PROJECT COPY

TECH PREP IMPLEMENTATION AND PRELIMINARY STUDENT OUTCOMES FOR EIGHT LOCAL TECH PREP CONSORTIA: AN INTERIM REPORT

Debra D. Bragg
Donna E. Dare
W. M. Reger IV
Ghazala Ovaice
Eboni M. Zamani
James D. Layton
University of Illinois at Urbana-Champaign

Carolyn J. Dornsife
Manuel Vallee
University of California, Berkeley

Carrie H. Brown
Professional Consultants Network

Margaret Terry Orr
Teachers College, Columbia University

National Center for Research in Vocational Education
Graduate School of Education
University of California at Berkeley
2030 Addison Street, Suite 500
Berkeley, CA 94720-1674

Supported by
The Office of Vocational and Adult Education
U.S. Department of Education

December, 1999 **MDS-1314**

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

Sorting out what Tech Prep means, how it has evolved, and how it has influenced the lives of students and teachers is a daunting task. Research of this type is always complex and incredibly demanding, especially under harried deadlines. Fortunately, I was blessed with a talented and devoted staff that cared deeply about the work. I am forever grateful for the tireless efforts of my professional colleagues, co-authors, and friends at the University of Illinois: Donna Dare, William Reger, Ghazala Ovaice, Eboni Zamani, and Jim Layton. Colleagues and co-authors Carrie Brown, Margaret Terry Orr, Manuel Vallee, Francis Caldwell, and especially Carolyn Dornsife are thanked for their generous gifts of time and talent. I am forever grateful to Carolyn's Dornsife's leadership on the transcript study and assistance with almost all aspects of the project.

We had tremendous support from eight Tech Prep consortium leaders who participated in the research, in some cases over several years. Though last names are omitted to protect anonymity, I still feel compelled to extend my thanks to Deb, Bonnie, Anne, Mike, Carole, Shannon, Gus, Bill, and Robert. You know who you are! In addition to these individuals, many others provided valuable information and support at the local level, including teachers, students, counselors, parents, employers, and community members. To all, we thank you for your valuable contributions.

We would be remiss if we neglected to thank the National Center for Research in Vocational Education (NCRVE) board and the Office of Adult and Vocational Education, United States Department of Education for supporting our work. In particular, NCRVE colleague, David Stern, NCRVE Director, provided valuable insights into the design of the study and sound advice along the way. I am also particularly grateful to Tom Bailey, Margaret Terry Orr, Delores Perin, and other colleagues at the Community College Research Center at Teachers College, Columbia University who encouraged and supported my work during my sabbatical leave there in the fall of 1997, when I wrote the initial proposal for this study.

As the document took shape, several individuals provided careful review and comment. In particular, I offer my deepest appreciation to Margret Ellibee, Frank Hammons, James Jacobs, Bob Stewart, James Stone, and Tina Stovall for sharing their many creative thoughts, constructive criticisms, and useful recommendations. Special thanks go to Lezli Austen for editing the final manuscript under a very tight timeline.

Preparation of any technical report is time-consuming, but nothing compares to the difficulties encountered in production of a report of this scope. We are immensely grateful to Linda Iliff and Megan Kirby for overseeing every facet of manuscript production. The work of other clerical and administrative assistants, Elaine Iliff, Laura Irle, Angie Bice, and Lesley Cooper provided enormous help as well.

Finally, we offer our deepest thanks to our family and friends who provided enormous support for our work over the past few years, on both a professional and personal level. Without their continued encouragement, this research could not have been accomplished.

Debra D. Bragg
University of Illinois at Urbana-Champaign

EXECUTIVE SUMMARY

In January 1998 a research study on Tech Prep implementation and student outcomes was undertaken. A panel of national experts identified six consortia as mature implementers of Tech Prep, and these consortia became the initial sites for the national study. Two additional consortia were selected near the end of 1998, with site visits and additional data collection conducted in 1999. Overall, the study examined a range of Tech Prep models and approaches in urban, suburban, and rural locations in the United States. The overarching purpose of the study was to describe in some depth and detail the evolving nature of eight local Tech Prep systems, to compare the post-high school education and economic outcomes of Tech Prep and non-Tech Prep participants, and to enhance understanding of how students transition from high school to college and work.

In order to describe students' Tech Prep experiences and related outcomes, the research team employed a mixed-method design, including repeated field visits, a follow-up survey of Tech Prep and non-Tech Prep participants, and an analysis of secondary and postsecondary transcripts for students in both groups. Over more than a two-year period, over 300 interviews with teachers, counselors, parents, and employers took place at approximately 60 high schools and 10 community and four-year colleges; and over 150 interviews were conducted with students at both the secondary and postsecondary levels. Approximately 4,700 students were selected for the student follow-up study across all eight consortia, with roughly equivalent numbers of Tech Prep and non-Tech Prep participants in each. The students in the sample graduated from high school between 1995 and 1998. Most consortia provided data on their 1996 and 1997 cohorts, fewer on the 1995 cohort, and only one site (the last site added to the study) on a 1998 cohort. The response rate for the follow-up survey was approximately 50% overall. In addition, high school transcripts were acquired for over 90% of the entire sample, and nearly 2,000 transcripts were obtained for students in the sample who matriculated to the main community college in the consortium, constituting about 40% of the entire sample.

Background on Tech Prep

Though Tech Prep began well over a decade ago, it was not until passage of the Tech Prep Education Act, as part of the Carl D. Perkins Vocational and Applied Technology Act of 1990, that Tech Prep received national attention. Beginning in 1991 or 1992, federal grants encouraged the establishment of core secondary and postsecondary curricula, both academic and vocational. Though relatively small in scale, these grants signaled the importance of restructuring academic and vocational curricula around Tech Prep.

Despite concerns about the goals of Tech Prep (see, for example, Hershey, Silverberg, Owens, & Hulsey, 1998) and how the initiative fit with other school reforms and the School-To-Work Opportunities Act (STWOA) (also see Orr, 1998), Tech Prep has proliferated. By the fall of 1995, Tech Prep was offered in well over half of the comprehensive high schools and the vast majority of community colleges in the United

States (Bragg et al., 1997; Silverberg, 1996a). As Tech Prep implementation progressed, a wider net was cast for local partners; more high schools, two-year colleges, businesses, and community-based organizations became engaged. A more diversified approach to financing Tech Prep included more state and local funds, although federal funds continue to be the mainstay of local Tech Prep programs. Support for Tech Prep has been strongest among stakeholders who contributed most to its long-term sustainability: state agency personnel, local secondary and two-year college administrators, business/industry representatives, vocational faculty, and students. Finally, some local leaders have depicted Tech Prep as a foundation for newer School-To-Work (STW) partnerships, and positive signs of collaboration can be seen between Tech Prep and STW. Increasing numbers of business/education partnerships and growth in the use of work-based learning are important signs of how Tech Prep is evolving.

Tech Prep Implementation and Preliminary Outcomes

This research study on Tech Prep implementation and student outcomes has provided a rich data source for understanding the Tech Prep experiences of students across the country in divergent settings. While the analysis of data available from this study is still in preliminary stages, extensive data have been analyzed and incorporated into a case study for each of the eight consortia. The summaries below provide an overview of each consortium's primary educational partners, local definitions of Tech Prep and Tech Prep students, and students' transition patterns to postsecondary education and work. Along with programmatic and systemic outcomes related to implementation of Tech Prep that are included within each case, additional student outcomes evident in the complete narratives include student demographics and educational characteristics, math and vocational course-taking patterns, and employment during and after high school.

Central State Education To Careers Consortium

Type of site and location: Rural and small town schools in the Midwest

Educational partners: 12 secondary high schools, one area vocational center, and one community college

For this consortium and the state in which it resides, a Tech Prep student is one who has made a conscious decision to follow a clearly defined sequence of courses to prepare for employment in a Tech Prep occupation, has declared Tech Prep as a major and has an Individualized Career Plan (ICP) indicating a Tech Prep occupation as a career goal. As defined locally, Tech Prep occupations require an Associate of Applied Science degree or two-year apprenticeship as the predominant method to enter the occupation, have the potential for above average entry wages and growth, require advanced technical skills, and also require multi-faceted problem-solving and critical thinking skills. A Tech Prep sequence of courses must include integrated academic and technical content, workplace skills, and instruction delivered both at the work-site and in the school/college setting. The vocational Tech Prep model is predominant in this consortium and has been implemented as a 4+2 or 4+2+2 model; however, the Tech Prep/youth apprenticeship program for this site is a more comprehensive, structured model (Hershey, Silverberg, Owens, & Hulsey, 1998). Articulation agreements include dual credit, course-to-course articulation in technical areas, with a maximum of six hours of articulated credits allowed.

According to survey results, nearly 75% of Tech Prep and over 80% of non-Tech Prep participants transitioned to some form of postsecondary education. Approximately 50% of students in all three groups (Tech Prep, non-Tech Prep, and youth apprentice) continued their education at the community college, with youth apprentices the most likely to continue there (82%). Though a relatively small percentage of students in any of the three groups continued their education at the four-year level, participants in the non-Tech Prep group (18%) were more likely than Tech Prep participants (5%) and youth apprentices (4%) to transition to a four-year college or university. Only 4% of the youth apprentice group did not continue on to postsecondary education, compared to over 25% of the Tech Prep group and about 20% of the non-Tech Prep group.

River Valley Tech Prep Consortium

Type of site and location: Urban, suburban, and rural schools in the Midwest

Educational partners: Sixty-four comprehensive high schools feeding three vocational high schools and comprising eight vocational education planning districts, one community college, a small business college, and a four-year university

In alignment with state definitions, Tech Prep in this consortium is a relatively selective program that, compared with vocational education, poses greater academic demands, particularly in mathematics and science, and provides a comprehensive technical foundation rather than mastery of particular technical skills. Within these parameters, a Tech Prep student is one who is enrolled in a sanctioned Tech Prep program, beginning in Grade 11 and continuing through the Associate degree in the occupational and employability competency delivery system. A Tech Prep program participant at the secondary level is defined as a student who is in Grade 11, has completed a Tech Prep application, has enrolled in articulated vocational programs, and is enrolled in or has taken at least one applied academics class. The consortium also defines a Tech Prep graduate as a student who has followed an approved Tech Prep curriculum pathway and has earned an Associate degree with an advanced skills certificate. Because of its extensive components and targeted approach, this consortium's Tech Prep Associate Degree (TPAD) approach can be classified as a comprehensive Tech Prep model (Hershey, Silverberg, Owens, & Hulsey, 1998). The 2+2 and 2+2+2 articulation models are supported by agreements known as memoranda of understanding, which allow for advanced skills articulation as well as dual enrollment.

Based on follow-up survey results, approximately 90% of all students in the River Valley Consortium matriculated to some type of postsecondary education. Nearly 75% of the Tech Prep group had gone on to college at the local community college, with another 10% matriculating to a combination of a two- and four-year college. By comparison, only about one-third of the non-Tech Prep group enrolled at a community college, but over 40% had gone to a four-year college or a combination of two- and four-year college (6%). Only 10% or less of either group had gone directly to work without attending some form of postsecondary education, within one to three years of high school graduation.

Southern Tech Prep Partnership

Type of site and location: Rural and small town schools in the South

Educational partners: 17 public school districts (with a total of 18 high schools), a regional career center, one community college, and an upper-division campus of a state university that shares the campus of the community college

In this state and consortium, a Tech Prep student is defined as a student in Grades 9-12 who follows an approved Tech Prep high school plan of study leading to postsecondary education and training and is enrolled in courses appropriate to that plan. A postsecondary Tech Prep student is one who declares a major leading to an AAS degree that is state-approved as Tech Prep. Occupations identified as Tech Prep occupations are those that have been targeted by a regional quality workforce committee, indicating they meet a higher standard of skill level and higher wages. The consortium's primary articulation approach is based on the 4+2 model, consisting of a high school core curriculum of grade-level or above academic courses, combined with a coherent sequence of career and technology courses of at least three and one-half credits, in addition to the Associate of Applied Science degree curriculum at the postsecondary level. Some 4+2+2 programs have also been developed. Dual credit, with enhanced or advanced skills curriculum, is available to students in articulated courses.

In this consortium, over 80% of all students reported by survey that they had continued on to some type of postsecondary education. Although the proportion was similar, more Tech Prep (43%) than non-Tech Prep participants (37%) enrolled in a two-year college within one to three years after high school graduation in this predominantly rural consortium. Almost equal percentages of both groups had enrolled in both two- and four-year college or university (16% Tech Prep and 18% non-Tech Prep) or four-year college or university only (17%). Less than 20% of either group had gone directly to work and not enrolled in any postsecondary education at all.

Sunland Tech Prep Consortium

Type of site and location: Urban, suburban, and rural schools in the Southeast

Education partners: 19 high schools and a large community college with four campuses

This consortium defines a Tech Prep student as any student who has completed by Grade 11 at least one technical course in an articulated program of study and two courses each of English, science, mathematics at specified levels identified by the state. A Tech Prep course of study consists of an articulated sequence of technical courses taken during the final two years of high school and the two years of postsecondary education (2+2) leading to an Associate of Science degree. Since Tech Prep students are identified in Grade 9 and are required to complete certain levels of courses in order to enroll in Tech Prep programs of study by Grade 11, the Tech Prep approach for Sunland is considered to be a 4+2 (6-year) articulated program (with some 4+2+2 programs available). While this initiative can be considered vocational Tech Prep, a college prep option is also available. The career academy model has also been used as a means of implementing Tech Prep in this consortium. Core course sequences associated with Tech Prep provide dual credit, and some programs offer the time-shortened approach.

In the Sunland consortium, about 70% of the Tech Prep and 85% of the non-Tech Prep participants reported that they entered some type of postsecondary education. Equal percentages of the Tech Prep and non-Tech Prep groups (36% each) attended two-year college, with fewer Tech Prep than non-Tech Prep participants (18% and 35%, respectively) transitioning to a four-year college or university. In addition, small percentages of both groups (2% Tech Prep and 10% non-Tech Prep) had attended both two- and four-year institutions. Nearly 30% of the Tech Prep group (compared to only 15% of the non-Tech Prep group) had not yet enrolled at any postsecondary institution.

Northwest Regional Educational Consortium

Type of site and location: Suburban schools in the Northwest

Educational partners: One regional educational service district serving seven high schools, one community college district, and a postsecondary propriety school

A Tech Prep student in this consortium is defined as a student who chooses, in Grade 11 or 12, to enroll in a major course of study in one of the 2+2 Tech Prep programs. These programs are linked to two-year Associate of Applied Science degree programs at the local community college. A Tech Prep course of study is defined locally as an integrated program of academic and professional-technical studies designed for students in Grades 11 and 12 and further postsecondary education. A Tech Prep program includes standard courses needed for a high school diploma plus electives that provide students with technical preparation for the given Associate degree program. The Tech Prep Associate Degree for this consortium can include advanced or dual credits in either academic or professional-technical courses.

Student responses on the follow-up survey indicated that about 70% had continued to some form of postsecondary education after high school graduation. Approximately 40% of both groups had attended college at the two-year college level only, and another 4% of the Tech Prep and 8% of the non-Tech Prep participants reported a combination of two- and four-year college. Fewer Tech Prep (16%) than non-Tech Prep participants (23%) had enrolled in four-year college only, while more Tech Prep (33%) than non-Tech Prep participants (26%) having gone directly to work, bypassing college altogether, within one to three years after high school graduation.

Metropolitan Tech Prep Consortium

Type of site and location: Urban schools in the Northeast

Educational partners: One technical college and 15 high schools.

In this consortium, a Tech Prep student is defined as any student in Grade 11 or 12 who is enrolled in Tech Prep math and Tech Prep English courses, who participates in a technical career cluster, and who expresses an intent to matriculate into the postsecondary Tech Prep curriculum. While in high school, Tech Prep students complete a series of classes having integrated academic and vocational content. Besides the sequential math curriculum, the high schools infuse math concepts into the technical curriculum. An English class is team taught by a high school teacher and college English instructor, and it is titled "Great Thinkers in Science," certainly a unique title for a senior-level English class. The overall approach to Tech Prep in this consortium can be considered an integrated Tech Prep model because of its emphasis on integrated curriculum developed by interdisciplinary teams of faculty (Bragg, 1995). Although articulation is not as prominent a feature of Tech Prep as curriculum integration, the primary approach to articulation is 2+2, with some 2+2+2 programs evolving in recent years.

According to follow-up survey results, nearly all students had enrolled in some form of postsecondary education after high school graduation, with only 6% of the Tech Prep and 11% of the non-Tech Prep participants indicating they had not enrolled in college at all. Over 50% of the Tech Prep and 46% of the non-Tech Prep participants reported going to a four-year college only, with smaller percentages of each group (about 30%) going to a two-year college only. Small percentages of students in either group (less than 10%) reported going to a two- and four-year college.

Workforce Development Consortium

Type of site and location: Rural schools in the Southeast

Educational partners: One community college and one school district that includes 14 high schools and one area vocational school

For this consortium, Tech Prep (known locally as College Tech Prep) has served as a means of replacing the general education curriculum, providing students with a strong academic foundation and technical skills. The core academic degree requirements for Tech Prep are similar to those for College Prep, with the exception that a Tech Prep course of study requires students to complete four sequenced technical courses as electives, and these courses substitute for the foreign language requirement. Students who complete the core Tech Prep curriculum in high school are considered College Tech Prep completers. In addition to its College Tech Prep program, this consortium also supports a vital youth apprenticeship program that includes 11 youth apprentice options. Each apprenticeship is based on the same core components of two years of College Tech Prep course work in high school, followed by a two-year Associate of Applied Science degree program at a two-year college (often with a scholarship), combined with paid work experiences with sponsoring businesses. This consortium uses a 2+2 approach to articulation, providing advanced standing credit and concurrent enrollment.

The extensive emphasis on college preparation could be a factor in the high transition rate of Tech Prep participants to postsecondary education. Nearly 90% of the Tech Prep and youth apprentice groups reported going to some type of postsecondary institution, compared to about 85% of the non-Tech Prep group. Approximately half of the Tech Prep and non-Tech Prep groups (48% and 55%, respectively) attended a four-year college or university within one or two years after high school graduation, with 5% more having attended both a two-year and four-year college. Slightly less of the youth apprentice group transitioned to four-year college than the other two groups. However, youth apprentices (39%) and Tech Prep participants (31%) were more likely to attend a two-year college than non-Tech Prep participants (17%). Slightly higher percentages of non-Tech Prep (17%) than youth apprentice and Tech Prep participants (13% each) indicated they had gone directly to work and not enrolled at any postsecondary institution, within one or two years after high school graduation.

Pacific Tech Prep Consortium

Type of site and location: Predominantly suburban, with a few urban schools in a state in the West

Education partners: 19 high schools and one community college district consisting of three community colleges

Tech Prep students are identified by this consortium when they have completed an articulated vocational course in high school that is part of a Tech Prep program of study. A Tech Prep course of study includes a sequence of related courses within a specific technical area designated as Tech Prep. Thus, the articulation component is the driving feature of Tech Prep in this consortium. Articulation agreements between high schools and the three community colleges in the consortium provide dual credit or advanced placement articulation options for students in vocational courses. The 2+2 model utilized for Tech Prep in this consortium follows the pattern of vocational Tech Prep identified by Hershey et al. (1998).

Students from the Pacific Consortium showed a very high rate of enrollment in postsecondary education, as indicated by the fact that 94% of both the Tech Prep and non-Tech Prep participants transitioned to some form of postsecondary education within one to three years of high school graduation. Approximately one-half of the students in both groups went to two-year colleges. Interestingly, the Tech Prep students entered two-year colleges and four-year universities at a slightly higher rate than their non-Tech Prep counterparts. Within one to three years of high school graduation, only a very small percentage of students had gone directly to work without attending some form of postsecondary education at all.

Concluding Observations

Since the scope of the report was quite extensive and further analysis remains to be done, concluding observations are offered at the end of the report to stimulate further discussion, debate, and study. In the future, we plan to address numerous research questions that remain unanswered regarding the relationships between Tech Prep implementation and students' educational experiences and outcomes, particularly at the postsecondary level. Further data collection of a longitudinal nature will provide us with the opportunity to gain additional insights into students' post-high school educational and employment outcomes. Still, the initial results suggest some interesting trends and issues with respect to Tech Prep implementation, and these observations are described briefly below.

First, Tech Prep and School-To-Work (STW) have formed a productive bond in some local Tech Prep consortia, providing the opportunity to coordinate resources to achieve more than might have been accomplished by one initiative on its own. Even so, some tensions exist between Tech Prep and STW, particularly in urban areas where the politics of school reform complicate efforts to change educational systems. Local governance structures have evolved incrementally to accommodate the demands of Tech Prep and later STW, with the roles of secondary schools, community colleges, and business and industry shifting over time. Another aspect of the evolutionary process of Tech Prep implementation has been the rising importance of academic standards, displacing to some extent the initial focus of Tech Prep on preparing students for technical employment. Issues surrounding the implementation of core academic and technical curriculum stem from this development, helping to explain why local educators continue to struggle to produce the kinds of systemic changes needed to support Tech Prep as an educational reform. Professional development has played an important role in educating stakeholders about Tech Prep and in engaging them in curriculum reform. Though involvement by business and industry varies, in some consortia employers have played an active role in helping to change attitudes and enlighten educators about competencies needed to be successful in the modern workplace.

Given these challenges, it is important to note that Tech Prep enrollments have increased in all consortia studied, ranging from 60% to 250%. Overall enrollment in Tech Prep as a portion of the total high school enrollment ranged from 7% to 35%, with most consortia reporting that about 15% of their high school students were considered Tech Prep participants. Moreover, transition to college has been a primary goal of Tech Prep, and high school graduates who have participated in Tech Prep have reported making the transition to postsecondary education in very high proportions. Across all the Tech Prep consortia studied, over 70% of Tech Prep participants indicated that they had enrolled in some form of postsecondary education, usually two-year college, but four-year college enrollment was substantial, particularly when students engaged in the College Tech Prep model. Further research will be conducted to determine the extent to which Tech Prep participants entered college without remediation, and the extent to which they persisted in college and completed their degree programs. Continuation in a Tech Prep course sequence, access to articulated credits, and participation in work-based learning are additional factors that need to be studied, providing valuable insights into the relationship between Tech Prep implementation and student outcomes.

INTRODUCTION

Growing up in America can be difficult. Increasingly diverse family arrangements, economic circumstances, and societal structures make life challenging for youths. Borman and Schneider (1998) argue for greater understanding of how young people encounter a rapidly changing society and how they cope with the complex problems they encounter. They contend, "As society changes we need to rethink what it means to be an adolescent" (p. ix). Rather than assisting young people to cope with social change by learning about the complex roles of adulthood, many of America's schools neglect this vital function (Hamilton, 1990). Most high schools lack a culture and curriculum dedicated to helping students make informed decisions about their futures (Schneider & Stevenson, 1999). This problem is most acute for students who are less privileged because of their economic status, gender, race/ethnic identity, and other special needs, but it is evident for almost all. In fact, since the mid-1980s, experts have argued that schools have not provided the majority of youths with relevant instruction and guidance needed to help them link in-school learning to a larger societal context, particularly to their communities and the workplace (see, for example, Parnell, 1985; The William T. Grant Foundation, 1988; Halperin, 1998).

Since *A Nation at Risk* was issued by the National Commission on Excellence in Education in 1983, the country has experienced a series of changes in educational policy and practice. The goals of school reform have varied widely, including efforts to raise high school graduation requirements, establish higher learning standards, make classroom teaching more sensitive to diverse learning modalities, assess academic achievement in more performance-based ways, connect the levels of the educational system from Kindergarten through Grade 16 (K-16), and integrate school-based with work-based learning to better prepare graduates to meet employer's needs (see, for example, Furhman, 1993; Gardner, 1991; Kirst, 1998; Resnick & Wirt, 1996; Secretary's Commission on Achieving Necessary Skills, 1991; Sizer, 1984; and Wilson & Rossman, 1993). Whereas a great deal of argument has been made for reform and numerous strategies have been attempted, critics continue to claim that little real change has occurred (see, for example, Apple, 1995; Tyack & Cuban, 1995). After more than a decade of reform, they claim the education received by youths of today is not significantly better than that of the past.

With so many problems identified at the Kindergarten through Grade 12 (K-12) levels, it is not surprising that concerns spill over to postsecondary education. Indeed, though secondary education continues to be lambasted for its low expectations and failed outcomes, students continue to graduate from high school and pursue higher education. In fact, higher education enrollment has grown by about 16% from 1985 to 1995 (United States Department of Education, 1998). By 1996, almost two-thirds of all high school graduates had enrolled in college within a year of finishing high school, showing the growing importance of postsecondary education in the overall educational system. In fact, the American Association of Community Colleges (AACC) report that 47% of high school graduates enroll in a community college following graduation (Phillippe, 1997). During the 1995-96 academic year, 56% of second-year students were enrolled in a two-year institution, while 38% were enrolled in a four-year school (Horn, Berktold & Malizio, 1998). Together, transfer and vocational-technical enrollments account for the most significant portion of the two-year college curriculum (Boesel & McFarland, 1994).

While the growing enrollment of recent high school graduates in higher education is an encouraging development, there are concerns. Many students enter college without having the fundamental academic background to be successful (Lewis & Farris, 1997). In fact, remediation rates soar on some two-year college campuses as more students choose to begin their college careers there (Horn, 1998). Kirst (1998) attributes the increase in college-level remediation to the serious disjuncture between secondary and postsecondary education created by incoherent policies at the different levels of education. College noncompletion is another issue that can be linked to inconsistent expectations and standards between the K-12 and higher education system, and this problem is linked to remediation. Adelman (1999) and others have shown that students lacking in basic academic competencies do not persist and complete degrees as much as their college-ready peers. Coupled with the propensity for new college entrants to "swirl" through the higher education system attending more than one or even two institutions and work while attending school, Adelman describes an increasingly complex environment for higher education in America (p. ix). Examining many of these issues in their recent report *College for All*, Boesel and Fredland (1999) argue that higher standards are needed for elementary and secondary education so that students can succeed in college. They also contend that more high school students should attend two-year college occupational education and training because of the positive labor market outcomes associated with such participation. By raising the skill levels of high school graduates and providing them with the opportunity to advance into college, they believe that both individuals and the economy will prosper. Of course, this recommendation is not new. It confirms the position advanced by Parnell in the mid-1980s that more high schools and community colleges should implement Technical Preparation (Tech Prep) education, an articulated secondary and postsecondary education initiative that gained momentum after its authorization in the Carl D. Perkins Act Amendments of 1990.

Indeed, Tech Prep was launched nationwide in 1991 and 1992 as states and localities began planning and implementation (Bragg, Layton, & Hammons, 1994). Since that time, more and more high schools have participated in a Tech Prep consortium and most community colleges have signed on as well. According to the authors of the national Tech Prep evaluation (Hershey, Silverberg, Owens, & Hulsey, 1998), by 1995 some level of involvement in federally-funded Tech Prep consortia was evident in "almost 70 percent of U.S. school districts serving 88 percent of all American high school students" (p. 22). Looking at the results of Tech Prep implementation by the mid-1990s, Hershey et al. reported that Tech Prep had achieved four accomplishments linked to implementation activities:

- Better communication and cooperation among educators through professional development and collaborative curriculum development processes.

- Greater use of problem solving, application of theory to practice, and "real world" contexts in academic classes.

- More involvement by employers in school functions, such as curriculum development, marketing of Tech Prep, and field visits to worksites.

- Heightened awareness about the need to strengthen math and science instruction for students who have traditionally been labeled "vocational" students, particularly by encouraging them to enroll in more applied math and science classes.

Research by Bragg, Puckett, Reger, Thomas, Ortman, and Dornsife (1997) involving a national survey of Tech Prep consortium directors and case studies focusing on local implementation revealed similar results:

- Stronger linkages between high schools, colleges (particularly two-year), employers, and community-based agencies.

- Greater awareness among state personnel, secondary and two-year college administrators, vocational faculty, employers, and students of contemporary educational goals and challenges surrounding student transition to college and work; and

- Increased opportunities for collaboration among these stakeholder groups through enhancements to academic and vocational instruction, expansion of business/education partnerships, and the provision for more work-based learning opportunities for students.

While these findings are encouraging, they do not capture the impact of Tech Prep on students. If Tech Prep is to continue to obtain public support, it is imperative that its potential and actual benefits are better understood. Persuasive research evidence showing the impact of almost any educational reform is difficult to come by, but pressure is mounting to obtain "hard data" that shows how change in educational practice linked to educational reform affects students. Tech Prep and other similar reforms need to be studied to determine their contributions to students' educational experiences and impact on high school-to-college or -work transition. If secondary-level preparation for transition to college and work is a central goal of Tech Prep, then an assessment of student readiness to move on to the postsecondary level and into the workplace should be conducted.

Research Objectives

Considering the magnitude of the federal commitment to Tech Prep, research was needed to gain greater understanding of how local Tech Prep initiatives have been implemented and how they have influenced student's educational experiences and transitions to postsecondary education and work. Whereas some attention has been paid to evaluation of Tech Prep to document implementation, estimate enrollments, and ensure compliance with legislative requirements, far too little attention has been given to the relationship between Tech Prep implementation, student participation, and student outcomes. To address this problem, a mixed-method study was conducted utilizing eight local Tech Prep consortia identified by a national panel of experts as mature implementers of Tech Prep. The study was guided by the following three objectives and related questions:

1) *To provide an in-depth description of selected local Tech Prep initiatives, focusing on implementation policies and practices designed to enhance student transition from high school to postsecondary education and work.* Questions linked to this objective are: What is the community (state and local) context for Tech Prep implementation? What goals, policies, and definitions are established for Tech Prep, and how are these related to STW, vocational education, and other educational reforms? How does Tech Prep operate at the local level, and what are the predominant components? What core curricular elements are pervasive at the secondary and postsecondary levels? How has Tech Prep evolved since its initial implementation in the early 1990s (or before), and what major milestones are evident in its implementation?

2) *To document the educational experiences and outcomes of student participants in local Tech Prep systems, and compare those experiences and outcomes to a comparable group of non-participants*. Questions related to this objective include: What are selected demographic, personal and educational characteristics of Tech Prep high school graduates (also referred to as Tech Prep participants), and how do they compare to non-participants? What are participants' course-taking patterns in the secondary curriculum (particularly math and vocational) and how do they compare to non-participants? How do participants and non-participants make the transition from secondary to postsecondary education and work? What are the employment experiences of participants and non-participants during high school and after high school graduation?

3) *To examine the various qualitative dimensions of students' experiences in Tech Prep, developing a richer and deeper understanding of students' perceptions of their experiences and the successes and failures they attribute to Tech Prep*. The primary question related to this objective is: What are the qualitative dimensions of students' experiences as they move through one or a combination of post-high school transition experiences, such as the transition from high school Tech Prep participation to college (especially community college Tech Prep participation) or the transition from high school Tech Prep participation to immediate full-time work.

Although these various goals and questions have guided the research design and data collection, answers to all of these questions are not yet available. Additional time is needed to analyze the extensive data set that has been amassed during the initial two years of this study. The specific purpose of this *interim* report is to describe the research findings as they relate to the first objective: to describe Tech Prep implementation. Preliminary results are also provided pertaining to the second objective focusing on the educational experiences and outcomes of Tech Prep participants and non-participants, but they are limited. In this report, we confine out discussion to student demographics, attitudes and other personal characteristics. High school math and vocational course-taking patterns are also presented, including the types and sequential levels of courses taken in these areas. Transition to postsecondary education (two- and four-year college) and work is also described, though additional analysis of college readiness, course-taking, and persistence remains for future reports.

Background

In the early 1990s the federal Carl D. Perkins legislation authorized Technical Preparation (Tech Prep) in Title IIIE, The Tech Prep Education Act.[1] In this legislation, Tech Prep emerged as an educational change strategy focused on updating vocational education and integrating it with more relevant and rigorous academic education for middle majority students (Hull & Grevelle, 1998; Parnell, 1985). A centerpiece of Tech Prep was its emphasis on encouraging more students interested in math, science, and technology to engage in a career pathway that leads to postsecondary credentials and technical careers. Through a consortium arrangement involving secondary schools and colleges (mostly two-year), Tech Prep was advocated as a vehicle for creating systemic change in high schools that could lead to college-ready students for postsecondary education and work. Along with academic and vocational integration, formal articulation between secondary and postsecondary and closer relationships between school-based and work-based learning were advanced as key components of the Tech Prep model.

Ideas central to Tech Prep were reinforced and advanced further in the mid-1990s when the School-To-Work Opportunities Act (STWOA) of 1994 was enacted, with numerous complimentary goals and strategies. Similarly to Tech Prep, School-To-Work (STW) initiatives emphasized rigorous school-based learning, with integrated academic and vocational education as a prominent part. In addition, STWOA emphasized two new components in the form of work-based learning and connecting activities. These added components were less evident in the initial implementation of Tech Prep (Bragg, Layton & Hammons, 1994), but STWOA endorsed them and some local educators associated them with Tech Prep (Silverberg, 1996a & 1996b). Work-based learning and connecting activities encouraged even closer connections between learning in school and in the workplace as job sites were thought to provide a more motivating context for learning for all students (Olsen, 1997). While linkages to postsecondary education were not as prominent in STWOA, they were encouraged, providing the opportunity for local consortia to capitalize, if they elected to do so, on the school-to-college partnerships that had started with Tech Prep.

With respect to implementation, some local practitioners approached Tech Prep as a special program for a targeted group of students, usually the middle majority which was defined as students between the 25^{th} and 75^{th} percentile on high school class rank or other standard measures of academic performance. Whereas this view of Tech Prep predominated early implementation, increasingly educators came to see Tech Prep as an avenue for systemic reform, focusing on the essential elements of the legislation designed to engage and benefit a wide range of stakeholders (Bragg et al., 1997). From this perspective, Tech Prep was predominantly focused on capacity-building geared at

---

[1] Since the time this study began, the Carl D. Perkins Vocational and Applied Technology Act Amendments of 1998 were passed by the U.S. Congress, providing additional resources and support for Tech Prep education. This newer legislation did not come into effect until after most data collection was completed for this study, so Tech Prep education in this report refers to implementation under Perkins II.

improving the educational system, going beyond "program" development for a specific student group. (For further discussion of a typology of policy instruments useful to this perspective, see McDonnell & Elmore, 1987). Like Tech Prep but even more so, the STWOA legislation advanced the notion of building a system that could give all students the opportunity to participate in rigorous academics integrated with career development and stimulating work-based learning (WBL) opportunities. (Using the policy typology of McDonnell and Elmore (1987) mentioned above, the STWOA policy focused even more than Tech Prep on capacity-building and system-change, making it more complex to implement at the state and local levels.) Still later, the Tech Prep legislation begun under Perkins II was reauthorized under the Carl D. Perkins Act Amendments of 1998, providing additional impetus to continue key components such as articulated core curriculum and academic and vocational integration. Taken together, these federal initiatives were intended to provide the impetus to change academic and vocational education at the local level. (See Table 1 for a comparison of the key elements of Tech Prep under Perkins II and Perkins III to the main components of STWOA.)

Prior Evaluation of Tech Prep and Related Reforms

Though limited, some research and evaluation has been conducted to document the implementation of key components (e.g., articulation agreements, integrated academic and vocational curriculum, professional development, work-based learning) of Tech Prep, STWOA, and related reforms (Boesel, Rahn, & Deich, 1994; Layton & Bragg, 1992; Bragg, Layton, & Hammons, 1994; Bragg et al., 1997; Hershey, Silverberg, & Owens, 1995; Silverberg & Hershey, 1995; Silverberg, 1996a; Silverberg, 1996b; Urquiola et al., 1997). Typically, these evaluations have focused on the extent of implementation of key components, referred to as "essential elements" of the Tech Prep legislation. Evaluations have been conceived for Tech Prep and STWOA to address underlying program theories constructed to address the requirements of the federal laws, evidenced in key components at the state and local levels (Weiss, 1997). To be sure, components vary from one consortium to another, even within states, as educators strive to translate policy into programs to meet local needs. To uncover the merits of Tech Prep, a components-based approach to evaluation has been evident in numerous evaluations, including those conducted by the authors (see, for example, Bragg et al., 1997; Dornsife, 1992; Orr, 1998). Other examples include the Tech Prep evaluation system developed by Brown, Pucel, Twohig, Semler, and Kuchinke (1998) in Minnesota and the evaluation systems for Tech Prep and STWOA developed for Florida by Hammons (1999).

Table 1

Parallels between the Essential Elements of Tech Prep under Perkins II and Perkins III and the Basic Program Components of the School To Work Opportunities Act Legislation

Perkins II (1990)	Perkins III (1998)	STWOA (1994)
1. Articulation agreement between the participants in the consortium	1. Articulation agreement between the participants in the consortium	School-based learning component– procedures to facilitate the entry of students participating in a School-to-Work Opportunities program into additional training or postsecondary education programs, as well as to facilitate the transfer of the students between education and training programs
2. Two years of secondary school preceding graduation and two years of higher education, or an apprenticeship of at least two years following secondary instruction, with a common core of required proficiency in math, science, communications, and technologies designed to lead to an associate degree or certificate in a specific career field.	2. Two years of secondary school preceding graduation and two years or more of higher education, or an apprenticeship program of at least two years following secondary instruction, with a common core of required proficiency in math, science, reading, writing, communications, and technologies designed to lead to an associates degree or a postsecondary certificate in a specific career field	School-based learning component— initial selection by interested students of a career major not later than the beginning of the eleventh grade
3. Include the development of Tech Prep program curricula appropriate to the needs of consortium participants	*3. Include the development of Tech Prep programs for both secondary and postsecondary, including consortium, participants in the consortium that*-- (A) meets academic standards developed by the State;	General program component— • integrate school-based learning and work-based learning, integrate academic and occupational learning, and establish effective linkages between secondary and postsecondary education

	(B) links secondary schools and 2-year postsecondary institutions, and if possible and practicable, 4-year institutions of higher education through nonduplicative sequences of courses in career fields, including the investigation of opportunities for Tech Prep secondary students to enroll concurrently in secondary and postsecondary coursework; (C) uses, if appropriate and available, work-based or worksite learning in conjunction with business and all aspects of an industry; and *(D) uses educational technology and distance learning, as appropriate, to involve all the consortium partners more fully in the development and operation of programs.*	School-based learning component— • a program of study designed to meet the same academic content standards the State has established for all students, including, where applicable, standards established under the Goals 2000: Educate America Act, and to meet the requirements necessary to prepare students for postsecondary education and the requirements for a student to earn a skill certificate Work-based learning component— • a planned program of job training and work experiences (including training related to preemployment and employment skills to be mastered at progressively higher levels) that are coordinated with learning in school-based learning component described in section 102 and are relevant to the career majors of students and lead to the award of skills certificates • instruction in general workplace competencies, including instruction and activities related to developing positive work attitudes, and employability and participative skills • broad instruction, to the extent practicable, in all aspects of the industry Connecting activities component– • designing school-based learning

		components described in section 102, work-based learning components described in section 103, and counseling and case management services

4. Include in-service training for teachers that— *(A) is designed to train teachers to implement Tech Prep;* (B) provides for joint training for teachers from all participants in the consortium; and (C) may provide such training on weekend, evening, summer, or workshops.	(4) Include in-service training for teachers that-- (A) is designed to train vocational and technical teachers to effectively implement Tech Prep programs; (B) provides for joint training for teachers in the Tech Prep consortium; (C) *is designed to ensure that teachers and administrators stay current with the needs, expectations, and methods of business and all aspects of an industry;* (D) focuses on training postsecondary education faculty in the use of contextual and applied curricula and instruction; and (E) provides training in the use and application of technology;	Connecting activities component– • training teachers, workplace mentors, school site mentors, and counselors • providing assistance to schools and employers to integrate school-based and work-based learning and integrate academic and occupational learning into the program
5. Include training programs for counselors designed to enable counselors to more effectively— (A) recruit students for Tech Prep, (B) ensure that such students successfully complete such programs, and (C) ensure that such students are placed in appropriate employment.	*5. include training programs for counselors designed to enable counselors to more effectively*-- (A) provide information to students regarding Tech Prep education programs; (B) support student progress in completing Tech Prep programs; (C) provide information on related employment opportunities; (D) ensure that such students are placed in appropriate employment; and	Connecting activities component– • training teachers, workplace mentors, school site mentors, and counselors • providing assistance to participants who have completed the program in finding an appropriate job, continuing their education, or entering into an additional training program • linking the participants with other community services that may be necessary to assure a successful transition from school to work

	(E) stay current with the needs, expectations, and methods of business and all aspects of an industry.	• collecting and analyzing information regarding post-program outcomes of participants in STWOA programs • linking youth development activities under this Act with employer and industry strategies for upgrading the skills of their workers School-based learning component– • career awareness and career exploration and counseling (beginning at the earliest possible age, but not later than 7th grade) in order to help students who may be interested to identify, and select or reconsider, their interests, goals, and career majors, including their options that may not be traditional for their gender, race, or ethnicity • initial selection by interested students of a career major not later than the beginning of the eleventh grade
6. provide equal access to the full range of Tech Prep programs to individuals who are members of special populations, including the development of Tech Prep services appropriate to the needs of such individuals; and	*6. provide equal access, to the full range of technical preparation programs, to individuals who are members of special populations, including the development of Tech Prep program services appropriate to the needs of special populations; and*	*General program requirements–* *al access to the full range of such program components (including both school-based and work-based learning components) and related activities, such as recruitment, enrollment, and placement activities, except that nothing in this Act shall be construed to provide any individual with an entitlement to services under this Act*
7. provide for preparatory services which	*7. provide for preparatory services that*	*General program requirements—*

assist all participants in such programs.	*assist participants in Tech Prep programs.*	*ions involving ongoing consultation and problem solving with students and school dropouts to identify their academic strengths and weaknesses, academic progress, workplace knowledge, goals, and the need for additional learning opportunities to master core academic and vocational skills*

Source: Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990 and 1998 and School-To-Work Opportunities Act of 1994.

At the federal level, a components-based approach to evaluation is evident in the work of Mathematica Policy Research, Inc. (MPR). Under contract with the United States Department of Education/Office of Adult and Vocational Education (USDE/OVAE), MPR has had primary responsibility for evaluating both Tech Prep and STWOA, using national survey research supplemented with case studies (Haimson, Hershey, & Silverberg, 1999; Hershey et al., 1998). These evaluations have identified benefits of Tech Prep and STW initiatives, but questioned their depth of impact and long-term sustainability. More precisely with respect to Tech Prep, Hershey et al. (1998) criticized Tech Prep models emphasizing vocational education reform and approaches centering on applied academics only, preferring a comprehensive Tech Prep model aimed at smaller, targeted student groups. Recognizing the limited resources associated with Tech Prep, Hershey et al. believed it could have more impact on learners and a greater chance of being institutionalized if it was a more focused, comprehensive programmatic effort.

The national evaluation also showed that Tech Prep laid the groundwork for STWOA in some localities by providing the foundation for secondary-to-postsecondary education transition, based on articulation agreements put into place when Tech Prep programs were first introduced in the early 1990s, and sometimes earlier (Silverberg, 1996a & 1996b). Later, Haimson et al. (1999) found other benefits of STWOA, praising state and local efforts to organize partnerships between educators and employers and supporting work-based learning opportunities for growing numbers of students. Still, Haimson et al. questioned the level of student participation and impact of STWOA, and worried about the feasibility of it benefiting all students, especially considering its pending sunset in 2001. Other researchers have drawn similar conclusions when studying related questions about STWOA implementation, including assessing relationships between schools and businesses. Results of a National Employer Survey by Zemsky, Shapiro, Iannozzi, Cappelli, and Bailey (1998) showed increasing levels of employer participation and positive changes in employer understanding of basic workplace skills and labor force recruitment, but more universal application of STW by U.S. employers was questioned.

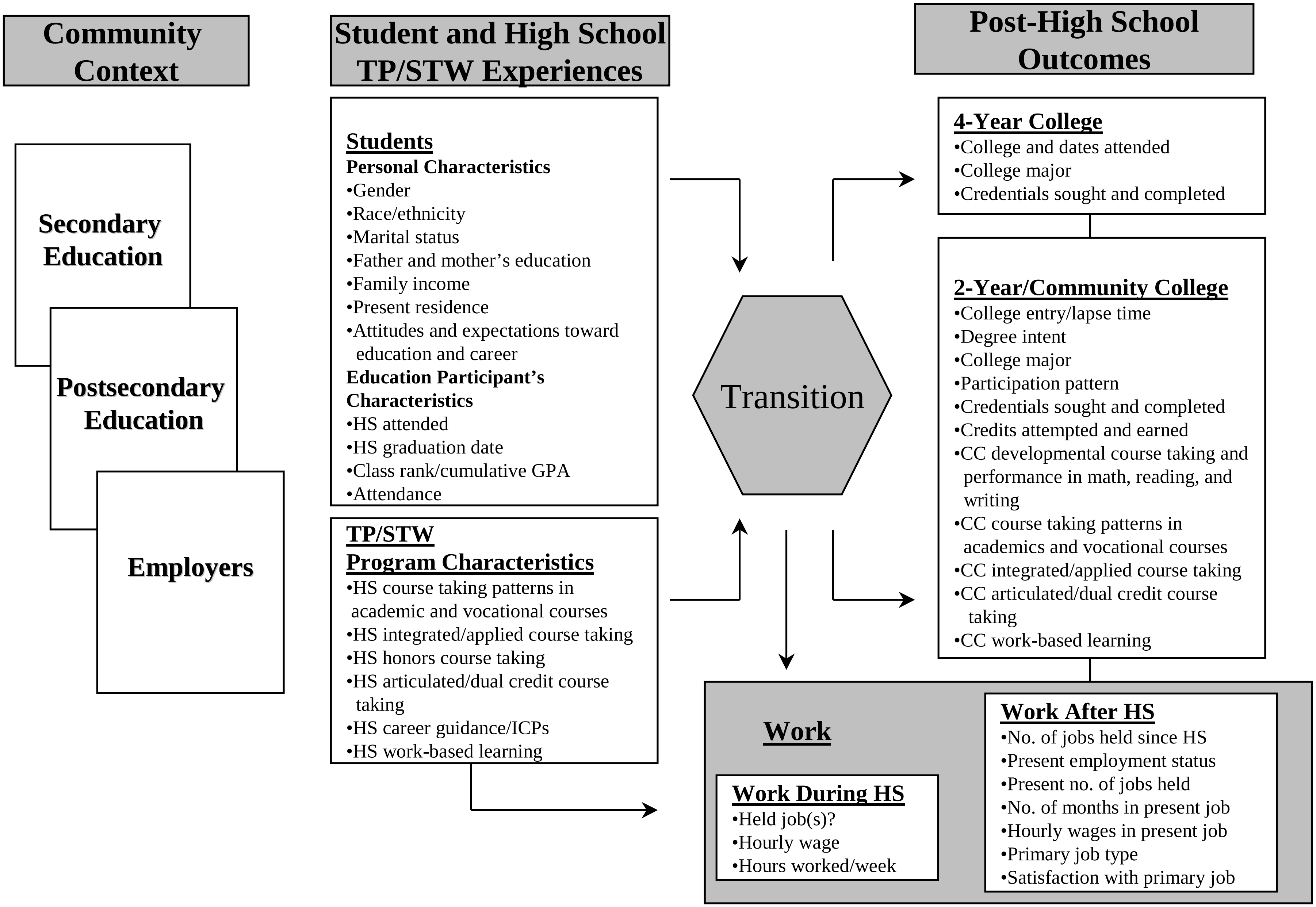
Conceptual Framework

Figure 1 provides a visual representation of the conceptual framework for this study. A brief narrative description of the figure and its visual depiction of the concepts and relationships between and among concepts is provided here. The graphic depiction of the conceptual framework appears static; however, it is important to understand that a primary focus of the study was on examining the evolution of Tech Prep since it first began. Though complex, our goal was to collect meaningful information on each aspect of the conceptual framework over the period of time that Tech Prep implementation had occurred, particularly for the period of time that students selected for our study were participating in the local Tech Prep system, roughly 1994-95 and thereafter.

To the left in Figure 1 is Community Context, showing secondary education, postsecondary education, and employers. Understanding the role played by each of these entities, and the relationships between them provides a foundation for the evolution of Tech Prep within each of the consortia, schools, and colleges. Community demographics, predominant businesses and employers, unemployment status, and secondary schools by student profile and dropout rates are presented as part of the community context. A brief description of higher education institutions is also provided to portray all of the major entities that exist within the K-16 system in the community.

The next column, moving to the right, focuses on students and their High School Tech Prep Experiences. In this part of the framework, we portray the demographic and educational characteristics of students, including gender, race/ethnicity, academic performance, and so forth. We also show the characteristics of Tech Prep that link implementation of key components such as core curriculum, integrated and articulated courses, individualized career plans, and work-based learning, which potentially influence students' learning experiences in secondary education. Both the school- and work-based aspects of secondary education are considered here as they relate to the legislative features of the Perkins II and STWOA laws. In addition, the conceptual framework shows the concept of work and how work can begin during high school, as this element potentially interacts with students' experiences in Tech Prep and STW. Therefore a range of information about work during high school is included, including hours worked per week and hourly wage.

Figure 1
Conceptual Framework for NCRVE Tech Prep/STW Evaluation



Transition from secondary to postsecondary education and/or work is an idea that is central to the conceptual framework (depicted by the stop-sign shape labeled Transition, located between columns two and three). When examining the experiences of high school graduates, we are keenly aware of the importance of identifying and describing how students move back and forth between various types and levels of postsecondary education (primarily two- and four-year college) and employment. In many ways, the question of what happens to students as they transition from high school to college or work is the most important, since a fundamental goal of Tech Prep is to create a seamless curriculum from high school to college and employment.

The conceptual framework shows various aspects of students' experiences and Post-High School Outcomes (shown in column 3). In this area, we examine student participation in academic and vocational courses as well as student access to work-based learning, integrated or applied curriculum, articulated course credits taken during high school, and so forth. In addition, the framework details various aspects of students' experiences in Work (i.e., number of jobs, employment status, number of months in present job, hourly wages). Unemployment status and participation in military service are also evident.

Taken together, the conceptual framework is intended to provide a visualization of the key concepts (variables and relationships among variables) examined in this study. The framework incorporates the components-based approach mentioned previously, but goes farther by linking key components to student outcomes in a way that can uncover the merits of the local Tech Prep system.

Research Design

Individual and cross-comparative case studies involving multiple site visits were conducted for approximately a two-year period with eight sites, utilizing a mixed-methods research design. In actuality, four of the eight sites were engaged in previous studies conducted by the primary researchers. Specifically, we engaged three of the sites in early studies of Tech Prep implementation, following soon after the Perkins II Tech Prep legislation was passed in 1990 (Bragg, 1992). Another site became known to us in 1992 through its involvement in the Urban Schools Network associated with the National Center for Research in Vocational Education (NCRVE), and we have followed the implementation of Tech Prep in this site since that time, including conducting field visits on a periodic basis. With respect to the other four sites, we had little or no prior affiliation prior to conducting this study. (Further details on site and subject selection appear later in this section.)

The mixed-method approach used for this study can be described as a dominant/less dominant design, focusing primarily on a qualitative approach and supplementing it with a quantitative research design centered on student follow-up and outcomes assessment (Creswell, 1994). The dominant qualitative approach involved case study research utilizing field visits, in-depth personal interviews, classroom observations, and extensive document review and analysis. The less-dominant design employed quantitative methods using follow-up survey research and transcript analysis to compliment the case studies. By linking the qualitative and quantitative methods, we hoped to gain a deeper understanding of how the local context shaped student experiences and outcomes.

One additional important aspect of the research design is that rather than taking a more removed stance as researchers, we encouraged a great deal of local involvement in the research process. Data were collected through a collaborative arrangement between NCRVE staff and local personnel, with the goal of enhancing the utilization of evaluation results on the local level (Patton, 1997). Regular telephone communications occurred between researchers and local staff to keep them informed about progress and to obtain assistance with data collection. Periodic updates were provided to all sites via e-mail. When preliminary results were obtained, they were presented to local personnel in a debriefing meeting to encourage a dialogue about local program improvement opportunities revealed by the results. A detailed report summarizing major findings was prepared for each site and delivered during these meetings. By maintaining these relationships, we hoped to assist the sites to further their local evaluation goals and processes, while gaining even greater insight into the complex relationships between implementation and outcomes.

Variables Central to the Investigation

The variables associated with student characteristics, experiences, and outcomes were grouped into seven categories (see Table 2). By clustering the variables in this manner, we could relate the variables to the conceptual framework shown above in Figure 1 and also move toward a deeper understanding of student participants in Tech Prep. (Note that Table 2 provides the entire array of variables under investigation, but that this report does not address all of them. This report focuses primarily on the sets of variables associated with demographics, high school participation, and to a lesser extent, transition to college and work.

Population and Sample

This section provides a brief description of how the specific sites and students within sites were selected for the study. (See Appendix A for additional notes on consortium, school, and student selection.

Site Selection

Building on prior research, we set out to identify six Tech Prep consortia (sites) to be part of this study. While it was advantageous to continue to study consortia with which we had a long history, it was not mandatory. Therefore, we sought the advice of numerous experts in the Tech Prep field to recommend consortia that would meet a lengthy list of selection criteria. Knowledgeable experts from all levels (federal, state, and local) were sought as informants regarding local Tech Prep consortia that would provide the most meaningful information to address the research objectives. Based on input from the panel of experts and our own knowledge of numerous Tech Prep sites, we

Table 2

Variables Clustered in Seven Major Categories

Category	Variables
Personal Attributes & Demographics	• Gender • Racial/ethnic identification • Limited English proficiency • Marital status • Mother and father's education level • Family income • Student's present residence
Personal Attitudes & Expectations	• Satisfaction with school • Utility of school • Importance of college to career goals • Confidence in reaching ultimate career goals • Educational aspirations • Career aspirations
High School Participation & Performance	• High school (HS) from which graduated • Date of high school graduation • Tech Prep/STW status (self-report, school-identification, and match of local definition with actual student course-taking) • Class rank percentile at graduation • Cumulative GPA at graduation • HS math courses taken and grades received • HS English courses taken and grades received • HS science courses taken and grades received • HS applied academic courses taken (any subject) and grades received • HS vocational courses taken and grades received

	• Articulated college credits earned and/or advanced placement courses taken during high school • Work-based learning courses/experiences (e.g., co-op, youth apprentice) • Career orientation, awareness, assessment experiences • Actual Tech Prep/STW participation profile
Employment Experiences & Outcomes (Pre & Post Secondary)	• Whether student held job in HS • Estimated hourly wage for primary job held in HS • Total hours worked in last job held before HS grad. • No. of jobs held since graduating from HS • Employment status at present time • No. of jobs held at present time • Months worked at primary job at present • Wages at primary job at present • Type of primary job at present • Satisfaction with primary job at present
College Readiness & Remediation	• Lapsed time from HS graduation to first college enrollment • Months between HS graduation and college entry • College math placement score • Level of math placement and no. of courses taken, if developmental level • College reading placement score • Level of reading placement and no. of courses taken, if developmental level • College writing placement score • Level of writing placement and no. of courses taken, if developmental level • Total no. of subjects in which student placed in college developmental course work

	• Total no. of developmental courses take (within and across subjects)
College Participation & Performance	• Continuing Tech Prep/STW status (self-report, school-identification, and match of local definition with actual student course-taking) • College program/unit • College major • College credentials seeking • Full- or part-time enrollment status • No. and level of college math courses taken and grades received • No. and level of college English courses taken and grades received • No. and level of college science courses taken and grades received • No. and level of college applied academic courses taken (any subject) and grades received • No. and level of college vocational courses taken and grades received • Articulated HS/College credits transcripted • No. and type college work-based learning courses/experiences (e.g., co-op, youth apprentice) • College career orientation, awareness, assessment experiences • Pell grant status and level of support per academic year

Postsecondary Education Outcomes	• Total credits attempted first semester, first year, second year, etc. and at graduation • Total credits earned first semester, first year, second year, etc. and at graduation • Ratio of credits earned vs. credits attempted first semester, first year, second year, etc. and at graduation • GPA first semester, first year, second year, etc. • Cumulative GPA at graduation • Credentials earned (i.e., certificate, license and/or degree by type)

ultimately selected six in the fall of 1997, including four consortia with which we were already associated. The following criteria guided our decisions:

- The consortium showed a strong commitment to Tech Prep as a primary vehicle of educational change (though the exact model and approaches varied across the selected sites);

- The consortium was identified by state agency personnel and peer institutions as indicative of the preferred policies, goals, and strategies for Tech Prep implementation within the state;

- The consortium was a "mature" implementer of Tech Prep in that it had started planning and implementation soon after Perkins II funds were awarded (or before) and enrolled students at the secondary and postsecondary levels by the mid- to late-1990s. Also in the mid- to late-1990s, a STWOA-funded initiative had begun, and this initiative had evolved simultaneously with Tech Prep;

- The consortium had initiated local evaluation of Tech Prep, had begun to document student outcomes (often with state support), and was willing to incorporate key aspects of the proposed research design into future plans for local evaluation;

- The consortium was not too unique or extreme to offer potentially valuable lessons about Tech Prep implementation to other similar consortia;

- The consortium would make a commitment to participate in the study to provide a means for local stakeholders to increase their understanding of Tech Prep implementation, to share what they had learned with others, and to use results to improve local programs and processes; and

- Across the consortia selected for this study, there was representation from rural, suburban and urban sites, providing a diversity of resources and circumstances from which to learn. (Of the original six sites selected, two were rural/small town, two were urban/surburban/rural, one was urban/suburban, and one was urban only).

Using the set of criteria specified above, in late 1998 two consortia were added to the study to allow for the examination of additional Tech Prep approaches, to provide for greater representation by region of the country, and to supplement the overall number of Tech Prep participants studied. One of the sites added was the Pacific Consortium, with an urban/suburban composition. This consortium started planning Tech Prep during the 1992-93 academic year, with implementation of a vocational Tech Prep model expanding in subsequent years. The other site that was added was the Workforce Consortium, which was a urban/suburban/rural site that started Tech Prep planning during the 1993-94 academic year. Though starting later than other sites, this consortium made substantial progress in the implementation of a College Tech Prep model, including the development of employer-sponsored youth apprenticeship programs. *Note that in each of the case study reports a pseudonym is used to give anonymity to the local site and institutions within it.*

Student Selection

Within each consortium, specific secondary schools, area vocational centers, and two- and four-year colleges were selected. (Details on selection decisions associated with specific educational institutions within sites are provided in Appendix A.) In brief, the secondary schools and colleges that were selected were thought to provide a representative cross section of institutions and student participants within each site. The number of secondary schools varied fairly widely from site to site, from two to fifteen, with the average being eight. Only one site included more than one two-year college and in this site three community colleges made up a regional community college district and students had access to any of the three college campuses. Finally, one consortium's lead postsecondary institution awarded two- and four-year college degrees.

With respect to the selection of students, a sample of approximately 300 Tech Prep high school graduates (also referred to as Tech Prep participants) was identified in each site, along with a comparison group of about 300 non-participants having similar cumulative high school academic characteristics. These 600 high school graduates were selected by the following process: the range of class rank percentiles [or cumulative grade point average (GPA) if class rank could not be determined by school officials] for the entire Tech Prep participant population was determined by records provided by each school within a site. Within this range, approximately 300 Tech Prep participants were selected for the site overall, ensuring that the sample was reflective of the entire Tech Prep population within schools and the overall site. Using the minimum and maximum class rank percentiles of the Tech Prep participant group as boundaries, the non-participant group was selected, again at random. For example, if the range of class rank percentiles for Tech Prep participants at one high school was 25%-75%, then the non-participants were selected from the same 25%-75% range. To insure equivalent groups, t-tests were computed to compare the mean class rank percentiles (and/or cumulative GPAs) of the groups.

The samples were further broken down by graduation year, ranging from 1995 to 1998, with most sites providing data on the 1996 and 1997 cohorts, fewer on 1995, and only one consortium (the newest site) on a 1998 cohort. Samples were drawn across years because most sites had too few Tech Prep graduates in any one year (especially in earlier years) to form a substantial enough group. In fact, in three sites, we selected the entire population of Tech Prep participants, and sometimes did not reach the 300 total (e.g., the total Tech Prep participants in the River Valley Consortium is about 200).

Finally, using this sample of Tech Prep graduates, we assisted the sites in identifying the sub-sample of graduates who had matriculated to the primary postsecondary institution in each consortium. By providing a list of Tech Prep graduates by name, along with other personal identifiers provided by each site, we were able to locate individuals who had matriculated to each site's primary postsecondary institution. The college records and transcripts of the identified matriculants were provided.

In total, across the eight sites, 4,671 students were selected for the study. Overall sample size ranged from 411 in the River Valley Consortium to 723 in the Workforce Consortium. A total of 2,317 Tech Prep participants were included in the study, and a comparison group of 2,278 non-participants was selected. In addition, 76 students were classified as youth apprentices in two sites, and this group was treated as an additional sub-group for the student outcomes analysis. Of the overall group of 4,671, 1,868 (38%) of the sample had matriculated to the lead college in the consortium.

Rationale for the Sampling Approach

To understand the sampling procedure, it is important to note that we did not impose a particular definition of the Tech Prep student on the sites. Rather, we assisted the sites to operationalize their own existing definitions in ways that were tangible and meaningful to the investigation. In so doing, we devised a sampling procedure to select Tech Prep participants on the basis of the specific definitions and policies employed by each consortium, ensuring greater consistency between the sample selected and the designated features of Tech Prep in each site. No doubt there were drawbacks to this method since it was impossible to assume comparability in the Tech Prep "treatment" across sites or randomly assign students to such a treatment, there were important advantages. By operationalizing local definitions and selecting Tech Prep participants at the point they completed secondary school, we were more likely to identify Tech Prep students who had engaged in a Tech Prep experience consistent with the local model. In fact, the variation of approaches that was evident in the eight local Tech Prep consortia enhanced our depth of understanding regarding implementation, and this diversity also maximized our ability to learn about participants' experiences and outcomes in various contexts.

To explain further, the decision to select comparable groups based on academic performance at high school graduation (i.e., class rank percentile or cumulative GPA) was made for an important reason. Much of the research conducted to date has treated Tech Prep and STW as a primary secondary school reform (see, for example, Hershey et al., 1998). While we were interested in learning what happened to students during high school, we were even more interested in learning what had happened to students *after* high school, in their transition from school to college or work. To examine this question as a predominant one, we wanted to control for potential differences between the Tech Prep participant and non-participant groups. Since high school academic performance is known to impact transition behavior [see, for example, Pascarella and Terenzini (1991) and recent studies by Adelman (1999) and Boesel and Fredland, (1999)], sample selection took into account high school class rank percentile or cumulative GPA at high school graduation.

Data Collection and Analysis

The research approach used for this study consisted of three phases. A brief description of each phase is provided below.

Phase One

In Phase One, multiple field visits were conducted with the original six sites where in-depth personal interviews were conducted with secondary school and community college personnel (administrators, teachers, counselors), employers, and other key informants. Over more than a two-year period, approximately 60 high schools and 10 community and four-year colleges were the site for over 300 interviews with teachers, counselors, parents, and employers; over 150 interviews (from 20 to 30 students per site) were conducted with students at both the secondary and postsecondary levels. These interviews occurred individually and in small groups with most lasting from 40 to 60 minutes. During this first phase, Tech Prep participants and non-participants also completed a brief 25-item questionnaire to provide additional information about their career and educational aspirations and various in-school and school-to-work transition experiences. These surveys were analyzed and results were used to formulate additional on-site interview questions in follow-up visits and prepare the follow-up questionnaire administered as part of Phase Two of this study.

In addition, each site provided access to extensive documentation that accompanied initial planning of Tech Prep and subsequent implementation throughout the 1990s. Quarterly and annual reports and budgets, mission statements, strategic plans, marketing materials, course and curriculum guides, guidance and counseling manuals, teacher training materials, and so forth were shared. Extensive document review was conducted, with results incorporated into later data collection activities and case study reports. Along with descriptive statistical analysis of student questionnaire results, content analysis was conducted of field notes and tape transcriptions to identify predominant patterns and themes emerging from these qualitative data. At least two members of the research staff were involved in the content analysis of field notes and tapes and, in the role of author or reviewer, in the preparation of each case study report.

Phase Two

In Phase Two of the study, an outcomes assessment plan was devised through a collaborative planning process with each site, ensuring consistency with the research objectives and variables, data collection methods, and sampling procedures, but also maintaining sensitivity to local conditions and constraints. The plan was started in January, 1998, with a “kick-off” meeting to bring local consortium directors and evaluation personnel together to accomplish several goals: a) to reach consensus on goals and outcome measures for this study, b) to establish a deeper understanding of the data collection processes, c) to promote cross-site collaboration, d) to assign an NCRVE liaison to each site and provide the opportunity for these persons to become acquainted and comfortable with their assigned sites, e) encourage sites to utilize the research expertise of NCRVE personnel and incorporate the data collection activities associated with this study into the local Tech Prep evaluation system, and f) to provide an opportunity for a USDE/OVAE representative to communicate with the sites and convey the importance of the study from the federal perspective. Moreover, this meeting provided the opportunity for all participants develop a sense of commitment to and ownership for the study.

Immediately following the kick-off meeting, a site visit was conducted with each of the consortia to finalize the local outcomes assessment plan. This follow-up on-site meeting also provided the opportunity to communicate the goals of the study and planned data collection procedures to local officials who were unable to attend the kick-off meeting (due to limited resources, the travel expenses of only two representatives of each site were supported.) In addition, an extensive amount of local information was collected, including high school graduation lists, the names of Tech Prep participants, high school transcripts and student records, college transcripts and student records (if the individual matriculated to the regional two-year college), and institutional course and curriculum guides and related materials.

At the beginning of the study, a local implementation, i.e., “milestone” activity, was devised as a way to obtain self-assessment information. We developed this process to allow local personnel to document major critical events that had occurred in the local implementation process since the inception of Tech Prep. Displayed in each case study report, these milestone charts provided valuable information explaining the local context for Tech Prep implementation, assisting us with interpretation of the meaning and importance of local events and actions. The milestone chart provided valuable information about the evolution of the local implementation process and critical factors associated with it.

Follow-up Survey

A 36-item questionnaire was devised to obtain information from the Tech Prep participants and non-participants. Mailed to the entire sample, this survey instrument had four sections: a) high school educational experiences and work, b) transition to college and college experiences and expectations, c) post-high school work experience and expectations, and d) demographics and personal characteristics. (For a copy of the survey instrument, see Appendix B.) The instrument was developed following an extensive review of the literature and analysis of other similar instruments (for example, Stern, Stone, Hopkins, McMillion, & Cagampang, 1994). The survey instrument was reviewed by a panel of experts in the Tech Prep field to establish content and face validity. It was also reviewed by representatives of the six original sites, to ensure the questions were logical and accurate at meeting specific local needs. After a thorough review and revision based on the feedback of these groups, the instrument was pilot tested at two sites (one rural, one urban) with comparable student groups. Another set of minor revisions was made at this time.

Administration of the instrument was conducted three times initially, lasting for approximately 8-10 weeks total (Dillman, 1978). Following this activity, non-respondents were contacted via telephone to engage in an interview to provide comparable information. For the original six sites, the primary period of mail survey administration was October-December 1998, followed by telephone interviewing in February-March 1999. The two new sites were engaged in the mail survey in February-April 1999, with the telephone interviews conducted immediately thereafter. Finally, during the summer of 1999, all remaining non-respondents were mailed a fourth and slightly abbreviated version of the follow-up survey, and follow-up phone calls were made simultaneously, encouraging non-respondents to complete the survey. (For additional discussion of the survey methodology, see Appendix C.)

By the conclusion of the fourth administration of the follow-up survey, the overall response rate reached 48% across all sites, ranging from 62% in the Central State Consortium to 39% in the Pacific Consortium. The response rate of the Tech Prep participants and non-participants was very similar in each site. A comparison of the response rate of sub-groups reveals that the highest response rates were obtained for the 1998 cohort in the Workforce Consortium (the most recent cohort to graduate from high school) and the youth apprentice group in the Central State Consortium, where encouragement by local administrators prompted a high level of participation.

Transcript Analysis

Student records and transcripts were collected from some consortia through a central education agency such as a Local Education Agency (LEA) or Institutional Research Office, where a computerized management information system was used. However, in most consortia, the records were not computerized so we worked directly with guidance, administrative, and/or research personnel to secure student records and transcripts within the selected educational institutions. (See Appendix D for notes related to the transcript analysis.) Once the transcripts were provided, an electronic database was created and maintained at the University of Illinois at Urbana-Champaign (UIUC) site. Once the transcripts were assembled, all personal information that would identify a student was removed, and students were referred to by an omnibus code number, in accordance with the human subjects review procedures of the two universities engaged in this study.

Transcript data entry began during the summer of 1998 when the first consortium's transcripts were received. Given the volume of transcripts, a nationally-recognized firm was engaged to conduct the data entry work. Data entry personnel entered transcript information using a computerized data system, and specific items were listed on a "transcript format checklist." A specific checklist was prepared for each consortium's transcripts including the following items from the secondary school record: student's date of birth, race/ethnicity and gender, date entered and graduated, GPA, class rank percentile, details on individual course (name, length, grade, credit), total number of credits received, absentee data, and type of diploma awarded. For the college transcripts, much of the same demographic and general background information and individual course data was entered. Additional information included the student's declared major, declared degree, academic status, placement test scores, credits attempted and earned (for the first and last semester/quarter), and GPA by semester and cumulative. Quality control procedures were developed and used routinely as data for each consortium site were processed.

Course Coding

Course coding refers to the process of associating a course title with a classification code. The process involves selecting a course description for the classification system that most closely matches the course description in the course catalog. In keeping with the methodology used in several nationwide, large-scale transcript studies, we used the Classification of Secondary School Courses (CSSC), and the Secondary School Taxonomy (SST) as standards for classifying and coding the high school courses. [These studies include the 1994 High School Transcript Study (HSTS) conducted for the National Center for Statistics by Westat, Inc. (NCES 97-262), and the comparative study of credits earned for 1994, 1990, 1987, and 1982 high school graduates also conducted by Westat, Inc. (NCES 97- 260).]

The SST was developed as a uniform framework for organizing the high school curriculum and classifying transcript data (Gifford, Hoachlander, & Tuma, 1989). It was first developed for use with the High School and Beyond 1980 Sophomore Cohort Transcript study, and has since been used in the 1994 High School Transcript Study (HSTS), and the on-going national evaluation of STW (personal conversation with J. Hamison, March, 1998). (For researcher notes on how the SST coding was conducted, see Appendices D, E and F.)

Furthermore, in agreement with Adelman (1995), we used the Classification of Instructional Programs (CIP) to code community college courses. This classification source was supplemented with Adelman's (1995) New College Course Map (CCM). The CIP and CCM were used in the postsecondary transcript analyses for the National Longitudinal Study of the High School Class of 1972 (NLS-72) and the High School & Beyond Sophomores (HSB/So). As described by Adelman (1995) "the postsecondary transcripts for both cohorts were gathered 11 or 12 years after high school graduation and provide a tapestry of precisely what is studied, where, and by whom, in the nation's colleges, community colleges, and postsecondary trade schools" (p. vii).

Data Analysis

In terms of data analysis, the initial phase of our work was entirely descriptive, providing an initial understanding of the scope and range of results to basic questions associated with the variables and clusters of variables. Frequency distributions, measures of central tendency, Chi Square, t-test, and oneway ANOVA statistics were calculated to determine differences between the groups of Tech Prep participants and non-participants (and youth apprentices in two sites), depending on the type of data and number of comparison groups.

Results are presented in this document as *preliminary* indications of student demographics, experiences, and outcomes associated with Tech Prep participation. *By no means should these results be considered inclusive of all of the data collected or all the results that will be available ultimately.* We have simply had insufficient time to complete the entire data analysis process before this report had to be compiled for NCRVE. Therefore, a great deal of data analysis still awaits completion and subsequent publication.

Future data analyses will provide the opportunity to create composite variables revealing more sophisticated measures of the students' Tech Prep/STW experiences (e.g., participation in articulated course sequences extending from the secondary to postsecondary levels), and it will provide the opportunity to use inferential statistics to deal more effectively with individual characteristics that could impact the student outcomes which interest us most, (i.e., matriculation to, retention in, and completion of postsecondary education). Transitions to work after high school are also interesting, but rely almost entirely on follow-up survey results. Due to non-responses problems, these findings are not likely to be as extensive. Still, we recognize the importance of moving to a deeper level of understanding of the interrelationships among the unique variables and variable clusters available in the data set, and forward to this next stage of the data analysis.

Phase Three

During Phase Three of the project, a customized report including qualitative and quantitative) results was prepared for each site and presented at a debriefing meeting attended by a select group of local stakeholders, primarily local decision makers. The purpose of this meeting was to synthesize and disseminate major results and encourage interpretation of results as a way to generate meaningful dialogue for local program improvement. By attempting to address both the formative and summative aspects of local needs for evaluative information, we attempted to assist personnel in building meaningful local Tech Prep evaluation systems and utilizing these and future results for program improvement (Patton, 1996). Sometimes, in addition to the debriefing meeting with local officials, we presented the site's results to a wider audience of educators, employers, students, parents, and community representatives. We accommodated such requests to facilitate further development of the Tech Prep initiative and related evaluation processes.

Contents of this Report

The introduction of this report describes the problem and literature supporting the need for this investigation. In addition, a visual depiction of the conceptual framework is provided to inform readers of the sets of variables and inter-relationships among variables being studied. The research design, methods, and analysis are presented in this introduction as well, giving an overview of the strategies used to carry out the study.

The following chapters provide case study narratives for each of the eight local Tech Prep sites engaged in the study. Each of the consortia is identified with its pseudonym as follows:

- Central State Education-To-Careers Consortium
- River Valley Tech Prep Consortium
- Southern Tech Prep/School-to-Careers Partnership
- Sunland County Tech Prep Consortium
- Northwest Regional Education Consortium
- Metropolitan Tech Prep Consortium
- Workforce Development Consortium
- Pacific Tech Prep Consortium

In each case, our *initial* interpretation of student outcomes is set within the context of findings gathered via the field studies, presenting the qualitative and quantitative aspects of Tech Prep implementation within each consortium. As much as possible, the case study reports are comparable in content, format and length, providing a similar scope of information, though access to some detailed information varied from site to site. Although some variation is evident, each of the cases addresses the following themes:

- Community Context – This section identifies the consortium and its partners, regional demographics, local political and economic factors, and key features of the schools and colleges within the consortium. Enrollments and student demographics are specified in this section by school, when available.

- Tech Prep Implementation - Emphasizing the evolution of Tech Prep over time, this section includes an explanation of the changes that have occurred within the schools, particularly transitions involving vocational education, Tech Prep, STW and related reforms such as High Schools That Work (HSTW). The goals and definitions of the local Tech Prep initiative are specified, based on local policy and practice. Governance and funding information is provided herein. This section also contains the milestone chart completed by local officials, usually the site director, illustrating the most critical events associated with Tech Prep development over time. When available, an organizational chart for the consortium is included. Typically, barriers to implementation are described in this section as well.

- Key Components – The key components section provides an overview of marketing and student recruitment strategies used by the consortium; guidance and counseling practices; professional development processes used for faculty, counselors, and administrators; program evaluation and student outcomes assessment methods employed by the consortium; and any other components that are considered “key” to the local initiative, including scholarships and student leadership organizations.

- Tech Prep Curriculum Reform – A major part of each case study is devoted to curriculum development and reform. This section begins by looking at core curriculum at the secondary and postsecondary levels and the minimum high school graduation and college degree requirements of educational institutions engaged in Tech Prep implementation. How high school exit and college entrance requirements relate to Tech Prep is a focus of the discussion of core curriculum in each site. Articulation agreements are also explained, along with information on career pathways or related curriculum structures associated with sequencing or clustering of vocational-technical and academic courses. The integration of academic and vocational-technical education, applied academics, and contextual learning is also described, as are any other changes in instruction and delivery of curriculum that pertain to Tech Prep. Work-based learning activities engaged in by the consortia are also described in this section.

- Student Demographics, Experiences, and Preliminary Outcomes – The remainder of each case includes a summary of *preliminary* findings related to the sample of Tech Prep participants and non-participants. Initial results from transcripts and surveys include demographics, educational characteristics, math and vocational course-taking patterns, work experience during high school, transition to college, and post-high school employment.

- Summary – the last section of each case provides a brief summary of major findings and conclusions associated with implementation and student outcomes, and the complex interrelationships between them.

At the end of this report, concluding observations point to emerging knowledge surrounding Tech Prep implementation and student outcomes, as evidenced in this investigation of eight selected Tech Prep consortia. These comments are not intended to be comprehensive, but rather to help direct future analysis by researchers, policy analysts, scholars, and others engaged in assessing the impact of these reforms.

CENTRAL STATE EDUCATION-TO-CAREERS CONSORTIUM

Donna E. Dare and Debra D. Bragg

Community Context

The Central State Education-To-Careers Consortium (Central State Consortium) is located in a large state in the midwestern region of the country. The largest community in the consortium, with a population just under 35,000, is surrounded by several small, rural towns whose populations range from approximately 200 to 6,000. The total population of the county is 88,257. Citizens of the county are mostly White (88%) with very few minority groups represented (9% African-American, 2% Hispanic, and 1% other). The median family income is $30,392, and the median home value is $38,700; 15% of the population live at or below the poverty level.

Twelve high schools reside in the Central State Education-To-Careers Consortium (Central State Consortium) region. Ten of these are actively engaged in Tech Prep implementation. An area vocational center (AVC) serves all high schools in the consortium, and the AVC is an active ingredient in the local formula for Tech Prep implementation. While vocational courses are offered at local high schools, they are also taught at the AVC, and students travel from the home high school to take these classes for about half of the school day.

High school enrollments vary across the ten schools, though most are quite small. The largest comprehensive high school in the consortium reports an enrollment of almost 1,800 students. All other high schools are rural schools with student populations ranging from approximately 150 to slightly over 500, with an average population of 283 (see Table 1). The dropout rate across these 10 high schools varies widely, from 1.8% for the smallest high school in the consortium to 12.9% for a moderate-size high school. The largest high school (High School 104) also showed a high dropout rate of 11.6%.

Table 1
Enrollment of High Schools during 1996-97 School Year

School	**Total Enrollment for 1996-97**	**Drop Out Rate for 1996-97**	White	Black	Latino/ Hispanic	Asian/ Pacific. Island	Native American
101	204	7.4%	99.5%	0.5%	0.0%	0.0%	0.0%
102	261	3.1%	98.1%	0.4%	0.4%	1.2%	0.0%
103	165	2.4%	100.0%	0.0%	0.0%	0.0%	0.0%
104	1,767	11.6%	67.1%	26.3%	3.6%	2.8%	0.2%
105	410	5.1%	96.2%	3.8%	0.0%	0.0%	0.0%
106	474	9.1%	87.2%	0.0%	12.8%	0.0%	0.0%
107	144	2.1%	100.0%	0.0%	0.0%	0.0%	0.0%
108	357	12.9%	100.0%	0.0%	0.0%	0.0%	0.0%
109	158	1.8%	98.7%	0.0%	1.3%	0.0%	0.0%
110	373	7.7%	98.1%	1.3%	0.5%	0.0%	0.0%
Total High School Population	4,313		94.5%	3.2%	1.9%	0.4%	0.0%

Source: 1997 School Report Cards

Note: Details may not add to 100 due to rounding. The 1996-97 drop out rate compares the number of students who enrolled in ninth grade in the fall of 1993 with the number from that group who actually graduated in 1997. Adjustment to the rate has been made for students who transferred in and out of school and rates include students who took more than four years to graduate.

All the communities that comprise this consortium are served by one community college that is the lead agency for Tech Prep. This community college, the Midwest Area Community College (MACC), was established in 1946 as an extension center of the state's land grant university, and it serves a total population base of approximately 112,000. For 1997-98, the total enrollment of MACC was nearly 7,500 students, including 500 students in non-credit classes. The majority of students are male (60%) and White (66%). In addition to the transfer function, the college catalog states that the college's mission emphasizes "occupation-oriented education." The college offers four degrees: Associate in Applied Science (AAS), Associate in Arts (AA), Associate in Science (AS), and an Associate in Engineering Science (AES). Although Tech Prep was originally designed as 4+2 (grades 9-14), the consortium now provides the option of a 4+2+2 model through informal agreements with four state universities that offer capstone programs or advanced degrees in some technical areas.

There are no four-year universities/colleges in the communities in this consortium. In fact, the closest university is about 40 miles away and it is a land-grant, selective-admission institution that enrolls few students from the local area. Other public and private four-year colleges and universities are located more than 60 miles away.

Economic and Political Context

During the 1980s and early 1990s the economy of the region struggled. The county suffered from double-digit unemployment that resulted in the closing of a major automotive parts manufacturing plant and related businesses. The impact of a weak local economy remains evident today; however, the Area Economic Development Corporation (AEDC) currently boasts of a revived industrial climate and an unemployment rate under 7%. Drawing upon data from the state's Department of Revenue and Bureau of Employment Security, a 1998 AEDC report shows employment in the region as follows: 21 new major manufacturers/distributors employing 21% of the local labor force (compared to a national average of 15%), 26% of the workforce in wholesale and trading (compared to a national average of 23%), 21% employed in service (compared to a national average of 30%), and 20% in government (compared to a national average of 16%).

The turn-around in the local economy is due, at least in part, to the efforts of numerous public and private organizations that devoted time and attention to this matter. About a decade ago, the AEDC, businesses, educational entities, and community representatives joined forces to address the local economic woes in more strategic and coherent fashion. Through a business-initiated effort entitled "Work Force 2000," over 200 groups and individuals from the community became engaged in a progressive effort to turn around the local economy.

From a more current perspective, this initiative laid the groundwork for Tech Prep and ensured a ripe environment for its growth and development throughout the decade of the 1990s. Today, Tech Prep is recognized by community leaders as a major stimulus to local economic development. Likewise, it is perceived as a major impetus for educational reform at both the secondary and postsecondary levels. In this region, Tech Prep is viewed as a catalyst for change and linchpin for educational reforms, including providing the basis for more recent School-To-Work (STW) developments. In a local quarterly publication of the consortium entitled "Winds of Change," local constituents described Tech Prep during 1994 as being responsible for:

- a new way of approaching the curriculum,
- a broader perspective that produces a quality "product" (i.e., graduates and potential employees for local businesses), and
- a cultural shift in the relationship between education and business and industry.

Throughout the history of Tech Prep in this consortium, high schools, MACC, and local businesses and industries have worked together in a collaborative effort to address workforce development and educational needs. The Tech Prep coordinator works jointly with local school administrators and with local economic development personnel to maintain strong business commitment to educational reform. While the extent and type of implementation of Tech Prep varies from school to school, most schools in the consortium have adopted Tech Prep as one vehicle to achieving school reform. Particularly since the options for university education in the immediate area are limited, MACC has become the primary postsecondary institution for students who graduate from area high schools, and Tech Prep has been adopted because of its potential to transition students to MACC.

Tech Prep Implementation

Due largely to the predominance of manufacturing and agriculture, vocational education has strong roots in this region. With the changes in technology brought on during the 1970s and 1980s, however, traditional vocational education had become outdated. The need to make changes to address emerging workforce needs was a widely accepted goal. Rather than rally around the idea of eliminating vocational education, community leaders looked to vocational education as a means of precipitating change, but only if vocational education could reform itself too. With the development of Work Force 2000 and the emergence of Tech Prep in the early 1990s, educators and business and industry representatives convened more and more frequently to determine how they could develop new educational programs to meet local labor market needs. A particular concern of the community was how to replace 40% of the manufacturing workforce eligible for retirement before the year 2000. Tech Prep and vocational education were advocated as the solution to this problem. As such, local leaders of Tech Prep solicited even greater input from business and industry. Using Work Force 2000 representatives to identify occupational cluster areas and labor market needs, Tech Prep leaders worked with secondary and postsecondary educators to develop articulated courses and programs that would convey competencies required by business and industry. The community college participated too by developing 25 courses of study as Tech Prep pathways. These programs begin at the Area Vocational Center (AVC) or in the high schools and continue at MACC. Some include an option at one of the state's four-year universities.

With the statewide implementation of School-To-Work (STW), known locally as Education-To-Careers (ETC), in more recent years (beginning locally in 1997), Tech Prep has been the foundation for both school- and work-based learning and connecting activities. The consortium's Tech Prep coordinator has also served as the ETC coordinator, and she has made deliberate attempts to merge the two initiatives in a way that does not overlap resources or duplicate efforts. For example, using articulation agreements first developed for Tech Prep, the local coordinator introduced career pathways recommended by the state. She also encouraged area high schools to adopt guidance activities that support all students in pursuing various educational options within specific pathways. (See Figure 1 showing major milestones for the Central State Consortium from its inception to 1998-99.)

FIGURE 1
CENTRAL STATE CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
FUNDING				Tech Prep planning grant	\$93,000 Tech Prep \$140,000 Work Force 2000 \$75,000 HS 104
PERSONNEL	Dean of Career and Occupational Education	Dean of Career and Occupational Education	Small Midwest Area Community College (MACC) team begins work on Work Force 2000	Tech Prep Coordinator hired and begins implementation of Work Force 2000	TP Coordinator resigns; Present TP Coordinator hired; Work Force 2000 Coordinator hired
LEGISLATION				Tech Prep	
STRUCTURE/ PARTNERS	1. Business advisory councils 2. Labor Management Council formed	Business/Industry come to the college with a need	Occupational program advisory councils	Work Force 2000 Board formed; TP Steering Committee formed	Work Force 2000; TP; Occupational program advisory councils
EVALUATION					

	1994	1995	1996	1997	1998
FUNDING	\$119,000 Tech Prep \$140,000 Work Force 2000 \$75,000 HS 104	\$94,000 Tech Prep \$125,000 Work Force 2000 February: special grants award 1) Rural=\$95,000; 2) Tech Prep Youth Apprenticeship (TPYA) = \$75,000; 3) MACC Demo= \$50,000 MACC begins *"best practice" funding"*	\$95,000 Rural \$75,000 TPYA \$75,000 MACC Demo	\$94,000 Tech Prep \$95,000 Rural \$75,000 TPYA \$75,000 MACC Demo	\$256,000 Tech Prep \$70,000 Work Force 2000
PERSONNEL	HS 104 hires TP Coordinator; Total = 2		Secondary apprenticeship coordinator assigned part-time; Rural coordinator hired Total=5	HS 104 institutionalizes TP coordinator	No rural coordinator; MACC picks up 50% of TP position; transition to ETC; Work Force 2000 Coordinator concentrates on Career Beginnings, 8^{th} grade project. Total=3
LEGISLATION					
STRUCTURE/ PARTNERS	North District Advisory Council formed (NDAC) South District Advisory Council formed (SDAC) Occupational program advisory councils	Applied advisory group formed		STW in the Work Force 2000, N&SDAC, app. board melt into ETC Board; TP becomes an ETC committee	ETC Committees active
EVALUATION		3 pilot schools begin TP counts	<u>Benchmarking</u>: 1. Recruitment of students 2. CORD, Gallup – Begin TP counts in all high schools	Applied database begins	ETC begins data collection; NCRVE study begins

FIGURE 1
CENTRAL STATE CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
ARTICULATED CURRICULUM					Manufacturing: electronics, Office Systems, Information Systems
PROFESSIONAL DEVELOPMENT			*County-wide Education Summit* with business/industry stating concerns	Business/industry tours = 10 educators	Business/industry tours = 33 educators; Steering Committee inservices begin; applied academic workshops; newsletter developed
GUIDANCE					Heavy marketing to students & educators

	1994	1995	1996	1997	1998
INTEGRATED CURRICULUM	Applied academic materials bought for all HS; Job Seminar course at MACC	Integration project at MACC; schools begin to experiment with integration	Schools begin small integration projects; career awareness		
ARTICULATED CURRICULUM	Marketing Power System Agriculture	Health Manufacturing Tech	Childcare English		
PROFESSIONAL DEVELOPMENT	Business/industry tours = 75 Workshops: applied math, administrative inservice, integration, computer workshops, team building with business/industry partners	Business/industry tours = 113; MACC 4-day inservice with 90% volunteer participation; Steering Committee Inservices: 1) Marketing 2) *Accomplishments & Visions Retreat* Workshops: integration, applied math, applied biology, applied communications, Technology Day, Specific site inservices, Cognitive Applied Training, National Tech Prep Network (NTPN) (7)	Business/industry tours during school year Administrative inservice at business site Apprenticeship inservices Two steering committee inservices Study team to Germany NTPN (7)	Business/industry tours Workshops: Internet services Mini-workshops: *NC Best Practice*; math at business/industry worksite training; career portfolio; Dr. Willard Daggett; SCANS, ETC planning retreat; Roosevelt Renaissance model Conferences: Daggett (12); NTPN (8)	Business/industry tours; academy developed; Workshops: WorkKeys; SCANS; ETC inservices, leadership training for steering committee
GUIDANCE	TP in student registration guides.	Career Videos developed; Company TP scholarship formed; Student Leadership Academy formed; Parents 2000 formed.	Applied Orientation; *Career Expo* developed	Individualized Career Plans (ICPs) expanded into all schools; *Instr. Mentors* developed at MACC, ETC notebooks	
WORK-BASED LEARNING	County Advisory Councils formed; job shadowing pilot	Interfirm manufacturing apprenticeship formed; job shadowing expanded	50 apprentices expand to banking, accounting, health, consumer management; Worksite training developed	First TP apprenticeship graduates	Postsecondary apprenticeship Fast-Track apprenticeship

Beginning in 1994-95, the state implemented a school improvement planning process through which all elementary and secondary schools in the state review and submit annual plans for school improvement. In 1996 and 1997, annual state report cards noted that most secondary schools in the consortium included plans for increasing academic standards. Several schools focused on improving students' performance in reading, writing, math, or science, including increasing math and science requirements for graduation. Improved technology was another focus of the school plans to better prepare students for the world beyond the classroom. According to state board of education personnel who work with this site, the school improvement planning process has enhanced Tech Prep and ensured its acceptance within the local educational reform process. The extent to which local personnel have perceived as close a relationship between Tech Prep and school improvement has varied from school to school, possibly related to their commitment to Tech Prep as an educational reform strategy.

Tech Prep Goals and Definitions

A goal of the Tech Prep initiative in this consortium is to improve educational options for students in the neglected majority (25^{th} to 75^{th} percentile), but recruitment has not been targeted to students of specific ability levels. All high school students are eligible to participate, according to local officials. Only the Tech Prep/youth apprenticeship program is subject to a selective admissions process, but even there selection criteria do not limit potential students to the middle two quartiles. Attendance and disciplined behavior are as important as academic performance. Through ETC's enhanced focus on career awareness and career guidance, recruitment efforts focus on students of all ability levels.

The state in which this consortium lies established a standard definition for a Tech Prep student based on the federal legislation. The definition of a Tech Prep student is "one who has made a conscious decision to follow a clearly defined sequence of courses to prepare for employment in a Tech Prep occupation." According to published state and local definitions related to Tech Prep, "a conscious decision means the student has declared Tech Prep as a major and has a formal Individualized Career Plan (ICP) indicating a Tech Prep occupation as his/her goal." A one-page document of definitions used by this consortium indicates that for an occupation to be designated as a Tech Prep occupation, it must meet all the following criteria:

- An Associate of Applied Science (AAS) degree or a two-year apprenticeship is the predominant method to enter the occupation.
- The occupation has opportunities for above-average entry wages and potential growth.
- The occupation requires advanced technical skills.
- The occupation requires multifaceted problem solving and critical thinking skills.

In this consortium, Tech Prep students are identified by high school counselors or teachers on the basis of their participation in certain courses or activities associated with a Tech Prep program of study. Since the definition of a Tech Prep student is intertwined with the curriculum itself, it is important to clarify the models of Tech Prep that were being employed in this case. Utilizing the main forms of Tech Prep identified by Hershey, Silverberg, Owens, and Hulsey (1998) as reference, the predominant approach to Tech Prep curriculum for this consortium was what they described as "enhancing vocational programs" (p. 96). Therefore, enrollment in vocational education classes associated with a designated Tech Prep occupation became a crucial component of Tech Prep participation in this consortium. Having an Individualized Career Plan (ICP) that specified educational and career goals associated with a Tech Prep occupation was also used to identify Tech Prep participants. However, whereas applied academics and career guidance were emphasized, their implementation was so inconsistent across the high schools that these elements were not useful in the identification of Tech Prep students.

Besides the vocational Tech Prep model, two other forms of Tech Prep were implemented that influenced how Tech Prep students were identified. First, the largest high school in the consortium (104) experimented with a school-within-a-school (SWIS) approach to Tech Prep for freshman and sophomores. In high school 104, students at the freshman and sophomore levels were identified to participate in the Tech Prep SWIS because of their apparent middle majority academic characteristics. Consequently, students who were affiliated with the SWIS were designated as Tech Prep participants. However, after only a few years, the Tech Prep SWIS was disbanded out of concerns from school administrators and teachers about tracking. Subsequent efforts to implement Tech Prep have included infusing integrated academic and vocational curriculum strategies across the curriculum, rather than through specific program options.

A third form of Tech Prep has yielded more acceptance and is widely recognized as a successful approach to Tech Prep within the region and state. This option is referred to as the Tech Prep/youth apprenticeship program. Tech Prep/youth apprenticeships have engaged many business partners and a growing number of students in several career fields, especially manufacturing technology. Again referring to Hershey et al. (1998), the Tech Prep/youth apprenticeship program fits the "highly structured, comprehensive programs of study" (p. 96) approach because there is a defined course sequence involving academic and vocational curriculum for select group of students. In the Central State Consortium, youth apprentices are selected to participate based on their having an acceptable attendance record, being on grade level in math and English, and having no serious disciplinary problems. Without doubt, most students selected for the Tech Prep/youth apprenticeships have made a deliberate commitment to pursue the program from the secondary to postsecondary level.

Figure 2
Snapshot of the Local Tech Prep Approach

Primary Goal: To improve educational options for students in the neglected majority

Tech Prep Student: One who has made a conscious decision to follow a clearly defined sequence of courses to prepare for employment in a Tech Prep occupation. Making a "conscious decision" means a student has declared Tech Prep as a major and has an Individualized Career Plan (ICP) indicating a Tech Prep occupation as a career goal.

Tech Prep Course of Study consists of a sequence of academic and vocational courses taught at a minimum during the last two years of secondary school preceding graduation and (1) during two years of postsecondary education leading to an Associate of Applied Science degree or (2) an apprenticeship of at least two years following high school. The sequence must include integrated academic and vocational content, workplace skills, and instruction delivered both at the work-site and in the school/college setting. Programs can begin at the 9th grade and some also articulate to four-year baccalaureate degrees.

Tech Prep Occupation:

- An Associate of Applied Science degree or two-year apprenticeship is the predominant method to enter the occupation.
- The occupation has the potential for above average entry wages and growth.
- The occupation requires advanced technical skills.
- The occupation requires multi-faceted problem-solving and critical thinking skills.

Primary Articulation Approach:

- 4+2 articulated programs (some 4+2+2)
- Dual credit, course-to-course articulation in technical areas
- Maximum 6 hours of articulated credits

Predominant Tech Prep Approach:

- Vocational Tech Prep
- Tech Prep/youth apprenticeship
- School-Within-A-School (freshman-sophomore academy) – no longer functioning

Source: Local Tech Prep definitions (1996)

The consortium has used the state's definitions and guidelines as the basis for its own, but it also made local adaptations. Specifically, nearly all existing vocational programs offered through the AVC have been considered a part of the local Tech Prep program. Juniors and seniors in these programs who participated in articulated course sequences were considered Tech Prep students, regardless of whether they engaged in other aspects of Tech Prep (e.g., applied and integrated curriculum, career planning). Also, once students were flagged as Tech Prep, they continued to be given that designation even if they discontinued participation in a specified Tech Prep course of study, except in the case of youth apprentices where closer monitoring of student progress has been done. The local tracking system for Tech Prep is simply not sophisticated enough to change a student's classification after he or she has been labeled. Both of these phenomenon could inflate Tech Prep enrollment for the consortium; however, the reported Tech Prep enrollment in 10 participating high schools provide a general indication of the size and scope of this local initiative (see Table 2). While not all students are likely to be bona fide Tech Prep students, many are. Overall, 370 of the entire population of 1,805 (20.5%) of graduating high school seniors were Tech Prep participants as of spring 1996 and spring 1997.

Table 2
Number of Graduates and Tech Prep Participants by High School

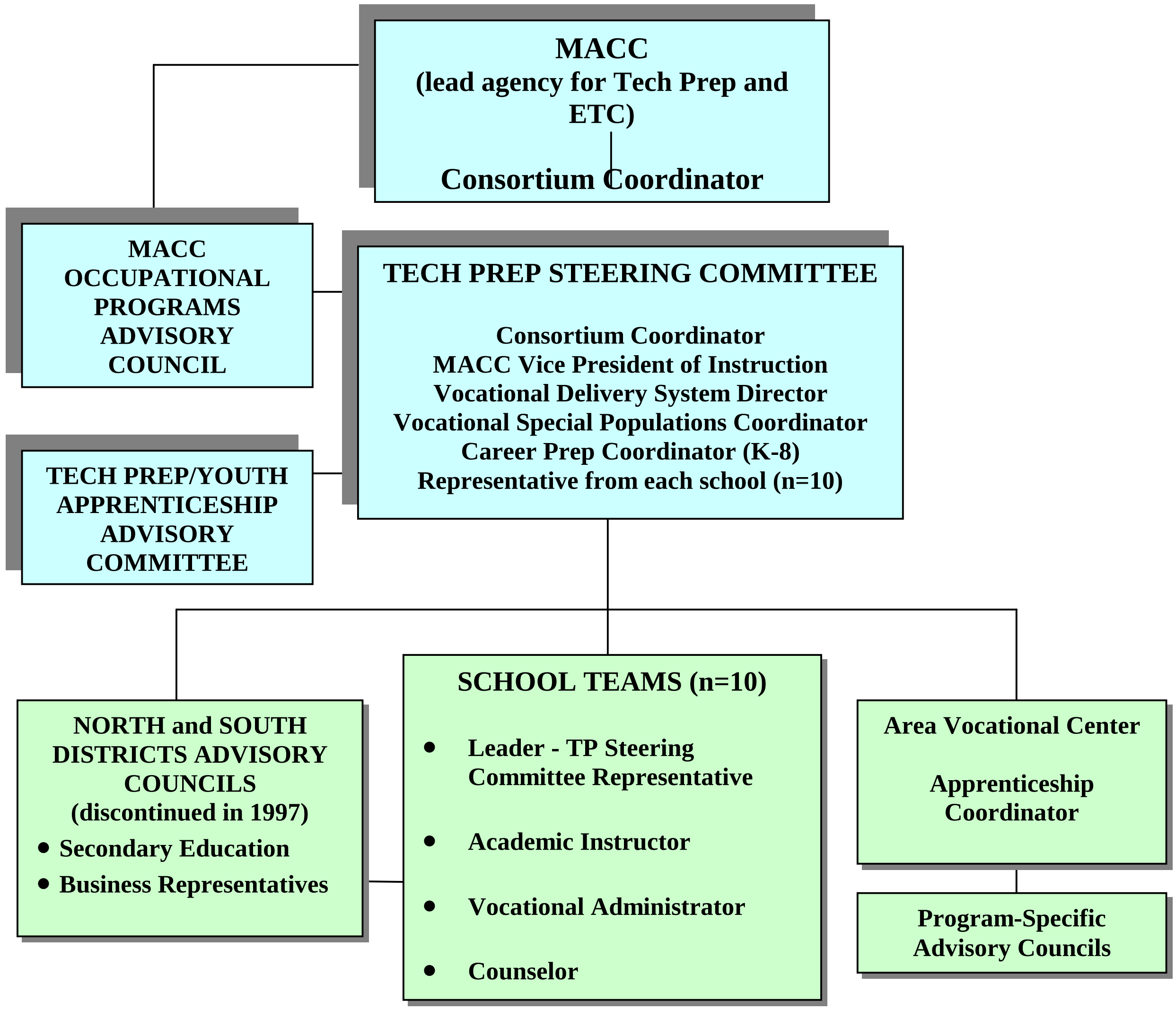
High School Code	Number Graduates		Number of Graduates Participating in Tech Prep	
	1996	1997	1996	1997
101	41	40	11	7
102	67	67	27	14
103	44	32	21	13
104	330	334	27	46
105	106	81	11	19
106	109	101	14	19
107	39	46	10	17
108	83	87	13	19
109	39	39	13	7
110	60	60	23	39
Total	918	887	170	200

Source: Local database and graduation lists provided by consortium high schools

Governance and Funding

From the beginning, MACC has served as the lead agency and fiscal agent for Tech Prep (see Figure 3 for an organizational chart for the consortium), and later also for Education-to-Careers (ETC). Since 1993, the current Tech Prep coordinator has worked in conjunction with the Work Force 2000 director to lead educational efforts related to workforce development in the region. The combined efforts of these two leaders have been enhanced through the involvement of other administrative personnel from MACC and surrounding high schools who supported implementation of Tech Prep. Leadership has been shared by many citizens in the community; however, the factor cited most frequently during our interviews as the primary reason for the success of Tech Prep was the constant leadership provided by the consortium's coordinator (from 1993 to the present). Her vision, enthusiasm, dedication, and tireless energy were cited numerous times as a powerful force driving local Tech Prep and ETC accomplishments.

Figure 3
Central State Consortium Organizational Chart (1999)



Beyond the central leadership role of the consortium, each school was represented on the consortium's Tech Prep steering committee, and these representatives facilitated school teams to engage in interdisciplinary curriculum reform and other activities linked to Tech Prep. The Tech Prep steering committee also worked in conjunction with the ETC governing board to coordinate the two local initiatives, with the ETC governing board acting as an umbrella organization for Tech Prep. With broader community and business representation, the ETC governing board was used increasingly as a means of coordinating Tech Prep implementation efforts within the evolving local ETC system.

At the school level, the largest high school in the consortium (104) employed a coordinator to oversee the Tech Prep program. Other high schools did not have sufficient resources for specialized staff, so they delegated one or more personnel to oversee Tech Prep as a part of their regular duties. At the AVC, an apprenticeship coordinator was employed to administer the program and guide youth apprentices attending classes there. In addition to administrative personnel and faculty at all levels of the educational system, a core group of business representatives and AEDC personnel were involved in and committed to Tech Prep across the region. Many of these leaders who started with Tech Prep later embraced ETC, serving in leadership roles on ETC committees to support both initiatives.

Shared decision making was a cornerstone of this local initiative from the beginning. In 1994, in response to the increase in school/business partnership activities and the progress of Tech Prep implementation, two new advisory councils, one for north district high schools and one for south district schools, were formed to oversee work-based learning (WBL) initiatives in key career areas. Both of these advisory councils were co-chaired by a secondary educator and a business/industry representative. These two new advisory councils were in addition to the advisory council for high school 104, MACC's advisory councils, and AVC's program-specific advisory councils that were already in existence. In 1997, these two district advisory councils and the workforce challenge group were folded into ETC so as to ensure better coordination and greater efficiency in the implemented of these related initiatives.

Funding

The consortium received a total of $31,000 in Fiscal Year (FY) 1991 and $39,000 in FY1992. Funding for Tech Prep implementation increased dramatically in FY1993 to over $300,000 and stayed at that level or higher through FY1998 (the last reported funding cycle provided in this report). By 1998 the total had increased to over $500,000 when taking into account various federal and state funding sources, including School-To-Work Opportunities Act (STWOA) funds. In fact, throughout the history of the consortium, federal and state funds were the predominant source of revenue to support Tech Prep planning and implementation (see Table 3). However, in more recent years, some local funds were appropriated to Tech Prep for the full-time salary of the local consortium coordinator at MACC. Consortium leaders agreed that this commitment of local funds demonstrated the institutionalization of Tech Prep. Local leaders also reported that business and industry had made generous donations of funds and in-kind contributions, but these funds were not documented in the consortium's financial reports. Still, business support for Tech Prep/youth apprenticeships was confirmed by many sources, including wages and college tuition for youth apprentices and business-sponsored scholarships for other Tech Prep participants.

Unique among the fifty states, the state in which this consortium resides has matched the federal Tech Prep investment since 1991. In 1999, $5 million in state funds was appropriated to support Tech Prep implementation. Having state funds available has boosted resources for Tech Prep considerably, as evidenced by several special grants received by this consortium. In fact, maintaining state-level funding is a priority of state and local leaders, precipitating a discussion about performance-based funding. However, to date, this method of funding has not been implemented, but other evaluation efforts have been launched. In 1998 state officials funded the land grant university in the state to design and implement a comprehensive evaluation system for Tech Prep, requiring more extensive reporting of student participation in Tech Prep and related outcomes than has occurred in the past. Eventually, once the Tech Prep evaluation system is implemented fully and validated by users, the state may reconsider the merits of performance-based funding for Tech Prep.

When examining how funds were used by MACC and the high schools, the local Tech Prep coordinator reported that they were used primarily for staff development, instructional and promotional materials, and instructional equipment.

Table 3
Funding for Tech Prep by Source and Fiscal Year

<table>
<tr><th rowspan="2">Reform & Funding Source</th><th colspan="8">Fiscal Year</th></tr>
<tr><th>FY91</th><th>FY92</th><th>FY93</th><th>FY94</th><th>FY95</th><th>FY96</th><th>FY97</th><th>FY98</th></tr>
<tr><td colspan="9">Tech Prep</td></tr>
<tr><td>Federal & State</td><td>$31,000</td><td>$39,000</td><td>$93,000
75,000</td><td>$119,000
140,000
75,000</td><td>$94,000
95,000
75,000
50,000</td><td>$95,000
75,000
75,000</td><td>$94,000
95,000
75,000
75,000</td><td>$256,000
70,096</td></tr>
<tr><td>Local</td><td>NA</td><td>NA</td><td>NA</td><td>NA</td><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td colspan="9">ETC</td></tr>
<tr><td>Federal</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>$15,837</td><td>$140,000</td><td>$134,381</td></tr>
<tr><td colspan="9">Other Sources</td></tr>
<tr><td>Work Force 2000</td><td colspan="2">Funded by private industry</td><td>$140,000</td><td>$140,000</td><td>$125,000</td><td>$60,000</td><td>$70,000</td><td>$70,000</td></tr>
<tr><td>TOTAL</td><td>$31,000</td><td>$39,000</td><td>$308,000</td><td>$474,000</td><td>$439,000</td><td>$320,837</td><td>$549,000</td><td>$530,477</td></tr>
</table>

Source: Milestones activity chart (Figure 1) and information supplied by Tech Prep coordinator.

Note: NA means Not Available. State funds included support for Tech Prep overall, but also for special awards for the largest high school in the consortium (104), a rural demonstration grant, a work-based learning grant for youth apprenticeships, and a postsecondary demonstration grant.

Key Components

This section focuses on the non-curricular components of marketing, guidance and counseling, professional development, and evaluation and student assessment. The consortium's Tech Prep Student Leadership Academy is also discussed.

Marketing and Student Recruitment

Initially, the Tech Prep initiative focused its recruitment efforts on high school students, but the initiative has expanded its recruitment strategies to younger students as the years have passed, including students at the elementary and middle school levels.

Recommendations for students to participate in Tech Prep take place at the eighth-grade level and generally target students in the middle two quartiles who do not have serious disciplinary problems. Recruitment is particularly heavy in the freshman year when counselors attend ninth-grade classes to explain course requirements for Tech Prep, show students a locally developed video on Tech Prep and youth apprenticeships, and inform students that they should be ready to make a decision about Tech Prep when signing up for classes in the spring. Active Tech Prep students and youth apprentices are encouraged to recruit other students into the program.

In the early years of Tech Prep, marketing efforts were focused on getting the word out to students, parents, school administrators and faculty, and business and industry representatives, and these efforts were largely dependent on the efforts of the Tech Prep coordinator. Stakeholders perceived her communication efforts as extremely diligent and as highly effective in getting buy-in. Newsletters, brochures, and locally developed videos were distributed for marketing purposes, but the presentations and direct one-on-one communications had the most impact. Additional efforts included recruitment dinners, career fairs, and other events held at MACC to promote Tech Prep and the youth apprenticeship program. In 1995-96, various administrative personnel from the consortium, two academic faculty from MACC, and researchers from the state's land grant university participated in a benchmarking project that focused on student recruitment. Among other findings, the study concluded that posters and brochures were used extensively but not effectively, one-on-one recruitment efforts were highly effective but not used often enough, and television and newspaper marketing were not widely used or regarded as effective. Recommendations of the benchmarking study called for increased parental involvement and a more systemic approach to career development beginning at the elementary level. Since 1996, the Student Leadership Academy and Parents 2000 program have been strengthened to enhance marketing for Tech Prep.

Guidance and Counseling

Career guidance efforts have been extended along with the ETC initiative, which is broader in scope and emphasizes career guidance for all students. In response to the benchmarking activities that were conducted in 1996, local personnel recognized the need to provide career information for students at a much younger age to enable them to begin to make informed decisions about academic and career plans. Even earlier, in 1993 and 1994, Tech Prep was included in registration guides for the college and most of the high schools in the consortium. In 1995, the consortium began using locally developed career videos with high school students. The videos were designed to encourage area youth to pursue technical jobs available in the region and to explain the education and training needed to fill these local positions.

High school counselors were responsible for conducting interest inventories and assessments. They were also responsible for career resources and career center materials. They also reviewed students' records and made recommendations for students to participate in youth apprenticeships. In discussing their role, counselors saw themselves in two primary roles: recruiters of Tech Prep students and facilitators for Tech Prep. Most of the career guidance activities offered at area schools were not restricted to Tech Prep students; however, Tech Prep did fund a number of career guidance activities in the consortium. Emphasizing the focus on all students, Tech Prep career guidance activities were consistent with other initiatives, such as ETC.

Tech Prep organized and funded several region-wide career-related activities starting at eighth grade, and a brief description of each activity follows.

Career Awareness Project

Eighth grade students visited businesses/industries once a month to experience real life work situations. In November and March, students were invited to "Bring a 7th Grade Buddy" to the activity. While considered a key component of career guidance activities that support Tech Prep, this activity was not funded by Tech Prep monies.

Job Shadowing

Ninth grade students were encouraged to shadow a worker during a normal work day. Over 700 students and 80 businesses participated in 1997. (Also see Job Shadowing in the Work-Based Learning section.)

Career Expo

Held annually since 1996 at the local civic center and coordinated by the Area Vocational Center (AVC) staff, the Career Expo has provided early high school students with the opportunity to obtain local job market and postsecondary training information from approximately 70 local businesses.

Youth Apprenticeships

A primary model for Tech Prep in this consortium, Tech Prep/youth apprenticeships engaged 37 high school graduates between 1995 and 1997. (Also see Youth Apprenticeships under Work-Based Learning section.)

Career Fair

A Career Fair has been held during the spring of each year at MACC. Participants (twelfth graders and community college students) have talked with business partners, discovered job opportunities, and distributed resumes.

Career Discovery Days

Career Discovery Days have addressed career needs of female students interested in nontraditional careers. With events scheduled individually, female high school seniors shadowed female students in community college classrooms in nontraditional fields.

Career Center in High School 104

In 1996, the largest school in the consortium (High School 104) implemented a career center equipped with computers, a television monitor and VCR, a laser disc player, and a variety of career research materials, including vocational biographies and Horizons. Students at 104 and other area high schools were given the opportunity to complete various series of career inventories at the junior level. Horizons was also used.

Career Beginnings

Career Beginnings was implemented for juniors at High School 104, providing the opportunity for teacher coaches and business mentors to help students prepare for employment during the summer between their junior and senior years. Monthly training sessions were provided for participating students. In 1997, 55 students participated in Career Beginnings. This community-based program was offered through a collaborative of MACC, a local community action program, the largest city in the consortium, along with High School 104.

In addition to these activities, other career guidance activities for elementary students were also sponsored by ETC. While career guidance activities for all age levels were enhanced over the years through both Tech Prep and ETC, more effective mechanisms for relating Tech Prep directly to career guidance activities were needed. Counselors expressed concern with the limited scope of Tech Prep implementation and suggested that it needed to expand so that it influenced the whole system. One counselor recommended doing more with "teaching high school teachers how to work cooperatively and how to teach integrated and applied curriculum." Counselors indicated that they worked with classroom teachers extensively to provide career guidance information as part of the curriculum.

Professional Development of Faculty, Counselors, and Administrators

Education personnel indicated that teachers had changed in recent years, and they were more willing to work together since Tech Prep implementation began. Before Tech Prep, teachers described traditional classroom practice as isolated. After Tech Prep professional development, they thought they interacted more frequently and meaningfully with peers. All teachers cited the business and industry tours (conducted since 1992) as important in their interaction with other faculty and with business and industry representatives.

Starting in 1992, only 10 educators participated in business and industry tours. Since that time, the tours have increased and improved. In 1993, 46 educators participated. By 1995, 62 secondary and postsecondary staff toured a total of 23 business sites organized around career clusters. In 1996 special tours were conducted for school board members from surrounding districts in order to increase their awareness of the nature of work-based learning and other aspects of school and business collaborations. In 1997 and

1998, the tours were expanded from one- to three-day tours in conjunction with ETC. The work-site activities were conducted for elementary, secondary, and postsecondary educators as part of a week-long inservice titled Educators Leadership Academy, including nationally-known speakers.

In addition to participating in the weeklong inservice, secondary and postsecondary counselors met monthly at various work-sites for tours and discussions about workplace skills. Year-long mentoring of secondary and postsecondary educators by business and industry representatives was also provided. In 1998, professional development plans incorporated a focus on workforce needs and ETC, with all educators placed at one business site to learn "all aspects of the industry" and develop a closer relationship with business personnel. This inservice was sponsored by the Tech Prep grant, the vocational instructor program sponsored by the state, and a vocational elementary career development grant.

Finally, Continuous Quality Improvement (CQI) was an important feature of Tech Prep professional development for many MACC faculty. The coordinator of Tech Prep described CQI as an integral part of MACC's Tech Prep initiative. She explained, it is "a way of life for us; it is how we process things." The CQI process was used to set Tech Prep policy and determine procedures for monitoring student performance at the work-site. The CQI process was also used to solve a number of problems related to Tech Prep and to facilitate decision making by stakeholders. Annual inservices included faculty and staff from the college spending time in teams to use principles of CQI to improve Tech Prep at the community college. In addition to training in CQI, since 1997 staff at the secondary and postsecondary levels has received training and testing on WorkKeys, a product of American College Testing (ACT). This assessment was a primary tool used by MACC's Business and Economic Institute Division to assess employability skills of job applicants and trainees, activities only tangentially related to Tech Prep.

Additionally, as part of a benchmarking project, faculty and administrators at all levels visited sites in other states where Tech Prep was being implemented successfully. Another site included in this study, the Workforce Consortium, was one of the sites visited by members of the consortium. Also, teams made two trips to Germany and one to England to gather information on effective work-based learning and apprenticeship models. These teams included business and industry representatives as well as educators. Information from these site visits was shared with other faculty during MACC's inservice activities. At the state level, faculty participated in an annual meeting called Connections where topics related to Tech Prep were presented. Locally, technology-based workshops were conducted for faculty where staff were trained in Internet use and how to build web pages. High schools in the consortium have conducted their own professional development activities, including methods of using applied and integrated curriculum materials.

Program Evaluation and Student Outcomes Assessment

Using state definitions associated with Tech Prep, this consortium created a database for Tech Prep by building on data required by the state for vocational education and

Tech Prep students. Since 1995, the consortium has used the state's vocational information management system to identify and track Tech Prep students. In addition, since 1996 the consortium coordinator has maintained a separate database for youth apprentices. In 1998 the state began modifying the data management system to accommodate participation in a broader range of ETC activities, including various work-based learning activities. The state also began development of a statewide plan for systematic evaluation of Tech Prep. Due to the evaluation activities this consortium had initiated, the new information management system (referred to as ISIS) identifies Tech Prep students who participate in a range of vocational courses and work-based learning experiences, including activities that are part of ETC.

In addition, in 1996-97 MACC began publishing comprehensive follow-up reports about Tech Prep students from all feeder high schools, including the student's major; indicators of persistence and success at the community college (attendance and cumulative GPA); and writing, reading, numerical, and elementary algebra placement test scores. Students who participated in the Student Leadership Academy began completing satisfaction and feedback surveys in 1997, and students who participated in job shadowing and youth apprenticeships completed surveys asking about their experiences. These survey results were used formatively by the local Tech Prep coordinator to determine what modifications, if any, needed to be made in Tech Prep.

Student Leadership Academy

One of the unique components of the Central State Consortium is its Student Leadership Academy. According to many Tech Prep students, being in the Student Leadership Academy was one of the most beneficial aspects of their Tech Prep experience. The Student Leadership Academy was piloted during 1995-1996 and its mission was to empower high school students to market Tech Prep to their peers and to the community. In recent years, the purpose has included empowering high school students to make the necessary changes to accommodate ETC. Faculty nominates secondary students to participate in the academy. Total enrollment has purposefully been kept low, but has grown over time. In 1995, 36 secondary students participated; in 1997, 43 participated.

Training for students in the Leadership Academy has been conducted primarily by an English and communications instructor at MACC, with the support of other college faculty and administrators. Six sessions have been provided during the academic year, consisting of leadership, communication, presentation, and team building skills; and general information on the community college, Tech Prep, and ETC programs. Peer mentoring has been included in the academy as well. Through this arrangement, secondary Tech Prep students were assigned to a postsecondary Tech Prep student mentor who acted as a host or hostess during a daylong visit to the community college campus. The Student Leadership Academy has been perceived as a highly effective means of marketing Tech Prep to students in junior high and high school.

Tech Prep Curriculum Reform

In the Central State Consortium, curriculum was modified to support the implementation of Tech Prep and later ETC. The following section provides a summary of curriculum changes that have been part of this consortium's Tech Prep effort.

Core Curriculum and High School Graduation Requirements

To date, no high schools in the consortium adhere to a separate required curriculum for Tech Prep students; rather, several schools provide a list of recommended courses that comprise the Tech Prep options. Typically, these include both academic and vocational courses, with some of the vocational courses providing articulated credits at MACC. One high school (High School 102) identifies a Tech Prep curriculum with "suggested" vocational class sequences and core academic "requirements," but all other schools identify Tech Prep curriculum as recommended (as opposed to required). Five schools in the consortium (102, 103, 104, 108, and 110) publish a list of Tech Prep courses, and one of the five schools (110) provides a list of vocational courses in six cluster areas.

Without exception, Tech Prep students in all high schools in the consortium must meet state graduation requirements to graduate from high school, but they are not required to exceed them**.** According to the 1998 school code for the state, high school graduation requirements include:

- 3 years of language arts;
- 2 years of mathematics, one of which may be related to computer technology;
- 1 year of science;
- 2 years of social studies, of which at least one year must be history of the United States or a combination of history of the United States and American government; and
- 1 year chosen from music, art, foreign language (which shall be deemed to include American Sign Language) or vocational education.

Although AVC faculty believed the caliber of students taking vocational courses had risen since Tech Prep was first implemented, this change was not a result of increased graduation requirements imposed by Tech Prep. However, due to a strong philosophy of local control in this state, each high school can establish its own requirements beyond the minimum for high school graduation, resulting in variation among consortium schools (see Table 4). Only in one instance (High School 104) is there a stated set of core curriculum for Tech Prep that differs from standard graduation requirements. Specifically, High School 104 requires eight semesters of English and two years of math. Also evident in Table 4, there is no standard system of awarding credits or weighting classes across the high schools in this consortium, further complicating curriculum alignment activities at the consortium level.

Table 4
Credits Required for Graduation by High School

High School	No. of credits to graduate	Math	English	Science	Social Studies/ Science	Other Academic Requirements (not including PE, Drivers Ed, Consumer Ed, Health)
101	22	2 Yr.	3 Yr.	1 Yr.	2 Yr.	Community Service - 1 year Resource Management - ½ year Microcomputer Applications - ½ year Careers - ½ year 1 year from music, art, foreign language, vocational education
102	36	2 Yr.	3 Yr.	1 Yr.	1 Yr.	None listed
103	20	2 Yr.	3 Yr.	2 Yr.	2 Yr.	Keyboarding - 1 year Vocational and/or Electives – 2 years
104	40	2 Yr.	4 Yr.	2 Yr.	2 Yr.	None listed
105	19 (acad.)	2 Cr.	3 Yr.	2 Cr.	2 Cr.	1 credit from music, art, foreign language, or vocational education
106	45	2 Yr.	3 Yr.	2 Yr.	3 Yr.	Speech – ½ year 1 year from music, art, foreign language, vocational education
107	25.75	2 Yr.	4 Yr.	2 Yr.	2 Yr.	Civics - ½ year Keyboarding - 1 year 1 year from music, art, foreign language, vocational education
108	20	2 Yr.	4 Yr.	1 Yr.	2 Yr.	1 credit from music, art, foreign language, vocational education
109	24	2 Yr.	3 Yr.	2 Yr.	2 Yr.	1 year keyboarding or computer processing 1 year from music, art, foreign language, vocational education
110	45	2 Yr.	4 Yr.	2 Yr.	2 Yr.	Keyboarding - 1 year Computer Education - 1 year 1 year from music, art, foreign language, vocational education

Source: High School Course Catalogs

Note: The state requires enrollment in seven semesters of PE unless waived. If PE is waived, an equivalent amount of elective credit must be substituted. High schools in this consortium indicate different procedures for waiving PE courses, but high schools indicate that they require four years of PE for graduation. Seven high schools list one semester of Driver's Education as required. Seven high schools list one semester of Consumer Education or Resource Management as a requirement; one school lists one year; and one school lists one quarter. All schools require one semester of Health.

High school course credits vary from high school to high school, which accounts for the range of credits required for high school graduation indicated in Tables 4 and 5. Six of the high schools (101, 103, 105, 107, 108, and 109) count one credit for each year-long academic course and one-half credit for most semester courses, and the required number of credits for graduation range from 19 to 24. The other four high schools (102, 104, 106, and 110) count one credit for each semester course, and required credits for graduation range from 36 to 49, although three of the schools require 45 to 49 credits.

To understand how the minimum high school graduation requirements compare to university requirements and thereby the college prep curriculum, Table 5 summarizes the recommended courses for college prep in several high schools in the consortium, as compared to the minimum high school graduation requirements and Tech Prep requirements. In 1998, state universities collectively published the following list of minimum requirements specifying 15 total academic credits, with variations occurring by university:

- 4 years of English
- 2 or 3 years of social studies
- 3 years of math
- 2 or 3 years of science
- Other electives, including music, art, vocational education, foreign language

Table 5 lists university requirements, although these vary from one university to another across the state. For example, some universities require two years of science and others require three; thus, “2-3 years” is indicated in the table. Students who adhere to minimum high school graduation requirements do not meet the minimum university requirements in English, math, science, and foreign language in most of the high schools in the consortium. For students in the five schools where suggested or required courses are listed for Tech Prep, the science and English courses approach minimum requirements for university entrance, but the requirements in math and foreign language fall short of university requirements. No social studies requirements or computer skills courses were listed for Tech Prep students, although these are required by universities as indicated in Table 5.

Table 5
Minimum High School Graduation, Tech Prep, and University Requirements in Core Academic Subjects

Courses	Minimum High School Graduation Requirements	Tech Prep Requirements	University Requirements
English	3 yrs. (6 high schools) 4 yrs. (4 high schools)	4 yrs. (with exceptions for specific programs) (4 schools) 3 yrs. (with Applied English and Speech recommended) (1 school)	4 yrs.
Mathematics	2 yrs.	2 yrs. (except Ind. Cluster, requiring 3 yrs.) (1 school) 2 yrs. (Applied Math I, II & perhaps Geometry recommended) (1 school) 2, 3, or 4 yrs. (depending on TP cluster) (1 school) 3 yrs. (Algebra or Geometry-Algebra-Algebra 3/Tri or Algebra 3/Trig or Analysis) (1 school)	3 yrs.

Courses	Minimum High School Graduation Requirements	Tech Prep Requirements	University Requirements
Science	1 yr. (3 high schools) 2 yrs. (7 high schools)	2 yrs. (except Health cluster requiring 3 yrs.) (3 schools) 3-4 yrs. (Biology or MATS/A-Chemistry or Physics or Human Physiology & Anatomy) (1 school)	2-3 yrs.
Social Studies	1 yr. (1 high school) 2 yrs. (8 high schools) 3 yrs. (1 high school)	None listed	2-3 yrs.
Foreign Language	1 yr. (7 high schools include foreign language with other options for a 1 yr. elective requirement)	1 yr. (1 school)	2 yrs. (103; included with other elective options for 102 and 110)
Computer Skills	1 year (5 schools require Keyboarding and/or Computer Processing, Computer Education, or Microcomputer Applications	None listed	1 yr. Keyboarding (103)
Electives	1 yr. (7 schools require 1 yr. of electives from the following options: foreign language, music, art, or vocational education) 2 yrs. (1 school requires 2 yrs. of elective or vocational courses)	Vocational Course Sequences (5 schools) 1 yr. fine arts (1 school)	Other electives, including music, art, vocational education, foreign language (2 yrs. of same electives recommended by all 3 high schools who provide course listings for college prep)
Total Credits	Varies by school depending on how credits/years are counted (range: 19 credits – 45 credits)	None listed	15 credits

Source: High School Course Catalogs

Note: Only 5 high schools provided information on Tech Prep curriculum requirements.

The various high schools also offer a range of classes for learning disabled students, educable mentally handicapped, trainable mentally handicapped, and behavior emotionally disordered students. A few schools list developmental courses, such as General Math at 104, Developmental English (grades 9-10) at 108, and Basic English (grade 9) at 109. Other ways students having trouble in academic subjects are accommodated is by moving through the core curriculum at a less accelerated rate (e.g., not taking Algebra I until the junior or senior year rather than the freshman year).

Honors courses or honors programs are offered at eight high schools in the consortium. High School 102 indicated that developmental and honors courses are designated by a weighted grading system only, with developmental classes receiving 3.0 on a 4.0 scale and honors classes receiving 5.0 on a 4.0 scale. At High School 104, the MATS

(Motivated and Academically Talented Students) program is designed for students who meet designated criteria on Stanford Achievement Tests (above 95 percentile), IQ tests (above 125), teacher inventories, and the Slosson Intelligence Test. Since Tech Prep enrollment in this consortium is not limited to a specific academic range, Tech Prep students are eligible to participate in developmental courses or honors courses, as appropriate.

Since 1992, secondary curricula have included applied academics courses, including Applied Communications, Applied Math Year 1, Applied Math Year 2, Applied Biology, and Applied Chemistry. Applied courses are available to students at both the high school and community college levels (see Table 6). Many courses in the vocational sequences are designated as applied and are taught using applied methodologies (e.g., hands-on course work; practice using real-world or work-based activities, equipment, and materials; interactive learning opportunities with high levels of student participation).

Table 6
Applied Academics Courses by High School and Community College

High School	Applied Courses Offered	Grade Level
101	Applied Algebra A Applied Algebra B Biological Science Applications in Agriculture/ Physical Science Applications in Agriculture	9-12 10-12 11-12 11-12
102	Applied Vocational Math	11-12
103	Applied Math I Applied Math II Applied English Applied Communications Incorporated Throughout	9-11 10-11 11-12 9-11
104	English 5-6 T English 7-8 T Applied Physical Science	10 11 9-10
105	None designated as applied academics courses	
106	Vocational Math I Vocational Math II	10-11 11
107	Tech Prep Math I Tech Prep Math II	
108	Integrated Math	10
109	None designated as applied academics courses	
110	Tech Math 1 Tech Math 2	10 11-12
MACC	<u>English:</u> Technical Communication (ENGL 122) Communication Skills (Office Personnel) (ENGL 130) Human Services Communications (ENGL 140) <u>Math:</u> Business Mathematics (MATT 104) Pre-Technical Mathematics (MATT 132) Technical Mathematics I (MATT 133) Technical Mathematics II (MATT 134)	13-14

Source: High School Course Catalogs and Community College Catalog

Applied academics courses are not limited to Tech Prep students, partly because the schools are too small to create a separate track. However, there is no evidence that the schools want to create a separate track and, in fact, many school officials, teachers and parents object to this idea strongly. Speaking to this point, the elimination of the Tech Prep SWIS program at school 104 typified local objections to the creation of special programs for selected students. Rather than create separate Tech Prep classes, students are encouraged to take the regular academic courses. Now, in High School 104, students participating in Tech Prep take the same academic courses as all other students. Instead of creating distinct courses for particular students, there is a deliberate attempt to infuse applied and integrated academics into the curriculum at large. If students find the course work too challenging, they would be encouraged to stay in the course but slow their pace. For example, students may take two years to complete Algebra 1 rather than one year.

While several teachers, particularly at the AVC and MACC, said they were already teaching applied courses before Tech Prep, the Tech Prep initiative was attributed with furthering these efforts, particularly because of the funds made available to purchase new applied course materials. In 1994 applied materials were purchased for all area high schools. Regional Tech Prep funds were also used to purchase English and math curriculum materials. In addition, the consortium purchased science modules (i.e., the Principles of Technology curriculum), although the science materials were less widely requested and used. According to the Tech Prep coordinator, faculty have been provided with training to use the materials, but they have always been used selectively. She also indicated that the applied English/communications materials were probably used more extensively than other applied materials. Faculty who were interviewed validated that they used the materials selectively and also indicated that they used the same materials for students at different grade levels. Recent interviews with students indicated that many teachers use applied methodologies even in classes that are not designated as applied.

Tech Prep and the Curriculum of the Community College

Admission at MACC is based on an open admissions policy that indicates anyone can be admitted who: a) has earned a high school diploma or General Education Development (GED) diploma, or b) shows successful performance in testing programs designed to assess ability and competency. Students enrolling in transfer (i.e., Associate of Arts [AA] or Associate of Science [AS] or career-oriented programs (i.e., Associated of Applied Science [AAS]) are either fully- or provisionally-admitted. The community college specifies core curriculum for the various degree programs as shown in Table 7.

Table 7
Minimum College Credit Requirements for Various Degree Programs

Curriculum Area	AAS Degree Requirements	AA Degree Requirements	AS Degree Requirements	AES Degree Requirements
Communications	6 hours	9 hours	9 hours	6 hours
Science	3 hours (total math and science)	6 hours	8 hours	16 hours (laboratory)
Math		3 hours	6 hours	19 hours
Humanities	3 hours	15 hours	9 hours	3-9 hours
Social Science	3 hours	9 hours	9 hours	3-9 hours
Human Well-Being	None listed	3 hours	3 hours	2 hours
Electives/Other	47 hours of courses in area of concentration, depending on program	17 hours of electives in areas of interest for fulfillment of sequences, prerequisites, and other transfer requirements	18 hours of electives in areas of interest for fulfillment of sequences, prerequisites, and other transfer requirements	6-14 hours in engineering specialty courses
Total Credit Hours	62-69 hours (varies, depending on program)	62 hours	62 hours	62-65 hours

Source: Community College Catalog

In addition to general admission requirements, all first-time students who enter as full-time students are required to take ACT's ASSET test, and placements in courses are based on these test scores. Part-time students are required to take the test only if they are entering a math or English course or a course with a reading level requirement. According to the coordinator of placement at MACC, placement in math and English courses for initially enrolling students is relatively well-enforced. Students are not supposed to take college-level courses unless their placement scores indicate that they have attained the required skill level. However, reading test scores are used less effectively, since many courses require college-level reading skills but do not require placement based on ASSET test scores.

Though attempts have been made to address core curriculum issues and minimum requirements in order to provide Tech Prep students with a smooth transition to the community college, these course sequences (and articulation agreements) do not always guarantee successful transition of students from one course to another, from one level of education to another, or from one job to another. To address the needs of students who do not test at a level appropriate for entry into regular community college classes, other remedial courses have been developed and designated as pre-tech. For these classes, the instructor selects material to be covered that will advance students to the appropriate skill level and also give them information about entry-level competencies required for their selected careers. Classroom methods are adapted to meet students' learning needs while still addressing course content.

Articulation Agreements and the Vocational Curriculum

All high schools provide access to vocational education courses, even if the courses are not available at the home school. Through the regional vocational delivery system (which closely parallels this consortium's geographic region), vocational courses are taught at the home high schools or AVC, but most are offered at the AVC.

Tech Prep has facilitated the development of formal articulation agreements in vocational areas since its inception in 1991. By 1995-96, 25 Tech Prep programs of study were developed in the following areas: Power Systems; Social Science Careers; Business, Marketing, Management; Health; Agriculture; Information Systems; Office Systems; and Industrial Careers. Each program was developed collaboratively by MACC and the high schools and AVC, with the support of advisory councils and business representatives. All Tech Prep programs of study were designed to meet AAS degree requirements, supported by 34 articulation agreements.

Tech Prep programs of study comprise both academic and vocational-technical courses, with the vocational-technical courses yielding college credit far more than academic courses. The 25 programs of study designated as Tech Prep, paralleling specific career fields, follow:

- Accounting Office Personnel
- Accounting
- Administrative Assistant Personnel
- Agribusiness
- Associate Degree in Nursing
- Commercial Floriculture
- Computer Communications and Networks
- Computer Programming/Mainframe & Mid-Range
- Computer Programming/Systems
- Criminal Justice - Law Enforcement Option
- Desktop Publishing Office Personnel
- Early Childhood: Teacher Aide Option
- Early Childhood Education Services - Early Childhood: Day Care Option

- Electronic/Computer Option
- Electronic Technology
- Human Services
- Industrial Maintenance
- Manufacturing Engineering Technology
- Manufacturing Engineering Technology (CAD option)
- Marketing Mid-Management
- Medical Office Personnel
- Office Support Specialist
- Ornamental Horticulture
- Power Technology
- Work Processing Office Personnel

The most structured requirements for Tech Prep are provided in articulation agreements linked to specific courses within the Tech Prep programs of study. Table 8 provides a sample of courses that provide articulated college credit for high school students in this consortium.

Table 8
A Sample of Articulated Credit Courses at MACC

Vocational Course	Schools Offering Course	MACC Course
Horticulture Conservation (HORT I-II (A122) and/or HORT III-IV (A222)	AVC	Introduction to Floral Design HORT 160
Accounting 1-2 (B151)	101, 102, 104, 105, 106, 107, 108	Accounting I BACC 113
Keyboarding 1 (B 320)	All high schools in study	Keyboarding BOFF 114
Micro App. 1-2 (B 131)	101, 102, 104, 106, 108	Basic WordPerfect BOFF 134
Auto Mechanics IA-IIA (I 232A) or Auto Mechanics I-II (I 132) and/or Auto Mechanics III-IV (I 232B)	106 AVC AVC	Intro. to Engine Technology Power 103
Electronics I-II (I 142) and/or Electronics III-IV	AVC	Intro. to Electricity and Electronics ELEC 160
Welding I-II (I 192)	AVC	Arc Welding

Vocational Course	Schools Offering Course	MACC Course
Welding III-IV (I 292)		WELD 180
MFG 1-2 (I 181) or MFG I-II (I 182) and/or MFG III-IV (I 282)	102, 106 AVC AVC	Basic Machining MFRG 160
Drafting I-II (I 162) and/or Drafting III-IV (I 262)	AVC	Tech Drafting I DRAF 163

Source: Community College Catalog and Various High School Course Catalogs

As stated in the Tech Prep definitions adopted by this consortium, an articulation agreement means a commitment to a program designed to provide students with a non-duplicative sequence of progressive achievement leading to competencies in a Tech Prep education program. According to AVC faculty and community college personnel, although articulation agreements existed between the community college and secondary schools for a number of years prior to Tech Prep, they were seldom if ever used. According to the consortium coordinator, usage has increased over the years of implementation of Tech Prep. The MACC catalog states that, in order to obtain college-level course credit for these articulated classes, a student is required to complete the high school class with a C or better, enroll in the approved Tech Prep program at the community college within 18 months of high school graduation, and apply for the credit with the appropriate division office at the community college.

In this consortium, college credit is granted for classes taken in high school after a student has completed nine hours of college work successfully with a C or better average in the articulated program. If a student does not make satisfactory progress (C or better) in the next higher level course, the student may be required to return to a lower-level course. This decision is at the discretion of the division chair and the instructor for the course in which the student's performance is less than adequate. Students are not charged a fee for any articulated courses and are not allowed more than six college credit hours of articulated credit.

Career Pathways

Since 1995, the consortium has used a clustered approach to describe Tech Prep programs of study offered at both the AVC and MACC. Other vocational programs exist at the AVC, but the majority are part of Tech Prep. In 1995, the programs that included articulated agreements and structured course sequences were organized into eight career clusters. However, with implementation of ETC, the state has emphasized the development of six career pathways. In an attempt to align the eight career clusters with Tech Prep and ETC, this consortium has classified the vocational curriculum into six career pathways. Table 9 shows the relationship between the previous Tech Prep programs of study and the newly designed career pathways.

Table 9
Tech Prep Program Areas by Career Pathway

Career Pathway	Tech Prep Programs of Study
Industrial & Engineering Technology	• Automotive Technology • Electronic Technology • Electronics-Computer Option • Industrial Maintenance • Manufacturing Engineering Technology • Manufacturing Engineering Technology, CAD Option
Business, Administrative and Technology	• Accounting • Accounting Office Personnel • Administrative Personnel • Computer Communications & Networks • Computer Programming/PC Systems • Desktop Publishing Office Personnel • Marketing • Medical Office Personnel • Medical Office Services • Small Computer Systems • Software Specialist
Health Services	• Bachelor's Prepared Registered Nurse • Certified Nursing Assistant – Certificate • Licensed Practical Nurse – Certificate and Pre LPN • Radiological Technology – AAS • Food Handlers Certificate • Medical Office Personnel – AAS and Medical Office Services – Certificate • Health Administration • Medical Technology • (Pre) Optometry * • (Pre) Occupational Therapy * • (Pre) Pharmacy * • (Pre) Physical Therapy * • (Pre) Med. and Dentistry * • (Pre) Veterinary *
Human Services	• Early Childhood: Day Care Option • Early Childhood: Teacher Option • Criminal Justice: Law Enforcement • Marketing • Substance Abuse Counselor Training, Human Service
Agriculture and Natural Resources	• Agri-Business – AAS-DACC • Commercial Floriculture – AAS • Ornamental Horticulture – AAS • Floral Design – Certificate • Grounds Attendant Certificate
Arts and Communications	• Marketing • Desktop Publishing

Source: Career Pathways Inservice Workshop Materials (1999)
Note: Programs designated by an asterisk are transfer degree programs.

Some changes in curriculum have resulted in transitioning older, more traditional vocational education programs of the late 1980s and early 1990s into structured Tech Prep programs of study. These changes have included the integration of academic skills and Secretary's Commission on Achieving Necessary Skills (SCANS, 1991) into vocational courses as well as some integration of vocational and SCANS skills into academic courses. At both the secondary and college levels, the changes have included the use of more applied methodology in academic classes (e.g., more hands-on assignments, less lecture and more discussion-oriented classes, more collaboration among students in preparing assignments, greater use of real-world assignments, etc.). These curricular changes have received ongoing support from the local Tech Prep consortium. However, the extent to which the movement from eight clusters to six career pathways will enhance curriculum remains to be seen. The Central State Consortium coordinator sees career pathways as a means of continuing the enhancement of vocational programs, including Tech Prep programs of study. Thus, she strongly endorses the use of the six career pathways for all Tech Prep programs of study and has used Tech Prep funds to provide professional development related to the career pathways. Through this use of Tech Prep funds, technical assistance was provided during spring 1999 by an out-of-state consultant who is affiliated with the Northwest Consortium included in this study and has a history of implementing career pathways in high schools.

Integration of Academic and Vocational Curriculum

Local stakeholders see Tech Prep as a predominant means of integrating academic and vocational education. At the same time, they recognize the complexities in implementing academic and vocational integration and believe they have a long way to go before they achieve a high level of implementation. Still, throughout the 1990s while Tech Prep implementation has occurred, constant attention has been paid to integration. In 1994, curriculum development efforts across the consortium resulted in a number of integration projects. During that year, school officials of High School 105, a small rural school, reported that they had conducted almost 40 separate integration projects. During that same year, in High Schools 103, 104 and 106 integration projects were conducted. Integration projects began at MACC in 1996, including the development of a new integrated environmental science course that combines ethics and writing skills with environmental science. Also in 1996, career awareness materials were purchased for the high schools for infusion into the curriculum. Since 1997, some students in the Tech Prep consortium have been provided with contextual learning opportunities that include a project developed by the local newspaper and a project conducted at the local water company.

Instruction and Delivery of Curriculum

Patterns of change in instructional practices seem to be related to the core academic disciplines. Changes in the English curriculum have occurred where teachers at both the secondary and postsecondary levels have altered their curriculum to reflect more of a career focus. English teachers described their efforts as focusing more on "process than product," allowing students to work more collaboratively, to do peer evaluations, and to self-evaluate their writing. One English teacher expressed satisfaction that she and other teachers let students continue to work on a product "until they get it right--sometimes over several years of high school." These same high school English teachers also indicated that their courses were somewhat less literature-based and more thematic than before Tech Prep. They selected literature with a more practical focus and relied on approaches that combined reading, writing, listening, and speaking. This integration of skills and application of knowledge enabled English and communication teachers to address a number of skills that were included in SCANS and other competency listings and to reinforce problem-solving and decision-making skills.

At the community college level English teachers talked about collaborating with colleagues after participating in the business and industry tours. One instructor said she had invited several business representatives whom she met on tours to do mock interviews with her students. She also assisted in developing the integrated environmental science class at MACC. While this instructor's enthusiasm for teaching in new ways was encouraging, she lamented the fact that the potential for English teachers to support integration was overwhelming. In her opinion, because writing crosses every discipline, the opportunity for integration is enormous, but there is too little time to develop effective curriculum and not all academic faculty are supportive or cooperative.

Work-Based Learning

Work-based learning (WBL) preceded the federal STW legislation in this site since Tech Prep was first implemented in 1991. Anticipating STW even at this early date, WBL became a "required element" of all consortia in the state where the Central State Consortium is located. Here, WBL was implemented extensively, spurred on by the strong need for viable solutions to workforce development problems. Although some WBL opportunities existed prior to Tech Prep in this consortium, they were relatively traditional. Cooperative education (co-op) and random exposure to business and industry through field trips were the main avenues for WBL offered through both the AVC and high schools. Since Tech Prep implementation, WBL has evolved into more structured learning opportunities that feature job shadowing and youth apprenticeships. Co-op learning and internships have also been enhanced.

Job Shadowing

Although it was not offered before Tech Prep, job shadowing is now viewed by many educators as a key feature of Tech Prep. Piloted for the first time during 1994 and expanded to include all high schools in 1995, job shadowing is a one-time activity for ninth graders that gives them an opportunity to see first-hand the skills and abilities needed for various occupations. Based on their career interests, students choose three careers they would like to shadow during a typical workday, and then they are matched with business mentors. Students spend approximately five hours in a job shadowing activity--four hours with a mentor in the shadowing experience and an hour in transportation and lunch that is provided by each student's assigned mentor. AVC staff provide guidelines, questionnaires, evaluation forms, and follow-up letters to support job shadowing as a WBL activity. One high school guidance counselor indicated that students who participate in job shadowing are given homework related to their job shadowing experience. Students also participate in roundtable discussions after the event. Over 700 freshman students and 80 businesses have participated in recent job shadowing events.

Co-op Experiences

For a number of years, students in area high schools and the AVC have participated in Cooperative Career Education (co-op), or Cooperative Extended Campus. In the past, co-op programs were available for seniors only and included work-site learning for two or three days of the five-day school/work week or for part of each school day. In recent years, these co-op learning experiences have been expanded to include juniors and seniors. Work-related classes at school emphasize career opportunities, planning for the future, job-seeking skills, personal development, and economics. Increasing numbers of Tech Prep students who are not youth apprentices have participated in these more structured co-op experiences in recent years.

Internships

In addition to co-op, internships have also been enhanced and expanded at the community college in association with Tech Prep. MACC students receive three to six hours of credit during their program of study for WBL, primarily through internships. Over 70% of the programs at MACC offer WBL experiences as part of a program of study. In the past two years, the state agency that administers higher education has provided a WBL grant that pays 50% of an intern's wages. As with co-op, increasing numbers of Tech Prep students are participating in this WBL option.

Youth Apprenticeships

The most extensive approach to WBL offered is the youth apprenticeship model. Development of the youth apprenticeship program parallels the development of Tech Prep, and the two approaches are considered inseparable. Tech Prep is viewed as the more global educational approach, with youth apprenticeships as a primary vehicle to accomplish it. Development of the youth apprenticeship program has been deliberate and carefully planned, though not without difficulties. Any time such an extensive educational plan is put into place, barriers will need to be overcome. In the following brief narrative, the evolution of Central State Consortium's youth apprenticeship program is outlined, including its successes and failures.

Development of the Tech Prep/youth apprenticeship program began in 1993-94 when two manufacturing companies approached the Tech Prep consortium to start youth apprenticeships designed to combine school- and work-based learning. The goal was (and still is) to move students through a required sequence of courses that would develop competencies for the careers they desired to pursue through the Tech Prep program of study. A few years later, other businesses expressed interest in the youth apprenticeship concept, encouraging the local Tech Prep consortium to expand their concept of youth apprenticeship. Subsequently, besides manufacturing, youth apprenticeship programs were developed in accounting and banking, consumer management, and health occupations. However, the vast majority of youth apprenticeships are still affiliated with manufacturing occupations or associated with manufacturing firms in the area, including apprenticeships in accounting.

Through youth apprenticeships, students at the secondary and postsecondary levels receive academic credit through their participation in supervised work-site experiences supported by academic and vocational training. The Tech Prep/youth apprenticeship programs of study follow a specified sequence of articulated courses, creating the pathway that is non-duplicative and progressive in difficulty. To ensure this goal is met, instructor/mentors are assigned at MACC and they meet with their assigned students at least twice during the semester to monitor academic and work-site progress.

Unlike other components of the local Tech Prep initiative, the youth apprenticeship component includes a selective admissions process. All students at the tenth-grade level are provided with information about the option and are asked to apply. Notifications are passed along to high school counselors, and they, in turn, recommend students who they think will be interested. As long as students meet the basic requirements of less than six absences during the first two years of high school, grade level or higher performance in math and reading (using whatever measure is used by the school), and no serious disciplinary problems in or out of school, counselors can recommend the students. Grades and test scores are not usually used for screening youth apprentices.

Once student applicants are recommended for the program, they and their parents are invited to an on-site orientation. At that time, business representatives explain the types of entry-level positions for which the apprentices will be qualified at completion of the program. For students still interested after the orientation, the screening process consists of two interviews, a physical examination, and drug screening. Most companies sponsoring apprenticeships also ask students to prepare a written communiqué prior to the first interview to demonstrate communication skills. Critical thinking and problem-solving exercises are presented to students during the second interview.

Each participating company works from a basic apprenticeship model but is allowed to design its own apprenticeship by identifying employee skills and needs, customizing selection and screening criteria, restructuring the WBL experience (including scheduled work times, salary, plan for developing skills, tuition reimbursement or payment plan, etc.), and offering other details. Businesses work closely with secondary and postsecondary educators to develop supportive curriculum. In addition to academic and technical course work, the general youth apprenticeship model typically includes:

- continuous paid work-site experience for the duration of the apprenticeship;
- student training through the Student Leadership Academy;
- work-site supervisor training through Work-site Training Workshops;
- instructor/mentors;

- business-paid postsecondary education;
- guaranteed full-time employment for a designated period of time upon successful completion; and
- occupational program guarantees of competencies required by business and industry for a given program of study.

All apprentices are assigned a work-site supervisor/mentor. Work-site mentors are chosen on the basis of three primary factors: depth of technical knowledge, quality of work ethic, and interest in working with people. In order to enhance the quality of the work-site learning experience, the community college and local business partners who provided youth apprenticeships sponsored a three-day training program for work-site mentors titled National Work-site Supervision Certification, Level 1. This training was developed by Jobs for the Future (JFF), Maine's Center for Career Development, and Siemens Corporation. Fifteen participants attended the first workshop in September of 1996. The workshop focused on the Tech Prep and ETC initiatives, quality, psychology of youth and learning, job analysis, communication and instruction, conflict resolution, legal considerations, work safety, and student orientation. The college has since developed and provided its own eight-hour Work-site Supervisor Workshop. The training includes four modules:

Module 1 - Introduction to Work-site Training

Module 2 - Training

Module 3 - Soft Skills

Module 4 - Essential Elements

Although the college is not in a position to require work-site supervisors to attend this training, many work-site supervisors do attend, and businesses participating in apprenticeships strongly endorse work-site supervisor training for their employees.

Interestingly, applications to the youth apprenticeship program have risen at MACC, while interest has declined at the high school level. Though approximately 150 secondary students submitted applications during the first year when only 10 youth apprenticeships were offered, the number of secondary applicants has tapered off significantly in recent years. In 1998, 85 high school students applied for youth apprentices available in five cluster areas (manufacturing, accounting, banking, consumer management, and health occupations) and involving more businesses. According to several vocational faculty, the reason for declining applicants is that counselors have become more selective in making recommendations as they have come to better understand what businesses are looking for in a youth apprentice. Of the 85 high school students who applied for the youth apprenticeship program for the 1997-98 academic year, 40 students were accepted.

Manufacturing Youth Apprenticeships. Numerous meetings between the Tech Prep coordinator and local manufacturing industries resulted in an agreement to implement a modified version of an inter-firm manufacturing youth apprenticeship program, and this was the first apprenticeship program to be implemented in the Central State Consortium. Beginning in 1995, students who participated in the inter-firm manufacturing youth apprenticeship program were placed in one of five industries in the area. A total of 18 youth apprentices were placed in these manufacturing firms at the time. Nine of these apprentices were placed in a large manufacturing firm that produces plastic packaging films for meat and foods. Other sponsoring manufacturers produce forklifts, trucks, and parts; carbon steel crankshafts; and heat transfer equipment products. Later, welding and machine shops signed on. The first students to complete these manufacturing youth apprenticeships graduated from MACC in 1997.

At the secondary level, all manufacturing youth apprentices complete the Ford Academy of Manufacturing Sciences (FAMS) curriculum offered at the AVC. At the postsecondary level, most apprenticeship programs of study require at least two semesters of English/communications classes, at least one semester of math, and one social science elective in addition to technical courses. Some apprenticeships also require a semester of science. Postsecondary students split their time between work and school. Some youth apprentices had a less regular work-site schedule (e.g., one entire month at a work site) or spent alternate days at school and work (e.g., Monday, Wednesday, and Friday at school and Tuesday and Thursday at work). One manufacturing site in particular provided no work-site experience during the school year but hired youth apprentices full-time for eight to ten weeks during the summer. However, the majority of the apprentices indicated that they spent 16-24 hours per week at the work-site during the school year, and most also continued their employment during the summer months.

As an aside, in 1997 the Tech Prep coordinator developed a modified apprenticeship program to allow postsecondary students who had not participated in an apprenticeship in high school to participate in a sequence of college courses coupled with work-site experience, yielding a certificate or AAS degree. This program is referred to as the Fast-Track Apprenticeship, but it is not considered an official Tech Prep option because it lacks the secondary component. Still, it demonstrates the degree of enthusiasm for the apprenticeship model at MACC and within the community.

Between 1995 and 1997, a total of 37 students from the 10 high schools included in this study were identified as youth apprentices at the time of their graduation from high school, and these apprentices were almost entirely in manufacturing. By 1997-98, 23 different companies in the region were supporting youth apprenticeships, mostly related to manufacturing. In total, 45 were secondary apprentices; 27 students were postsecondary apprentices. All 27 postsecondary students were enrolled in manufacturing apprenticeships or engaged in apprenticeships in a manufacturing environment, usually doing an accounting apprenticeship. At the secondary level, the apprenticeships were more diversified, but most were involved in manufacturing. Only eight secondary students were involved in banking or accounting, one in healthcare, one in consumer management, and two in automotive companies.

In 1998, most apprentices reported receiving between minimum wage and $7.00 per hour. The site that hosted the largest number of manufacturing apprentices advertised that it paid $8.00 per hour, but youth apprentices actually received minimum wage with the remaining wages held in escrow for college tuition. While not all students were clear about all aspects of their compensation, all understood that their college tuition was being paid by the sponsoring firm. Generally, sponsoring companies contributed approximately $3.00 per hour on behalf of each apprentice for college tuition. The funds were either paid to the students as reimbursement for tuition or paid directly to the college.

While the model for youth apprenticeships has gained support from local businesses, its implementation has brought to light some potential areas that need improvement. Students involved in manufacturing apprenticeships believed the curriculum provided a strong foundation for college and offered good career opportunities; however, over half indicated that clearer communications should be provided about the key features of the program at the beginning. Several manufacturing apprentices involved in eight-ten weeks of summer employment expressed discontent with the schedule. A few indicated they experienced problems with union laborers who felt their jobs were threatened. However, overall, the apprentices felt positively about the program and were grateful about the opportunity the youth apprenticeship had provided them to attend college and gain work experience. From an employer's perspective there were many benefits. Most importantly, the program provided a new source of entry-level employees for local manufacturers, even though there had been some challenges in recruiting and retaining students. Yet, in this community, workforce needs still far exceeded the number of students who participating in youth apprenticeships. Some described the current apprenticeship initiative as a "drop in the bucket" in terms of solving local workforce concerns. Knowing that, the local commitment to the youth apprenticeship concept was understandable. Local stakeholders were proud of their accomplishments, believing the benefits far outweighed any difficulties.

Student Demographics, Experiences, and Preliminary Outcomes

The following section provides a summary of preliminary outcomes for a sample of high school graduates randomly selected from ten schools participating in the Central State Consortium in three groups: Tech Prep, non-Tech Prep, and youth apprentice. Preliminary results are presented relative to student demographics and educational characteristics; math and vocational course-taking; and transition to postsecondary education, particularly to the community college within the Central State Consortium. Employment during and after high school is also presented.

Similarly to the methods used for all cases in this study, sample selection for this consortium entailed the acquisition of lists of all Tech Prep high school graduates who completed high school in 1995, 1996 and 1997. The students had graduated from one of the ten high schools that reported Tech Prep student enrollments in the Central State Consortium. (See Appendix A for further details on student and site sampling decisions for this site.)

Since this consortium does not treat Tech Prep as a special program or label Tech Prep students as such, school personnel were asked to identify Tech Prep students based on the local (and state) definition which specifies that a Tech Prep student is "one who has made a conscious decision to follow a clearly defined sequence of courses to prepare for employment in a Tech Prep occupation." According to the definition, "a conscious decision means the student has declared Tech Prep as a major and has a formal Individualized Career Plan (ICP) indicating a Tech Prep occupation as his/her goal." Tech Prep/youth apprentices met this definition, but additional criteria were used in their selection into the youth apprenticeship program, including good attendance, disciplined behavior, and at least average academic performance. In contrast to the Tech Prep initiative where distinctions were downplayed, the Tech Prep/youth apprenticeship program was quite evident, with the youth apprentice label used widely to describe program participants.

Using the lists of Tech Prep graduates supplied by the high schools, a graduate sample was drawn for the Central State Consortium. The number of Tech Prep graduates in 1995 was extremely small, causing us to drop this cohort group from the analysis altogether with the exception of four youth apprentices who were included with the 1996 graduate cohort. For the 1996 and 1997 cohorts, all Tech Prep high school graduates were arrayed according to class rank percentile (separately by high school), and a random sample of about 260 was drawn, ensuring that the sample was reflective of the total population of Tech Prep graduates in each school and by graduation year. Once the Tech Prep sample was drawn, a similar sample of non-Tech Prep graduates was selected at random from the same high schools using the same upper and lower limits on class rank percentile as the Tech Prep group, ensuring a comparable distribution on class rank at high school graduation.

As specified above, the total population of youth apprentices in 1995, 1996, and 1997 was selected for the study because this group was small, representing a total of 37 youth apprentices for all three years. In fact, at the time the initial sample of Tech Prep graduates was selected, the youth apprentices and Tech Prep graduates were grouped together. However, later when field visits from this study showed that the educational experiences of the youth apprentice group were substantively different from the Tech Prep group, a decision was made to separate the youth apprentice and Tech Prep groups for data analysis purposes. When this was accomplished, a significant difference in class rank percentile and cumulative GPA became evident between the groups, with the non-Tech Prep and youth apprentice groups showing higher academic performance than the Tech Prep group. (Refer to Table 11 for frequency distributions for the three groups on class rank percentile and cumulative GPA.) ANOVA revealed that the mean class rank percentile for the non-Tech Prep group ($M = 48.7$) was significantly higher ($F = 4.7$, $df = 2$, $p = .01$) than the mean class rank percentile for the Tech Prep group ($M = 43.3$) and was lower, though not significantly, than the mean class rank percentile of the youth apprentice group ($M = 54.9$). Similarly, ANOVA showed that both the non-Tech Prep and youth apprentice groups had a significantly higher mean cumulative GPA than the Tech Prep group ($F = 7.27$, $df = 2$, $p = .001$). When examining results in this section it is important to keep these group differences in mind, particularly in terms of academic and vocational course-taking and transition to postsecondary education.

Demographics and Personal Characteristics

Like the local vicinity where it is located, Tech Prep high school graduates were predominantly White (about 90%), with a very small percentage of African-Americans and Hispanics represented in the group. Tech Prep graduates were fairly evenly divided between males and females, as was the non-Tech Prep group. However, a significant difference was evident on gender between the three groups ($\chi^2 = 11.52$, $df = 2$, $p = .003$). A larger percentage of the youth apprentice group (78%) was male than the total Tech Prep (57%) and non-Tech Prep groups (45%), due to a dramatic imbalance during 1996, with 93% of the youth apprentices being male and 7% female. The 1997 cohort of youth apprentices was divided more evenly between males and females, due mostly to a concerted effort to recruit more females into the 1997 youth apprentice cohort.

On other personal characteristics, all three groups were predominantly single, and the majority lived at home with their parents. About two-thirds of graduates in all three groups reported living at home with their parents when the follow-up survey was conducted one or two years after high school graduation. As expected, there was a tendency for more recent graduates to be living at home than those who graduated earlier, but these differences were not significant.

When asked about their father's education level, the majority of graduates in all three groups indicated their fathers had either finished high school only or had some college but no degree. The mother's education level followed a similar pattern, except for the youth apprentice group where the mother's education level was higher ($F = 3.36$, $df = 2$, $p = .04$). Thirty-three percent of the mothers of youth apprentices had a bachelor's degree or higher, compared to only fourteen percent of the Tech Prep and fifteen percent of the non-Tech Prep graduates. The majority of graduates in all three groups indicated that, while they were still in high school and living with their parents, their total annual family income was between $30,000 and $60,000. No difference was found in family income between the three groups or 1996 and 1997 cohorts within the groups.

Table 10
Percentage Distribution on Selected Demographics by Tech Prep Status and Year of High School Graduation

	Non-Tech Prep			Tech Prep			Tech Prep/ Youth Apprentice		
	Total Grad. n=156	1996 Grad. n=63	1997 Grad. n=93	Total Grad. n=148	1996 Grad. n=68	1997 Grad. n=80	Total Grad. n=30	1996 Grad. n=15	1997 Grad. n=15
Gender									
Male	45.0	43.9	46.1	57.2	58.7	56.0	78.3	93.3	50.0
Female	55.0	56.1	53.9	42.8	41.3	44.0	21.7	6.7	50.0
Race/Ethnicity									
White, non-Hispanic	92.0	91.9	92.0	89.5	95.5	88.6	89.7	86.7	92.9
Black, non-Hispanic	4.8	8.1	2.7	7.2	3.0	6.3	10.3	13.3	7.1
Hispanic	2.7	0.0	4.3	2.6	2.9	2.5	0.0	0.0	0.0
Asian/Pacific Islander	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
American Indian/ Alaskan Native	0.6	0.0	1.0	0.7	0.0	1.3	0.0	0.0	0.0
Marital status									
Single	87.9	85.7	89.4	85.7	86.8	84.8	90.0	93.3	86.7
Single with children	7.6	4.8	9.6	7.5	7.4	7.6	3.3	0.0	6.7
Married	3.8	7.9	1.1	2.7	1.5	3.8	0.0	0.0	0.0
Married with children	0.6	1.6	0.0	4.1	4.4	3.8	6.7	6.7	6.7
Father's education level									
Less than HS graduate	10.0	13.3	7.8	8.8	9.5	8.2	6.9	6.7	7.1
HS graduate	35.3	33.3	36.7	39.7	33.3	45.2	48.3	53.3	42.9
Some college, no degree	25.3	30.0	22.2	23.5	30.2	17.8	24.1	6.7	42.9
Two-year associate's degree	12.0	15.0	10.0	14.0	15.9	12.3	13.8	20.0	7.1
Four-year bachelor's degree	13.3	6.7	17.8	12.5	9.5	15.1	6.9	13.3	0.0
Graduate degree	4.0	1.7	5.6	1.5	1.6	1.4	0.0	0.0	0.0
Mother's education level									
Less than HS graduate	3.9	3.3	4.3	5.7	7.7	3.9	10.0	6.7	13.3
HS graduate	34.9	31.7	37.0	46.1	47.7	44.7	20.0	20.0	20.0
Some college, no degree	24.3	36.7	16.3	17.7	15.4	19.7	26.7	33.3	20.0
Two-year associate's degree	17.1	13.3	19.6	17.0	15.4	18.4	10.0	6.7	13.3
Four-year bachelor's degree	16.4	13.3	18.5	9.9	9.2	10.5	20.0	20.0	20.0

Table 10 (cont.)

Graduate degree	3.3	1.7	4.3	3.5	4.6	2.6	13.3	13.3	13.3
Family income									
$14,999 or less	6.9	7.7	6.4	5.6	4.0	6.9	7.7	7.1	8.3
$15,000 – $29,999	12.3	13.5	11.5	24.1	24.0	24.1	7.7	7.1	8.3
$30,000 – $44,999	26.9	30.8	24.4	26.9	26.0	27.6	38.5	57.1	16.7
$45,000 – $59,999	24.6	21.2	26.9	20.4	18.0	22.4	26.9	14.3	41.7
$60,000 – $74,999	12.3	17.3	9.0	13.9	16.0	12.1	11.5	7.1	16.7
$75,000 – $89,999	10.0	7.7	11.5	7.4	10.0	5.2	3.8	7.1	0.0
$90,000 or more	6.9	1.9	10.3	1.9	2.0	1.7	3.8	0.0	8.3
Present residence									
Live with my parent(s)	66.7	60.7	70.7	66.2	57.4	73.8	58.6	53.3	64.3
Live alone	8.5	8.2	8.7	12.2	20.6	5.0	17.2	13.3	21.4
Live with spouse or significant other	7.8	13.1	4.3	10.8	8.8	12.5	6.9	6.7	7.1
Live with a friend or roommate	17.0	18.0	16.3	10.8	13.2	8.8	17.2	26.7	7.1

Source: Education-To-Careers Follow-up Survey File (n = 334) for all items except gender, which came from the Tech Prep High School Transcript File (n = 558).

Note: Details may not sum to 100 due to rounding.

Educational Characteristics

In terms of overall results on class rank percentile, it is important to note that the Tech Prep graduates were represented in all four quartile groups on class rank percentile, though the vast majority of Tech Prep graduates were in the middle two quartiles, between the 26th and 75th percentile. By comparison, most youth apprentices were in the second quartile, 51st to 75th. Over 50% of youth apprentices had cumulative GPAs of 3.51 or above, compared to 27% of the Tech Prep and 34% of the non-Tech Prep groups. Nearly 64% of the Tech Prep, 55% of the non-Tech Prep, and 81% of the youth apprentice group had attained a cumulative GPA of 3.01 or higher at the time they completed high school, indicating they had attained a B average or better.

Differences were evident between the 1996 and 1997 cohorts for the Tech Prep and youth apprentice groups on class rank percentile. In the case of Tech Prep, the class rank percentile of 1996 Tech Prep graduates was higher than the 1997 group, though cumulative GPA was not statistically significant. In the case of youth apprentices, the 1997 cohort had a significantly higher GPA than the 1996 cohort. Therefore, the cumulative GPA and class rank percentile rose for youth apprentice graduates between 1996 and

1997, whereas class rank percentile fell for Tech Prep graduates from 1996 to 1997. With data on two cohorts only, it was not possible to determine longer-term trends.

We examined whether or not students took the ACT or SAT as an indicator of interest in attending four-year college. Though this information was often missing, approximately half or fewer of the graduates took the ACT or SAT during high school, mostly the ACT. Tech Prep and non-Tech Prep graduates were more likely to take the tests than youth apprentices; in the case of SAT, the difference was statistically significant ($\chi^2 = 8.13$, $df = 2$, $p = .017$).

Surveys provided information on graduates' perceptions of their educational experiences. When asked about the utility of their high school education, most graduates felt their high school education was very or fairly useful. A small percentage indicated their high school education was either extremely useful or not at all useful. There were no significant differences among the three groups on perception of the utility of high school learning. There were also no differences between the 1996 and 1997 cohorts within each of the three groups.

Table 11
Percentage Distribution on Selected Educational Characteristics and Attitudes by Tech Prep Status and Year of High School Graduation

	Non-Tech Prep			**Tech Prep**			**Tech Prep/ Youth Apprentice**		
	Total Grad. n=263	1996 Grad. n=118	1997 Grad. n=145	Total Grad. n=252	1996 Grad. n=107	1997 Grad. n=145	Total Grad. n=35	1996 Grad. n=19	1997 Grad. n=16
Class rank percentile at HS graduation									
1 – 25%	19.7	10.4	27.1	25.5	19.2	30.3	10.5	0.0	20.0
26 – 50%	33.1	38.7	28.6	38.1	37.4	38.6	15.8	22.2	10.0
51 – 75%	31.0	34.9	27.8	25.1	24.2	25.8	63.2	77.8	50.0
76 – 100%	16.3	16.0	16.5	11.3	19.2	5.3	10.5	0.0	20.0
Cumulative GPA at HS graduation									
2.00 or less	2.9	2.1	3.5	6.4	5.6	6.9	3.2	0.0	6.3
2.01 – 2.50	11.2	10.3	11.8	15.8	11.1	18.8	0.0	0.0	0.0
2.51 – 3.00	22.4	23.7	21.5	23.1	20.0	25.0	16.1	33.3	0.0
3.01 – 3.50	29.9	29.9	29.9	27.8	35.6	22.9	29.0	40.0	18.8
3.51 – 4.00	19.1	21.6	17.4	15.4	14.4	16.0	35.5	20.0	50.0
4.00 and above	14.5	12.4	16.0	11.5	13.3	10.4	16.1	6.7	25.0

Table 11 (cont.)

Took ACT									
Yes	51.0	51.7	50.3	44.0	51.4	38.6	37.1	31.6	43.8
No/Unknown	49.0	48.3	49.7	56.0	48.6	61.4	62.9	68.4	56.2
Took SAT									
Yes	19.0	20.3	17.9	15.9	18.7	13.8	0.0	0.0	0.0
No/Unknown	81.0	79.7	82.1	84.1	81.3	86.2	100.0	100.0	100.0
Utility of HS learning									
Extremely useful	5.7	6.3	5.3	5.4	9.0	2.5	13.3	26.7	0.0
Very useful	26.8	28.6	25.5	21.1	13.4	27.5	16.7	6.7	26.7
Fairly useful	42.0	34.9	46.8	36.7	41.8	32.5	50.0	60.0	40.0
Somewhat useful	19.7	25.4	16.0	34.0	34.3	33.8	20.0	6.7	33.3
Not at all useful	5.7	4.8	6.4	2.7	1.5	3.8	0.0	0.0	0.0

Source: Tech Prep High School Transcript File for all items except utility of high school learning, which came from the Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Math and Vocational Course-Taking Patterns

The majority of graduates in all three groups took five to eight semesters of math courses during their high school years, indicating the majority had more than the equivalent of two years since only two years of mathematics were required for high school graduation. Based on transcripts, taking five or six semesters of math was the most common pattern, indicating that many students had two and one-half or three years of math, but there were no significant differences among the three groups in the total amount of math taken. However, significant differences within the Tech Prep and youth apprentice cohort groups emerged. The 1996 Tech Prep cohort took more math courses than the 1997 cohort (t = 2.28, df = 249, p = .02), and the 1997 youth apprentice cohort took more math courses than the 1996 cohort (t = 2.23, df = 33, p = .03), mirroring the pattern of academic performance shown in Table 11.

Graduates in all three groups took a variety of courses as their first math course in high school, but only about one-third of the Tech Prep and youth apprentice graduates started math with Algebra I or above. (See Appendix E for details on how math courses were categorized for this analysis.) Non-Tech Prep graduates were slightly more likely to start high school math with Algebra 1 or above, but even there the vast majority started with Pre-Algebra or below. A fairly large percentage of the youth apprentices (40%) began their high school math sequence with Applied Math, but their advancement in the math curriculum was not limited by starting with applied courses rather than the more standard Algebra 1 course. The progress of apprentices seemed to parallel other graduates' math course-taking and culminated at about the same level of course work by high school graduation. Slightly over 50% of the non-Tech Prep graduates reached Algebra 2 or above by high school graduation, with almost 45% of the graduates in the other two groups reaching a similar level. Few graduates in any group took advanced math courses beyond Algebra 2, such as Trigonometry or Calculus.

In regard to applied math, the number of semester courses taken differed among the three groups, with the youth apprentice and Tech Prep groups taking significantly more semesters of applied math than the non-Tech Prep group (F = 10.01, df = 2, p = .000). Though the majority of Tech Prep and non-Tech Prep graduates did not take any applied math courses, nearly 50% of the youth apprentice graduates did. In fact, almost 25% of youth apprentices took three or more semesters of applied math courses, compared to only 11% of the Tech Prep and 6% of the non-Tech Prep groups. There were no differences in the number of semesters of honors math courses taken among the three groups. Slightly over 20% of students in each group took one or more semesters of honors math. (Recall, eight of the ten high schools offer honors courses.)

Table 12
Percentage Distribution on High School Math Courses by Tech Prep Status and Year of High School Graduation

	Non-Tech Prep			**Tech Prep**			**Tech Prep/ Youth Apprentice**		
	Total Grad n=263	1996 Grad. n=118	1997 Grad. n=145	Total Grad. n=252	1996 Grad. n=107	1997 Grad. n=145	Total Grad. n=35	1996 Grad. n=19	1997 Grad. n=16
Total math courses by semester:									
1 – 2	3.8	3.4	4.1	1.6	1.9	1.4	2.9	5.3	0.0
3 – 4	23.6	25.4	22.1	37.7	30.8	42.8	20.0	26.3	12.5
5 – 6	44.9	46.6	43.4	40.1	39.3	40.7	54.3	57.9	50.0
7 – 8	24.7	22.0	26.9	17.9	24.3	13.1	20.0	10.5	31.3
9 or more	.4	0.0	0.7	.8	1.9	0.0	2.9	0.0	6.3
Lowest math taken									
Basic math	2.4	4.3	.7	1.6	2.0	1.4	2.9	0.0	6.3
General math	19.5	21.7	17.7	19.0	21.9	16.9	8.6	15.8	0.0
Applied math	19.5	20.9	18.4	27.9	21.0	33.1	40.0	31.6	50.0
Pre-Algebra	16.4	13.0	19.1	17.8	13.3	21.1	14.3	15.8	12.5
Algebra 1	37.5	33.9	40.4	31.1	37.1	26.7	25.7	31.6	18.8
Geometry	4.7	6.0	3.5	2.4	4.8	.7	8.6	5.3	12.5
Highest math taken									
Basic math	1.2	1.7	.7	0.0	0.0	0.0	0.0	0.0	0.0
General math	.8	.9	.7	1.6	2.9	.7	0.0	0.0	0.0
Applied math	5.1	7.8	2.8	6.5	7.6	5.6	2.9	5.3	0.0
Pre-Algebra	8.2	7.0	9.2	12.1	5.7	16.9	8.6	10.5	6.3
Algebra 1	19.1	24.3	14.9	25.5	22.9	27.5	22.9	31.6	12.5

Table 12 (cont.)

Geometry	12.9	11.3	14.2	10.6	9.6	11.2	22.8	21.0	25.0
Algebra 2	34.4	30.4	37.6	28.7	33.4	25.3	28.6	21.1	37.6
Advanced math	18.4	16.5	19.9	15.0	18.1	12.7	14.3	10.5	18.8
Total applied math by semester:									
None	75.0	70.3	78.6	65.1	70.1	61.4	48.5	52.6	43.7
1 – 2	18.6	21.2	16.6	23.8	22.4	24.8	25.7	26.3	25.0
3 – 4	5.3	6.8	4.1	9.9	5.6	13.1	22.9	15.8	31.3
5 – 6	1.1	1.7	.7	1.2	1.9	.7	2.9	5.3	0.0
Total honors math by semester:									
None	77.9	81.4	75.2	79.4	77.6	80.7	77.1	78.9	74.9
1 – 2	19.4	17.8	20.7	19.4	21.5	17.9	20.0	21.1	18.8
3 – 4	2.7	.8	4.1	1.2	.9	1.4	2.9	0.0	6.3

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding.

Vocational Course-Taking

Large numbers of graduates in all three groups took vocational courses during high school. Indeed, almost all graduates took at least one vocational course during high school, generally at the introductory level. Of several categories of vocational education, the most common specialization in this consortium was business. Over 80% of graduates in all three groups took at least one semester course or more of business. Vocational classes taken least often by the Tech Prep and non-Tech Prep groups fell into the categories of health, technical/communications (e.g., manufacturing technology), construction (e.g., carpentry, plumbing), and general labor market (e.g., career exploration, typing).

Important differences were identified among the three groups as to whether they enrolled in particular vocational specialty areas. The first section of Table 13 specifies the percentage of graduates who had taken one or more courses in several vocational areas. For example, a much higher proportion of youth apprentices took a course in the technical/communications category (χ^2 = 89.62, *df* = 2, *p* = .000) than the Tech Prep and non-Tech Prep groups, reflecting the predominance of the manufacturing technology program for youth apprentices in this consortium. Other significant differences between the groups on enrollment in vocational specialties follow:

- A lower percentage of youth apprentice graduates than Tech Prep and non-Tech Prep graduates took consumer and family science courses (χ^2 = 11.93, *df* = 2, *p* = .003);

- A higher percentage of youth apprentice and Tech Prep graduates than non-Tech Prep graduates enrolled in precision production courses (e.g., electronics, mechanical drawing, welding) (χ^2 = 14.79, *df* = 2, *p* = .001);

- A higher percentage of youth apprentice than Tech Prep graduates and non-Tech Prep graduates took general labor market courses (e.g., typewriting, industrial arts, work experience, career exploration) (χ^2=7.12, *df* = 2, *p* = .03); and

- A higher percentage of youth apprentice and Tech Prep graduates than non-Tech Prep enrolled in specific labor market courses (e.g., co-op training, apprenticeship) (χ^2=9.05, *df* = 2, *p* = .01).

Though few students took advanced vocational courses in any area, results associated with course-taking beyond the fundamental level are important to examine. In this rural consortium, traditional vocational specialties such as business, agriculture, and consumer and family studies were the most likely to attract enrollments beyond the introductory level, partly because these vocational courses were most prevalent (or sometimes the only) courses offered by the high schools. Consequently, enrollments, even in these traditional areas, were quite low at the advanced levels. However, within the areas of consumer and family studies, technical/communications, precision production, specific labor market, and general labor market, significant differences emerged among the three groups on the levels of courses taken.

To clarify, the levels referred to here are associated with the Secondary School Taxonomy (SST). In the SST, vocational classes are categorized into one of three categories: first in a sequence or Level 1, second in a sequence or Level 2, and a specialty course or Level 3. (See Appendix F for examples of course titles that fit within the levels of each technical specialization.) Categories shown in the latter section of Table 13 indicate sequential course-taking in specific vocational areas, with participation in a minimum of one course in each level representing the most advanced course-taking pattern. When interpreting these results, it is important to note that high schools do not always offer three levels in many vocational specialty areas and/or the number of higher level courses may be extremely limited. Therefore students may have access to only Level 1 or Level 1 and 2 courses in a particular vocational specialty. If associated with Level 1 and Level 2 enrollment at minimum, they were identified as a sequential course-taker for the purposes of this preliminary analysis. Knowing this, results for the Tech Prep and non-Tech Prep groups on sequential vocational course-taking follow:

- More Tech Prep graduates were engaged in sequential course-taking in consumer and family studies than non-Tech Prep graduates (χ^2 = 15.53, *df* = 8, *p* = .05);

- More youth apprentices than Tech Prep or non-Tech Prep graduates were engaged in sequence course-taking in technical/communications (χ^2 = 111.70, *df* = 4, *p* = .000);

- More Tech Prep and youth apprentice graduates than non-Tech Prep graduates were engaged in sequential course-taking in precision production (χ^2 = 17.75, *df* = 8, *p* = .02); and

- More youth apprentices than Tech Prep and non-Tech Prep graduates were engaged in sequential course-taking in specific labor market areas (χ^2 = 46.84, *df* = 4, *p* = .000).

Table 13
Percentage Distribution on Vocational-Technical Education Courses by Tech Prep Status and Year of High School Graduation

	Non-Tech Prep			**Tech Prep**			**Tech Prep/ Youth Apprentice**		
	Total Grad. n=263	1996 Grad. n=118	1997 Grad. n=145	Total Grad. n=252	1996 Grad. n=107	1997 Grad. n=145	Total Grad. n=35	1996 Grad. n=19	1997 Grad. n=16
Course-taking in vocational area:									
Business	86.3	83.1	89.0	88.1	86.0	89.7	82.9	89.5	75.0
None	13.7	16.9	11.0	11.9	14.0	10.3	17.1	10.5	25.0
Agriculture	30.8	37.3	25.5	30.2	40.2	22.8	31.4	26.3	37.5
None	69.2	62.7	74.5	69.8	59.8	77.2	68.6	73.7	62.5
Consumer/Family	58.2	59.3	57.2	61.9	60.7	62.8	31.4	5.3	62.5
None	41.8	40.7	42.8	38.1	39.3	37.2	68.6	94.7	37.5
Health	11.0	8.5	13.1	15.1	13.1	16.6	8.6	10.5	6.3
None	89.0	91.5	86.9	84.9	86.9	83.4	91.4	89.5	93.7
Construction	5.7	5.1	6.2	7.5	8.4	6.9	11.4	10.5	12.5
None	94.3	94.9	93.8	92.5	91.6	93.1	88.6	89.5	87.5
Technical/Comm.	6.5	6.8	6.2	12.3	12.1	12.4	62.9	57.9	68.8
None	93.5	93.2	93.8	87.7	87.9	87.6	37.1	42.1	31.2
Precision production	22.8	19.5	25.5	35.7	40.2	32.4	42.9	52.6	31.3
None	77.2	80.5	74.5	64.3	59.8	67.6	57.1	47.4	68.7
Mechanics/repairers	26.2	21.2	30.3	28.2	21.5	33.1	25.7	31.6	18.8
None	73.8	78.8	69.7	71.8	78.5	66.9	74.3	68.4	81.2
Specific labor market	30.4	32.2	29.0	41.3	38.3	43.4	45.7	36.8	56.3
None	69.6	67.8	71.0	58.7	61.7	56.6	54.3	63.2	43.7
General labor market	10.3	9.3	11.0	12.7	15.0	11.0	25.7	26.3	25.0
None	89.7	90.7	89.0	87.3	85.0	89.0	74.3	73.7	75.0
Business									
None	13.7	16.9	11.0	11.9	14.0	10.3	17.1	10.5	25.0
Only level 1	71.9	69.5	73.8	67.9	66.4	69.0	71.4	84.2	56.3
Only level 1 and 2	12.9	12.7	13.1	18.3	16.8	19.3	8.6	5.3	12.5
Only level 1 and 3	1.1	0.0	2.1	0.4	.9	0.0	0.0	0.0	0.0
Min. 1 in each level	0.4	.8	0.0	1.6	1.9	1.4	2.9	0.0	6.3
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 13 (cont.)

Agriculture									
None	69.2	62.7	74.5	69.8	59.8	77.2	68.6	73.7	62.5
Only level 1	5.3	3.4	6.9	6.3	7.5	5.5	11.4	10.5	12.5
Only level 1 and 2	1.1	1.7	0.7	0.8	0.9	0.7	0.0	0.0	0.0
Only level 1 and 3	10.3	11.0	9.7	7.9	15.0	2.8	8.6	10.5	6.3
Min. 1 in each level	0.4	0.0	0.7	0.8	1.9	0.0	0.0	0.0	0.0
Other	13.7	21.2	7.6	14.3	15.0	13.8	11.4	5.2	18.8
Consumer/Family									
None	41.8	40.7	42.8	38.1	39.3	37.2	68.6	94.7	37.5
Only level 1	22.1	19.5	24.1	19.0	19.6	18.6	11.4	5.3	18.8
Only level 1 and 2	6.8	8.5	5.5	8.3	7.5	9.0	2.9	0.0	6.3
Only level 1 and 3	14.1	16.1	12.4	15.1	12.1	17.2	2.9	0.0	6.3
Min. 1 in each level	3.4	2.5	4.1	6.0	5.6	6.2	0.0	0.0	0.0
Other	11.8	12.7	11/0	13.5	15.8	11.8	14.3	0.0	31.3
Health									
None	89.0	91.5	86.9	84.9	86.9	83.4	91.4	89.5	93.7
Only level 1	6.8	4.2	9.0	11.5	10.3	12.4	0.0	0.0	0.0
Only level 1 and 2	1.1	0.8	1.4	0.4	0.9	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min. 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	3.0	3.4	2.8	3.2	1.9	4.2	8.6	10.5	6.3
Construction									
None	94.3	94.9	93.8	92.5	91.6	93.1	88.6	89.5	87.5
Only level 1	4.9	4.2	5.5	4.8	4.7	4.8	8.6	5.3	12.5
Only level 1 and 2	0.8	0.8	0.7	2.4	2.8	2.1	2.9	5.3	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min. 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	.4	.9	0.0	0.0	0.0	0.0
Technical/Comm.									
None	93.5	93.2	93.8	87.7	87.9	87.6	37.1	42.1	31.2
Only level 1	6.1	6.8	5.5	9.5	11.2	8.3	40.0	26.3	56.3
Only level 1 and 2	0.0	0.0	0.0	0.4	0.9	0.0	17.1	26.3	6.3
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min. 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	.4	0.0	.7	2.4	0.0	4.1	5.8	5.3	6.3
Precision production									
None	77.2	80.5	74.5	64.3	59.8	67.6	57.1	47.4	68.7
Only level 1	19.0	17.8	20.0	28.2	32.7	24.8	31.4	42.1	18.8
Only level 1 and 2	0.8	1.7	0.0	2.8	2.8	2.8	5.7	5.3	6.3
Only level 1 and 3	1.1	0.0	2.1	0.8	0.0	1.4	0.0	0.0	0.0
Min. 1 in each level	0.0	0.0	0.0	0.8	0.0	1.4	0.0	0.0	0.0
Other	1.9	0.0	3.4	3.2	4.7	2.1	5.8	5.2	6.3

Table 13 (cont.)

Mechanics/repairers									
None	73.8	78.8	69.7	71.8	78.5	66.9	74.3	68.4	81.2
Only level 1	7.6	5.9	9.0	5.6	3.7	6.9	5.7	10.5	0.0
Only level 1 and 2	0.4	0.8	0.0	3.2	5.6	1.4	0.0	0.0	0.0
Only level 1 and 3	3.8	2.5	4.8	6.0	3.7	7.6	2.9	5.3	0.0
Min. 1 in each level	0.0	0.0	0.0	0.8	0.9	0.7	0.0	0.0	0.0
Other	1.9	11.9	16.5	12.7	12.7	16.5	17.1	15.8	18.8
Specific labor market									
None	69.6	67.8	71.0	58.7	61.7	56.6	54.3	63.2	43.7
Only level 1	25.9	25.4	26.2	25.0	27.1	23.4	17.1	15.8	18.8
Only level 1 and 2	1.5	3.4	0.0	1.6	2.8	0.7	20.0	15.8	25.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min. 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	3.0	3.4	2.8	14.7	8.4	19.3	8.6	5.2	12.6
General labor market									
None	89.7	90.7	89.0	87.3	85.0	89.0	74.3	73.7	75.0
Only level 1	10.3	9.3	11.0	12.7	15.0	11.0	25.7	26.3	25.0
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Min. 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Tech Prep High School Transcript File.

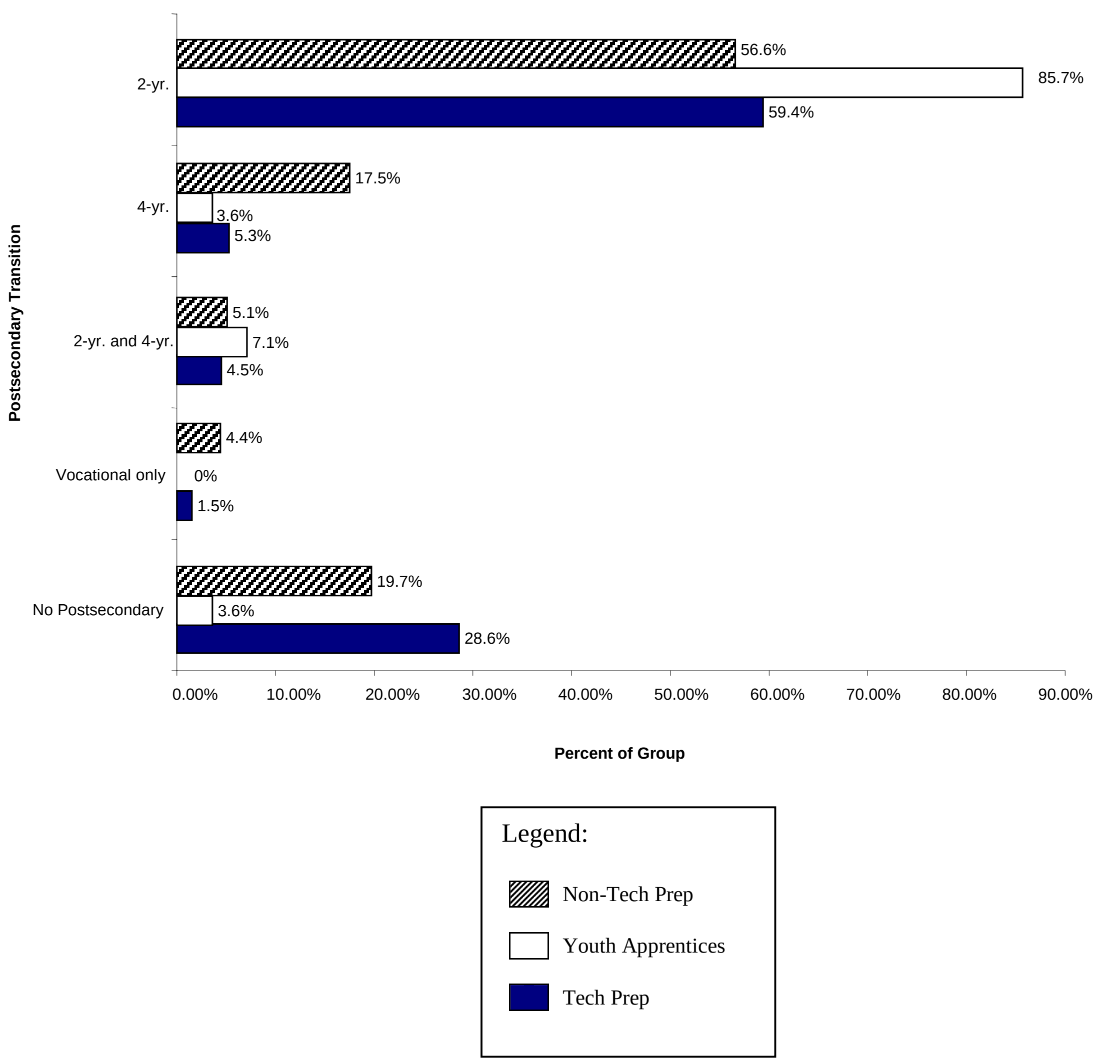
Note: Details may not sum to 100 due to rounding. The "other" category includes course combinations other than those specified, and this category was not included in significance testing. Between group differences were computed on the total groups, but not cohorts by year due to small cell sizes.

Transition to Postsecondary Education

Looking at the entire group of high school graduates participating in this study, it is apparent that most students continued into some form of postsecondary education. Approximately 70% of Tech Prep, 80% of non-Tech Prep, and nearly all youth apprentice high school graduates continued their education at the postsecondary level. Enrollments at MACC were quite high for all groups, indicating this community college was an important aspect of the overall educational system in the region. Over 40% of all students continued their education after high school by enrolling at MACC, as evidenced by their having an MACC college transcript. According to one MACC administrator, this percentage is probably slightly higher than the typical matriculation rate of area high school graduates, because MACC has always drawn a substantial percentage of high school graduates in this predominantly rural area. In fact, a similar percentage of Tech Prep (41%) and non-Tech Prep (39%) graduates matriculated to MACC after high school graduation in 1996 and 1997. However, it is important to point out that the percentage of youth apprentices transitioning to MACC was much higher (84%) than the other two groups, suggesting the program was playing an important role in helping the vast majority of youth apprentices to transition to the community college.

These results paralleled findings obtained from the graduate follow-up survey, showing that a sizeable percentage of high school graduates in all three groups continued to postsecondary education at the two-year college, specifically MACC. According to the survey results, over 50% of all three groups continued education at the two-year college level, with youth apprentices most likely to continue there. Though a relatively small percentage of graduates in any of the three groups continued their education at the four-year college level, non-Tech Prep graduates (18%) were more likely to matriculate to four-year college compared to the Tech Prep (5%) and youth apprentice graduates (4%). Finally, though the majority of graduates did go to college of some type, some did not. In fact, the Tech Prep group was the most likely not to continue postsecondary education within one or two years after high school graduation, though, in time these graduates may choose to go to college too.

Figure 4
Transition to Postsecondary Education by Tech Prep Status



Work Experience During and After High School

Although there were no differences among the groups regarding employment during high school, it is important to note that over 80% of the high school graduates studied were employed at some time during high school. A typical graduate made less than $6.00 per hour and worked between 11 and 30 hours per week when working during high school (see Table 14). A slightly higher percentage of youth apprentices reported working during high school than the other groups (90% vs. about 84%), and more apprentices were making over $6.00 per hour than the other two groups (37% vs. 15% for Tech Prep and 21% for non-Tech Prep).

Table 14
Percentage Distribution in Employment Experiences During High School by Tech Prep Status and Year of High School Graduation

	Non-Tech Prep			**Tech Prep**			**Tech Prep/ Youth Apprentice**		
	Total Grad. n=156	1996 Grad. n=63	1997 Grad. n=93	Total Grad. n=148	1996 Grad. n=68	1997 Grad. n=80	Total Grad. n=30	1996 Grad. n=15	1997 Grad. n=15
Employed during HS									
No	16.1	15.9	16.3	15.2	13.2	16.9	10.0	13.3	6.7
Yes	83.9	84.1	83.7	84.8	86.8	83.1	90.0	86.7	93.3
Estimated hourly wages in last job held before HS graduation									
Zero – unpaid	2.3	3.7	1.3	0.8	0.0	1.5	0.0	0.0	0.0
Less than $5.25 /hr	45.4	48.1	43.4	38.7	39.0	38.5	29.6	30.8	28.6
$5.26 to $6.00 /hr	38.5	33.3	42.1	37.9	30.5	44.6	33.3	30.8	35.7
$6.01 to $7.00 /hr	7.7	5.6	9.2	12.9	22.0	4.6	29.6	38.5	21.4
$7.01 to $8.00 /hr	4.6	9.3	1.3	4.8	3.4	6.2	7.4	0.0	14.3
More than $8.00 /hr	1.5	0.0	2.6	4.8	5.1	4.6	0.0	0.0	0.0
Total hours worked during typical week in HS									
Less than 5 hours	3.8	5.6	2.6	0.0	0.0	0.0	0.0	0.0	0.0
6 – 10 hours	11.5	14.8	9.1	6.5	6.9	6.2	11.1	15.4	7.1
11 – 20 hours	31.3	33.3	29.9	40.7	46.6	35.4	18.5	15.4	21.4
21 – 30 hours	35.9	29.6	40.3	23.6	17.2	29.2	44.4	53.8	35.7
31 – 40 hours	14.5	13.0	15.6	25.2	25.9	24.6	22.2	15.4	28.6
More than 40 hours	3.1	3.7	2.6	4.1	3.4	4.6	3.7	0.0	7.1

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Work After High School

After high school, the majority of graduates in all three groups held either one or two jobs, with most holding only one job at the time the follow-up survey was conducted one or two years after high school graduation (see Table 15). The majority of Tech Prep and youth apprentice graduates were employed full-time, while just under half of non-Tech Prep graduates were employed full-time. The majority of graduates in all three groups were at least fairly satisfied with their jobs, with more youth apprentices than other groups indicating they were extremely satisfied, though the groups were not statistically different. Youth apprentices also indicated a higher level of confidence in reaching their career goals, although the vast majority of students in all three groups were either extremely or very confident of reaching their career goals.

A significant difference was identified in the number of months employed in the primary job (i.e., the one where graduates spent the most time if they held more than one job) among the three groups ($F = 4.37$, $df = 2$, $p = .01$). Youth apprentices held their primary jobs longer than the other two groups; just over 25% of the youth apprentices had been in their primary job for 36 months or more. 1996 Tech Prep and youth apprentice graduates had worked in their primary jobs longer than their 1997 counterparts, but this finding did not hold for 1996 and 1997 non-Tech Prep graduates at a statistically significant level.

When graduates were asked to identify the type of job they held currently (i.e., entry-level or unskilled, semi-skilled, skilled or technical, or professional), there were significant differences among the three groups ($\chi^2 = 15.95$, $df = 6$, $p = .01$). The majority of non-Tech Prep graduates and approximately half of the Tech Prep graduates reported that they held entry-level/unskilled jobs; but only 29% of youth apprentices did so. Almost half of the youth apprentices held semi-skilled jobs, compared to 37% of the Tech Prep and 21% of the non-Tech Prep graduates. (The nature of the jobs held by the youth apprentices engaged in manufacturing technologies placed them at the semi-skilled level.) The majority of all groups hoped to attain a professional job.

Table 15
Percentage Distribution of Post-High School Employment by Tech Prep Status and Year of High School Graduation

	Non-Tech Prep			**Tech Prep**			**Tech Prep/ Youth Apprentice**		
	Total Grad. n=156	1996 Grad. n=63	1997 Grad. n=93	Total Grad. n=148	1996 Grad. n=68	1997 Grad. n=80	Total Grad. n=30	1996 Grad. n=15	1997 Grad. n=15
No. of jobs since HS									
1 – 2	60.9	58.7	62.4	51.4	48.5	53.8	60.0	46.7	73.3
3 – 4	23.1	19.0	25.8	29.1	30.9	27.5	20.0	26.7	13.3
5 – 6	9.6	14.3	6.5	8.8	8.8	8.8	16.7	20.0	13.3
7 – 8	2.6	3.2	2.2	3.4	5.9	1.3	3.3	6.7	0.0
9 or more	3.8	4.8	3.2	3.4	4.4	2.5	0.0	0.0	0.0
None	0.0	0.0	0.0	4.1	1.5	6.3	0.0	0.0	0.0

Table 15 (cont.)

No. of jobs held currently									
0	10.6	9.7	11.2	10.4	4.8	15.3	3.4	0.0	6.7
1	76.8	82.3	73.0	78.5	77.8	79.2	75.9	78.6	73.3
2	11.3	6.5	14.6	11.1	17.5	5.6	17.2	14.3	20.0
3 or more	1.3	1.6	1.1	0.0	0.0	0.0	3.4	7.1	0.0
Current employment status									
Full-time (35 hours or more per week)	48.1	49.2	47.3	54.9	58.2	52.0	60.0	53.3	66.7
Part-time (less than 35 hours per week)	37.8	36.5	38.7	28.2	26.9	29.3	33.3	40.0	26.7
Unemployed seeking employment	7.1	4.8	8.6	7.7	4.5	10.7	6.7	6.7	6.7
Unemployed not seeking employment	5.1	4.8	5.4	6.3	7.5	5.3	0.0	0.0	0.0
Military full-time	1.9	4.8	0.0	2.8	3.0	2.7	0.0	0.0	0.0
Months worked in current primary job									
Less than 6 months	37.1	26.4	44.3	28.9	32.2	25.8	14.8	30.8	0.0
6 – 12 months	25.0	24.5	25.3	37.2	27.1	46.8	22.2	7.7	35.7
13 – 24 months	15.2	20.8	11.4	20.7	22.0	19.4	25.9	7.7	42.9
25 – 36 months	9.1	15.1	5.1	3.3	6.8	0.0	11.1	15.4	7.1
36 months or more	13.6	13.2	13.9	9.9	11.9	8.1	25.9	38.5	14.3
Wages per hour, current primary job									
Zero	1.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
$5.25 or less	11.4	11.3	11.4	10.0	6.9	12.9	7.1	7.1	7.1
$5.26 – $6.00	25.0	18.9	29.1	20.0	13.8	25.8	10.7	0.0	21.4
$6.01 – $7.00	21.2	22.6	20.3	19.2	24.1	14.5	25.0	21.4	28.6
$7.01 – $8.00	15.2	17.0	13.9	13.3	8.6	17.7	10.7	14.3	7.1
$8.01 – $9.00	9.1	3.8	12.7	13.3	17.2	9.7	17.9	35.7	0.0
$9.01 – $10.00	6.8	13.2	2.5	6.7	3.4	9.7	10.7	7.1	14.3
$10.01 – $11.00	6.1	7.5	5.1	13.3	22.4	4.8	17.9	14.3	21.4
$11.01 – $12.00	2.3	3.8	1.3	1.7	1.7	1.6	0.0	0.0	0.0
More than $13.00	1.5	1.9	1.3	1.7	1.7	1.6	0.0	0.0	0.0
I don’t know	0.0	0.0	0.0	0.8	0.0	1.6	0.0	0.0	0.0
Change in wages per hour from HS to present									
-$1.00	7.9	8.2	7.7	10.5	11.1	9.8	7.7	7.7	7.7
0	21.1	16.3	24.6	20.0	14.8	25.5	11.5	7.7	15.4
+$1.00	27.2	22.4	30.8	21.9	25.9	17.6	11.5	7.7	15.4
+$2.00	17.5	16.3	18.5	10.5	9.3	11.8	30.8	38.5	23.1
+$3.00	11.4	16.3	7.7	10.5	9.3	11.8	11.5	7.7	15.4

Table 15 (cont.)

+$4.00	7.0	8.2	6.2	12.4	11.1	13.7	19.2	23.1	15.4
+$5.00 or more	7.9	12.2	4.6	14.3	18.6	9.8	7.7	7.7	7.7
Type of current primary job									
Entry level/unskilled	62.6	57.7	65.8	48.8	42.4	54.8	28.6	35.7	21.4
Semi-skilled	20.6	28.8	15.2	37.2	35.6	38.7	46.4	35.7	57.1
Skilled or technical	12.2	9.6	13.9	10.7	18.6	3.2	17.9	21.4	14.3
Professional	4.6	3.8	5.1	3.3	3.4	3.2	7.1	7.1	7.1
Type of primary job desired									
Entry level/unskilled	3.3	3.3	3.2	4.1	2.9	5.1	0.0	0.0	0.0
Semi-skilled	7.8	6.7	8.6	12.9	10.3	15.2	3.3	0.0	6.7
Skilled or technical	25.5	31.7	21.5	26.5	23.5	29.1	30.0	53.3	6.7
Professional	63.4	58.3	66.7	56.5	63.2	50.6	66.7	46.7	86.7
Satisfaction with primary job									
Extremely satisfied	15.7	9.1	20.3	17.4	18.6	16.1	25.0	28.6	21.4
Very satisfied	29.1	32.7	26.6	23.1	23.7	22.6	21.4	21.4	21.4
Fairly satisfied	32.8	32.7	32.9	28.1	25.4	30.6	25.0	14.3	35.7
Somewhat satisfied	17.9	20.0	16.5	23.1	25.4	21.0	21.4	28.6	14.3
Not at all satisfied	4.5	5.5	3.8	8.3	6.8	9.7	7.1	7.1	7.1
Confidence in reaching career goals									
Extremely confident	37.4	41.9	34.4	34.0	35.3	32.9	48.3	42.9	53.3
Very confident	36.8	29.0	41.9	31.3	33.8	29.1	31.0	28.6	33.3
Fairly confident	14.2	12.9	15.1	16.3	14.7	17.7	17.2	21.4	13.3
Somewhat confident	5.8	6.5	5.4	12.2	7.4	16.5	3.4	7.1	0.0
Not at all confident	5.8	9.7	3.2	6.1	8.8	3.8	0.0	0.0	0.0

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Summary

The Central State Consortium has had a number of successes but, despite its accomplishments, has experienced the challenges that occur along with many educational reforms. Over the eight fiscal years documented in this case, some components of Tech Prep developed while others remained in a less mature stage. Components such as work-based learning (WBL) and professional development were implemented strategically and enthusiastically, while other components such as academic and vocational integration struggled. While many factors help to explain why some components advance and other do not, local business involvement played a key role in this consortium's implementation process. Local businesses were particularly active and vocal partners in the Central State Consortium by encouraging WBL opportunities for students and actively supporting the youth apprenticeship program. Businesses also helped to strengthen professional development for faculty by providing work-site learning opportunities that extended well beyond one-shot workshops. Key stakeholders attributed progress in the implementation of Tech Prep to the numerous collaborative relationships that had emerged between MACC and the high schools, but particularly to the relationships between the local educational institutions and business. Local consortium leaders spoke numerous times about how business involvement and support provided the leverage to make needed changes.

Perhaps because of the local economic and employment situation and concern for workforce development, WBL flourished in the Central State Consortium, mostly through youth apprenticeships. As support from educators and businesses grew, the workforce development and related WBL foci of the initiative matured. Over time, the educational system focused on linking school-based learning and WBL, attempting to solidify the relationship between the two. As a result, some educators at all levels came to view education as synonymous with workforce development. In fact, several teachers indicated that the consortium leadership encouraged all teachers to consider themselves as Tech Prep teachers and to play a major role in preparing students for work.

Partly because of the youth apprenticeship program, the Central State Consortium dedicated significant portions of Tech Prep and ETC resources in time, funding, and staffing to WBL. Curriculum change was not perceived to be as significant for other high school students because of the priority placed on youth apprenticeships, an option that attracted students who might participate in traditional college prep curriculum anyway. In fact, efforts to develop a general Tech Prep curriculum had been difficult to launch and sustain. In several schools Tech Prep had not developed into a particularly cohesive or comprehensive approach. School scheduling and joint planning time remained major barriers to making curriculum changes in these predominantly small, rural schools where it was impractical to isolate students for specific interventions like Tech Prep, even if school officials wanted to do so, and they did not. Still, in some high schools applied academics courses were supported enthusiastically and students were enrolling in them while also taking vocational courses, often at the area vocational center (AVC).

Curriculum change at the postsecondary level had been undertaken through a collaborative approach involving local administrators, faculty, and businesses. One community college administrator described MACC's approach to curriculum reform as emphasizing flexibility by designing Tech Prep programs of study to meet specific competency requirements for various local businesses. Likewise, ongoing participation of business and industry and increased levels of support in curriculum-related professional development activities confirmed a dynamic process. Key stakeholders confirmed that input to MACC from business and industry partners was stronger after the implementation of Tech Prep, and this level of input had had a positive impact, particularly on vocational-technical programs. Yet, the tight connection between Tech Prep and vocational education was somewhat problematic for this consortium, because some stakeholders perceived of vocational education as predominantly focused on low wage jobs. Consequently, some of the greatest challenges came in marketing the Tech Prep initiative to parents, community members, and some academic faculty who preferred more traditional approaches to education. Still, some stakeholders suggested Tech Prep had a significant impact on reforming vocational education in this region, because they believed Tech Prep played a role in enhancing the image and quality of vocational education. Once primarily a high-school only program, vocational education now included a postsecondary focus, and that was a positive change. Vocational faculty themselves indicated that important changes had taken place as a result of Tech Prep. They noted that the caliber of student attending the AVC had improved since Tech Prep, and the vocational curriculum had changed to include more SCANS and academic competencies. Teachers across the consortium indicated that academic and vocational faculty interacted more frequently and productively than prior to Tech Prep, and this interaction had enhanced students' educational experiences. However, high school student perceptions of the AVC and vocational education remained mixed. Recent high school graduates had more positive perceptions than current high school students.

Set within the context of a highly developed youth apprenticeship program that received a great deal of time and attention from educators and business leaders, but a less well developed Tech Prep option for the general student population, a preliminary analysis of student demographics, educational experiences, and transition revealed important findings. First, about two-thirds of the Tech Prep and youth apprentice graduates started the high school math curriculum below Algebra 1 (with most youth apprentices starting with Applied Math). Looking at the highest level of math taken, over 40% of the youth apprentices and 50% of the Tech Prep graduates completed Algebra 2 or more advanced math (e.g., trigonometry or calculus). Non-Tech Prep graduates started and ended the math curriculum at a slightly higher level, but the difference was not statistically significant. The vast majority of graduates in all three groups took high school vocational classes, with Tech Prep and youth apprentices more heavily represented than non-Tech Prep in precision production (e.g., electronics) and specific labor market courses (e.g., co-op). Youth apprentices were also more likely than the other two groups to have taken one or more technical/communication courses (e.g., manufacturing technology), general labor market courses (e.g. work experience, career exploration), and specific labor market courses (e.g., coop), reflecting the core curriculum of the youth apprenticeship program. Transition to college was similar for Tech Prep and non-Tech Prep graduates in that the vast majority (at least 70% of both groups) went to some type of college, though non-Tech Prep graduates were more likely than Tech Prep to continue to college by one to two years following high school graduation. Youth apprentices were the most likely to transition to college, with nearly all matriculating to MACC. After high school, most Tech Prep graduates and youth apprentices were employed full-time, while just under half of the non-Tech Prep graduates were employed a similar amount. Youth apprentices held their primary job longer than members of the other two groups, and more youth apprentices held jobs that required higher level skills. The majority of all groups hoped to attain a professional job at some point in their career.

Recognizing the merits of the youth apprenticeship program, recently this consortium has sought ways to engage more high school students in educational experiences comparable to those offered by the youth apprenticeship program. Knowing that such a comprehensive WBL program cannot be sustained for a large number of students, consortium leaders have sought to expand academic and vocational integration and contextual learning to more classrooms in the high schools and community college. This strategy is intended to help infuse more real world problems into academic and vocational classes so that students engage in school learning that is applicable to life experiences outside of school. Already, consortium leaders have supported the adoption of career pathways in all high schools as a means of encouraging Tech Prep participation by a larger proportion of the general student population. Time will tell whether contextual learning will be implemented more fully within the high schools and community college and yield positive outcomes for more students in the Central State Consortium.

RIVER VALLEY TECH PREP CONSORTIUM

Ghazala Ovaice and Donna E. Dare

Community Context

The River Valley Tech Prep Consortium (River Valley Consortium) is located in a seven county area (including urban, suburban, and rural communities) whose hub is a large industrial city in the Midwest. This Tech Prep consortium consists of eight vocational education planning districts, which are part of the state's structure for secondary vocational education, and three vocational centers. Sixty-four comprehensive high schools supply students to these three vocational high schools. Statistics available from the state for 1998 indicate that the most urban district in the consortium has a minority population of approximately 70% (predominantly African-American) and a dropout rate of 16%, while rural and suburban districts that comprise the consortium have very small minority percentages (usually less than 10%) and lower dropout rates (less than 10%). The consortium also consists of over 100 business partners including manufacturers, automotive dealers, hospitals, and clinics. The postsecondary institutions included in the consortium are City Community College (CCC), a small business college, and a four-year university also located in the city. CCC is the fiscal agent and primary coordinator of River Valley Consortium's initiative.

Tech Prep in this consortium has been operationalized as a 2+2 program, although in more recent years it has expanded to embrace a stronger emphasis on four-year degree programs. Thus, the population of primary interest to this consortium is eleventh and twelfth graders and postsecondary students, particularly those at the community college level. In fall 1997, the total population of eleventh- and twelfth-grade students was 20,550, with a total Tech Prep population of 748, or 3.6% of all eleventh and twelfth grade students. Of the 748 students enrolled in Tech Prep in fall 1997, 418 were eleventh graders. Tech Prep enrollments for the consortium during 1996 and 1997 are provided in Table 1.

Table 1

Tech Prep Enrollment in 1996 and 1997

Grade Level	**Tech Prep Enrollment**		
	1996	**1997**	**% Increase**
11^{th} and 12^{th} Graders	631	748	19%
Community College	106	226	113%
Total	737	974	32%

Source: Statewide evaluation web site

Of the schools that comprise the Tech Prep consortium, three schools are the focus of this study: two schools that serve vocational education planning districts, named in this case the River Valley Career and Technical Center and Brown County Career and Technical Center, and one comprehensive high school, renamed Suburban High School. Two of these schools are the most mature deliverers of the Tech Prep curriculum in the consortium, and these three schools together are considered representative of the overall Tech Prep approach of the consortium.

The River Valley Career and Technical Center (RVCTC) opened in 1971 with 13 member school districts from two of the seven counties. There are now 27 member school districts from five adjoining counties that feed into RVCTC, with a total of 27 member high schools. In 1998 the center itself had approximately 1,790 total students enrolled, with small numbers of minorities students and approximately 85-90% Caucasian students during the time this study was conducted. Although the students attend RVCTC, their graduation diplomas are earned from their home high school.

The Brown County Career and Technical Center (BCCTC) was established in 1967. Only seven high schools feed into BCCTC, compared to the 27 that feed into RVCTC. This career center consists of 19 full-time programs and three cooperative programs. BCCTC also provides students with a diploma from the home high school. Enrollment at this career center since 1996 has been approximately 650 students per year, most (approximately 90-95%) of whom are Caucasian.

Suburban High School (SHS) is unlike the two vocational education planning district schools in that it is a comprehensive high school that offers vocational program options, including Tech Prep. Students can choose one of three comprehensive programs: career education, college preparatory, or a combination career-college preparation. At Suburban High School, it is reported that 95% of graduates go on for postsecondary education. The stress on academics at Suburban High School can be attributed, at least in part, to a recent National Science Foundation grant to advance technical education. Total enrollment for Suburban High School during 1997 was 2,393. According to an annual school report card for the district, the median annual household income in 1998 was reported to be slightly higher (at $37,439) than similar districts in the state (at $36,406). Only 2% of the district's students were economically disadvantaged.

In addition to the career centers and high schools in the region that comprise the River Valley Consortium, two primary postsecondary institutions are involved. City Community College (CCC), located downtown in the largest city of the consortium, currently enrolls 20,000 students in credit classes. This two-year college currently offers five different degree programs (AA, AS, AAS, ATS [Associate of Technical Study], and AIS [Associate of Individualized Study]). The college offers over 70 career programs as part of the AAS degree programs (which include Tech Prep Associate Degrees [TPAD]), 34 certificate programs, and over 30 university programs (AA and AS degree). Most programs are seven quarters in length and commence each fall.

Just under 400 students (363=1.8% of the student population) who attend CCC are under the age of 18. The majority of students (10,136, or 51%) are over 27, with the remaining students falling between the ages of 18 and 27 (9,350, or 47.1%). Table 2 provides a breakdown of demographics for CCC students for 1997.

Table 2

Demographic Data for City Community College (1997)

Male/ Female	Black/ African American	Native American	Asian/ Pacific Islander	Hispanic	Cauca-sian/ White	Non-resident Alien	Total
Male	1, 085 (5.5%)	33 (0.2%)	189 (1.0%)	70 (0.4%)	6,342 (31.9%)	6 (0.0%)	7,725 (38.9%)
Female	2,352 (11.8%)	39 (0.2%)	235 (1.2%)	110 (0.6%)	9,390 (47.3%)	6 (0.0%)	12,132 (61.1%)
Total	3,437 (17.3%)	72 (0.4%)	424 (2.2%)	180 (1.0%)	15,732 (79.2%)	12 (0.0%)	19,857 (100.0%)

Source: State web site for the governing board for colleges and universities

Note: Details may not sum to 100 due to rounding.

In recent years, as the design of Tech Prep has evolved to include more of an emphasis on four-year degree programs, City University (CU) has become a partner in providing educational programs that satisfy the local definition of a Tech Prep program of study. Also located downtown in the largest city in the consortium and approximately two miles from CCC, this university enrolls over 10,000 students, with 19% of the student population coming from the city and the surrounding area and 60% coming from the state. Annual undergraduate tuition and fees are $15,530, and more than 90% of CU students receive financial aid. The university's web site indicates that, for the class of 2002, just under 50% of the students come from the middle two quartiles of their graduating classes.

To date, CCC has served the role of coordinating the Tech Prep initiative in the region and providing leadership in bringing business and industry and education together to address workforce needs indicated by local labor market data. Students we interviewed at both the high school and community college level indicate that Tech Prep was a vital approach for helping them meet their educational and career goals. The consortium partners continue to strive toward the goal of providing a seamless continuum of educational and work opportunities that will lead to high skill, high wage jobs for local Tech Prep graduates.

Economic and Political Context

According to the community's web site, the population for the region is approximately one million, with a combined annual income of over $5.5 billion. However, across the seven counties, the economic situation varies widely. In 1998, median household income for the most urban district was $26,246, while the rate for the county as a whole, which includes suburban and rural areas, was $36,877. In 1996, the unemployment rate of one neighboring community feeding into CCC was only 2%, while the largest city's unemployment rate at the same time was close to 7%. According to an employment outlook published by the local area in 1998, employment in the region has risen by 7% since 1992.

The consortium's director explained that part of the reason for a sluggish labor force is a lack of skilled workers in the area. For example, there has been a tremendous need in the area for information technology workers, particularly in the computer industry, to meet the needs of a number of large and small information technology firms. There has also been an increased demand for workers in the fields of electronics engineering technology and manufacturing technology. According to her, "the old assembly line jobs are gone," but not the foundation for the manufacturing industry. She also indicated that, overall, the economic environment is positive.

Local labor market data also indicated that, while some layoffs have occurred in recent years, the economy is expanding. Manufacturing, particularly automotive and parts manufacturing, has historically been and is currently the local area's economic base. The largest manufacturer, a major automotive manufacturer, has made significant capital investments (approximately $380 million) in local facilities during the past several years and has maintained an active employment base of 20,000 since 1988. This company and four other leading manufacturing and Fortune 500 companies continue to experience growth. Even for one major employer in the area that did experience layoffs, nearly one-fourth of its employees laid off from high technology jobs have also been rehired by other high technology companies in the region.

A number of groups and agencies have influenced the implementation and development of Tech Prep in this region. These include, for example, the Chamber of Commerce, an auto dealers' association, a hospital association, an alliance of information technology companies, and a local chapter of the Society of Manufacturing Engineers. These organizations have provided direct input in determining competencies required for Tech Prep program graduates. They have also helped program implementation and development through provision of current labor market data. Business representatives from these agencies have indicated that they view Tech Prep as a vehicle for resolving their labor needs.

Tech Prep Implementation

Tech Prep Goals and Definitions

Prior to the development of the strategic plan that is currently in place for Tech Prep, six critical components guided the implementation of the Tech Prep initiative statewide. The six critical components were:

- Systemic change,
- Partnerships,
- Expanded student opportunities,
- Early individual career education,
- Competencies, and
- Advanced skills.

These six components guided the implementation of Tech Prep at state and local levels prior to and during the time most of the students in this study were graduating from secondary Tech Prep programs from 1995 to 1997. When the state first implemented Tech Prep, community college presidents and vocational school superintendents came together and created a prescriptive model for the initiative, based on the six components outlined above. According to the local Tech Prep consortium director, the state's Tech Prep model is fairly narrowly defined because of the early decisions of these presidents and superintendents: "They are the ones who made the determination about the consortia, who the members should be, and that the two-year colleges will be the fiscal agents and administrators of grant funds."

More recently, however, the state modified these six critical components and incorporated them into a strategic plan for career, technical, and adult education (including Tech Prep) that was put into place in spring 1997. The policy context for this strategic plan was the Carl D. Perkins Vocational and Applied Technology Education Act of 1998; a state senate bill and its accountability measures such as the school report cards; core measures and standards of performance (attendance, placement, testing, etc.); and the federal Workforce Investment Act.

As set forth in the state's strategic plan, the mission of Tech Prep is "to prepare students for technology-based careers demanded by the increasing competitive world economy." This mission is to be accomplished by achieving four goals:

1. Providing a seamless education path,
2. Expanding the enrollment of Tech Prep students,
3. Ensuring that teaching and learning reflect the needs of all students, and
4. Maximizing opportunities.

The statewide plan has been adopted at the local consortium level, and the River Valley Consortium has developed its own plan that supports state goals. The local action plan that outlines strategies for accomplishing state and local goals goes through annual review and modifications as needed each year.

Since 1995, funding for Tech Prep has been based on the results of a statewide external evaluation related to the strategic plan (e.g., numbers of students, remediation rates, quality of collaboration, professional development, etc.). While the state plan for Tech Prep implementation originally concentrated only on a two-year associate degree, the current strategic plan is designed to improve the linkage to four-year degrees. Most program areas articulate with four-year programs, with the exception of allied health.

The history of vocational education throughout this state is particularly strong, and the River Valley region has long been involved in a vocational education program designed to address needs of the manufacturing workforce in the region. Historically, however, vocational education in the region included a continuum of supportive academic course work but was not necessarily designed to move students on to postsecondary education. The vocational education program included certification programs, articulation agreements, and a number of cooperative education programs and work-study programs for students. Prior to 1990, the region also provided vocational educators with a regional Professional Development Center. As precursors to the later Tech Prep and STW initiatives, vocational programs had included career plans for students, portfolios, and some career-related research opportunities (see milestones in Figure 1).

The state where this consortium is located was one of the earlier states to receive STW funding, so state and local entities have had longer than some other states to develop complementary relationships between the Tech Prep and STW initiatives. STW has offered competitive grants, and Tech Prep programs across the state, including the River Valley Consortium, have taken advantage of these opportunities for additional resources. Many STW groups have looked to advances in schools where curriculum changes have taken place as a result of Tech Prep and have used those existing successful reforms to design broader educational reform, such as career pathways. Thus, because Tech Prep has been well-implemented in this state and in this consortium, Tech Prep has been a foundation for other career-related educational reforms. In this consortium, STW is viewed as a complementary reform. According to the consortium's director, the local perspective is that Tech Prep is older and structured more toward specific results, while, according to the consortium director, STW is open-ended with a very broad agenda, one that is “too broad to be particularly effective.”

The sentiment regarding the future of Tech Prep is that it remains a viable educational alternative and strategy for reform and that it is not going to die out, as opposed to STW whose funding will sunset within the next year. In fact, for the most part, it is perceived as flourishing, with continually growing numbers of educational entities and students wanting to participate. The consortium’s director attributed Tech Prep with influencing educational change at the state and local levels, the collaboration of K-16 faculty within and across institutions, curricular changes, and the development and implementation of educational pathways from high school to associate degrees.

FIGURE 1
RIVER VALLEY CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
FUNDING		Perkins II federal Tech Prep funds	State released RFP's	River Valley Tech Prep Consortium (RVTPC) began with three year Perkins grant.	RVTPC received state STW funds for special projects. RVTPC received Perkins expansion grant funds.
PERSONNEL			State leaders: State Department of Education and State Board of Regents	Full time coordinator hired, office & college fiscal agent New coordinator hired in two months.	Each high school/VEPD site named a local Tech Prep coordinator.
LEGISLATION	HB 1225 & S 345 major school reform.				
STRUCTURE/ PARTNERS				RVTPC formed with one community college, seven Vocational Education Planning Districts (VEPD's), & 67 school districts.	Greater Urban consortium formed with 2 VEPD's in common with RVTPC.
EVALUATION					VEPD's sign annual memorandums of understanding. Began student tracking mechanism. RVTPC became a site for Mathematica study.

	1994	1995	1996	1997	1998
FUNDING	State received STOWA which included Tech Prep funds.	RVTPC received funding based on grant proposal.	State began performance-based funding.	Annual performance-based grants.	Annual performance-based grants.
PERSONNEL	Added assistant coordinator in central Tech Prep office.		Regional STW coordinators hired to "collaborate" with Tech Prep.	Continued to expand and control Tech Prep office with part time specialty assistants.	
LEGISLATION				State SB55 affects graduation requirement and outcome-based education.	
STRUCTURE/ PARTNERS	Butler Joint Vocational School District and Middletown merge.	Consortium strategic planning in conjunction with Greater Urban.	Regional planning with Clark State and Upper River Valley.		
EVALUATION	MGT hired by state. Began RVTPC strategic planning.	Collect data and determine remediation and matriculation rates.	Joined with City State Tech Prep strategic plan.	Develop student assessment tools. First Tech Prep associate degree graduates.	Committed to working with NCRVE.

FIGURE 1
RIVER VALLEY CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
INTEGRATED CURRICULUM	Strong curriculum of applied (vocational level academics) at high school, but not up to "college standard."			Emphasis on applied academics at all levels (ongoing).	NSF grant for NCE/AME. Modular architecture. Partnership with RVTPC.
ARTICULATED CURRICULUM	Strong history of articulation agreements.		Tech Prep consortium planning based on articulation history.	Developed letters of understanding as Tech Prep articulation agreements (ongoing). Use of curriculum pathways.	
PROFESSIONAL DEVELOPMENT	Regional Professional Development Center. Project Discovery. Vocational certification programs.				
GUIDANCE	Career development programs across the state including individual career plans, career passports (portfolios), and career research.			Part of planning group for consortium. Started Tech Prep concept workshop done annually.	Started awareness days program (ongoing).
WORK-BASED LEARNING	History of strong vocational work-study programs and college co-op programs.				Started auto & electronics mentoring program with state STW funds.

	1994	1995	1996	1997	1998
INTEGRATED CURRICULUM	Math/Science tech center at college.	TIES (Teachers in Industry for Educational Support) instituted.	Continued growth of TIES.		
ARTICULATED CURRICULUM	Continual updates of pathways.	TIES	TIES	Continual quality checks initiated.	
PROFESSIONAL DEVELOPMENT	Developed comprehensive professional development plan for consortium (including guidance).	TIES	TIES	Collaboration of professional development initiatives on SCC campus. State change in licensure and pre-service programs.	Development of the pre-service and in-service university based on teacher education for community college faculty.
GUIDANCE		TIES	TIES		
WORK-BASED LEARNING	Mentoring model used for other occupational areas.	Work-based learning a part of every program. TIES	TIES		

The Tech Prep definition at the local level is heavily influenced by and aligned with the state definitions. Tech Prep is viewed locally as a broadly defined technology program for students who wish to pursue postsecondary education, including at least an associate degree in a technical area. Tech Prep programs of study, or pathways, include a focus on combined academic and technical training at both the secondary and postsecondary levels. Students in this consortium are enrolled in Tech Prep in the eleventh grade, and students are identified as Tech Prep students when they participate in articulated programs of study. A number of key definitions outlining this consortium's Tech Prep initiative are supplied in Figure 2.

Figure 2

Snapshot of the Local Tech Prep Approach

Primary Goal: Tech Prep is a relatively selective program that, compared with vocational education, will pose greater academic demands, particularly in mathematics and science, and provide comprehensive technical foundation rather than mastery of particular technical skills.

Tech Prep Student: A Tech Prep student is one who is enrolled in a sanctioned Tech Prep program, beginning in grade 11 and continuing through the associate degree in the occupational and employability competency delivery system.

Tech Prep Graduate: A Tech Prep graduate is a student who has followed an approved Tech Prep curriculum pathway and has earned an associate degree with an advanced skills certificate.

Tech Prep Program Participation: A Tech Prep program participant [at the secondary level] is defined as a student who is in grade 11, has completed a Tech Prep application, has enrolled in articulated vocational programs, and is enrolled in or has taken at least one applied academic class.

Primary Articulation Approach:

- 2+2 (four-year) articulation programs (some 2+2+2)
- Tech Prep pathways articulated based on memoranda of understanding
- Incoming, outgoing, and advanced skills articulation agreements
- Dual enrollment

Predominant Tech Prep Approach:

- Tech Prep Associate Degree (TPAD)
- Comprehensive Tech Prep

Source: Local consortium materials

According to the consortium's director, the definition of Tech Prep has not really changed over the years, but the occupational program areas and the emphasis have changed—from a more occupationally specific program approach to a more clustered approach. For example, the emphasis went from preparing nurses or radiology technicians to preparing allied health professionals who, upon completion of their Tech Prep program of study, had an entire list of competencies and skills they had achieved.

Target Population

Throughout the history of the consortium, the target population has been the "middle majority," but the initiative has increased its emphasis on addressing the needs of students who intend to pursue postsecondary education. Based on marketing and recruiting strategies, Tech Prep student identification begins with profiles that are created by staff, including counselors and teachers, for potential candidates who would be well-served by Tech Prep. These profiles are developed on the basis of desirable characteristics of a "typical" Tech Prep student (e.g., a student who may not be succeeding in traditional classes or a student who enjoys projects or teamwork) and are based primarily on the knowledge and recommendation of classroom teachers who are in the best position to know students. These profiles are then circulated among teachers, counselors, and administrators for recommendation to a Tech Prep program of study.

Once the profiles have been developed and potential students have been identified, teachers and counselors from the 34 feeder schools into the two career centers nominate students as Tech Prep students. Counselors then review the ICPs of the nominees, and candidates are interviewed so staff can inform them of the structure and design of the program—namely, that it involves at least two years of college, emphasizes hands-on instruction, and involves job shadowing, part-time jobs, and technical curriculum for development of skills and competencies.

In order to be accepted into Tech Prep and identified as a Tech Prep student, students must have:

- passed all parts of the Ninth Grade State Proficiency Test,

- successfully completed Algebra I,
- attained junior status at a participating high school by opening of classes, and
- been recommended by a high school guidance counselor.

For the allied health technology program, students must have also received a C or better in Algebra I and successfully completed Biology I. As of fall 1996, having passed all parts of the Ninth Grade State Proficiency Tests was no longer required (but was still recommended), although passing this proficiency test is still required for high school graduation. While the consortium director indicated that different schools have added specific requirements for entrance into various Tech Prep programs, the only requirement that is true across the board is a C in Algebra I and, in the case of allied health technology, a C in Biology.

Student tracking mechanisms were first put into place in this consortium in 1993. During the first nomination process in spring 1993, five students were nominated from 34 schools. Additional recruitment strategies conducted during 1993 resulted in the identification of 150 potential Tech Prep students, 51 of whom participated in Tech Prep during fall of 1993 (12 at BCCTC, 17 at joint vocational centers, and 22 at RVCTC). Enrollment in Tech Prep has continued to increase each year since the program's implementation.

Table 3

Number of Graduates and Tech Prep Participants by High School

School	Number of Graduates			Number of Graduates Participating in Tech Prep		
	1995	1996	1997	1995	1996	1997
RVCTC feeder high schools	3,839	3,989	3,921	27	75	75
BCCTC feeder high schools	1,561	1,540	1,617	10	28	52
SHS	495	521	476	0	6	21
Total	5,895	6,050	6,014	37	109	148

Source: Official NCRVE worksheet for determining the local Tech Prep student population

The current strategic plan indicates an intention to expand the enrollment of Tech Prep students to 15% of all eleventh and twelfth grade students in public education by the year 2000. The consortium also plans to increase the percentage of students having completed the high school portions and enrolling in state-assisted colleges and universities by the year 2002 to 66% of those identified as Tech Prep in eleventh and twelfth grades. The consortium also intends to include 25% of students from groups traditionally underrepresented in technology-based occupations.

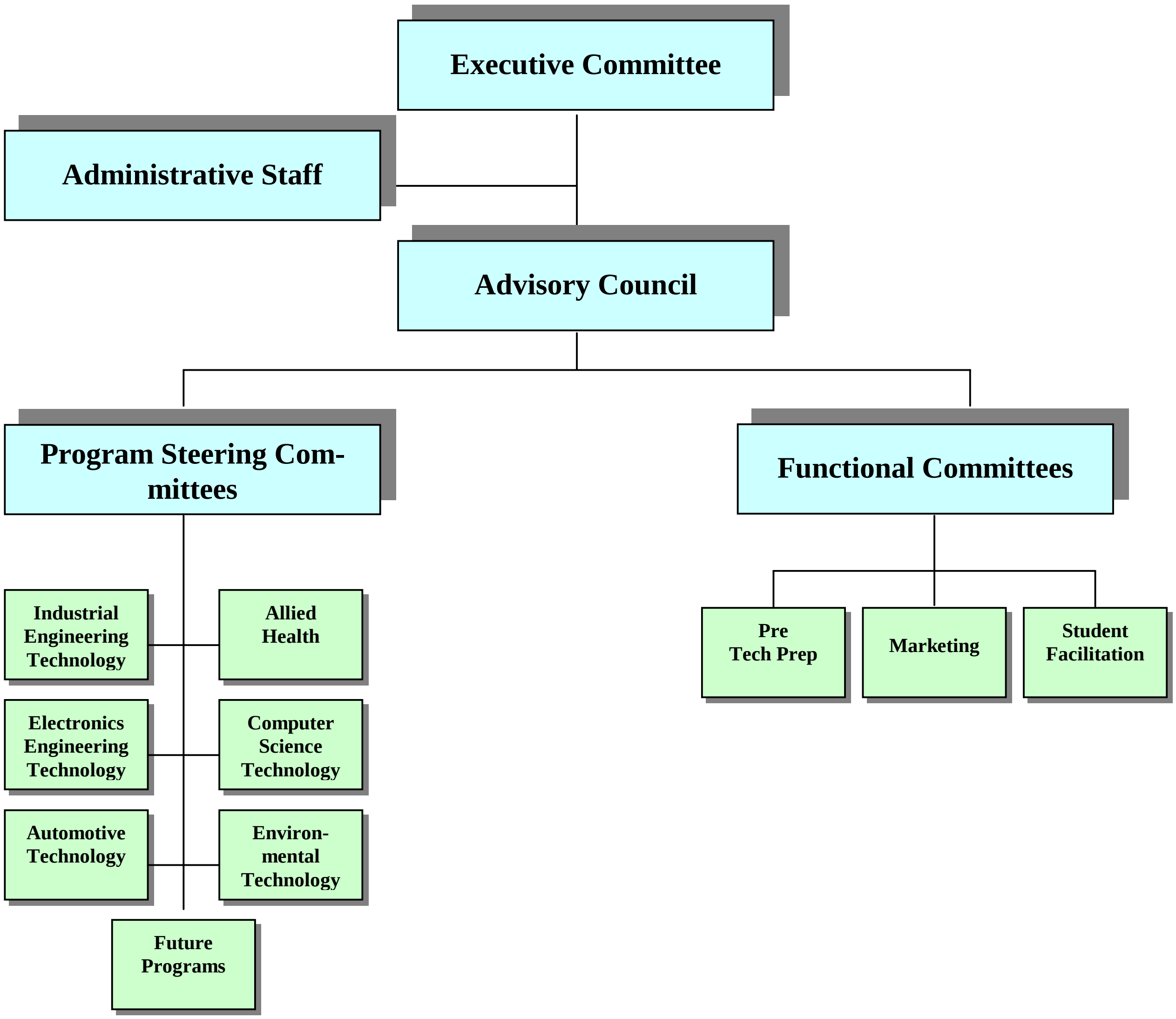
Governance and Funding

By state design, four committees, supported by a full-time staff, plan for and implement the work of the River Valley Consortium: an executive committee, an advisory council, program steering committees, and functional committees. The program steering committees include secondary and postsecondary faculty, counselors, as well as supervisors and individuals from industry, and these committees have direct input into curriculum development. At present, the local consortium has six program steering committees and three functional committees in place to assist with the ongoing governance and continued development of Tech Prep. The River Valley Consortium has two full-time positions (a director and an assistant director), three part-time assistants, and two support staff.

There is no common decision-making process for Tech Prep and STW. To date, Tech Prep governance has been conducted as reflected in Figure 3 and decisions have been made largely through the committee structures under the guidance of an executive committee.

Figure 3

River Valley Consortium Organizational Chart (1996)



Funding

Prior to the implementation of Tech Prep in 1992, several federal and state legislative acts helped lay the foundation for Tech Prep implementation at the local level: major school reform legislation in 1990; Perkins II, which provided federal Tech Prep funding also in 1990; and the state's release of request for proposals for funding for Tech Prep. Since 1991, leadership for Tech Prep and the administration of Tech Prep funds have come jointly from the state's department of education and its governing board. However, at the local level, colleges and universities have served as fiscal agents for the 26 Tech Prep consortia across the state. Overall funding by source is shown in Table 4.

Table 4

Funding for Tech Prep by Source and Fiscal Year

Funding Source	**Fiscal Year**						
	FY92	**FY93**	**FY94**	**FY95**	**FY96**	**FY97**	**FY98**
Tech Prep							
Federal and State	2,250	133,590	248,230	263,900	267,590	404,770	452,490
Local		32,000	32,000	32,000	84,000	94,000	76,000
STW							
State funds (prior to STWOA)			27,540	63,690	28,070		
					2,000		
TOTAL	2,250	165,590	307,770	359,590	381,660	498,770	528,490

Note: There are small amounts of state funds in the consortium's base funding for Tech Prep, but these were not identified separately by the consortium director. Local funds are provided by consortium members. NA means Not Available.

The River Valley Consortium officially began in 1992 with a three-year Perkins grant. STW funding followed in 1994, but the specific amount of these funds was unknown to project staff since they were not administered by the consortium. According to the consortium director, Title IIIE funding was received in 1991-92 and 1993-94, and the STW grant from the state provided the funds for the consortium to add the automotive cluster and health occupations cluster. Since 1996, Tech Prep funding at the local level has been performance-based, which is based on statewide evaluation results looking specifically at the number of Tech Prep students in a consortium and the remediation rates between high school and college. Each consortium receives a base amount of funding, and additional funds are based on January enrollment figures and remediation rates. Recently, bonuses have been added for low remediation rates. An external evaluator collects data each year to support the computation of performance-based funding, and the state allocates funds to the local consortium's fiscal agent, who then administers the funds based on the consortium's action plan for the year.

In addition to performance-based funding, the River Valley Consortium has also benefited from other grants that have provided supplemental funding. The consortium is a partner in the National Science Foundation (NSF) grant to City University and CCC to advance technical education through the development of a new degree program for Tech Prep engineering students. The grant also supports professional development and curriculum development. Instruction associated with this program focuses on contextual learning; hands-on, authentic learning tasks; and applications to new situations.

Barriers to Implementation

The River Valley Consortium has identified six features of its Tech Prep initiative that it considers unique: competency-driven curriculum and career pathways that are driven by industry; strong articulation agreements (i.e., memoranda of understanding) and strong ties between academic institutions; highly esteemed professional development initiatives that include non-Tech Prep as well as faculty who teach Tech Prep classes; efforts on the part of all institutions to support a "seamless transition" to other schools or to work; a state-driven strategic plan; and Tech Prep scholarships offered by CCC. While these six features are regarded locally as important features of the initiative, this consortium has also faced challenges and barriers throughout the implementation process. Like other consortia, faculty involvement has been hindered by planning time, release time for professional development, and funds to support them in the curriculum development process. One CCC dean suggested that these needs have hindered faculty from moving "from a teaching model to a learning model." A 1997 CCC report also indicated that there is a lack of resources and support for faculty who want to change delivery of instruction at the college level. While strategies were developed in 1998 and 1999 to address some of these barriers, other challenges remained, including providing more work-based learning opportunities for Tech Prep students.

Key Components

This section addresses such non-curricular components as marketing and student recruitment, guidance and counseling, professional development, and program evaluation and student outcomes. Tech Prep scholarships awarded by the consortium are also described.

Marketing and Student Recruitment

The River Valley Consortium has adopted a marketing and student recruiting plan with five components: (1) researching parents' attitudes about technical education, (2) carefully specifying the target student population, (3) nominating potential Tech Prep students, (4) promoting potential Tech Prep students, and (5) providing intensive orientation for students who apply for Tech Prep. To assess parental attitudes, a marketing firm was used in the first year of Tech Prep implementation to conduct focus groups with parents. These focus groups assessed parental attitudes about school, vocational education, and workforce preparation. The findings indicated that parents supported high school vocational education as long as it did not interfere with their children going to college. This finding then laid the foundation for the consortium's focus on Tech Prep as a program that concentrated on preparing its students for postsecondary education.

As indicated above, students recruited in 1993 and their parents participated in Tech Prep awareness days. Separate day-long programs were held at the career centers and other schools for all students nominated. As part of these awareness days, nominated students also visited CCC and local businesses and industries associated with the program. While at CCC, students had the opportunity to talk with faculty, tour the college labs, and have questions answered.

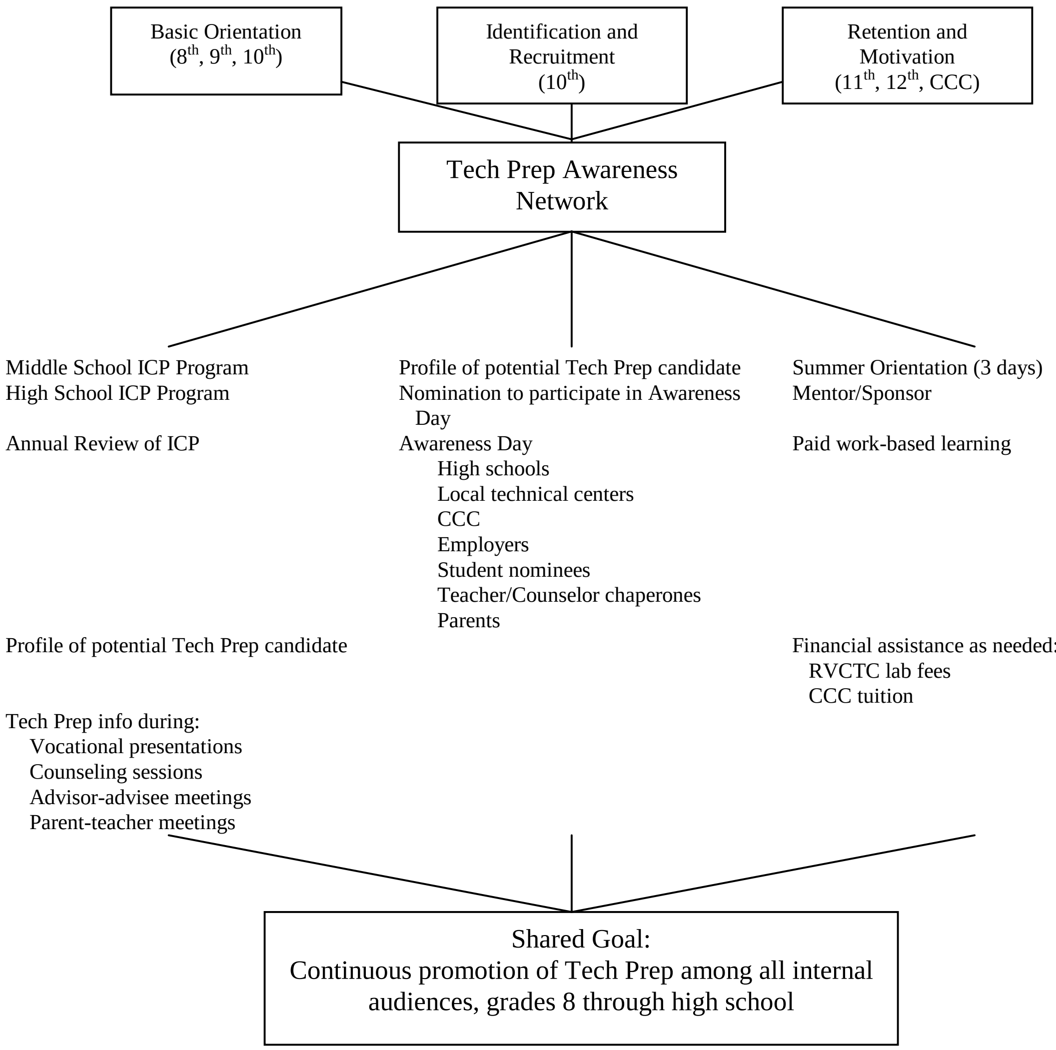
The purpose of the summer orientation for nominated students was to continue to foster interest in the program through speakers from participating companies and company worksite tours. Students also participated in small lab projects and took college admissions tests for the purpose of determining areas for skill improvement to focus on during the last two years of high school.

This awareness and orientation strategy has been a primary marketing and recruitment strategy throughout the history of the consortium. Additional marketing strategies have included newsletters and articles in school and area papers to make stakeholders aware of the various components of the local Tech Prep initiative, various programs of study, and changes in Tech Prep options. A wealth of literature has also been made available at all area schools, particularly CCC, in the form of brochures and flyers describing specific Tech Prep programs of study and/or career clusters. Former and current Tech Prep students have also been included in marketing the initiative to students through various workshops and presentations across the region.

In addition to consortium-wide marketing procedures, the consortium has developed an internal marketing strategy. The model includes strategies for promoting Tech Prep from middle school through high school. Figure 4 below gives an overview of the consortium's marketing strategy.

Figure 4

Internal Marketing Model for Tech Prep



Tech Prep efforts have included strategies to recruit students from underrepresented populations (i.e., individuals who participate in programs that traditionally graduate students of the opposite gender, individuals with handicaps, educationally and economically disadvantaged individuals, and individuals with limited English proficiency). In 1995, a college faculty member was working under a separate grant to attract women into engineering and had met with tenth grade female students at the two joint vocational centers. In the first year, however, there were only three women in the centers. In the first year, however, there were only three women in the Tech Prep electronics program and one in manufacturing technology. The population served in the consortium schools is primarily white, and the same is true of the students participating in Tech Prep. Recent efforts have been more successful in attracting females and minority students into Tech Prep programs of study, according to an interview with a local administrator.

Guidance and Counseling

The River Valley Consortium has several career guidance initiatives in place. By state mandate, all eighth graders have been provided with formal career guidance through the use of Individual Career Plans (ICPs), and these have been reviewed annually throughout high school. As indicated above, the consortium also has held awareness and orientation activities for nominated tenth graders to assist students with career decisions.

In this consortium, counselors in most schools have advised both Tech Prep and non-Tech Prep students alike. In addition, counselor involvement with specific Tech Prep activities has varied from school to school. Some counselors were champions of Tech Prep, while others were not. The long-term, ongoing use of ICPs statewide has had somewhat of an impact on the role of the counselor in regard to Tech Prep, and the ICP has become a primary resource in the Tech Prep guidance counseling process. However, in this consortium, the director regards the role of the faculty and the role of the nomination team as critical to the guidance counseling process, as it relates to Tech Prep.

The third year of the statewide evaluation process revealed some disconcerting findings related to the use of ICPs. Generally, students did not see much emphasis placed on these plans. Tech Prep representatives, however, did promote the use of ICPs, but the extent of use still varied from school to school, especially since the ICP was perceived as a vocational strategy and this guidance tool had not historically been seen as useful for the student population at large.

The Tech Prep director agreed that counselors had an impact on the way students made choices, but she also stated that, at least in the early years of Tech Prep, academic faculty did not understand Tech Prep. As a result, she felt the influence of academic faculty was somewhat negative. However, she also indicated that teachers had more of a positive impact than guidance counselors once the consortium achieved a mix of counselors and academic and vocational teachers who had access to industry settings that enabled them to understand Tech Prep. The director pointed out that a workshop titled The Tech Prep Concept was a turning point in the guidance and counseling process. Sponsored by the consortium, this workshop was originally designed for counselors, but very quickly included academic faculty as well. The Tech Prep Concept workshop is ongoing.

In 1998, the consortium developed and distributed Career Pathway Planning Guides (hard copy and software version) and provided in-service to all school districts. The River Valley Consortium also collaborated with STW, vocational schools in the region, the City Area Chamber of Commerce, and City Daily Newspapers in Education to prepare and publish a career development supplement for classroom use and monthly career pages.

Professional Development of Faculty, Counselors, and Administrators

The River Valley Consortium has several programs in place for the continued professional development of faculty and staff. Across the consortium, schools signed a memorandum of agreement that includes a detailed professional development plan and an agreement to pay for substitute teachers while faculty participated in professional development activities.

One ongoing professional development opportunity for the consortium was the Teachers in Industry for Educational Support (TIES) program. In this program, participating companies sponsored teams of two to four educators, with a stipend of $450 per teacher. The goal of the program was to support continued partnerships between industry and educators. According to the 1996-97 strategic plan for the consortium, one of the strengths of TIES was that Tech Prep instructional teams and industry participants began to speak the same language and share the same vision. TIES has increased over the years to two TIES programs per summer, and approximately 70% of the participants in TIES are now non-Tech Prep faculty and industry representatives. While TIES was not a required professional development activity, those who participated added competencies to their own portfolio. Also, this opportunity was in alignment with the state's secondary education efforts in developing a new licensure (as opposed to certification) system that requires extensive professional development for renewal of a teaching license.

TIES was a three-week externship program that matched teams of educators with area employers to learn industry applications, complete projects, and design practical, real-world problem-solving activities for students. The program generally took place during the summer and included faculty working at an area business for 12 days and then writing lesson plans and developing projects for classroom use for three days. The 1998 projects included flowcharting a company's process for ISO certification and developing a project for students to remodel a home.

The consortium's strategic plan specifically included instructor training in the area of curriculum development (including curriculum writing) as one of its goals. The 1997 goal was to have 30% of Tech Prep instructional teams complete the professional development and curriculum writing training program by July 30. This goal has been met each year since 1997. This particular professional development strategy included instructors collaborating with the National Center for Excellence in Advanced Manufacturing Education, developing models to serve as guides for curriculum development, and establishing a network of industry affiliates to support TIES.

Another notable professional development program offered by this consortium was the annual winter symposium at CCC. These events were day-long symposia that brought together middle school faculty and college educators, business partners, parents, counselors, administrators, curriculum specialists, school board members, and community leaders, as well as some Tech Prep students. Over 400 participants attended in 1998, including non-Tech Prep faculty from across the consortium.

As an enhancement to the consortium's professional development activities, the consortium developed agreements with City University whereby graduate credit was awarded for professional development programs offered through the consortium. Also, any City University course took by faculty who teach Tech Prep classes was offered at a reduced rate. In addition, using grant funds from the State's Department of Development, the consortium also offered a mentorship program for automotive faculty.

A unique collaboration between several universities in the region and CCC, two other consortia, the local STW initiative, and industry occurred during the summer of 1999. Participation of faculty who teach Tech Prep classes from this consortium was supported by Tech Prep dollars. This collaboration resulted in the design of a three-course series. The first course provided teachers with the opportunity to become more engaged in educational reform issues. The second course provided experience in an industrial setting. The third course pulled together information from the teachers' experiences in the first two courses and related the information to specific disciplines. The series closed with an after-hours gathering of all participants.

As part of the annual strategic planning process, a SWOT (strength, weaknesses, opportunities, and threats) analysis was conducted for the purpose of bringing direction and clarity to the professional development plan. Proposed evaluation methods for planned activities were included in the annual process. The on-going professional development goals for 1998-99 included, among other goals, expanding offerings for professional development, increasing communication among stakeholders, conducting workshops for new Tech Prep instructional teams, expanding TIES, and developing and publishing modules to support Tech Prep instruction.

Program Evaluation and Student Outcomes Assessment

The River Valley Consortium has participated in both statewide and national evaluations. Most notable is the national evaluation of Tech Prep conducted by Mathematica Policy Research (MPR), for which field visits were made in 1995 and 1998. The consortium was chosen as one of only ten consortia across the country to be involved in the national evaluation. In addition, the consortium participates in a five-year evaluation process sponsored by the State Department of Education. The state's strategic plan mandates that each local Tech Prep consortium be evaluated annually.

The state evaluation is also designed for formative purposes and builds upon the results of the national evaluation. Several key recommendations have come to fruition at the consortium-level as a result of the statewide evaluation. For example, the first evaluation conducted in 1995 resulted in the development of a statewide strategic plan. At the local level, this recommendation was supported by the local Tech Prep consortium director, and a forward-looking strategic plan and supportive action plans were developed for the consortium as well.

In addition, the consortium developed a student tracking system in 1995 as part of the CCC management information system in order to collect comparative data on Tech Prep and traditional students. The consortium used the management information system that was already in place and adapted it to enter data they needed for tracking students. As part of this process, juniors in Tech Prep programs of study came to CCC where they completed orientation activities, took the college COMPASS placement exam, filled out an application to the college, and were thereby entered into the college data management system.

According to the consortium director, the problem with this adapted tracking system was that the Tech Prep office did not have control of actually getting teachers to bring their students to CCC; thus, they did not control the extent of the information on Tech Prep students that was available for input. While this portion of the data management system was administrated by the Tech Prep office at CCC, they still had difficulty impressing secondary schools with the importance of making sure all Tech Prep students had been to CCC by December 1 of their junior year, and completed applications for CCC, along with competency exams for placement.

In addition to these evaluation efforts and attempts to track students, each of the different Tech Prep program area teams also identified specific evaluation activities annually. These evaluation efforts were both qualitative and quantitative. The consortium director stated that these annual evaluations had pointed out areas of strength and weakness. The evaluations had also affected the consortium's performance-based funding. She also indicated that these evaluation mechanisms had helped to provide more consistency in implementing Tech Prep across the state.

In a 1999 follow-up study to determine the impact of the local Tech Prep initiative, the consortium reported that 271 of the 1998 Tech Prep high school graduates matriculated on to CCC. Another 124 graduates had transitioned to other postsecondary institutions, including other two-year and four-year colleges and universities. Seven students entered the military, and 28 Tech Prep graduates from 1998 were reported to be working in a field related to their program of study, rather than attending college.

Tech Prep Scholarships

The CCC Tech Prep scholarships are a unique and key component of this initiative. They are available for students who have:

- Earned a cumulative GPA of 2.25 for the junior and senior year in high school,
- Completed their high school program as designed,
- Continued their high school Tech Prep program of study at CCC,
- Passed all parts of the COMPASS placement test,
- Completed the Free Application for Federal Student Aid (FAFSA) and submitted it to the financial aid office by May 1 of their senior year,

- Enrolled as a full-time student (i.e., 12 or more credit hours), and
- Maintained a 2.25 GPA in college.

Tech Prep students who satisfy these criteria are eligible for a $1,000 scholarship per year during the two years immediately following their high school graduation. Students in allied health can elect to have their scholarship spread over a three-year period, since the program requires completion of additional credits. Scholarship recipients who were interviewed indicated that their decision to matriculate to CCC was due, in part, to the scholarship.

The criteria outlined above reflect two major changes in recent years: (a) the minimum cumulative GPA for eligibility has been raised from a 2.0 to a 2.25, and (b) the scholarship amount and duration has been reduced from $3,000 to $1,000 per year. Part of the reason for the change was due to the large number of credits that scholarship recipients were taking each quarter to complete their degree within two years. Students were also found to be taking more course credits instead of participating in co-op. In addition, over the last few years the college had fewer dollars and more students wanting Tech Prep scholarships. CCC's board of trustees felt strongly that they wanted to provide assistance to as many students as possible; hence, they decided to increase GPA requirements and reduce the tuition. The consortium director indicated that these changes had actually served to increase the level of commitment from students. Although there had been a slight drop in participation in Tech Prep at CCC, she felt that these changes had provided a good strategy for "weeding out" students who were less committed to their studies and possibly more interested in a "free ride."

Tech Prep Curriculum Reform

Core academic and vocational curriculum associated with Tech Prep at the secondary and postsecondary levels is described in this section.

Core Curriculum and High School Graduation Requirements

The state educational system is highly centralized, and the high school curriculum in the River Valley Consortium is largely prescribed by the state. Minimum state graduation requirements are presented in Table 5. Students at all schools are required to meet state-specified high school requirements in order to graduate.

Table 5

State Minimum High School Graduation Requirements

Subject Area	1983 Standard (effective until 9/15/01)	Minimum State Requirements after 9/15/01	Last Graduating Class Affected	Change
English/Language Arts	3 units	4 units	2002	+1
Health	½ unit	½ unit	2002	Same
Mathematics	2 units	3 units	2002	+1
Physical Education	½ unit	½ unit	2002	Same
Science	1 unit	2 units until 9/15/03 (must include 1 unit biological science and 1 unit physical science) 3 units after 9/15/03 (must include 1 unit biological science and 1 unit physical science)	2002 & 2003	+1
Social Studies	2 units	3 units	2002	+1
Electives	9 units	8 units until 9/15/03 7 units after 9/15/03 (after 01 – units must include 1 unit or 2½ units of business/technology, fine arts, or foreign language)	2002 & 2003 2004	-1 -1
Total	18 units	21 units	2002	+3

Source: State Department of Education web site

In addition, local high schools have developed additional course and credit requirements. Generally, credits to graduate range from 17 to 24 depending on the number of academic requirements of each individual school. Table 6 presents minimum high school graduation requirements of a sample of the 64 high schools that comprise the consortium for whom course catalogs were provided.

Table 6

Credits Required for Graduation by High School

High School	No. of Credits to Graduate	Math	English	Science	Social Studies/ Science	Other Academic Requirements (not including PE, Drivers Ed., Consumer Ed., Health)
RVCTC*	NA	NA	NA	NA	NA	9th Grade Proficiency Test for all
202	17	3	4	3	3	½ credit keyboarding ½ credit computer literacy
204	24	3	4	3	3	Not listed
216	24	2	4	2	3	1 credit computer science 1 credit fine arts (1)/applied arts (2)
219	20	2	3	1	2.5	1 credit in life skills or fine arts ½ credit in basic communications 3 majors consisting of 3 units or credits in a subject area 1 minor consisting of 2 units in a subject area
228	19.5	2	4	2	2	Not listed
230	20	2	3	2	3	Not listed
231	20	2	3.5	2	2	½ computers ½ fine arts ½ speech
BCCTC*	21	2	3	1	2	(1 social science credit must be U.S. history and civics)
232	18	2	4	1	2	½ practical arts 1 fine Arts ½ business
234	21	2	3	2	2	1 business technology or fine arts
235	21	3	4	3	3	2 performing/visual arts and/or applied arts 2 foreign language
237	21	3	4	2	3	At least 1 or 2½ units of business/technology, fine arts and/or foreign language
Suburban High School (239)*	19	2	4	1	2	3 credits in additional area other than English (science, social studies, vocational/career, applied arts, fine arts, foreign language, business)

Source: High School Course Catalogs

Note: *High schools included in the study. NA means Not Available.

In addition to these core requirements for graduation, all students who graduate from high school are required to pass the Ninth Grade State Proficiency Test. A state proficiency test is also given in the twelfth grade; however, this test is not mandatory and passing the test is not required for graduation.

Most high schools in the consortium offer honors courses as well as an honors diploma. Requirements for the honors diploma are as follows:

- Successful completion of the high school curriculum or the individualized education program developed for the student by the high school, and
- Demonstration of ninth grade level of literacy and basic competency on all ninth grade proficiency tests required by rule 3301-13-01 of the Administrative Code.

Except for one exception, students must also meet all of the following criteria:

- Earn 4 units of English,
- Earn 3 units of math (including at least the competencies obtained in Algebra I, Algebra II, and Geometry),
- Earn 3 units of science (including at least one unit of Foundational Science with an emphasis in Chemistry and at least one unit in an applied science with an emphasis in Biology),
- Earn 3 units of social studies,
- Earn 3 units of foreign language or two units each of two foreign languages,
- Earn 1 unit of fine arts,
- Maintain an overall high school grade point average of at least 3.5 on a 4.0 scale up to the last grading period of the senior year, and

- Obtain the score(s), indicative of overall honors, on the twelfth grade proficiency tests designated by the State Department of Education, or obtain a composite score of 27 on the ACT or an equivalent composite score of 1210 on the SAT.

The state also offers an Award of Merit for students in college prep, vocational, and applied programs of study. The Award of Merit requires four units of English, three units of math, three units of science, three units of social studies, three units of a foreign language, and two units in business, computer, visual or performing arts. Students must maintain above average attendance for grades 9-12. Students must maintain a 3.2 on a 4.0 point scale for grades 9-12; must earn the equivalent of an overall grade point average of 3.5 on a 4.0 point scale for grades 11 and 12; or must rank in the top 25% of the class (whichever is more inclusive). In addition, to earn honors status students must participate in co-curricular, extra-curricular, or community activities in accordance with procedures established by the district board of education.

Tech Prep and the Curriculum of the Community College

CCC has an open admissions policy, like most community colleges across the nation, but all new students seeking a degree or certificate have to complete placement testing for English, reading, and mathematics. Transfer students who do not have math or English courses that are equivalent and transferable must take placement tests. Except for students with accepted transfer courses, all students who take a math or English class at CCC have to be assessed prior to enrollment. No degree-seeking student can register for any credit courses without test scores on file. Non-degree seeking students taking courses for the purpose of personal interest or career development are not required to participate in assessments.

Students must begin math and/or English course sequences either at or below the level indicated by their placement results. If students do not demonstrate ninth grade proficiency in reading, they must complete Fundamentals of Reading (DEV 064) as a prerequisite to enrolling in any college level course not considered exempt.

Although parallel information was not available for either RVCTC or BCCTC, Suburban High School's annual school district reports for 1996, 1997, and 1998 indicated that vocational education placement rates were 99%, 100%, and 98%, respectively. However, a 1998 follow-up study of 319 Tech Prep graduates (72% of students in secondary Tech Prep) identified 136 graduates enrolled at CCC. Of these students, only 8% had enrolled in remedial courses. Remediation rates were highest for students in allied health and industrial engineering technology from the RVCTC school.

Table 7

Remediation Rates for Students in Tech Prep Programs

Tech Prep Program	School	No. of Graduates Enrolled in Postsecondary Education	No. and % of Graduates Enrolled in Remedial Courses
Allied Health (ALH)	RVCTC	13	3 (23%)
	BCCTC	12	1 (8%)
Automotive (AUT)	RVCTC	8	0 (0%)
	BCCTC	5	0 (0%)
Computer Support Technology (CST)	RVCTC	25	2 (8%)
	BCCTC	5	0 (0%)
	SHS	14	1 (7%)
Industrial Engineering Technology (IET)	RVCTC	13	4 (31%)
	BCCTC	4	0 (0%)
	SHS	17	0 (0%)
Electronic Engineering Technology (EET)	RVCTC	20	0 (0%)
	BCCTC	0	0 (0%)
	SHS	0	0 (0%)
Total		136	11 (8%)

Source: Information provided by the River Valley Consortium director

Students seeking associate degrees at CCC are required to complete a series of courses to fulfill general education requirements, consisting of courses that are common to all degrees, regardless of major. The general education requirements at CCC include the ability to express oneself clearly and logically in standard English both in written and oral form; the ability to think rationally, systematically, and logically and to solve quantitative problems through proper means of analysis and/or synthesis; the ability to understand the complex modern world and the social interactions which take place therein; and the ability to understand the role and applications of computers in today's society. Minimum course requirements at CCC are as follows:

- At least two courses in written communications,
- One oral communications course,
- One mathematics course,
- One humanities course,
- One social science course, and
- A computer theory/application course.

All students must also participate in assessments of the general education learning outcomes prior to graduation.

Most programs at CCC are seven quarters in length and commence in the fall quarter. According to the 1996-97 college catalog (which would have been applicable when students from this study were in attendance), associate degrees required that students:

- Fulfill requirement of the degree program,
- Complete a minimum of 90 credit hours,

- Maintain a cumulative GPA of at least a 2.0, and
- Complete an application for graduation.

Students at CCC who wanted to matriculate on to City University (CU) were generally enrolled in university parallel degree programs at CCC. These programs were designed for students who planned to transfer to four-year colleges and universities. Students who met the admissions requirements at both CCC and CU could also qualify for a dual admissions program. The program allowed students majoring in electronics engineering, industrial engineering technology, manufacturing engineering technology, mechanical engineering technology, or quality engineering technology at CCC to receive annual academic progress reports showing their credits and progress toward a bachelor's degree at CU. Assuming students would complete an associate's degree at CCC with a qualifying GPA, they were guaranteed admissions into the corresponding program at CU with junior-level standing. Upon entering CU, students received an annual one-third tuition scholarship.

In addition to a guarantee of transfer credit, CCC also provided a guarantee of job competency for all AAS degree students, including Tech Prep students. This guarantee applied only to graduates who were employed full-time within 12 months of their graduation in the area of their program of study. If an AAS graduate was deemed by an employer to be deficient in technical job skills identified by the program outcomes for the degree program, the graduate was provided with up to nine quarter hours of additional, tuition-free training.

Competency-Based Tech Prep Curriculum

A driving feature of the state Tech Prep curriculum has been the use of competencies. The state derived a list of competencies that were then locally validated. Industry practitioners assisted in creating the list of all necessary competencies required for a Tech Prep graduate to start in a particular job within an occupational cluster. Faculty then addressed competencies in the curriculum based on the level of instruction they provided (i.e., introductory to advanced skills, high school, or community college environment).

During the period our study was conducted, six Tech Prep programs of study were offered by the River Valley:

- Allied Health Technologies (ALH),
- Automotive Technology (AUT),
- Computer Support Technology (CST),
- Environmental Technologies (ENV),
- Electronic Engineering Technology (EET), and
- Industrial Engineering Technology (IET).

Schools in the River Valley Consortium offered these six Tech Prep programs in the junior and senior years (see Table 8). Tech Prep programs of study were also offered by some schools other than the three schools included in this study.

Table 8

Tech Prep Programs by Institution (1998)

Institution	**Program**						**Total Units**
	ALH	**AUT**	**CST**	**EET**	**ENV**	**IET**	
BCCTC	Junior Senior	Junior Senior	Junior Senior	--	Junior Senior	Junior Senior	10
RVCTC	Junior Senior	Junior Senior	Junior Senior	Junior Senior	Junior Senior	Junior Senior	13
Suburban High School	--	--	Junior Senior (2)	--	--	Junior Senior	4
Total Units	**4**	**4**	**7**	**2**	**2**	**6**	**27**

Source: Consortium document outlining programs available by institution for fall 1998

Note: Units refer to vocational programs offered in a junior class or a senior class and are the basis of vocational education funding in the state. A program offered at each class level refers to one unit. Suburban High School offers access to all six programs through area vocational centers, but only two are offered at the high school campus.

Suburban High School provides three pathways for students. They are:

- A career education prep pathway,
- A college prep pathway, which is essentially a four-year college prep pathway, and
- A combined career/college pathway, which includes both college prep and Tech Prep, such as early childhood education, construction trades, and culinary arts/hospital management (see Curriculum Reform section below for a description of pathways).

Moreover, the Suburban High School offered all six Tech Prep programs of study in the combined career/college pathway. By comparison, the college prep pathway offered science, math, communication, and human services as four-year pathways in professional areas, with an emphasis on technical support roles requiring an associate's degree and/or specific skill development.

Fifty pathways that parallel vocational programs were available at RVCTC, including the six Tech Prep pathways. Nineteen pathways and three co-op programs were offered at BCCTC, four of which were Tech Prep pathways. Across the consortium, school districts themselves decided which pathways they would offer based on students' needs and available resources. Tech Prep pathways were distinguished from vocational pathways primarily by the fact that the vocational pathways included only eleventh and twelfth grade course sequences, while the Tech Prep pathways included course sequences for a two-year associate's degree.

The consortium is adding the following four new programs as of the 1999-2000 academic year: engineering technologies cluster, business technologies cluster, information technologies (CST Expansion), and an interactive media technologies. All program descriptions include courses to be taken at the career centers, CCC, and, if available, at the university level. In instances where students want to continue on for a bachelor's degree, 2+2+2 agreements with City University are in place for the engineering technology and industrial engineering technology programs.

Curriculum Development

Curriculum development for Tech Prep in this state has been competency-driven. The consortium uses the state's Tech Prep Curriculum Services to develop curriculum through the use of Tech-Prep Competency Profiles (TCP). Joint teams of high school and college faculty work with employers to prepare the TCPs, which identify skills at both the secondary and postsecondary levels. According to the director, teachers have tended to utilize this service over the more traditional approach of adopting applied academics curriculum from the Center for Occupational Research and Development (CORD). Earlier CORD materials were used as a starting point for Tech Prep curriculum development by many teachers, but now teachers (especially those who have participated in professional development opportunities and/or TIES) create their own materials.

The TCP process is essentially a modified curriculum development process titled Developing A Curriculum (DACUM) that involves high levels of collaboration among representatives of business, secondary faculty, community college faculty, and university faculty. Business and industry representatives outline desired competencies for potential employees who perform specific jobs, and educational personnel work together to determine at what level and in what courses these competencies should be taught. This process is known locally as "leveling" competencies.

Prior to the implementation of Tech Prep, State Competency Analysis Profiles (SCAPs) were utilized to determine competency requirements, and SCAPs existed for every occupation within a vocational program. While SCAPS are still used at the state level to provide basic competency lists for secondary vocational programs, the TCP process outlines competencies for both academic and vocational education for Tech Prep programs of study at both the secondary and postsecondary levels. Through an annual review process and face-to-face curriculum review meetings, consortia members are provided with information that enables them to change curriculum to address new competencies. According to the consortium director, while the TCP process is required, the state does not require documentation of changes to curriculum. Sometimes very little change is necessary, but sometimes a great deal of change is needed in curriculum, particularly for volatile industries like computer or information technologies.

All Tech Prep programs of study must fulfill the minimum high school graduation requirements, but some Tech Prep programs have additional minimum competency requirements for graduation. In such instances, a student may meet high school graduation requirements without meeting all of the additional competency requirements suggested for the program of study. In these cases, the student can graduate from high school but may not be able to articulate into a course at CCC unless he or she can demonstrate a required level of competency.

Each Tech Prep steering committee "levels" the competencies to be acquired by the end of twelfth grade and at the end of the associate degree. In some programs, exit competency reviews are conducted by the high schools to determine students' acquisition of competencies. There is some flexibility within the schools as to when the exit competency review meetings take place. However, an assessment of students results in a "career passport," which is a list of competencies that students possess when they finish the twelfth grade. The career passport is also considered to be part of the TCP process and serves as a portfolio displaying the student's credentials. The passport includes a letter of recommendation from a school administrator, the student's resume, a school profile, a certificate of recognition (related to twelfth grade proficiency), student accomplishments, letters of recommendation, a sports vita (if applicable), and documentation of other abilities such as music, art, drama, or community service. In addition, the passport validates student performance through three components of the passport:

- A career narrative in which the student defines career goals, immediate plans for graduation, and a "Plan B" option,
- Evidence of student skills, including a school transcript and a list of occupational skills for vocational students, and
- Verification of employability skills.

To verify employability skills, students are required to produce two writing samples that address at least two of the five competencies (i.e., resources, interpersonal skills, information, systems, and technology) that were identified by the Secretary's Commission on Achieving Necessary Skills (SCANS). The writing samples provide supporting evidence that the student understands his or her personal abilities and work attitudes.

Based on the TCPs, courses are then structured to address competencies required within given programs of study. Including the courses that address these competencies, curriculum pathways are then developed. A curriculum pathway is simply an entire program of study, from eleventh grade through an associate's degree, that addresses all competencies required for graduates to move directly into a career. Suburban High School describes a pathway as "classes which offer sequential preparation of knowledge and skills in the core content area that when successfully completed, should present opportunities at graduation to advance to the next level of continuing education and/or employment."

Curriculum pathways are also linked to SCAPs. As result, faculty in each discipline and at each institutional level (secondary and postsecondary) come together to "level" the TCPs (i.e., determine what competencies should be taught at what levels and in what courses). Courses are sequenced based on the outcomes of this joint curriculum development process. In some cases, existing courses are used, while in other cases new courses must be developed. Thus, the curriculum development process proceeds from identification of TCPs, or competencies, to course development to establishing curriculum pathways.

In most instances, the end result is the designation of math, science, and language arts courses to be taken at the secondary level, a two- to three-hour block of courses that enables a student to develop required technical competencies, and designated academic and occupational courses to be completed at the postsecondary level.

Historically, particularly at the community college level, what is taught in a course is often based on faculty expertise or faculty perceptions of what is pertinent to the course. However, the use of TCPs emphasizes content that business and industry deems as most important. The local consortium director indicated that faculty are often uncomfortable with the TCP process, since it puts so much ownership of content in the hands of business and industry. Faculty do not have the option of throwing out competencies once they have been identified collaboratively. One problem is that faculty themselves sometimes do not have the competencies identified, particularly in fields like computers or information technology that change so rapidly. However, faculty do appreciate sharing information with business and industry. The process has also enabled the consortium to develop professional development strategies, recruitment methods, and job shadowing opportunities for both students and faculty. The TCP process has also enhanced team teaching, the development of real-world projects, and the sharing of laboratory and other resources. An outcome of the TCP process has also yielded articulation agreements.

Articulation Agreements and the Vocational Curriculum

Although some vocational programs have been converted to Tech Prep, the consortium director indicated that Tech Prep is essentially developed “from the ground up through program application, the TCP process, and pathway creation for a four-year program.” According to her, Tech Prep really does not have traditional articulation agreements. However, agreements that essentially serve as articulation agreements do exist for this consortium in the form of a memorandum of understanding between CCC and respective partners (e.g., corporation, hospitals, high schools, four-year institutions). The memorandum of understanding consists of a statement of the mission and goals of Tech Prep in the consortium. In addition, the following six guidelines of articulation are outlined:

1. Upon entry into the Tech Prep program students will be jointly admitted to City Community College (CCC).

2. Students will complete entry-level competencies during their junior and senior years and move into advanced levels of study at the community college. (The programs of study for the four-year programs are generally outlined in curriculum pathways that are attached to each agreement.)

3. The curriculum pathway details the waivers of any courses at CCC based on completion of the articulated courses during the junior and senior years as part of special course offerings by CCC at the high school, courses jointly taught, or completion of courses through the high school Tech Prep curriculum.

4. Students must complete the high school portion of the curriculum with at least a "C" average.

5. The curriculum pathway details any required proficiency/challenge exams the student needs to take prior to attending CCC.

6. Representatives from each institution will meet annually to review and make amendments, as necessary, based on curriculum changes.

Memoranda of understanding are comprised of outlined course sequences, called pathways, that are designed to address specific competencies within specific courses. Pathways indicate the program of study at both the high school and college levels; but, unlike articulation agreements, these pathways do not directly link programs at the high school with programs at the college that may have existed before the Tech Prep pathway was developed. However, to designate articulated courses, the consortium writes a memorandum of understanding with each school, outlining the courses in the pathway. Thus, although the consortium does not use the term articulation agreement for these Tech Prep pathways, the pathways include articulated courses that can be described within the framework of traditional practices related to articulation agreements.

Articulation agreements in this state and in this consortium are categorized in three different ways: incoming, outgoing, and advanced skills. At CCC, only Tech Prep programs offer incoming and advanced skills articulation agreements. A number of outgoing agreements exist, including both Tech Prep and non-Tech Prep pathways. In a sense, the non-Tech Prep articulation agreements have been a barrier for Tech Prep because some students fail to see the advantage of Tech Prep when other articulation agreements exist.

Incoming agreements with secondary schools, hospitals, and professional organizations detail courses that will be recognized by CCC based on successful completion of the requirements. For Tech Prep students, the course and credit hours are recorded on student transcripts with a Y grade. To receive articulated credit, students must provide documentation of successful completion of requirements per the agreement and obtain departmental approval before the information can be placed on the college transcript.

In 1994, CCC had over 40 incoming articulation agreements with organizations, including high schools, hospitals, and businesses. CCC also had 32 1+1 agreements with two local community colleges, where students could complete general education then transfer to CCC for the technical/occupation requirements of the degree program. Also as of 1994, the consortium had established incoming agreements in 11 program areas with four career centers in the region covered by the consortium. As of 1996, there were incoming agreements with 38 different organizations, high schools, hospitals, and businesses.

Outgoing agreements are articulated agreements with other colleges and universities indicating how CCC programs and courses will transfer to those institutions. As of 1994, outgoing articulation agreements had been established statewide with 17 four-year colleges or universities in 50 different program areas. Academic departments at CCC worked with the Academic Credit Assessment Information Center (ACAIC) and the four-year institutions to develop these agreements. That same year, CCC developed 18 outgoing articulation agreements with four-year institutions.

Since 1989, CCC has moved from informal to formal incoming articulation agreements, resulting in a 50% increase. It appears that these agreements are explicitly defined and maintained by each participating organization. All formal agreements are on file centrally at the ACAIC. Agreements are developed and updated by the academic departments involved in conjunction with an ACAIC director who works as a liaison between CCC and the various organizations. ACAIC serves as both an information center for students, as well as a clearinghouse to ensure all student credits are accurately applied and listed on student transcripts.

From 1990-1994 there was a steady decrease in the number of courses and credits articulated (with a slight jump in 1992). The decrease was attributed to short-term articulation agreements that expired in 1992. 1994 was the first year that Tech Prep articulation agreements were developed in the form of memoranda of understanding. Additionally, a shift in the number of Tech Prep agreements can be accounted for where courses are embedded in the program design. A decline in agreements during that time can also be attributed to a decline in the secondary school population eligible for articulation.

Tech Prep students can be dually enrolled in college courses while in the high school portion of the program. For example, industrial engineering technology students take robotics classes at CCC. The work cell created as part of this class was presented at the 1995 Society of Manufacturing Engineers' student robotics competition. Both high school and CCC students won national awards for their designs. In allied health, several college courses were taught by high school faculty for college credit: medical terminology, introduction to allied health, physics, and anatomy and physiology.

For articulated Tech Prep courses, some consortia in the state award AP credit, but CCC generally prefers the use of advanced skill credit. In advanced skills agreements, students take classes that are progressive in level of difficulty, at both the secondary and postsecondary levels. For students who come to CCC with an advanced level of credits, CCC does not shorten the degree program but has, instead, actually added more advanced level courses to round out the rest of the degree. However, this practice is not universal for all programs.

The River Valley Consortium is facilitating curriculum expansion in two new areas: plastics and environmental health and safety technology. Corresponding programs at the high school, community college, and university level are being developed or modified to allow for articulation. Currently only two sites have environmental programs; but as of 2000, a few more schools are adding environmental programs. The plastics program is part of the industrial engineering technologies program.

In conjunction with the memoranda of understanding and changes in curriculum to support articulation, academic courses at vocational high schools and career centers are now taught at a higher level in communications, mathematics, and science. The RVCTC has hired new faculty to teach academic courses in chemistry and in anatomy and physiology, which were not offered previously. These courses are available to Tech Prep students but are also offered to other students. According to the Tech Prep coordinator, vocational schools in the state have offered applied academics courses for a number of years, but the course content was related specifically to a career area. She indicated that the thrust of Tech Prep was to advance applied courses to the college prep level. She reported that, in 1998, the state passed changes in graduation requirements that now require all schools, including vocational schools, to offer more advanced academic courses. Her perception was that the schools that have been involved in Tech Prep have already brought changes to the vocational student population at large.

A number of issues have arisen over the years in response to articulation agreements, or memoranda of understanding, related to Tech Prep. First, some vocational education faculty who already deal with the target population (i.e., the middle majority) thought the new articulation process was redundant or needless. Second, with prior articulation agreements, students took exams to make sure they had attained a certain level of competency and receive articulated credit. With the implementation of Tech Prep agreements, some faculty assumed that the new agreements would eliminate the need for the exams, but it has not. When secondary students entered CCC without adequate competencies, exams were reestablished over the objection of high school faculty. Furthermore, the Tech Prep director described difficulties within the articulation process, particularly in the automotive and electronics technology, because of differences in educational background and work experiences of secondary and postsecondary faculty.

Emerging Curricular Approaches

In 1995, the national evaluation study noted five changes related to curriculum reform that are still apparent today:

- Team of academic teachers formed for Tech Prep students;
- Applied, occupationally relevant materials used in academic classes;
- Cooperation between academic and occupational instructors has increased;
- New technical curricula developed; and
- Students involved in hands-on projects requiring cooperation with other occupational programs and in work-site activity.

Curriculum modifications have continued to occur at both the secondary and postsecondary levels. For example, a 1996 grant application prepared by the consortium director indicated that some local educators saw Tech Prep as a way to replace the general education curriculum at Suburban High School. The old general education curriculum was abandoned and replaced by new programs in computer support technology and industrial engineering technology. The academic courses (math and science in particular) were changed substantially. Physics had traditionally been offered in eleventh or twelfth grade as an honors course for upper-level students, but, a technical physics course was added for Tech Prep students. Later that course was expanded to include students other than TP, and math courses were expanded similarly.

Faculty at Suburban High School were also involved with curriculum initiatives at CCC (i.e., TIES), providing faculty with experience in new program areas. During the 1999-2000 year, this school will add business technology and environmental technology Tech Prep programs, reaching approximately 50-60 students per program. This school also has established agreements with two other local high schools to offer all of the Tech Prep programs, except for electronics. Thus, students can choose a program that is not offered at their own high school.

Other curriculum modifications have occurred at the community college level such as the provision for advanced placements where students take advanced skills training rather than abbreviate their time in college. Even so, while curriculum reform has made some strides at CCC, at least one administrator perceives that "great transformations" have occurred more in "pockets" than across the entire curriculum. He indicated that the college does not have the mechanisms in place for all faculty to know how to participate in Tech Prep, even though faculty interest level is high. He stated that faculty, as a whole, want to acquire new skills, especially those related to technology, but the time for doing so is limited. He strongly supports the development of curriculum modules but recognizes their limitations in actual practice at CCC.

ITACS

In addition to other emerging curriculum, the most recent curriculum reform is Integrated Technical and Academic Competencies (ITACs). This new statewide model for developing curriculum is designed to maximize student opportunities for all students by integrating workplace context with academic, employability, and technical competencies. ITACs build upon current business/industry verified lists (SCAPs and TCPs) and incorporate national academic, employability, and occupational standards, including SCANS. All ITACs are reviewed by vocational and academic teachers, business and industry, and the joint council for the state, which includes the Department of Education and the state's governing council.

The format for ITACs includes the following components:

- Strand – a theme that runs through two or more competencies;
- Statement of Expectation – frames the competencies within a string, providing a rationale for development;
- Scenario – a real-life situation which engages learners in solving problems or performing tasks to demonstrate knowledge and skills in context;
- Guiding Questions – interdisciplinary questions to engage learners in solving the problem and researching information needed to make a decision about what to do;
- Competencies – observable, measurable performance; and
- Key Indicators – skills, knowledge, or attitude that, when exhibited, reveal a significant component of competence.

Three types of ITACs have been developed as a framework for curriculum development.

- Core ITACs – represent what individuals need to know and be able to do to be successful – in further education, in a career, and in life. These include solving problems and thinking skillfully, working responsibly, communicating effectively, planning and managing a career, applying technology, and managing resources.
- Career Cluster ITACs – consist of the foundational competencies common to related occupations or industries in six career clusters (arts & communications, business & management career, environmental & agricultural systems career, health services, human resources, industrial & engineering systems).
- Specialization ITACs – consist of those competencies critical to success in a specific industry or occupation.

TCPs are now being used as a subset of ITACs. As described in the document outlining the use of ITACs, TCPS and SCAPS are referred to as specialization competency documents. ITACs support the implementation of the clustered approach that is being used by the state for outlining general areas of study for all secondary education programs, including vocational education.

Integrated and Applied Curriculum

The River Valley Consortium emphasizes applied curriculum (see Table 9). Originally, CORD applied curriculum materials were used, but now many of the consortia in the state rely on the State Tech Prep Curriculum Services for the development of applied curricula. The consortium also has course recommendations in career guidance, communications, mathematics, and science for ninth and tenth grade pre-Tech Prep students. Vocational education planning districts work with feeder schools to develop specific prerequisites.

Table 9

Applied Academics Courses by Schools

School	Applied Courses Offered	Grade level
RVCTC & BCCTC	Tech Prep English I and II Tech Prep Physics I and II Tech Prep Chemistry Anatomy & Physiology Microbiology Employability Algebra II College Algebra	11 - 12
SHS	Tech Prep English Business English Principles of Physics Tech Prep Math	11 - 12
CCC	Technical Communications 1 & 2 Business Communications 1 & 2 Technical Math 1, 2, 3, 4 Technical Physics 1, 2, 3 Technical Chemistry Biochemistry Allied Health Math Business Math Nursing Math	13 - 14

Table 9 (cont.)

CCC	Math for Business Analysis Math/Science/Technology Center (modules of integrated instruction as parts of other courses)	

Source: River Valley Consortium director

Note: Table shows courses for only the schools included in this study.

The consortium also works toward integration of courses and subjects at both the secondary and postsecondary levels. While some studies indicate that the use of integrated and applied curriculum occurs primarily at the secondary level, CCC began implementing multi-disciplinary courses in the early 1990s and has since developed capstone courses that include projects requiring students demonstrate specific competencies and knowledge. The River Valley Consortium also incorporates “hands-on” projects across disciplines and classrooms as well as across work sites. For example, automotive students learning about safety procedures with specific machinery in their technical course, have to create a safety manual for their applied English course, and, then, as part of their co-op experience, have to present this same manual to their supervisor.

In 1995 the national evaluation noted that an interdisciplinary academic curriculum was, at that time, only partially realized. This 1995 study identified early evidences of the use of more relevant curriculum and greater opportunities for hands-on learning. The report also stated that academic and occupational instructors had made significant efforts toward integration. Since that time, the use of integrated and applied curriculum has advanced further, but barriers exist. Scheduling in the public schools (in terms of faculty release time for planning integrated work or for participation in externships) remains a problem. On the college level, CCC has continued to deal with barriers related to new course development (e.g., numbers of students and approval by the state’s governing board). As late as 1998, the Tech Prep coordinator indicated that walls between academic and occupational disciplines had still not broken down across this consortium.

Work-Based Learning

Based on the state’s definition and according to an award application prepared by this consortium, work-based learning is learning that takes place at a work site, and it includes a number of different activities that can be identified along a continuum from short-term, introductory experiences to more intensive and extended experiences, including paid work experiences and formal training. Although work-based learning activities vary, they typically involve schools and employers working together to devise objectives, activities, work tasks, and, sometimes, criteria for monitoring or assessing students.

Although work-based learning is a component of both the secondary and postsecondary programs, it is not required as part of the Tech Prep experience. In most cases work-based learning occurs during the summer between a student's junior and senior year. As a result, Tech Prep students have some work-based learning experience integrated into their curricula. Students have been expected to take part in school projects that have included collaboration with various occupational disciplines as well as in projects based at actual industry sites. However, more extensive and extended work-based learning experiences have not been pursued by most Tech Prep students.

One exception to the relatively low level of work-based learning opportunities for Tech Prep students is the automotive pathway, which includes a work-based learning component due to industry demands. At CCC, the automotive technology program has three corporate-based programs in which students complete an associate's degree in two years, but half of their time is spent at the dealership under the direction of a technician. These work-based programs are very highly regarded, and the admissions requirements are rigid. Industry technicians are trained to serve as mentors through 16 hours of mentor training. This mentor training has since been expanded to include work-based mentors in program areas other than automotive.

Regarded locally as the first of the work-based learning programs, this automotive program includes strong support from dealer associations in the community. More recently, work-based learning has been implemented for information technology as well. This work-based learning option is structured similarly and supported by an information alliance group. In program areas such as industrial engineering where a similar group does not exist, work-based learning options have lagged behind. Work-based learning for secondary allied health students has been limited by liability restrictions because of students' ages. Although students in allied health spend extended time in the workplace, the experience is usually unpaid.

According to the River Valley consortium director, work-based learning is an aspect of Tech Prep that the consortium is trying to enhance, even though it has not been emphasized by the state historically. She felt that the impetus for work-based learning has come more from STW than Tech Prep.

Student Demographics, Experiences, and Preliminary Outcomes

The following section summarizes results for a sample of high school graduates from 1995-1997 in the River Valley Consortium. The findings describe students' demographics, educational characteristics, math and vocational course-taking patterns; employment experiences during and following high school; and transition to postsecondary education or work. Results are discussed for both Tech Prep and non-Tech Prep graduates. In the analysis, the 1995 and 1996 graduates are combined because these cohorts were small, but the 1997 cohort is retained as a separate cohort group.

Sample selection for this consortium was conducted by a consortium leader who was located in the BCCTC school, because of his close association and long history with high school personnel in the region. NCRVE personnel were not allowed direct access to lists of high school students, precluding their direct involvement in the sampling process. Using procedures comparable to other cases that were communicated to the River Valley Consortium, the BCCTC official identified a random sample of Tech Prep graduates from two area vocational centers (14 feeder high schools having 10 or more Tech Prep participants) and one comprehensive high school that provided its own Tech Prep program. These schools were chosen because of their long-standing affiliation with the local Tech Prep initiative relative to other schools that had signed on to Tech Prep more recently. (See Appendix A for further details on the sampling procedures for this site.)

In this consortium, Tech Prep was viewed as a broadly defined technology program for students who wanted to pursue postsecondary education, including at least an associate degree in a technical area. Tech Prep programs of study, or pathways, included a focus on combined academic and technical training at both the secondary and postsecondary levels. Students in this consortium enrolled in Tech Prep in the eleventh or twelfth grade, and students were identified as Tech Prep students when they participated in a sanctioned technical and applied academics program, beginning in grade 11 and continuing through the associate degree in the occupational and employability competency delivery system. Students were considered Tech Prep graduates when they followed an approved Tech Prep curriculum pathway and earned an associate degree with an advanced skills certificate. Students were selected into Tech Prep based on their passing all parts of the Ninth Grade State Proficiency Test, successfully completing Algebra I, attaining junior status at a participating high school by opening of classes, and receiving a recommendation from a high school guidance counselor. Some Tech Prep pathways required higher admission criteria, though most were not substantially different. It is important to note that while these criteria were not highly selective, they did provide a unique distinction to the Tech Prep program (as opposed to vocational education programs that were non-selective). Most students who participated in Tech Prep knew that they were part of a special experience as evidenced by follow-up survey results showing that the vast majority (over 80%) considered themselves to be Tech Prep students during high school.

Once the sample of Tech Prep students was drawn using the above mentioned definition, a sample of non-Tech Prep graduates was selected, but access to student records from feeder high schools complicated selection of non-Tech Prep graduates. While it was possible to include a non-Tech Prep participant group in this analysis, it was not possible to obtain a complete set of transcripts on non-Tech Prep graduates nor to ensure an equivalent distribution on high school academic performance (refer to Table 11 in later discussion). Readers are therefore cautioned about drawing comparisons between the Tech Prep and non-Tech Prep groups when examining results associated with this case.

Demographics and Personal Characteristics

The vast majority of Tech Prep and non-Tech Prep graduates were White, non-Hispanic. Males dominated the Tech Prep group (64%), while the non-Tech Prep group was evenly distributed by gender (see Table 10). Nearly all graduates were single, and the majority were living at home with their parents. The total annual family income of Tech Prep graduates was fairly evenly distributed between $15,000 and almost $90,000; non-Tech Prep graduates' family income was distributed similarly. There was a significant difference in annual family income between the Tech Prep cohorts, with the 1997 cohort showing higher family income than the previous one (t = 2.19, df = 75, p = .03).

In reporting their parents' education level, about one-half of Tech Prep graduates reported that their fathers had completed high school (or less), and the other half reported that their fathers had finished some college or beyond. The fathers of non-Tech Prep graduates were more highly educated, with just over one-third having finished high school or less education, and almost two-thirds some college or more. The pattern of education of mothers was similar; however, both Tech Prep and non-Tech Prep graduates indicated that their mother's education exceeded their father's. Examining results for cohorts within the Tech Prep group, a significant difference between the 1995/96 and 1997 cohorts emerged, with the education level of fathers of the 1997 cohort being higher than the 1995/96 cohort (t = 4.04, df = 92, p = .000).

Table 10

Percentage Distribution on Selected Demographics by Tech Prep Status and Year of High School Graduation

	Tech Prep			Non-Tech Prep		
	Total Grad. n=97	1995/96 Grad. n=34	1997 Grad. n=63	Total Grad. n=91	1995/96 Grad. n=31	1997 Grad. n=60
Gender						
Male	63.9	61.8	65.1	50.5	48.4	51.7
Female	36.1	38.2	34.9	49.5	51.6	48.3
Race/Ethnicity						
White, non-Hispanic	90.8	85.3	93.6	86.8	93.5	83.3
Black, non-Hispanic	6.2	8.8	4.8	9.9	3.2	13.3
Hispanic	1.0	0.0	1.6	0.0	0.0	0.0
Asian/Pacific Islander	1.0	2.9	0.0	0.0	0.0	0.0
Other	1.0	2.9	0.0	3.3	3.2	3.3
Marital status						
Single	95.9	97.1	95.2	87.9	87.1	88.3
Single with children	2.1	2.9	1.6	1.1	0.0	1.7
Married	1.0	0.0	1.6	4.4	6.5	3.3
Married with children	1.0	0.0	1.6	6.6	6.5	6.7
Father's education level						
Less than HS graduate	9.6	15.2	6.6	8.0	6.7	8.8
High school graduate	41.5	63.6	29.5	28.7	33.3	26.3
Some college, no degree	17.0	9.1	21.3	21.8	23.3	21.1
Two-year associate's degree	7.4	6.1	8.2	9.2	10.0	8.8
Four-year bachelor's degree	19.1	6.1	26.2	17.2	13.3	19.3
Graduate degree	5.3	0.0	8.2	14.9	13.3	15.8
Mother's education level						
Less than HS graduate	6.5	9.1	5.1	2.2	3.2	1.7
High school graduate	38.0	48.5	32.2	35.6	41.9	32.2
Some college, no degree	21.7	18.2	23.7	27.8	19.4	32.2
Two-year associate's degree	17.4	9.1	22.0	7.8	6.5	8.5
Four-year bachelor's degree	14.1	12.1	15.3	22.2	22.6	22.0
Graduate degree	2.2	3.0	1.7	4.4	6.5	3.4
Family income						
$14,999 or less	6.5	6.9	6.3	3.0	0.0	4.7
$15,000 – $29,999	14.3	17.2	12.5	13.4	4.2	18.6
$30,000 – $44,999	19.5	31.0	12.5	25.4	45.8	14.0
$45,000 – $59,999	15.6	17.2	14.6	22.4	29.2	18.6
$60,000 – $74,999	23.4	17.2	27.1	13.4	12.5	14.0
$75,000 – $89,999	14.3	10.3	16.7	13.4	8.3	16.3
$90,000 or more	6.5	0.0	10.4	9.0	0.0	14.0

Table 10 (cont.)

Present residence						
Live with my parent(s)	72.3	63.6	77.0	62.1	67.7	58.9
Live alone	10.6	15.2	8.2	5.7	0.0	8.9
Live with spouse or significant other	6.4	9.1	4.9	11.5	12.9	10.7
Live with a friend or roommate	10.6	12.1	9.8	20.7	19.4	21.4

Source: Education-To-Careers Follow-up Survey (n = 188) for all items

Note: Details may not sum to 100 due to rounding.

Educational Characteristics

With regard to high school cumulative GPA and class rank percentile, the distribution of the two groups was quite different (see Table 11), with Tech Prep graduates distributed more widely on class rank percentile and GPA than the non-Tech Prep group. Overall, Tech Prep graduates had higher class rank percentile rankings and higher cumulative GPAs than their non-Tech Prep counterparts.

Additionally, the survey inquired about students' attitudes toward their learning during high school. Most students in both the Tech Prep and non-Tech Prep groups described the utility of their high school learning as very, fairly, or somewhat useful.

Table 11

Percentage Distribution on Selected Educational Characteristics and Attitudes by Tech Prep Status and Year of High School Graduation

	Tech Prep			**Non-Tech Prep**		
	Total Grad. n=174	1995/96 Grad. n=74	1997 Grad. n=100	Total Grad. n=100	1995-96 Grad. n=32	1997 Grad. n=68
Cumulative GPA at HS graduation						
Less than 1.0	0.6	0.0	1.0	0.0	0.0	0.0
1.01 – 1.50	4.4	4.9	4.0	0.0	0.0	0.0
1.51 – 2.00	11.3	14.8	9.1	1.0	0.0	1.5
2.01 – 2.50	23.8	26.2	22.2	24.0	18.8	26.5
2.51 – 3.00	21.3	24.6	19.2	47.0	56.3	42.6
3.01 – 3.50	23.8	16.4	28.3	26.0	18.8	29.4
3.51 – 4.00	15.0	13.1	16.2	2.0	6.3	0.0

Table 11 (cont.)

Class rank percentile at HS graduation						
1 – 25%	15.2	16.9	13.9	1.3	3.1	0.0
26 – 50%	27.5	27.1	27.8	35.5	31.3	38.6
51 – 75%	29.7	28.8	30.4	60.5	62.5	59.1
76 – 100%	27.5	27.1	27.8	2.6	3.1	2.3
Utility of high school learning						
Extremely useful	9.4	9.1	9.5	4.4	6.5	3.3
Very useful	36.5	33.3	38.1	28.6	12.9	36.7
Fairly useful	30.2	27.3	31.7	41.8	48.4	38.3
Somewhat useful	19.8	21.2	19.0	23.1	32.3	18.3
Not at all useful	4.2	9.1	1.6	2.2	0.0	3.3

Source: Tech Prep High School Transcript File (n = 274) for all items except utility of high school learning, which came from the Education-To-Careers Follow-up Survey (n = 188)

Note: Details may not sum to 100 due to rounding.

Math and Vocational Course-Taking Patterns

The vast majority of Tech Prep and non-Tech Prep graduates reported taking a total of five to eight semesters of math during high school, exceeding the minimum graduation requirement of two years of math (though a few high schools required three years). In fact, most graduates were meeting or even exceeding the new state requirements that were going into effect in 2001, specifying that all students would complete at least three years of math in high school. A higher percentage of Tech Prep graduates took seven or more semesters of math than the non-Tech Prep group. Also, the total amount of math courses increased for the Tech Prep cohorts, with the 1997 cohort taking more math than the 1995/96 cohort.

Looking at specific math courses taken, results show that Tech Prep graduates were much more likely to start their high school math sequence with basic or general math than the non-Tech Prep group, with 44% of Tech Prep graduates taking basic or general math compared to only 6% of the non-Tech Prep group. (See Appendix E for examples of course titles corresponding to the categories shown here.) In addition, nearly 40% of the Tech Prep group started math with an applied course, compared to only 7% of the non-Tech Prep. In contrast, non-Tech Prep graduates (50%) started high school math at a higher point in the curriculum (e.g., 64% of this group started high school math with Algebra 1 or above compared to 14% of the Tech Prep group), and this result was statistically significant (t = 11.58, df = 271, p = .04). In terms of the last and most advanced math course taken in high school, non-Tech Prep graduates completed higher level math courses, on average, than the Tech Prep group (t = 2.09, df = 271, p = .04). About 60% of the Tech Prep group completed Algebra 2 or more advanced math (18%) compared to 65% of the non-Tech Prep group (28% of the non-Tech Prep graduates took advanced math). Still, the proportion of Tech Prep graduates who completed Algebra 2 or more advanced math is noteworthy, since the majority of these students began high school math with basic or applied courses.

Applied math was much more prevalent in the core curriculum of Tech Prep graduates (45%) than non-Tech Prep (8%) (t = 6.743, df = 272, p = .000). In fact, applied math courses were not taken by non-Tech Prep graduates in 1995/96 but by 1997 11% of the non-Tech Prep cohort was taking applied math, and this finding was statistically significant (t = 2.05, df = 98, p = .04). Neither group participated in honors math to a very extensive degree, but participation by non-Tech Prep graduates did exceed the Tech Prep group (t = 2.87, df = 272, p = .000).

Table 12

Percentage Distribution on High School Math Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep			**Non-Tech Prep**		
	ALL n=174	1995/96 n=74	1997 n=100	ALL n=100	1995-96 n=32	1997 n=68
Total math courses						
0	5.2	9.5	2.0	3.0	6.3	1.5
1 – 2	2.3	5.4	0.0	3.0	3.1	2.9
3 – 4	5.2	5.4	5.0	13.0	18.8	10.3
5 – 6	23.6	18.9	27.0	37.0	31.3	39.7
7 – 8	58.0	58.1	58.0	37.0	34.4	38.2
9 or more	5.7	2.7	8.0	7.0	6.3	7.4

Table 12 (cont.)

Lowest math course						
Basic math	42.8	48.6	38.4	1.0	0.0	1.5
General math	1.8	4.1	0.0	5.0	3.1	5.9
Applied math	38.2	36.5	39.4	7.0	0.0	10.3
Pre-Algebra	2.9	1.4	4.0	23.0	34.4	17.6
Algebra 1	13.3	8.1	17.2	50.0	43.7	52.9
Geometry	0.6	0.0	1.0	14.0	18.7	11.8
Algebra 2	0.6	1.4	0.0	0.0	0.0	0.0
Highest math course						
Basic math	0.0	0.0	0.0	0.0	0.0	0.0
General math	0.0	0.0	0.0	3.0	3.1	2.9
Applied math	1.2	2.7	0.0	0.0	0.0	0.0
Pre-Algebra	3.5	5.4	2.0	0.0	0.0	0.0
Algebra 1	15.6	18.9	13.1	8.0	6.3	8.8
Geometry	20.3	12.2	26.3	24.0	25.0	23.5
Algebra 2	41.6	35.1	46.5	37.0	43.8	33.8
Advanced math	17.9	25.7	12.1	28.0	21.9	30.9
Total applied math by semester:						
None	54.6	51.4	57.0	92.0	100.0	88.2
1 – 2	40.2	40.5	40.0	8.0	0.0	11.8
3 – 4	5.2	8.1	3.0	0.0	0.0	0.0
Total honors math by semester:						
None	96.0	94.6	97.0	84.0	78.1	86.8
1 – 2	2.3	4.1	1.0	11.0	12.5	10.3
3 – 4	1.1	1.4	1.0	4.0	9.4	1.5
5 – 6	0.6	0.0	1.0	1.0	0.0	1.5

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding.

Vocational Course-Taking

All graduates in both groups had taken at least one vocational course during high school, with courses in business being the most popular (see Table 11). Interestingly, 46% of Tech Prep and 75% of non-Tech Prep students had taken a business course. In this area and also consumer and family studies, a much higher percentage of non-Tech Prep graduates had enrolled than Tech Prep (business: (χ^2 = 21.77, df = 1, p = .000; consumer/family studies: χ^2=18.30, *df* = 1, *p* = .000). However, in several other vocational areas, enrollments by Tech Prep graduates far exceeded non-Tech Prep, particularly in the areas of health (χ^2 = 33.96, *df* = 1, *p* = .000) and technical/communications (e.g., telecommunications, industrial technology, manufacturing technology) (χ^2 = 31.25, *df* = 1, *p* = .000). Of course, both of these specialties were targets for Tech Prep programs.

Two other vocational areas in which the percentage of Tech Prep enrollments surpassed non-Tech Prep at statistically significant levels follow:

- A higher percentage of Tech Prep than non-Tech Prep students took mechanics/repairers (e.g., auto body, air conditioning) (χ^2 = 5.39, *df* = 1, *p* = .02).

- A higher percentage of Tech Prep than non-Tech Prep students took general labor market courses (e.g., industrial arts, career guidance) (χ^2 = 15.60, *df* = 1, *p* = .000).

Looking closely at sequential enrollment in particular vocational specialty areas where Level 1 represents the first vocational course in a sequence, Level 2 designates the second course in a sequence, and Level 3 is a specialty course, it is evident that Tech Prep graduates engaged in sequential course-taking in several vocational areas to a greater extent than non-Tech Prep. (See Appendix F for examples of course titles that fit within the levels of each specialization.) In the area of health, a few more Tech Prep graduates engaged in sequential course-taking than non-Tech Prep graduates (χ^2 = 11.07, *df* = 2, *p* = .004), although enrollments beyond Level 1 were rare for both groups. In fact, no non-Tech Prep graduates enrolled in health courses at all.

In two areas, more non-Tech Prep graduates were engaged in sequential course-taking than Tech Prep and these areas were business (χ^2 = 33.07, *df* = 4, *p* = .000) and family and consumer studies (χ^2 = 26.46, *df* = 3, *p* = .000). In both of these areas, students enrolled primarily in Level 1, introductory, and Level 3, specialty, courses, but again enrollment beyond the most rudimentary level was uncommon.

Table 13

Percentage Distribution on Vocational-Technical Education Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep			Non-Tech Prep		
	ALL n=174	1995/96 n=74	1997 n=100	ALL n=100	1995-96 n=32	1997 n=68
Course-taking in vocational area:						
Business	46.0	43.2	48.0	75.0	59.4	82.4
None	54.0	56.8	52.0	25.0	40.6	17.6
Agriculture	6.9	6.8	7.0	10.0	6.3	11.8
None	93.1	93.2	93.0	90.0	93.8	88.2
Consumer/Family studies	19.0	27.0	13.0	43.0	43.8	42.6
None	81.0	73.0	87.0	57.0	56.3	57.4
Health	29.9	29.7	30.0	1.0	0.0	1.5
None	70.1	70.3	70.0	99.0	100.0	98.5
Construction	4.6	4.1	5.0	4.0	6.3	2.9
None	95.4	95.9	95.0	96.0	93.8	97.1
Technical/Communications	62.1	70.3	56.0	27.0	21.9	29.4
None	37.9	29.7	44.0	73.0	78.1	70.6
Precision production	34.5	41.9	29.0	29.0	31.3	27.9
None	65.5	58.1	71.0	71.0	68.8	72.1
Mechanics/repairers	5.2	5.4	5.0	0.0	0.0	0.0
None	94.8	94.6	95.0	100.0	100.0	100.0
Marketing	0.6	1.4	0.0	1.0	0.0	1.5
None	99.4	98.6	100.0	99.0	100.0	98.5
General labor markets	31.0	41.9	23.0	10.0	12.5	8.8
None	69.0	58.1	77.0	90.0	87.5	91.2
Specific labor markets	29.9	40.5	22.0	21.0	18.8	22.1
None	70.1	59.5	78.0	79.0	81.3	77.9
Business						
None	54.0	56.8	52.0	25.0	40.6	17.6
Only level 1	29.9	32.4	28.0	38.0	18.8	47.1
Only level 1 and 2	3.4	2.7	4.0	3.0	0.0	4.4
Only level 1 and 3	1.1	1.4	1.0	18.0	25.0	14.7
Minimum 1 in each level	0.6	1.4	0.0	0.0	0.0	0.0
Other	10.9	5.4	15.0	16.0	15.7	16.2
Agriculture						
None	93.1	93.2	93.0	90.0	93.8	88.2
Only level 1	0.6	0.0	1.0	2.0	0.0	2.9
Only level 1 and 2	5.2	5.4	5.0	7.0	3.1	8.8
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0

Other	1.2	1.4	1.0	1.0	3.1	0.0

Table 13 (cont.)

Consumer/Family studies						
None	86.0	73.0	87.0	57.0	56.3	57.4
Only level 1	10.3	16.2	6.0	21.0	28.1	17.6
Only level 1 and 2	0.0	0.0	0.0	3.0	0.0	4.4
Only level 1 and 3	0.6	1.4	0.0	9.0	6.3	10.3
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0
Other	3.1	9.4	7.0	10.0	9.3	10.2
Health						
None	70.1	70.3	70.0	99.0	100.0	98.5
Only level 1	9.8	9.5	10.0	0.0	0.0	0.0
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.6	1.4	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0
Other	19.6	19.0	20.0	1.0	0.0	1.5
Construction						
None	95.4	95.9	95.0	96.0	93.8	97.1
Only level 1	1.1	1.4	1.0	3.0	3.1	2.9
Only level 1 and 2	0.0	0.0	0.0	1.0	3.1	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0
Other	3.5	2.7	4.0	0.0	0.0	0.0
Technical/Communications						
None	37.9	29.7	44.0	73.0	78.1	70.6
Only level 1	13.8	20.3	9.0	7.0	6.3	7.4
Only level 1 and 2	0.6	1.4	0.0	0.0	0.0	0.0
Only level 1 and 3	12.1	4.1	18.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0
Other	35.7	44.6	29.0	20.0	15.7	22.0
Precision production						
None	65.5	58.1	71.0	71.0	68.8	72.1
Only level 1	24.1	28.4	21.0	24.0	21.9	25.0
Only level 1 and 2	10.3	13.5	8.0	5.0	9.4	2.9
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0
Mechanics/repairers						
None	94.8	94.6	95.0	100.0	100.0	100.0
Only level 1	5.2	5.4	5.0	0.0	0.0	0.0
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0

Other	0.0	0.0	0.0	0.0	0.0	0.0

Table 13 (cont.)

Marketing						
None	99.4	98.6	100.0	99.0	100.0	98.5
Only level 1	0.6	1.4	0.0	0.0	0.0	1.5
Only level 1 and 2	0.0	0.0	0.0	1.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0
Specific labor markets						
None	70.7	59.5	78.0	79.0	81.3	77.9
Only level 1	28.7	37.8	22.0	16.0	12.5	17.6
Only level 1 and 2	0.6	1.4	0.0	1.0	0.0	1.5
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	1.3	0.0	4.0	6.2	1.0
General labor markets						
None	69.0	58.1	77.0	90.0	87.5	91.2
Only Level 1	31.0	41.9	23.0	10.0	12.5	8.8
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0

Source: Tech Prep/STW High School Transcript File

Note: Details may not sum to 100 due to rounding. The “other” category includes course combinations other than those specified, and this category was not included in significance testing. Between group differences were computed on the total groups, but not cohorts by year due to small cell sizes.

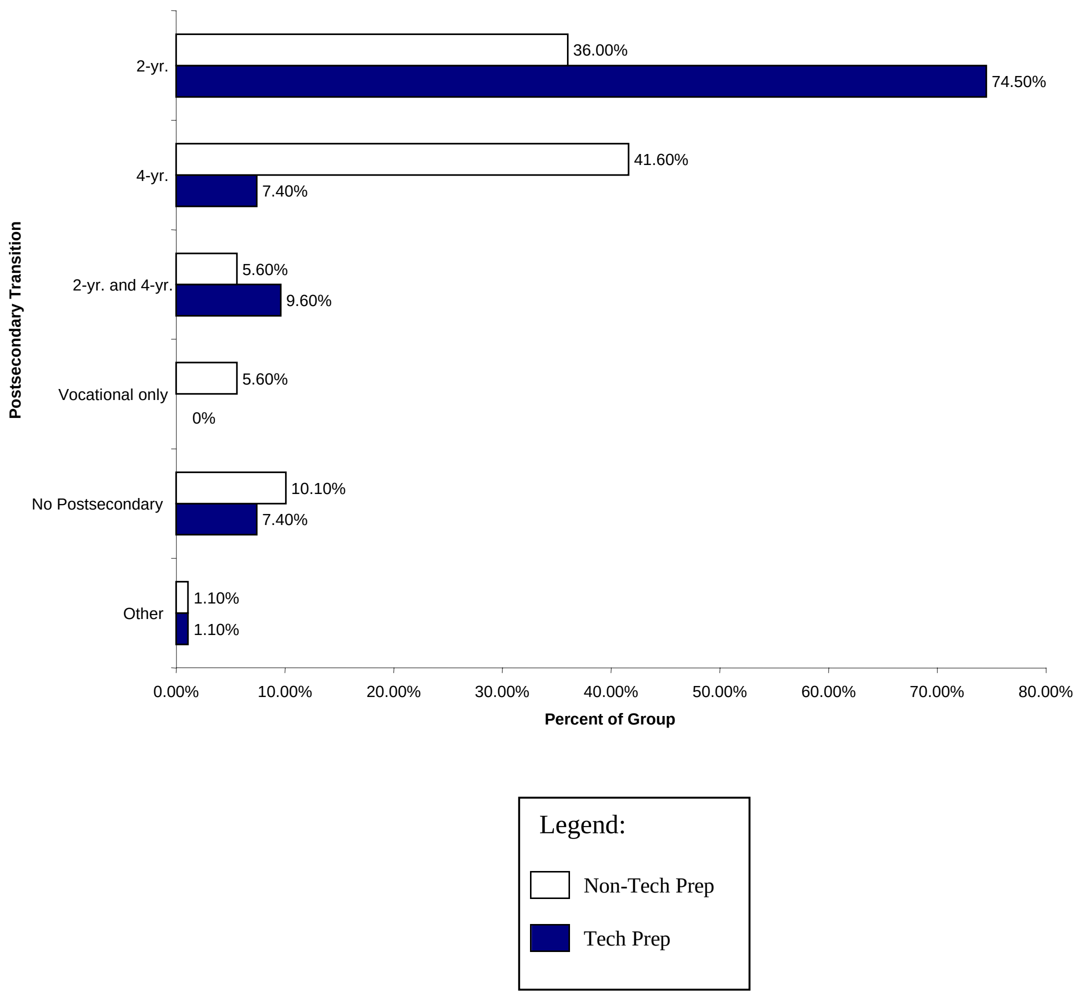
Transition to Postsecondary Education

Most graduates continued to postsecondary education within one to three years after high school graduation, based on follow-up survey and transcript results. On the basis of transcript data, 37% of the all participants in the study had obtained a transcript at CCC. The vast majority of these students were Tech Prep graduates, indicating they had made a transition from high school to CCC. By comparison, a CCC transcript was identified for only a few of the non-Tech Prep graduates, indicating they were much less likely to have continued their education at the lead two-year college in the consortium, namely CCC.

Results shown in Figure 5 based on the follow-up survey confirm that a much higher percentage of Tech Prep graduates matriculated to CCC than non-Tech Prep graduates. Indeed, nearly 75% of the Tech Prep group had gone on to college at CCC. Almost another 10% reported matriculating to a combination of a two- and four-year college, meaning some of these students probably enrolled at CCC after high school as well. By comparison, only about one-third of the non-Tech Prep graduates indicated they had enrolled at CCC, but over 40% had gone to a four-year college or a combination of two- and four-year colleges. Only 10% or less of either group had gone directly to work, without attending some form of postsecondary education within one to three years of high school graduation.

Figure 5

Transition to Postsecondary Education by Tech Prep Status



Work During and After High School

There was no difference between the Tech Prep and non-Tech Prep groups on whether they were employed at some time during high school. In fact, nearly all graduates held a job at one time while attending high school. Approximately 40% of both groups earned between $5.26 to $6.00 per hour, with slightly over one-third of both groups earning higher wages, usually $6.01 to $7.00 per hour (see Table 14). Tech Prep and non-Tech Prep graduates differed in the amount of hours worked during high school, with Tech Prep graduates working more hours than non-Tech Prep (t = 3.97, df = 163, p = .000).

Table 14

Percentage Distribution in Employment Experiences During High School by Tech Prep Status and Year of High School Graduation

	Tech Prep			Non-Tech Prep		
	Total Grad. n=97	1995/96 Grad. n=34	1997 Grad. n=63	Total Grad. n=91	1995/96 Grad. n=31	1997 Grad. n=60
Employed during high school						
No	11.5	15.2	9.5	11.1	26.7	3.3
Yes	88.5	84.8	90.5	88.9	73.3	96.7
Estimated hourly wages in last job held before high school graduation						
Zero – unpaid	2.4	0.0	3.5	0.0	0.0	0.0
Less than $5.25 /hr	21.2	32.1	15.8	26.3	27.3	25.9
$5.26 to $6.00 /hr	37.6	32.1	40.4	40.0	40.9	39.7
$6.01 to $7.00 /hr	28.2	21.4	31.6	13.8	18.2	12.1
$7.01 to $8.00 /hr	5.9	3.6	7.0	12.5	9.1	13.8
More than $8.00 /hr	4.7	10.7	1.8	6.3	4.5	6.9
I don't know	0.0	0.0	0.0	1.3	0.0	1.7
Total hours worked during typical week in high school						
Less than 5 hours	0.0	0.0	0.0	0.0	0.0	0.0
6 – 10 hours	3.5	3.6	3.5	11.3	9.1	12.1
11 – 20 hours	29.4	25.0	31.6	51.3	45.5	53.4
21 – 30 hours	47.1	46.4	47.4	28.8	45.5	22.4
31 – 40 hours	18.8	21.4	17.5	8.8	0.0	12.1
More than 40 hours	1.2	3.6	0.0	0.0	0.0	0.0

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Work After High School

After high school, most Tech Prep and non-Tech Prep graduates were employed and the majority held three or four jobs or even fewer between their high school graduation and the time they completed the follow-up survey one to three years later (see Table 15). When completing the survey, the majority of both groups indicated they held one job. However, 1995/96 non-Tech Prep graduates held more jobs between high school and current employment than the 1997 non-Tech Prep group (t = 2.48, df = 89, p = .02), with 26% of the 1995/96 cohort having held seven or more jobs compared to 7% of the 1997 cohort. A similar trend was evident for the Tech Prep cohorts, but it was not statistically significant.

For Tech Prep graduates, the current employment status reflected that 46% were working full-time and 44% part-time, only 7% were unemployed. By comparison, non-Tech Prep graduates were slightly more likely to be working full-time than part-time, but a sizeable proportion were unemployed. Of the 21% who reported being unemployed, some were seeking employment, but most were not, possibly because they were attending college full-time. Most members of each group had worked 12 months or less in their current primary position; however, Tech Prep graduates were slightly more likely to have held their primary job for a longer period of time than their non-Tech Prep counterparts. Approximately 30% of the Tech Prep group had worked in the current primary job for 25 months or longer, compared to 24% of the non-Tech Prep group. A significant difference was revealed in the months worked in the current primary job for the 1995/96 Tech Prep cohort compared to the 1997 cohort, with over 40% of the earlier cohort reporting working 25 months or longer, compared to 24% of the 1997 cohort (t = 2.14, df = 86, p = .04).

In terms of wages, most graduates earned between $6.01 and $10.00 per hour, though over 20% of both groups reported making $10.01 per hour or more. The wages of graduates in the 1995/96 Tech Prep cohort were higher than for the 1997 cohort, with about 40% of the 1995/96 cohort reporting wages over $10.00 per hour, compared to only 16% of the 1997 cohort (t = 2.16, df = 86, p = .03). As confirmation of this result, over

25% of the 1995/96 Tech Prep cohort reported a $5.00 or more change in wages, compared to about 11% of the 1997 cohort group. This pattern of higher wages for 1995/96 compared to 1997 graduates was not evident for the non-Tech Prep cohort.

In terms of the type of employment, 44% of Tech Prep and 54% of non-Tech Prep graduates held entry level/unskilled positions as their current primary job. The vast majority of Tech Prep and non-Tech Prep graduates reported being very or fairly satisfied with their current jobs; however, most desired professional positions. When describing their level of confidence in reaching their career goals, most graduates were extremely confident or very confident.

Table 15

Percentage Distribution of Post-High School Employment by Tech Prep Status and Year of High School Graduation

	Tech Prep			**Non-Tech Prep**		
	Total Grad. n=97	1995/96 Grad. n=34	1997 Grad. n=63	Total Grad. n=91	1995/96 Grad. n=31	1997 Grad. n=60
Number of jobs since HS						
1 – 2	20.6	17.6	22.2	17.6	12.9	20.0
3 – 4	37.1	35.3	38.1	45.1	29.0	53.3
5 – 6	21.6	20.6	22.2	23.1	32.3	18.3
7 – 8	11.3	8.8	12.7	7.7	16.1	3.3
9 or more	6.2	11.8	3.2	5.5	9.7	3.3
None	3.1	5.9	1.6	1.1	0.0	1.7
Number of jobs held currently						
0	6.5	3.1	8.2	17.6	13.8	19.6
1	81.7	90.6	77.0	65.9	55.2	71.4
2	9.7	6.3	11.5	15.3	31.0	7.1
3 or more	2.2	0.0	3.3	1.2	0.0	1.8
Current employment status						
Full-time (35 hours or more per week)	45.7	59.4	38.7	41.1	41.9	40.7
Part-time (less than 35 hours per week)	43.6	31.3	50.0	36.7	38.7	35.6
Unemployed seeking employment	2.1	0.0	3.2	6.7	9.7	5.1
Unemployed not seeking employment	5.3	3.1	6.5	14.4	6.5	18.6
Other	3.2	6.3	1.6	1.1	3.2	0.0

Table 15 (cont.)

Months worked in current primary job						
Less than 6 months	35.2	22.6	42.1	40.6	33.3	44.4
6 – 12 months	14.8	9.7	17.5	24.6	33.3	20.0
13 – 24 months	19.3	25.8	15.8	15.9	12.5	17.8
25 – 36 months	17.0	25.8	12.3	8.7	12.5	6.7
36 months or more	13.6	16.1	12.3	10.1	8.3	11.1
Wages per hour, current primary job						
Zero	0.0	0.0	0.0	0.0	0.0	0.0
$5.25 or less	2.3	6.5	0.0	1.4	0.0	2.2
$5.26 – $6.00	9.1	6.5	10.5	11.6	4.2	15.6
$6.01 – $7.00	19.3	12.9	22.8	21.7	33.3	15.6
$7.01 – $8.00	15.9	9.7	19.3	13.0	16.7	11.1
$8.01 – $9.00	18.2	19.4	17.5	11.6	12.5	11.1
$9.01 – $10.00	11.4	6.5	14.0	15.9	8.3	20.0
$10.01 – $11.00	9.1	9.7	8.8	7.2	8.3	6.7
$11.01 – $12.00	2.3	3.2	1.8	7.2	4.2	8.9
$12.01 – $13.00	3.4	6.5	1.8	2.9	8.3	0.0
More than $13.00	9.1	19.4	3.5	4.3	4.2	4.4
I don’t know	0.0	0.0	0.0	2.9	0.0	4.4
Change in wages per hour from HS to present						
-$1.00	1.0	2.9	0.0	4.4	3.2	5.0
0	32.0	32.4	31.7	41.8	45.2	40.0
+$1.00	13.4	8.8	15.9	8.8	3.2	11.7
+$2.00	13.4	11.8	14.3	13.2	22.6	8.3
+$3.00	12.4	8.8	14.3	14.3	9.7	16.7
+$4.00	11.3	8.8	12.7	7.7	3.2	10.0
+$5.00 or more	16.5	26.4	11.2	9.9	12.9	8.4
Type of current primary job						
Entry level/unskilled	44.3	45.2	43.9	53.6	50.0	55.6
Semi-skilled	27.3	22.6	29.8	23.2	25.0	22.2
Skilled or technical	25.0	25.8	24.6	15.9	12.5	17.8
Professional	3.4	6.5	1.8	7.2	12.5	4.4
Type of primary job desired						
Entry level/unskilled	1.0	2.9	0.0	1.1	3.2	0.0
Semi-skilled	3.1	2.9	3.2	6.6	9.7	5.0
Skilled or technical	22.7	29.4	19.0	14.3	12.9	15.0
Professional	73.2	64.7	77.8	78.0	74.2	80.0

Table 15 (cont.)

Satisfaction with primary job						
Extremely satisfied	18.2	22.6	15.8	21.7	25.0	20.0
Very satisfied	21.6	19.4	22.8	27.5	29.2	26.7
Fairly satisfied	31.8	25.8	35.1	30.4	33.3	28.9
Somewhat satisfied	15.9	16.1	15.8	13.0	4.2	17.8
Not at all satisfied	12.5	16.1	10.5	7.2	8.3	6.7
Confidence in reaching career goals						
Extremely confident	46.4	47.1	46.0	50.0	45.2	53.3
Very confident	30.9	32.4	30.2	31.9	32.3	31.7
Fairly confident	16.5	11.8	19.0	11.0	16.1	8.3
Somewhat confident	5.2	5.9	4.8	5.5	6.5	5.0
Not at all confident	1.0	2.9	0.0	1.1	0.0	1.7

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Summary

Tech Prep in the River Valley Consortium focused on a 2+2 core curriculum, though the 2+2+2 model had emerged, extending Tech Prep into four-year college degree programs. The target population for Tech Prep was eleventh and twelfth graders, particularly those actively seeking technical education degrees at a community college. Enrollment in Tech Prep programs had been kept low intentionally to ensure that the quality of the program was maintained. A selective admission process reinforced the consortium's focus, emphasizing that Tech Prep was a program designed for students of average academic ability or above who maintained good attendance and a positive attitude toward school. (In fall 1997, just under 4% of all eleventh and twelfth graders were identified as Tech Prep students.) To become a Tech Prep student, high school students had to be nominated by teachers and counselors, and they had to enroll in articulated vocational programs of study and applied academics courses during the eleventh and twelfth grades. Students who completed the secondary Tech Prep program, continued to the lead community college in the consortium, and maintained academic eligibility during college (i.e., a 2.25 GPA overall) were eligible to receive a Tech Prep scholarship, entitling them to

$1,000 per year for at least two years of collegiate studies at CCC immediately following high school graduation.

Tech Prep was viewed locally as a broadly defined technology program for students who sought postsecondary education, including at least an associate degree, in a technical area. Tech Prep programs of study included a focus on combined academic and technical training at both the secondary and postsecondary levels. With some variation in the local high schools and career and technical centers, the consortium offered the following six Tech Prep programs: allied health, automotive, computer support, electronic engineering, environmental, and industrial engineering technologies.

A driving feature of the state Tech Prep curriculum was the use of industry-driven skills and competencies, and the local consortium had made a firm commitment to implementing the state's model. Industry practitioners assisted in creating the list of all necessary competencies required for a Tech Prep graduate to start in a particular job within an occupational cluster. Faculty then developed and offered curriculum based on these competencies, providing an array of courses ranging from introductory to advanced skills at both the high school and community college levels. Courses were sequenced based on the specific outcomes of a joint curriculum development process.

The consortium identified six features of its Tech Prep program that were considered unique: competency-driven curriculum and career pathways driven by industry; strong articulation agreements to link the academic institutions; highly esteemed professional development initiatives; efforts on the part of all institutions to support a "seamless transition" to other schools or to work; a state-driven strategic plan; and Tech Prep scholarships offered by CCC. The consortium also overcame challenges throughout the implementation process, particularly in the areas of release time for professional development and funding to support curriculum development.

Since 1996, Tech Prep funding was performance-based and linked to a statewide evaluation process emphasizing increased enrollments, low remediation rates, quality collaborations, and effective professional development. In addition to performance-based funding, the consortium benefited from a large multi-year grant from the National Science Foundation (NSF) to develop a new degree program for engineering students; support professional development and curriculum development; and enhance innovative instructional practices including contextual learning; hands-on training, and authentic learning tasks. The consortium had put several programs in place to support the continued professional development of faculty and staff. Across the consortium, schools developed a detailed plan and signed an agreement to pay for substitute teachers while faculty participated in professional development activities. Professional development activities central to this consortium included the Teachers in Industry for Educational Support (TIES) program that partnered teachers with business and industry. In addition, the annual winter symposium attracted academic and vocational faculty as well as counselors and administrators from throughout the region.

Through its highly structured 2+2 or 2+2+2 core curriculum in specific technical areas, Tech Prep graduates seemed to gain valuable learning experiences. Though Tech Prep graduates started at lower levels in the high school math curriculum, they advanced to about the same level, with a sizeable percentage (70%) completing Algebra 2 or even more advanced math. Tech Prep graduates were much more likely to have participated in applied math courses, but these courses did not limit students' ultimate math course-taking behavior since Tech Prep students moved to as high a level in the high school math curriculum as their non-Tech Prep counterparts. At the same time they engaged in challenging academics, Tech Prep graduates participated in vocational courses in health, technical/communications, mechanics/repairers, and general labor market courses, all courses associated with specific Tech Prep pathways offered by the consortium. Except in business and consumer and family studies, Tech Prep graduates were more likely to have enrolled in vocational specialty courses and engaged in sequential enrollment in these courses than their non-Tech Prep counterparts. Transition to the community college was high for the Tech Prep group, but the vast majority of both groups attended college (either two- or four-year) after high school. Both groups were also likely to have been employed, both during and after high school graduation. Employment after graduation was often full-time, though wages were typically low, even for those in full-time positions. However, it was encouraging to learn that 1995-96 Tech Prep graduates experienced significantly higher wages than 1997 graduates. (This pattern was not evident for the non-Tech Prep group.) Almost all graduates wanted a professional job some day, and most were quite confident they would get it.

Sentiment regarding the future of Tech Prep was that it would remain a viable strategy to encourage educational reform in the region. Overall, Tech Prep was perceived to be flourishing, with growing numbers of educational entities and students wanting to participate. The consortium's director attributed Tech Prep with influencing educational change at the local and state levels, both at the secondary and postsecondary levels. Until Tech Prep, little emphasis had been placed on articulation of curriculum or linkages between secondary and postsecondary technical education. Now, almost a decade into Tech Prep implementation, local leaders were encouraged by collaborations that had emerged among K-16 faculty within and across institutions, and they believed more would be done to foster significant curricular changes on behalf of more students.

SOUTHERN TECH PREP/SCHOOL-TO-CAREER PARTNERSHIP

Carrie H. Brown

Community Context

The Southern Tech Prep/School-To-Career Partnership (Southern Partnership) is located in a large southern state. The partnership covers an area of 6,025 square miles that includes seven counties. The largest of the seven counties has a population of 81,000, with most (over 59,000) residing in one city. Each of the remaining six counties has a population smaller than 21,000. The State Data Center reports that the 1997 total regional population was approximately 182,458, with an average population per county of 26,065, comprised of the following groups: 44% White, 35% Hispanic, 6% Black, and 15% Other, including a relatively large Vietnamese population, as well as other Asian groups.

There are 17 public school districts with high schools in the Southern Partnership with a total of 18 high schools. All 18 high schools offer state-approved Tech Prep programs and participate in Tech Prep education activities. All 18 high schools offer some career and technology (C/T)[1] courses on the home campus. The two high schools in the largest school district share a career center that offers C/T programs more costly to operate. Career and technology courses are taught there for these selected programs, but students attending the career center graduate from their home high schools. The region does not have a traditional area vocational center, although the career center serves a somewhat comparable function for these two partnership schools.

Twelve of these 17 regional public school districts have K-12 enrollments of less than 1,600 and 12 have high school enrollments of less than 500. Six additional public school districts are composed of grades K-8 only. In addition to the 18 public schools in the region, the Southern Partnership offers professional development and articulation ser-

[1] In the early 1990s, along with the passage of the federal legislation, the term “career and technology (C/T) education” was adopted statewide to replace the term “vocational education.”

vices to public school districts in eight surrounding counties. The seven county region has 14 private schools, six with high school campuses. One of these actively participates in Tech Prep activities.

Enrollment by high school campus during the 1996-1997 school year is detailed in Table 1. The drop-out rate ranges from 0% to 6.8%, but 13 high schools report drop-out rates under 2%. Diversity within the schools is evident, with five high schools reporting White students in the minority. The majority of high schools report more than 25% of the students are Hispanic.

Table 1

Enrollment of Southern Partnership High Schools (1996-97)

High School	**Total Enrollment Grades 9-12**	**Drop-Out Rate**	White	Black	Hisp.	Asian	Native Amer.
301*	643	2.3%	60.0%	14.3%	25.3%	0.3%	0.0%
302*	341	1.1%	65.3%	4.1%	30.2%	0.0%	0.3%
303*	431	0.4%	61.5%	5.8%	32.3%	0.5%	0.0%
304*	434	0.0%	62.7%	12.2%	24.9%	0.2%	0.0%
305*	2322	1.8%	60.0%	5.8%	34.1%	1.1%	.04%
306*	1785	2.8%	33.1%	10.4%	56.1%	0.2%	0.1%
307	1163	1.0%	47.8%	2.8%	44.1%	5.3%	0.0%
308	108	6.8%	52.8%	0.9%	46.3%	0.0%	0.0%
309	527	0.7%	70.0%	9.1%	20.9%	0.0%	0.0%
310	245	0.0%	68.2%	2.0%	29.8%	0.0%	0.0%
311	695	1.9%	51.1%	11.7%	37.1%	0.0%	0.1%
312	264	2.6%	40.5%	2.3%	57.2%	0.0%	0.0%
313	114	5.1%	4.4%	29.8%	65.8%	0.0%	0.0%
314	325	0.6%	80.6%	1.8%	17.5%	0.0%	0.0%
315	379	0.0%	83.9%	9.8%	6.3%	0.0%	0.0%
316	178	1.1%	84.3%	2.2%	12.9%	0.6%	0.0%

Table 1 (cont.)

317	250	1.1%	73.2%	16.8%	9.6%	0.4%	0.0%
318	448	0.8%	25.9%	5.1%	69.0%	0.0%	0.0%
Total High School Population	10,652		54.0%	7.7%	37.3%	0.9%	0.05%

Source: [State] public education information database and school accountability website. The drop-out rate is the number of students in grades 9-12 who dropped out during the school year divided by the number of students who were in membership at any time during the school year (annual not longitudinal). A cumulative count is used in both the numerator and denominator to neutralize the effect of student mobility.

Note: ***High schools included in the study. Details may not sum to 100 due to rounding.

The region contains one public community college, the Southern Regional College (SRC), which serves a total in-district and out-of-district population of about 75,000, with an annual total enrollment of over 3,800. Currently about 800 students are enrolled in state-approved Tech Prep associate degree programs, although these students were not necessarily Tech Prep students in high school. A comprehensive community college, the SRC awards associate of arts (AA) and associate of science (AS) degrees for 26 academic transfer programs, ranging from mathematics and science to music and drama, and associate of applied science (AAS) degrees for 20 technical programs in the divisions of allied health (five) and workforce development and education (15), offering a total of 71 certificate and degree award options. According to the college catalog, of the programs offering AAS degrees, 15 are approved as Tech Prep. In addition, SRC offers a wide variety of non-credit courses to the community.

Sharing the SRC campus is an upper-division campus of a state university, offering upper-level instruction to supplement two-year programs offered by SRC. This close working relationship provides much needed access to baccalaureate degree programs for students in the region. The upper division campus offers freshman and sophomore courses not offered by SRC. Programs offered complement SRC's associate degree programs and provide a natural avenue for students to continue with baccalaureate preparation. All state universities offer options for SRC graduates to continue baccalaureate study; several offer inverted degree programs that grant students credit for their entire associate degree; and others transfer credit for articulated coursework.

Economic and Political Context

Experiencing economic ups and downs over the past decade, the region has seen solid growth in recent years. This rural region has evolved from an agricultural-based economy to a center of trade and manufacturing. Over the last 10 years the area's non-farm employment figures increased by over 10%. Unemployment peaked in 1986 at nearly 10%, but currently hovers around 6%. The region witnessed its greatest employment growth in 1990-91 when more than 4,600 new jobs were created during a period of new plant openings and expansions in the petrochemical industry. Although losing 2,400 jobs in the mining sector, the region saw a growth in service (42%), government (25%), and manufacturing (17%) during the same period. Although agriculture and oil and gas remain important industries, 62% of the jobs in the region are in trade, manufacturing, and services.

From the late 1980s until about 1994, the region operated one of 24 state planning committees designed to produce and maintain a quality workforce by matching current and projected jobs to training programs. These committees, composed of regional business and industry leaders and public school and postsecondary educators, developed regional labor market information and published information on training requirements for those jobs. Beginning in 1991, Tech Prep became a principal vehicle for delivering education and training for key jobs in the area and Tech Prep programs were developed based on the information provided by these committees. In 1995, the Tech Prep partnership expanded to include school-to-work (STW), and the partnership's governing board and staff assumed the responsibility of the former committee for the development of regional labor market information.

Early in its development the Southern Partnership began to build connections with related education reform initiatives. Academic reform was heavily influenced by a statewide mandate to eliminate lower-level courses, rewriting course content requirements for academic and vocational courses, as well as national and statewide emphasis on skills outlined in the America 2000 and Secretary's Commission on Achieving Necessary Skills (SCANS, 1991) report.

In 1994, the state initiated a district accountability system and a school report card that rates districts and individual campuses based on performance factors including attendance rates, dropout rates, and pass rates on the state's mandatory minimum skills test for high school graduation.

Additional regional and statewide reforms had an impact on the local implementation of Tech Prep and STW. For example, the Southern Partnership participates in a voluntary statewide effort led by business and industry leaders. Based on local community efforts, the initiative is designed to motivate students through a program that recognizes students who take a more difficult course of study and maintain a "C" average. The Southern Partnership promotes this concept as a method to enhance academic rigor for Tech Prep students.

Tech Prep Implementation

In 1987, the regional committee for a quality workforce in 1987 formed the initial basis for the improvement and/or development of new career and technology (C/T) education programs in the region based on local economic need. Because most of the public schools in the region are small and rural, the majority of C/T programs offered were, and continue to be, in business education, agriculture, and child and family development (CFD) or vocational home economics. Rather than eliminate these programs, the partnership first sought to improve and revise the existing C/T curriculum, as well as upgrade the requirements for academic courses, to serve the needs of business and industry in the region. Additional articulated programs have been developed to meet the needs of the business community, including criminal justice, electronics/instrumentation technology, drafting, and associate degree nursing.

Tech Prep and STW definitions are integrated at the local level, though Tech Prep programs fit within the larger umbrella of the local STW system. Tech Prep and STW integration was evident during interviews with business/industry personnel involved in efforts at the community level during our 1996 site visit. Members felt that the two programs were perfect complements, with STW emphasizing preparation in the earlier grades and workplace experiences, with Tech Prep offering an option for students to begin preparation for a community college degree while in high school. Many emerging curricular approaches in the partnership are tied to the expansion of workplace exposure in the earlier grade levels. Throughout the partnership, the approach to both is similar and STW activities complement the Tech Prep initiative. For example, curriculum integration, contextual learning strategies, and emphasis on workforce preparation are similar. Several important differences in definition were evident, however. They include:

- Tech Prep emphasizes secondary to postsecondary articulation, while in STW, the emphasis is from school to college to the workplace;
- STW focuses on workplace experiences and earlier work experiences;
- STW funds can be expended at lower grade levels; and
- Changes in previous state-guided Tech Prep partnership governing board composition to meet federal requirements for STW.

Efforts to implement integration of academic and technical courses and contextual learning strategies in the Southern Partnership schools have been influenced by Perkins II, including the Tech Prep Education Act, and the Southern Regional Education Board's (SREB) High Schools that Work (HSTW) initiative, in which the state participates. Over the next three years, Tech Prep funds will be used to develop HSTW sites in each Tech Prep partnership in the state, including one or more sites in the Southern Partnership, fully linking these initiatives.

All school districts in the state have been impacted by the availability of state funds designated for technology, including computers and campus networking. These resources have been enhanced by the use of Tech Prep funds for new and/or upgrading equipment and software for use in Tech Prep programs.

Tech Prep is administered at the state-level by the higher education agency in co-ordination with the secondary education agency; STW is administered by the state's workforce commission. Although there is some level of coordination outlined in the state's comprehensive plan, the level of coordination of these two initiatives at the local level varies across the state. Ten (37%) of the state's 27 STW partnerships, including the Southern Partnership, are administered locally by the same entity as the regional Tech Prep consortium. In the Southern Partnership, both initiatives have the same fiscal agent and share an advisory board. The partnership's director, funded 50% with Tech Prep funds and 50% with STW funds, is assisted by a full-time STW liaison and a full-time Tech Prep coordinator.

Tech Prep Goals and Definitions

Because of the strong coordination of Tech Prep and STW in this consortium, the partnership has identified five goals that direct their local initiative. They are:

Goal 1. Enlist the full support of partnership high schools and public two-year associate degree-granting institutions in developing, supporting, an improving relevant AAS Tech Prep programs.

Goal 2. Increase the number or high school students who enroll, persist, and graduate from AAS Tech Prep programs and are placed in relevant jobs or go on to additional education.

Goal 3. Promote and provide resources for the reform of educational content and methodology.

Goal 4. Strengthen the relationship between business, industry, secondary, and postsecondary institutions.

Goal 5. Evaluate and document the effectiveness of Tech Prep activities in the partnership region.

Of these five goals, Goals 1, 2 and 5 are drawn directly from state goals for Tech Prep, while Goals 3 and 4 are consortium-specific, but generally support the state's overall goals for Tech Prep.

In attempting to address these goals, the partnership has focused on developing and implementing programs of study for all students. Consequently, career guidance and counseling and related school-based recruitment activities are targeted to all students. According to a local promotional brochure, Tech Prep programs of study are "available to all students interested in having a rewarding career in a quality workforce".

While the partnership focuses on goals that address both Tech Prep and STW concerns, it has retained a strong Tech Prep focus. The partnership lies within a state that adopted guidelines for Tech Prep in 1992 based on federal legislation with state-level enhancements, including specific rules for partnership structure, management, business and industry involvement, and minimum staffing; program components including four years of high school based on specific graduation requirements and involvement of four-year colleges and universities; a process for joint secondary and postsecondary state agency approval of all Tech Prep programs; and a statewide definition for Tech Prep students.

The partnership developed programs, activities, and services within these guidelines. Tech Prep programs are based on the 4+2 model, or six-year plan, consisting of a high school core curriculum of grade-level or above academic courses, combined with a coherent sequence of career and technology courses of at least two and one-half credits, and the associate of applied science degree curriculum. When appropriate, the model is expanded to a 4+2+2 model, with provision for baccalaureate study.

There are two levels of articulation agreements in the state and in the partnership: program-level agreements, or state-approved six-year plans, and course-level articulation agreements, which outline specific criteria for the award of college credit. State-level approval involves a review of secondary course sequences and the associated postsecondary program(s) within a proposed six-year plan.

To be state-approved, a Tech Prep program must be an articulated six-year plan of study. Approved AAS degrees carry the designation “Tech Prep.” Students are identified as participating in a Tech Prep program only if they are participating in a state-approved plan of study.

The state defines secondary and postsecondary Tech Prep students independently for purposes of reporting to state-level databases. The state defines a secondary Tech Prep student as “a student in grades 9-12 who follows an approved Tech Prep high school plan of study leading to postsecondary education and training, and is enrolled in courses appropriate to that plan.” The postsecondary Tech Prep student is one who declares a major leading to an associate of applied science degree that is state-approved as Tech Prep.

Locally, Tech Prep education is defined as “programs (to) help young people progress smoothly from school to work by making the connection between one’s education and career. Tech Prep prepares the student for high-skill, high-pay technical occupations. Tech Prep is a six-year sequence of study beginning in the ninth year of high school, progressing through at least two years of college technical education, and culminating in an associate degree.”

High school students are identified by their degree of participation in career and technology courses and programs by school district personnel. This state coding system uses the numbers 0, 1, 2, and 3. Codes 0 and 1 are course enrollment codes based on enrollment in a C/T course in the fall semester. A 1 indicates a student is enrolled in one or more C/T courses; a 0 indicates they are not. Code 2 is used to indicate students who have chosen to follow a C/T course sequence that is not state-approved as Tech Prep; a 3 is used to indicate students who have chosen to follow a C/T course sequence that is state-approved as Tech Prep.

Figure 1

Snapshot of the Local Tech Prep Approach

Primary Goal: To fully prepare all youth for rewarding careers in a quality workforce.

Tech Prep Student: A student in grades 9-12 who follows an approved Tech Prep high school plan of study leading to postsecondary education and training, and is enrolled in courses appropriate to that plan. The postsecondary Tech Prep student is one who declares a major leading to an associate of applied science degree that is state-approved as Tech Prep.

Tech Prep Course of Study: Tech Prep programs are based on the 4+2 model, or six-year plan, which consists of a high school core curriculum of grade-level or above academic courses, combined with a coherent sequence of career and technology (C/T) courses of at least three and one-half credits, and the associate of applied science degree curriculum. Student participation in the recommended high school program, which is college preparatory, is encouraged. Some programs articulate to baccalaureate degrees.

Tech Prep Occupation:
- An associate of applied science degree is the predominant method to enter the occupation. Multiple-entry options are available for high school graduates and one-year postsecondary certificate holders, if appropriate.
- The occupation has been identified by a regional quality workforce committee as a targeted occupation for the region, which generally meets a higher standard of skill level and pays higher wages.

Primary Articulation Approach:
- 4+2 (six-year) articulated programs (some 4+2+2)
- Dual credit, enhanced or advanced skills curriculum
- Course-to-course articulation of technical courses
- Up to 15 articulated credit hours possible (within 24 months)

Predominant Tech Prep Approach:
- Vocational Tech Prep
- Emphasis on articulated courses for college credit

Source: State and Local Tech Prep Materials

In the Southern Partnership, Tech Prep high school students are identified primarily by counselors on the basis of their selection of courses that fit into a four-year Tech Prep plan, including those who are eligible for college credit through articulation. Articulated courses for college credit are identified with Tech Prep (articulated) courses, and the articulated courses are used for student recruitment. In 1994, partnership staff initiated a voluntary and supplementary method to identify students participating in articulated courses based on a student's completion of a student enrollment/intention form. Information from the forms has been used to record course-taking patterns and to develop a database for student follow-up.

Partnership staff promote additional components of Tech Prep education programs, such as curriculum integration and the application of contextual learning strategies, by providing appropriate supplemental curriculum materials, as well as staff development activities that support these concepts. (See Figure 2 for the major milestones identified by local officials for this partnership.) Although each school district offering Tech Prep participates in these activities to some degree, academic courses are not identified as applied and all teachers are encouraged to use real world applications and related curriculum integration strategies in their classrooms. Therefore, Tech Prep students are not identified based on their participation in these activities. Career guidance and counseling is strongly encouraged, and identification of a Tech Prep student is dependent on selection of a Tech Prep program plan of study. However, each school approaches the development of an individual student's high school plan of study differently.

Although the state provides a definition of a Tech Prep student and a statewide coding system for school district use, school district staff may rely on the student enrollment/intention form process to identify Tech Prep students. If so, potential exists to misidentify Tech Prep students. This can happen because the local system is not sophisticated enough to distinguish a student taking one Tech Prep course from a student who is a coherent course sequence taker with the intent to continue into related postsecondary programs, i.e. a true Tech Prep student according to the state's definition. This concern is coupled with the fact that implementation of the state's reporting system for Tech Prep students is burdensome for school personnel. The system relies on the annual identification of students who are enrolled in one or more C/T courses in the fall semester (not necessarily articulated courses), followed by a labor-intensive edit of students' codes to indicate participation in a Tech Prep program of study. There are opportunities for error in this reporting system, and until the 1998-99 school year, there were no financial incentives for the accurate reporting of these students. Although there is some concern about the accurate identification and longitudinal reporting of a high school Tech Prep student, regional data on the characteristics of cohorts of students identified as Tech Prep show a definite five-year upward trajectory, based on statewide evaluation results.

FIGURE 2
SOUTHERN PARTNERSHIP MILESTONES

	PRE-1990	1990-1991	1991-1992	1992-1993	1993-1994
FUNDING	Southern planning region one of 24 state-funded Quality Workforce Planning Regions (QWFP) for labor market information and workforce development. FY 1987-1989 state agencies offer six-year grants for 2+2 program development in targeted high demand occupations.	State continues to offer grant funds for 2+2 program development.	QWFP Committee funded by Perkins. State awards 20 planning grants totaling $1 million and $3.5 million in continuing implementation grants to 18 consortia in coordination with QWFP committees. Southern consortium awarded $50,000 and $200,000.	QWFP Committee funded by Perkins, JTPA, and state funds. State awards $8.4 million to continue implementation grants to 25 consortia. Southern consortium receives $300,033.	QWFP Committee funded by Perkins, JTPA, and state funds. State awards $8.2 million to continue implementation grants to 25 consortia. Southern consortium receives $263,334.
PERSONNEL	Director staffed regional QWFP Committee.		TP grant written and managed by college personnel.	First TP consortium director hired.	Second TP consortium director hired. Curriculum coordinator hired.
LEGISLATION	Statewide, 2+2 funded with Perkins funds.		State QWFP legislation passed to fund initiative.	Statewide, 2+2 funded with TP funds.	
STRUCTURE/ PARTNERS	Regional QWFP committee structure was 50% business, industry, and labor, and 50% secondary and postsecondary educational representatives.		Comprehensive TP consortia formed within same counties as QWFP committees. Composed of regional college, all 17 school districts, and local university. Functioned in close collaboration with QWFP committee. Share fiscal agent.		
EVALUATION	Annual state agency evaluation of results of QWFP committees. State initiates process to identify vocational coherent sequence takers in high school.	State funds external evaluator for 2+2 programs.	Site is identified as NCRVE pilot site.	State adds TP student identifier to secondary and postsecondary state data systems. State hires external evaluator to visit each consortium. Primarily qualitative. Consortium participates in national TP evaluation.	State continues to fund external evaluator; visits only ten sites. Consortium participates in national TP evaluation.

FIGURE 2
SOUTHERN PARTNERSHIP MILESTONES

	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999
FUNDING	QWFP Committee funded by Perkins, JTPA, and state funds. State awards $7.8 million to continue implementation grants to 25 consortia. Southern consortium awarded $267,000.	QWFP Committee funded by limited Wagner-Peyser funds in transitional period. State awards $7.5 million to continue implementation grants to 25 consortia. Southern consortium awarded $254,500. Consortium receives $24,626 in STW planning funds from the state.	State awards $3.5 million to continue implementation grants to 18 consortia. Southern consortium awarded $268,478. Partnership receives $14,000 in continuing STW planning funds to continue QWFP labor market function.	State awards $3.5 million to continue implementation grants to 18 consortia. Southern consortium receives $263,971. Partnership receives $300,000 in STW funds from the state.	State awards $8.5 million to continue implementation grants to 25 consortia. Southern consortium receives $272,000. Partnership receives $300,000 in STW funds from the state.
PERSONNEL			Third director hired (50% TP/50% STW). TP curriculum coordinator continues (100% TP). STW staff added (100% STW).		
LEGISLATION	State funding for QWFP committees abolished. State legislation creates local workforce development boards (WFDB), state skills standards board, and state-level workforce commission consolidating 21 related programs.		Local WFDB established.		State TP legislation passed. No funding attached.
STRUCTURE/ PARTNERS	QWFP structure abolished; TP committee assumes role of labor market information provider. Advisory board 59% BIL, 23% educators, 18% other.	Consortium adopts STW partnership structure; Becomes the STW/TP Partnership with a common advisory committee.	Partnership functions as committee for TP, STW, and regional labor market information provider. Committee works in coordination with WFDB.		

FIGURE 2
SOUTHERN PARTNERSHIP MILESTONES

	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999
EVALUATION	Annual regional evaluation process developed to identify and follow TP high school students. Consortium develops comprehensive competency profiles for all articulated courses. State contracts with external evaluators (two). Consortium participates in national TP evaluation.	First regional profile developed for the consortium. First statewide status report published. NCRVE evaluation site visit to consortium.	Second regional profile developed for the consortium. Second statewide status report published.	Third regional profile developed for the consortium. Third statewide status report published.	Fourth regional profile developed for the consortium. Fourth statewide status report published.

	PRE-1990	1990-1991	1991-1992	1992-1993	1993-1994
INTEGRATED CURRICULUM		State focuses on curriculum integration via Perkins legislation and state plan.		College program advisory committees add secondary partners for TP programs. Six-year plans integrate academic competencies.	
ARTICULATED CURRICULUM	No articulated curriculum reported for this consortium prior to TP implementation.		State initiates joint-agency process for TP program approval. First TP AAS degree program approved in the state submitted by the Southern Consortium.	TP graduation option added to state high school graduation plans. Regionally, 12 courses selected for articulation within TP programs in five AAS degree program areas.	
PROFESSIONAL DEVELOPMENT	Most staff development offered by school districts, state agencies, and intermediate state agencies.		TP consortium begins to offer staff development to teachers, counselors, and administrators in the area. First annual labor market information workshops provided for counselors.		Consortium is a primary source of staff development for secondary and postsecondary teachers in curriculum alignment, contextual teaching, and curriculum integration.
GUIDANCE	Guidance based on current school district systems.		First six-year plans developed for use in student recruitment and guidance.	Additional six-year plans added annually for use by counseling staff. TP graduation option part of counseling plan.	
WORK-BASED LEARNING	Basic vocational model with cooperative work experiences and health occupation clinicals.		State TP guidelines encourage external work place experiences whenever possible.		

Figure 2
Southern Partnership Milestones

	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999
INTEGRATED CURRICULUM	Consortium functions as statewide clearinghouse for the purchase and dissemination of applied curriculum.	State adopts minimum academic standards for TP programs. Consortium aligns with regional initiative to encourage higher level academics.	Consortium aligns all six-year plans with the state's academic recommendations.		State legislation adopts college-level academic curriculum as model for all high school TP programs.
ARTICULATED CURRICULUM		Over 181 articulation agreements in seven AAS degree program areas	Over 204 articulation agreements in six AAS degree program areas.		
PROFESSIONAL DEVELOPMENT	Consortium demonstrates annual increase in participants in staff development workshops.			Partnership offers staff development for workplace mentors and supervisors. Initiates summer internships for teachers.	
GUIDANCE	Consortium publishes brochures for use by counselors.		Partnership forms and hosts a counselor's professional development network for the region.		
WORK-BASED LEARNING	Consortium sponsors an internship program; hires an intern for the office.	Paid cooperative experiences in many industries in the region.		STW enhances WBL experiences; increased focus on exposure to WBL learning activities.	

In fall 1997, 14 school districts in the region reported a total of 3,200 Tech Prep students, or 29.6% of the total grade 9-12 regional enrollment. The SRC reported 798 Tech Prep students in the fall of 1997, although this number reflects all students who declared a Tech Prep major, including those who did not participate in and/or complete a high school Tech Prep program. Based on this multiple-entry/multiple-exit program concept, a student does not have to complete all courses specified in a Tech Prep program to be considered a Tech Prep program graduate. Tech Prep graduates are currently identified based on their C/T participation code in their senior year.

Table 2

Number of Graduates and Tech Prep Participants by High School

High School Code	Number of Graduates			Number of Graduates Participating in Tech Prep		
	1995	1996	1997	1995	1996	1997
301	122	110	134	4	36	58
302	28	39	45	2	4	15
303	57	73	82	2	29	50
304	71	86	85	2	22	41
305 and 306	603	595	633	162	252	275
Total	881	903	979	172	343	439

Source: State database

Statewide, from 1995-97, Tech Prep enrollment more than doubled from 25,956 to 61,729 and Tech Prep graduates increased from 7,926 of 151,306 to 18,162 of 160,786. Over a two-year period, the graduation rates more than doubled from 5% to over 11%.

Governance and Funding

The Southern Partnership was originally formed in 1991 as the regional Tech Prep partnership. The initial implementation grant application, which established the partnership, was submitted in December 1991, following the receipt of a $50,000 eight-month planning grant. The grant application, submitted on behalf of the partnership, was written by representatives of the SRC, with input from a 219-member Tech Prep planning partnership. The subsequent implementation award was $200,000, with an average annual award of approximately $267,000 for subsequent years.

The initial advisory board for the partnership consisted of representatives from business and industry, secondary and higher education, and the community, reflecting the intent of the state that local consortia include, from the beginning, broad representation from various sectors of the community in the development and governance of the partnership. SRC has been the mainstay of support of the initiative over the years due to its role as fiscal agent, sole community college in the region, and leadership of college administrators. In addition, the partnership's advisory committee chair and a key industry leader have provided the direction for the partnership's program development and strong professional development focus.

The partnership's advisory board meets quarterly to provide direction to the partnership's staff and to approve staff-level recommendations. The board is governed by a set of by-laws that clearly define the role of the college as fiscal agent and employer-of-record, as well as the responsibilities of the advisory board. The partnership's operational plan and funding proposals are drafted by staff and approved by the board before they are forwarded to the state by SRC. The board is divided into subcommittees that have responsibilities for key aspects of Tech Prep and STW.

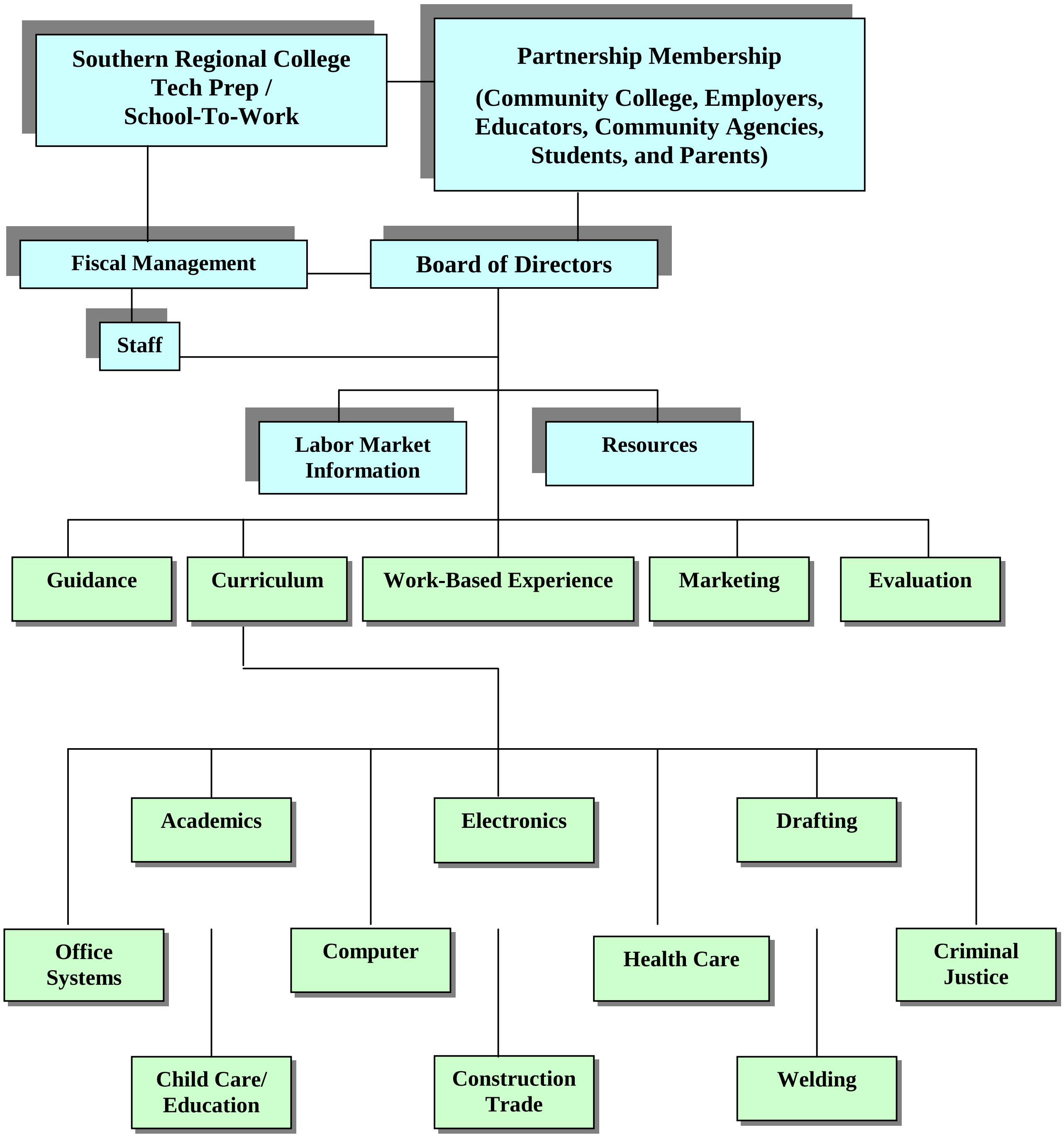
In 1995 the partnership received initial funds of $24,626 for federal STW planning and formally began operating as the Southern Regional Tech Prep/STW Partnership. The partnership serves as the regional labor market information committee, providing information on available jobs and related education and training. Membership in the partnership by public educational institutions in the region is voluntary, and level of participation by each school district varies due to the size and focus of the district. There are no public educational institutions in the region that are not members of the partnership.

The partnership is composed of the same 17 regional independent school districts engaged in Tech Prep plus 14 school districts from other regions of the state, the SRC, a state-supported upper-division public university campus, and numerous businesses, industries, and community and governmental agencies and associations (see Figure 3 for the partnership's organizational chart). Membership on the committee is approximately

39% educators, 36% representatives of state and local agencies, and 26% business and industry representatives. Subcommittees are responsible for labor market information, resources, guidance, curriculum, work-based experiences, marketing, and evaluation.

Figure 3

Southern Partnership Organizational Chart



The fiscal agent for the partnership's Tech Prep and STW federal funds is SRC, and the partnership's offices are located near the campus. The partnership staff is composed of three full-time professionals and one full-time administrative assistant. Currently, two student interns work part-time in the partnership office under a cooperative education plan using Tech Prep funds. The staff are employed by SRC on behalf of the partnership.

The partnership has received $2,139,316 in Tech Prep funds during the seven-year funding cycle, federal program year 1992-1999 under Perkins II. After the initial planning and implementation awards, base Tech Prep funding for the partnership was determined by a statewide competitive process that remained essentially stable through the 1998-1999 funding year. Beginning with Perkins III in 1999-2000, the state will be initiating a formula funding process for consortia. During 1999-00, the partnership will be allowed to carry over $20,000 awarded in May of the 1998-1999 fiscal year and earmarked for the development of a SREB High Schools that Work site. The partnership initially received STW planning funds from the state in 1995-1996 and 1996-1997, followed by $300,000 per year for the first two years of implementation. Due to anticipated cuts in state funding for STW, the partnership's funds will be reduced by at least 18% for 1999-00. Table 3 details the partnership's funding pattern by fiscal year.

A five-year analysis of the partnership's budgets reflects the following average budget by category: staff salaries, staff travel, office operation, and administration (56%); allocations for school district and college curriculum, equipment, student identification (21%); partnership-wide marketing and related printing and postage (12.5%); partnership-sponsored staff development (6%); other activities, such as student interns, worksite learning activities, and partnership-wide evaluation (5%).

Table 3

Funding for the Southern Partnership by Source and Fiscal Year

Federal Program Year	Tech Prep Perkins II	Tech Prep Perkins III	School-to-Work	Total Allocation
1991-1992	$250,000	NA	NA	$250,000
1992-1993	300,033	NA	NA	300,033
1993-1994	263,334	NA	NA	263,334
1994-1995	267,000	NA	NA	267,000
1995-1996	254,500	NA	24,626	279,126
1996-1997	268,478	NA	14,000	282,478
1997-1998	263,971	NA	300,000	563,971
1998-1999	272,000	NA	300,000	572,000
1999-2000	-	272,000	est. 18% decrease	TBD

Source: State agency grant records

Note: NA means Not Applicable. TBD means To Be Determined.

Barriers to Implementation

The perception of C/T education students as non-college bound continues to be a barrier to student recruitment into Tech Prep programs. Limited resources of small, rural schools in the region also limits the level of participation in Tech Prep implementation in programs outside of business education, agriculture-related occupations, and vocational home economics.

In our interviews of the SRC faculty, we learned that the use of applied methodologies in traditional academic classes is still not widespread; however, there are examples in this partnership. Reform is slow and sporadic at both the high school and college levels, and use of (and results of use of) applied teaching methods is spotty and not well documented. The SRC does not offer distinct, applied academic courses in graduation plans; general academic transfer courses are used, which may be taught with contextual learning strategies by individual instructors.

Key Components

This section discusses key non-curricular components for the Tech Prep partnership, including marketing and student recruitment, guidance and counseling, professional development, and program evaluation and student outcomes assessment.

Marketing and Student Recruitment

The majority of marketing and recruitment efforts have been initiated by the partnership's staff, assisted by individual school districts guidance and counseling efforts and by the SRC. Each participating institution clearly identifies articulated courses and Tech Prep degree programs in school and college course catalogs, serving as a recruitment tool. Students are recruited from the general population, and Tech Prep students reflect the general population in both high school and college programs.

The primary marketing and recruitment efforts initiated at the partnership level center around the publication of Tech Prep informational brochures that are widely distributed to schools within the partnership. In addition to career-specific flyers (Health Care, Electronics and Instrumentation, Drafting, Criminal Justice, Computer Information Systems, Child Care and Education, Carpentry and Construction, Transportation, Welding, Plumbing, Mechanics, Office Systems Technology, and Hospitality), other brochures and posters developed by partnership staff announce "earn free college credit now" and "make a $1,000,000 decision," reflecting attempts by the partnership to effectively market Tech Prep as a college-preparatory program designed to transition students into higher-paying occupations that are in demand. This strategy is supplemented with an annual list of regional targeted occupations, average wages, training time, and regional training providers for these high skill/high pay jobs.

The partnership's articulated course enrollment tracking form, or a student enrollment/intention form, serves as a word-of-mouth recruitment tool and provides an opportunity for partnership staff to recruit students into Tech Prep programs and related STW activities.

In addition, the partnership publishes a list of approved six- to eight-year Tech Prep plans for use by independent school district personnel and widely distributes monthly newsletters (mailed to over 17,000) with different versions targeting parents, educators, business/industry/labor, and students.

The partnership also participates in job fairs and an employer-internship recruitment program and markets Tech Prep extensively in the media (TV, radio, and newspaper). As of 1996, over $32,000 in air time had been donated to the partnership for public service announcements.

Guidance and Counseling

Under state agency guidelines, each school district should offer career guidance and counseling for students annually, beginning with the development of a student's high school graduation plan at the end of the eighth grade, based on a student's career objectives (if known), aptitude and ability assessment tests, and the district's graduation requirements.

For example, High School 305 publishes a course selection guide that provides an outline of guidance and counseling services. These services include educational planning; financial and scholarship planning; vocational testing; and crisis, substance abuse, and self-esteem services. The guide states that "counselors will assist in the development of a four-year educational plan for each student....that will help the student to select a high school curriculum that will maximize his/her transition into post high school vocational or educational pursuits." High School 304 provides students with a "planning guide" that is, essentially, a course and career planning document for all students that includes an interest survey, occupations, information on tests, as well as course lists and high school graduation requirements.

Through these publications and related routine guidance activities (as well as through the efforts of individual teachers), students are exposed to Tech Prep and procedures for credit for articulated courses. For example, the course guide for High School

305 includes a section on “Tech Prep college courses in high school” that details the requirements for award of college credit at SRC for articulated courses, listing and describing the college course and the high school course equivalent. High School 301 has a similar section on guidance and counseling in the course guide, with a similar section titled “Tech Prep Curriculum”. Courses eligible for Tech Prep articulated credit are specifically identified by High Schools 301, 302, 304, and 305. Ideally, Tech Prep student identification is collected by high school counselors annually when they advise students on their graduation plans and course enrollment and is reported by the school district campus to the state secondary agency.

A career development portfolio, for use by regional school districts, was developed by partnership staff using funds donated by a regional petrochemical industry. The portfolio is a planning guide for students that provides information on graduation requirements, information on Tech Prep (articulated) credit, and college requirements and features a course record for student use.

Under STW, the partnership has expanded its promotion of a system of comprehensive career guidance and counseling from a simple six-year plan for Tech Prep core curriculum to a system that includes the following components:

- <u>Awareness</u> of families of occupations (Career Intent Form);
- <u>Exploration</u> through research (library, film, video, and software programs - e.g., Discover) and interactions (interviews, presentations, and on-site tours);
- <u>Know job opportunities</u> through the targeted occupations (brochure);
- <u>Know yourself</u> through interest, aptitude, and values testing;
- <u>Career decision and plan</u> using course selection and financial aid (scholarships, grants, aid, and loans);
- <u>Career preparation</u> that includes academic, technical, work maturity, and life skills;

and

- Job realization, which includes networking, mentorships, work-study programs, apprenticeships, and other workplace preparation programs.

SRC provides counseling services, including academic advising, career guidance, and personal counseling. In addition, the college has a career center that features computerized career exploration and planning materials, as well as books and videos, designed to help students find an appropriate career and learn about the training required for a specific career. The center also includes job placement services and provides job postings.

The SRC catalog has a section devoted to how to obtain Tech Prep credit and each state-approved Tech Prep AAS degree is identified as a Tech Prep plan. In addition, SRC administration and staff market and recruit for Tech Prep programs via normal college processes for all AAS degree programs, as well as through efforts associated with the development and implementation of course and program articulation agreements.

Professional Development of Faculty, Counselors, and Administrators

A key activity of the partnership is professional development. Several times a year, the partnership sponsors region-wide workshops in conjunction with a number of regional and local agencies and organizations. Workshop topics are chiefly linked to articulation, career guidance and counseling, and curriculum integration.

Professional development activities targeting faculty focus primarily on contextual learning strategies/applied academics. Examples include the methodology for higher geometry/math achievement and The Write Stuff: Technical Writing for a Quality Workforce. These workshops are open to all schools in the region and surrounding area.

The partnership and SRC host annual curriculum alignment activities that include six-year plan development and course articulation. These joint secondary/postsecondary faculty meetings have promoted greater communication among high school and college faculty and have contributed to an increased awareness of the curriculum taught at each level and to the development of non-duplicative programs of study for students.

Professional development activities for counselors, as well as teachers, includes information on career awareness and exploration software, career tabloids, informational brochures, as well as six-year Tech Prep plans, career portfolios, and labor market information. Although the majority of field trips, workplace internships, and job shadowing experiences target students, the teachers and administrators who accompany them are directly exposed to the workplace too.

Each school district sponsors additional annual staff development activities, as does SRC, for its employees. In addition, partnership members, including teachers, counselors, administrators, and community members, participate in the state's annual Tech Prep conference as presenters and attendees.

Whereas the partnership coordinator indicated that priorities for professional development have not changed much over the years, he is aware that professional development activities have been modified to meet evolving partnership needs. However, he also indicated that STW has brought about some changes, particularly in regard to topics presented for work site supervisors and mentors. Approximately 225 teachers, counselors, and administrators have participated in annual professional development activities each year since 1993-94 until 1998 when only 125 participated. This drop was due to a change in directors for the consortium and change in location of the partnership office, which ultimately resulted in fewer professional development opportunities being offered during the transition period.

Program Evaluation and Student Outcomes Assessment

The partnership participates in several levels of evaluation and student outcomes assessment. They include reporting requirements to federal and state agencies; partnership-initiated student identification and selective follow-up; state-level evaluation of associate degree programs under the institutional effectiveness process; state-level reporting of participation in STW activities; and state-level student assessment published in annual status reports on Tech Prep. Locally, the partnership has two objectives related to evaluation of both Tech Prep and STW. It seeks to conduct longitudinal assessment of student success for determination of ultimate program value, and to conduct near-term assessment of outcomes to guide program improvement. Related activities are associated with a performance measure. An example of the format used is:

Activity:	Develop and maintain integrated, high standard, state-approved curriculum pathways that respond to workforce needs and requirements
Performance Measure:	Six approved pathways maintained and four more added
Completion Dates:	Two new pathways in place by August 15, 1996, and two more by August 15, 1997
Documentation:	State agency approval documents
Task Responsibility:	Curriculum subcommittees
Graphics & Charts:	Bar chart of increase in approved pathways over time

The partnership quantifies the number of Tech Prep programs, the number of articulated courses offered by SRC, as well as the number of high schools that have articulation agreements with the college. Using the partnership's student enrollment/intention form, student tracking/follow-up is monitored by the partnership office. Each high school student enrolled in an articulated class completes a Student Enrollment/Intent Form that forms the basis for all longitudinal follow up. The data collection includes student name, address, phone number, date of birth, gender, ethnicity, social security number, year of graduation, school code, articulated course number, and teacher code. Based on this information, staff are able to generate describe students enrolled in Tech Prep articulated classes for program planning and monitor enrollment changes over time. In the Southern Partnership, this data collection process is administered by the classroom teacher each semester in a variety of classroom settings, predominantly in articulated C/T classes. This procedure allows the partnership to track enrollment trends in Tech Prep articulated courses and career pathways year-round; whereas state-level data are only collected in the fall semester of each academic year. Though the data collected are not intended to supplant the state-level data collection process, the personal information on Tech Prep students allows the partnership to administer follow-up surveys to Tech Prep high school graduates.

Student assessment at the high school level includes student competency profiles in each Tech Prep articulated course (the college also uses the same competencies for the equivalent courses); and a requirement that the student make a grade of B or better. In addition, students seeking internship prospects are assessed with a Workplace Readiness Profile. The partnership also conducts an annual follow-up survey of a random sample of Tech Prep high school graduates to determine enrollment in postsecondary schools, occupational employment, career goals, and the benefit of high school articulated Tech Prep courses. Thus far, assessment of Tech Prep has been limited to numbers of programs and student enrollments and graduations.

Each Tech Prep associate-degree program is evaluated through the state postsecondary agency's institutional effectiveness peer review procedure, and results are published annually and used, in part, to meet the state's Perkins data measures and standards. Tech Prep high school graduates are not routinely identified upon enrollment in the college, and students are not identified as Tech Prep to instructors (based on interviews with teachers and administrators at SRC). Tech Prep students at the college are identified by the partnership's follow-up study by matching high school records with college enrollments and when a student requests articulated credit from the registrar. The local student enrollment/intention form does allow partnership staff to conduct record-matching activities to determine if the students are enrolled at SRC. For example, the 1996 data match for SRC showed that 37% of the college enrollment (1,300 students) came from Tech Prep high school programs. According to the partnership director, the Tech Prep student population, in general, was younger, more likely to be full-time, constituted a higher-risk population, and roughly mirrored the general population in ethnicity.

In addition to regional evaluation efforts, state- and regional-level aggregate data are compiled by the state and distributed to each Tech Prep consortium. In addition to the number and types of Tech Prep programs offered and longitudinal enrollment trends in C/T programs, the statewide Tech Prep evaluation project provides each consortium annually with aggregate, longitudinal cohort data for student attendance rates; drop-out rates; graduation rates and plans; pass rates and scores on standardized tests; and enrollment in institutions of higher education and post-graduation employment and wages. All student data are based on the use of the state's C/T participation code.

The state views the STW initiative as a system rather than a program and, for this reason, does not define a STW student, per se. For reporting purposes and to measure the impact of funds on local activities and related programs, the state requires reporting of, at a minimum, the number of students who are involved in or participate in an activity funded by a local partnership. Each partnership determines reporting parameters based on its specific activities and the degree that STW funds impact them. Examples of these activities include participation in career fairs, career guidance activities, work-based learning activities, and coherent sequences of courses, including Tech Prep. Across the state, a Tech Prep student may or may not be considered a STW student depending on the relationship of a regional partnership with the Tech Prep partnership, and the impact of expenditure of STW funds on students participating in Tech Prep. STW students are defined by the completion of an extensive and detailed activity reporting matrix required by the state's STW office.

Scholarships

While not a key component at the local level, one unique component of this consortium and other consortia across the state is the scholarships for Tech Prep students. Tech Prep scholarships are awarded annually by the state to one Tech Prep student from each Tech Prep region, who then competes for an additional statewide honor and award. These $250 scholarships have been awarded to three students from the region by the state's independent Tech Prep association. The scholarships are funded by donations and membership dues.

Tech Prep Curriculum Reform

The Southern Tech Prep/School-To-Career Partnership has developed six-year plans of study that are composed of recommended academic and C/T courses. At the time students in this study were enrolled in high school, students were encouraged but not required to engage in college-preparatory program of academic study, plus two and one-half credits of a coherent sequence of courses in a related C/T area. (Since that time, the recommended Tech Prep core curriculum has increased in rigor, with the C/T course sequence increasing to three and one-half credits and the academic course sequence being the "recommended high school program".) The degree to which students adhere to the courses outlined in the plan varies by student and school district, depending partly on the extent to which counselors understand and encourage students to follow their six-year Tech Prep plans. Each six-year plan also identifies courses that are eligible for college credit by articulation and outlines the courses required for completion of the AAS degree.

Core Curriculum and High School Graduation Requirements

All Tech Prep students must meet minimum graduation requirements established by the state. These minimum requirements include:

- For students entering grade 9 in 1994-95, 1995-96, and 1996-97:
    - Four credits of grade-level English/language arts, or above;
    - Three credits of mathematics;
    - Two credits of science selected from a specific list of state board approved courses;
    - Two and one-half credits consisting of one credit of world history or world geog-

raphy, one credit of US history, and one-half credit of US government;

  - One-half credit of economics - free enterprise system;
  - One-half credit of health education; and
  - Electives to equal a minimum of 21 total credits.

- For students entering grade 9 in 1998-99 and thereafter:
  - Four credits of grade-level English/language arts, or above;
  - Three credits of mathematics to include Algebra I;
  - Two credits of science to include one from either biology, chemistry, or physics;
  - Two and one-half credits consisting of one credit of world history or world geography, one credit of US history, and one-half credit of US government;
  - One-half credit of economics - free enterprise system;
  - One academic elective selected from world history, world geography, or a state board approved science course;
  - One and one-half credits of physical education;
  - One-half credit of health education or one credit of health science technology;
  - One-half credit of speech; One credit of technology applications (selected from a list of state approved list of 15 computer/telecommunications courses such as microcomputer applications, computer technology); and
  - Electives to equal a minimum of 22 total credits.

A state-approved Tech Prep program must be an articulated six-year plan of study starting at the ninth grade and articulated with two-year college. Approved AAS degrees carry the designation “Tech Prep” to designate completion of the six-year program of study. The graduation requirements for individual high schools included in the study are noted in Table 4.

Table 4

Credits Required for Graduation by High School

High School	No. of credits to graduate	English	Math	Science	Social Studies	Other Academic Requirements
301	22	4	3	2	2.5	Restricted academic elective –1, economics - 0.5, health - 0.5, speech - 0.5, technology applications – 1
302	NA					
303	25	4	3	2	2.5	economics - 0.5, health - 0.5, speech - 0.5, computer science - 1, fine arts - 1
304	27	4	3	2	2.5	Restricted academic elective –1, economics - 0.5, health - 0.5, speech - 0.5, technology applications – 1
305	22	4	3	2	2.5	Restricted academic elective –1, economics - 0.5, health - 0.5, speech - 0.5, technology applications – 1
306	22	4	3	2	2.5	Restricted academic elective –1, economics - 0.5, health - 0.5, speech - 0.5, technology applications – 1

Source: High School Course Catalogs

Note: NA means Not Available

Graduation requirements for students exiting public high schools in the state have been subject to extensive revision, concurrent with the implementation of Tech Prep and related education reforms. Beginning prior to the 1991-1992 school year, the state's board of education ruled that all non-grade level courses in science, mathematics, and language arts (e.g., Correlated Language Arts and Fundamentals of Mathematics) would no longer meet minimum state high school graduation requirements; they were to be phased out as graduation credit entirely. Simultaneously, the state's curriculum underwent a rewrite, moving from state board-approved lists of "essential elements" to be taught by teachers in both academic and C/T courses, to state board-approved "essential knowledge and skills" to be learned by students. In addition, the state's mandatory exit exam was revised to reflect these curriculum changes, from a fact-based test to a more application-based one.

The most dramatic change in graduation requirements was initiated for students entering grade 9 in school years 1994-1995, 1995-1996, and 1996-1997 which corresponds to the period when students in this study were graduating from high school. This reform established three levels of state requirements for the award of a high school diploma (local school districts may enhance minimum state requirements):

- Minimum graduation plan (21 credits);
- Recommended high school program (24 credits); and
- Distinguished achievement program (24 credits).

A critical feature of the recommended and distinguished achievement high school graduation plans for Tech Prep is outlined in the electives/additional components section of the plans. This component provides that students demonstrate proficiency equivalent to three and one-half credits (one-half credit = one semester course) in a coherent sequence of courses for C/T preparation, including coherent sequences approved as Tech Prep. Although not required, all Tech Prep students were encouraged to meet the requirements of the recommended high school program, according to state guidelines. Six-year Tech Prep plans have been upgraded for students entering the ninth grade in 1998-1999 and thereafter.

State public universities each set their own admissions requirements, shown in Table 5. Looking only at credits (not course content), the recommended curriculum for Tech Prep meets or exceeds the university admission requirements in each academic area.

Table 5

Minimum High School Graduation, Tech Prep, and University Requirements

Courses	Minimum High School Graduation Requirements	Recommended Tech Prep Requirements	University Requirements
English and Speech	4 credits ½ credit of speech	4 credits of grade-level English/language arts, or above ½ credit of speech	4 credits
Mathematics	3 credits including Algebra I	3 credits of mathematics consisting of Algebra I, Geometry, and Algebra II	3-4 credits
Science	2 credits in Biology, Chemistry, or Physics	3 credits of science, with no more than one credit per area, selected from Integrated Physics and Chemistry, Biology, or Physics including Principles of Technology	2-3 credits
Social Studies	2.5 credits of World History, World Geography, or US History, and ½ credit of US Government; ½ credit of Economics - Free Enterprise System	3.5 credits consisting of one credit of World History, World Geography, US History, or ½ credit of US Government; ½ credit of Economics - Free Enterprise System	2-3 credits
Foreign Language	0	Two credits in the same language other than English	0-2 credits
Computer Skills	1 credit	1 credit	0-1 credits
Fine Arts	0	1 credit	0-1 credits
Career electives	0	3.5 credits	0
Additional electives	1 restricted academic elective; 5 ½ additional	0	varies
Total credits	22	24	varies

Source: State agency websites

Note: All graduation plans require ½ credit of health and 1½ credits of physical education.

High schools in the partnership offer a variety of courses to meet the needs of their student population, but there are limitations because the schools are small and many operate on a 6- or 7-period day. Some schools continue to offer honors courses, but these courses were to be phased out beginning with students entering ninth grade in the 1998-99 school year. All schools also offer advanced placement (AP) courses. Each high school creates an individualized graduation plan for special education students and offers reading improvement and remedial math courses to all students who need them, although these courses cannot be counted toward graduation except as electives. The state sponsors a gifted and talented program, and the SRC offers concurrent (dual) enrollment opportunities for exceptional students.

The Southern Partnership provided key leadership to the state's Tech Prep consortia during 1995-1997 by acting as a clearinghouse for the purchase and dissemination of CORD and AIT curriculum integration materials. Prior to that time, and after, the primary focus has been on providing professional development for academic and C/T teachers in curriculum integration and contextual learning strategies.

Applied Academics Curriculum. The state recognizes the importance of contextual learning strategies for all students, but it does not encourage schools to adopt applied academics courses per se. Rather, schools are encouraged to infuse real world applications into traditional academic courses. To support this strategy, applied curriculum materials have been purchased by the partnership for school districts to use as supplementary materials, and these materials seem to have been used to varying degrees. Further, workshops have been offered for academic teachers who seek to engage their students in contextual learning. By pursuing this strategy, schools in the partnership have avoided the creation of a separate set of academic courses for Tech Prep students, often associated with tracking. However, this approach does have serious drawbacks because it is nearly impossible for anyone besides individual classroom teachers to know whether students are actually experiencing any kind of contextual learning within traditional academic courses. Related to this concern, counselors who assist students to develop six-year plans designating particular academic and C/T courses often have no way of knowing which courses provide contextual learning experiences for students. Consequently, whether students experience anything different from traditional academic instruction that is very difficult to determine without extensive on-site investigation. A leader of the local partnership did provide important insight on this matter however. He noted that high schools operating with one counselor were much more likely to be providing appropriate guidance for Tech Prep students because they were more knowledge about the courses being offered in their schools. Because of the small size of the schools operating with only one counselor, they could provide more consistent advise to students regarding Tech Prep course-taking, at both the secondary and postsecondary level. Though not extensive, some courses at SRC are taught with contextual learning strategies, and the partnership will be emphasizing increased use of these approaches in the future.

It should be noted that there is an exception to the rule of no applied academics courses in high school and that is the Principles of Technology course developed by the Center for Occupational Research Development (CORD). This course has been adopted by the state as a science credit and is incorporated into the state's graduation requirements for the recommended and the distinguished achievement graduation programs for students entering ninth grade in 1998-1999 and thereafter.

Tech Prep and the Curriculum of the Community College

There are no entrance requirements that relate specifically to Tech Prep students entering SRC. Following a multiple-entry, multiple-exit model, a non-Tech Prep high school student may enroll in an associate degree program that has been approved as Tech Prep by taking the appropriate entry-level courses outlined in the degree plan. All students entering public two-year degree-granting institutions for the first time must take basic skills tests in reading, writing, and mathematics, although they are not required to pass all sections of the test to enroll. The scores are used to determine if a student requires academic remediation prior to enrolling in college-level English or mathematics courses. Under the open enrollment policy of community and technical colleges in the state, a student must be a high school graduate, have a GED, and/or have taken one or more of the following assessment tests: ASSET, ACT, or SAT. One SRC catalog indicates that, in addition to the state-required test, assessment tests are used to place students in the appropriate level of English or mathematics courses and to determine if the student requires remedial reading courses.

Degree options for workforce education programs in the state are the Associate of Applied Science (AAS) and Associate of Applied Arts (AAA) degrees (see Table 6). Degrees must be limited to a total of 60-72 semester credit hours, with 50% to 75% of course credits drawn from a common technical specialty (as defined by four- or six-digit CIP codes). The remaining courses should consist of related studies and general education courses that meet the requirements of the Southern Association of Colleges and Schools (SACS). Each degree must have an overall minimum of 15 semester credit hours in general education core curriculum, with at least one course in humanities/fine arts (e.g., English Composition, American Literature, Speech, Journalism, foreign language, Philosophy, or Drama, Art, and Music), social/behavioral sciences (e.g., Government, History, Psychology, Sociology, Anthropology, and Economics), and mathematics/natural sciences (e.g., Biology, Chemistry, Physics, College-Level Mathematics, Academic Computer Science, and Geology). In addition, each degree program must contain competencies in mathematics, computer science, and communication and must be integrated into each course and program as applicable and relevant. If stand-alone courses, they must be of collegiate level and transferable as academic courses (not related to a specific occupation). Integration of external learning experiences into all workforce education programs is strongly recommended, according to the state's technical program guidelines. In general, the 15 semester credit hours of academic courses in AAS degrees are transferable to baccalaureate-degree programs.

Table 6

Minimum Credit Requirements for Various Degree Programs at the Community College

Curriculum Area	AAS Degree Requirements	AA Degree Requirements	AS Degree Requirements
Communications	3 minimum	15	12
Fine Arts		3	3
Humanities		0	0
Natural Science	3 minimum	4	8
Mathematics		3	6
Social/Behavioral Sciences	3 minimum	12	12
Computer Science	0	4	4
Other Academic Courses	additional courses from above to equal at least 15 SCH	Varies by degree plan	Varies by degree plan
Electives/Other	49-57 credits in the area of concentration	Varies by degree plan	Varies by degree plan
Interdisciplinary/ Cross-cultural Studies	0	3	3
Total Required	64-72 varies by program	62-72 varies by program	62-72 varies by program

Source: College catalog

Articulation Agreements and the Vocational Curriculum

Each state-approved Tech Prep AAS degree program is based on a college preparatory secondary four-year curriculum, developed cooperatively by secondary and postsecondary subject-area faculty. Articulated courses in each program form the basis for "advance placement" of high school students into more advanced courses in a Tech Prep AAS course sequence. Students entering the postsecondary portion of the Tech Prep AAS programs who have not participated in Tech Prep in high school, take these entry-level courses in the regular sequence at the college.

Course-level articulation agreements form the basis for all Tech Prep programs in the partnership's region. Each of these agreements is integrated within program-level articulation agreements, or six-year Tech Prep curriculum plans, approved by the state. Every Tech Prep program has one or more associated course-to-course articulation agreements. Terms of articulation agreements are prepared for signature by college and school district personnel based on the results of joint meetings of secondary and postsecondary faculties. Each articulation agreement is accompanied by a competency profile for the college-level course that certifies that the instructor of record agrees, or does not agree, that the student has met the level of competency required for award of college credit.

The general requirements for the award of articulated Tech Prep credit by SRC, in addition to the competency profile required for each course, are clearly outlined in the high school and college catalogs and in marketing materials developed and distributed by the partnership, and these requirements reflect the content of articulation agreements with participating school districts.

Tech Prep curriculum is composed of grade-level or higher academic courses (some taught using applied methods); course-to-course articulation agreements; six-year plans (grades 9-14) approved by the state as Tech Prep; and enhanced/advanced skills courses/certificates (now optional) offered by SRC in all state-approved Tech Prep programs. Some articulated courses are found in more than one Tech Prep six-year plan, and some non-Tech Prep students take articulated courses. Requirements to receive articulated credit from SRC currently include:

- Holding credit in escrow for 24 months after the date of graduation or completion of a GED;
- Passing all portions of the college minimum skills test;
- Taking the ASSET, ACT, or SAT tests;
- Completing and submitting an application for admission;
- Submitting an official transcript with high school Tech Prep (articulated courses) ap-

propriately noted;

- Successfully completing three credit hours at SRC; and
- Completing an application for posting of articulated Tech Prep credit.

Credit is entered on the transcript as Tech Prep credit and does not count in the calculation of the grade point average. There is no fee for posting articulated credit and up to 15 semester credit hours may be awarded by articulation.

Each Tech Prep program is noted in the college's catalog as a Tech Prep option and articulated courses are footnoted. As of fall 1996, there were 204 regional articulation agreements; all but those related to agriculture and child and family development (CFD) – welding and CFD are certificate programs – are Tech Prep agreements. The SRC has a guarantee for job competency that certifies up to nine tuition-free credit hours of additional training if an employer judges a graduate to be lacking in technical job skills identified as exit competencies for his/her degree plan. All 17 regional independent school districts are state-approved to offer at least two Tech Prep programs. The programs offered by SRC and designated Tech Prep are:

- Computer Programming,
- Instrumentation Technology,
- Advanced Electronics Technology,
- Criminal Justice - Correctional Science,
- Criminal Justice - Law Enforcement,
- Drafting,
- Associate Degree Nursing,
- Office Management,
- Executive/Administrative Secretary,
- Legal Secretarial,

- Medical Secretarial,
- Word Processing/Desktop Publishing,
- Records Management,
- Microcomputing, and
- Network Administrator.

The specific articulation options offered by each school district in the Southern Partnership are outlined in Table 7.

Table 7

Articulated Credit Courses at SRC

C/T Course	Schools Offering Course	SRC Course
Intro. to Client Care	301, 305, 306	Introduction to Client Care, NURS 1210
Business Computer Applications -- Microcomputer Applications Computer Science I	301, 302, 303, 304, 305, 306 -- 303 303	Principles of Computing, COSC 1401 Introduction to MS-Windows, COSC 1361 Introduction to MS-DOS, COSC 1279 Computer Programming in Basic, COSC 1416
Criminal Justice I Criminal Justice II --	301, 305, 306 305, 306 --	Introduction to Criminal Justice, CRIJ 1301 Crime in America, CRIJ 1307 Fundamentals of Criminal Law, CRIJ 1310
Manufacturing Graphics Computer Applications (CAD) Construction Graphics	301, 304, 306 301, 304, 305 304	Mechanical Drawing, DRFT 1303 Computer Drafting, DRFT 1454 Architectural Drafting, DRFT 2306
Electronics I Electronics II Electronics III	302, 305, 306 305, 306 305, 306	DC Circuits, ELEC 1451 AC Circuits, ELEC 1452 Semiconductors, ELEC 1453
Accounting Office Administration Co-op I Microcomputer Applications	301, 302, 303, 304, 306 301, 305, 306 301, 303, 304, 305, 306	Elementary Accounting I, ACCT 1371 Cooperative Education I, OFST 2375 Keyboarding, OFST 1301
Welding/Ag. Structures	301, 302, 303, 304, 305, 306	Welding, WELD 1301
Child Development	301, 304	CHID 1311

Source: College catalog, high school catalogs, and partnership database

The partnership maintains and disseminates a crosswalk of high school courses articulated with specific courses at SRC. In addition, the partnership maintains a database of all teachers who offer articulated courses in Tech Prep programs. Each articulated course appears in one or more proposed curricula (Tech Prep six-year plans) for high schools articulating with SRC. There is a recommended graduation plan that includes both the high school and college curriculum for each state-approved Tech Prep associate-degree program option. Articulated courses are noted on the high school transcript with a special state-designated code.

The partnership's process of recording student enrollment in articulated courses quantifies for each semester the enrollment by class and projected career area for each articulated course at each participating high school. The college is able to generate a list of students and the courses for which they have received articulated credit. Neither SRC nor the partnership has a current procedure for identifying Tech Prep student on enrollment in the college. Award of articulated credit is documented only after the student completes the college's requirements and petitions for award of credit.

Career Pathways

With the implementation of STW, the state has recommended seven career clusters, or pathways, that the Southern Partnership and its members can use for guidance activities and program development. These pathways are:

- Agricultural Science and Technology Education,
- Home Economics Education,
- Business Education,
- Health Science Technology Education,
- Technology/Industrial Technology Education,
- Marketing Education, and
- Trade and Industrial Education.

Beginning in 1999-2000, high schools are modifying their course catalogs to include career pathways. For example, High School 304 publishes a student planning guide that includes extensive information about different career pathways, the jobs available in the pathways, and training programs that prepare for those jobs. State publications outline course sequences that are appropriate for entry-level, technical, and professional jobs within each pathway.

The state is currently developing a process for the statewide articulation of specific high school courses with specific college courses. Essentially, this process allows high school students to request college credit and complete their Tech Prep program at any public two-year college in the state that offers a related program. The state intends to publish six-year curriculum plans that include these courses and also include career pathways that identify multiple associate degrees that articulate with high school C/T course sequences.

Instruction and Delivery of Curriculum

As indicated above, the state has encouraged the use of integration of academic and C/T curricula and the adoption of applied teaching methodologies. During interviews with faculty from across the partnership during 1997, several teachers representing both the secondary and postsecondary levels, particularly in English/language arts, spoke of their use of special materials in their classrooms to make more learning applied and relevant. However, there is no method in place statewide or locally to assess the effectiveness of new methodologies associated with Tech Prep nor the extent to which these methodologies and materials have been adopted in regular classroom practice.

Work-Based Learning

Prior to recent years, the high schools and SRC offered traditional work-based learning (WBL) experiences such as cooperative work experiences and clinical rotations. Since the implementation of STW, there has been greater emphasis on providing work site experiences for students, and in particular, greater exposure to employers through career exploration activities. The emphasis on WBL has been reinforced by providing supervisors and mentors with professional development on topics such as child labor laws and how to work with young employees. Summer work site shadowing experiences have also been provided for teachers.

One of the supporting principles of Tech Prep is that students should have opportunities to engage in activities that increase their awareness of the relationship between what they learn in school and what occurs in real-world work situations. Numerous high school and college Tech Prep programs have work-site experiences already in place, many of them paid experiences. Others have successfully laid the groundwork for increasing student involvement in the work site by including business, industry, and organized labor. About 30% of approved Tech Prep programs in the region have workplace experiences associated with them. Although internships and mentorships are available for each program area, not all students participate. Students work in local industries part-time through paid internships, cooperative experiences, and clinical rotations. Examples of work site experiences at various business and industry locations include: office/computers, CAD/drawing, carpentry, shipping/receiving, electronic maintenance, radio/computers, administrative/legal, criminal justice, office administration, and office/computers.

Job Shadowing and Career Awareness

Activities related to job shadowing for students have increased substantially since the partnership began implementing STW activities. For example, students participated in the following activities during the 1998-1999 academic year:

- 154 middle school students in district 313 researched and prepared career portfolios;
- 367 middle school students in district 305 participated in a career day;
- 12 high school students from school 302 participated in industry visits related to a computer construction and repair class and toured a major silicon chip manufacturer;
- 12 carpentry students from district 313 visited a construction site;

- 10 students from school 307 shadowed petrochemical industry employees;
- 450 elementary students from district 307 participated in a career awareness workshop;
- 100 elementary students from district 305 visited several businesses; and
- Middle school students from district 313 visited a major regional hospital.

Student Mentoring Program

The student mentoring program has grown to over 100 students in three years and is a collaborative effort among the partnership and area agencies and businesses. In response to the Tech Prep program guidelines and other influences, the SRC has added practicums and cooperative experiences to college-level Tech Prep programs. Examples of regional Tech Prep programs with WBL experiences include:

- Child Care and Development - postsecondary internship;
- Computer Information Systems - postsecondary cooperative work experience;
- Office Systems Technology - postsecondary cooperative work experience; and
- Nursing - secondary and postsecondary clinical rotations.

Apprenticeship Programs

There are no formal youth apprenticeship programs sponsored by schools and businesses in the partnership at this time; however, recent state-level legislation encourages the development of such programs and may result in the development of youth apprenticeship programs in this region. SRC has developed six Bureau of Apprenticeship (BAT) approved apprenticeships with Associated Builders and Contractors and a corporate sponsor in the following areas:

- general mechanic, building maintenance mechanic, general mechanic/welding /pipefitting/millwright; and
- instrumentation electrician, maintenance machinist, and maintenance repairer.

In addition, the college is developing, with high school involvement, six credit certificate programs in building trades with apprentice components.

Student Demographics, Experiences, and Preliminary Outcomes

This section summarizes results for graduates of six high schools in the Southern Tech Prep/School-to-Career Partnership. The findings address demographics and personal characteristics, educational characteristics, math and C/T course-taking patterns; transition to postsecondary education, and employment experiences during and following high school. Results are discussed for both the Tech Prep and non-Tech Prep high school graduate groups.

The sample of approximately 300 Tech Prep high school graduates in 1995, 1996, and 1997 was drawn randomly using lists of names supplied by six participating high schools in the Southern Tech Prep/School-To-Career Partnership. The six high schools selected for the study were identified purposively because they were thought to be the most representative of the entire group of 18 high schools in the consortium in terms of their approach to Tech Prep implementation and the diversity of their student populations. Also, these six high schools had begun implementation of Tech Prep in the early 1990s, providing them with sufficient time to have prepared their first group of Tech Prep graduates by 1995. Four of the high schools were small rural schools, providing approximately one-half of the sample of students for this analysis. The remaining two schools were much larger and located in the largest community in the consortium. From these two schools, the remaining half of the sample was drawn based on the local definition of a Tech Prep student. (Refer to Appendix A for additional details on the sampling procedures for schools and students in this site.)

The Tech Prep students were those individuals who, in grades 9-12, followed an approved Tech Prep high school plan of study leading to postsecondary education and training. Based on state and local specifications, a Tech Prep course of study includes the following: "Tech Prep programs are based on the 4+2 model, or six-year plan, which consists of a high school core curriculum of grade-level or above academic courses, combined with a coherent sequence of career and technology (C/T) courses of at least three and one-half credits, and the associate of applied science degree curriculum." A six-year curriculum plan must be approved by the state to serve as a road map for academic and C/T course-taking at the high school and college levels. When approved, students who develop six-year plans can be reported to the state as Tech Prep students, and the AAS degree is officially identified as Tech Prep.

Once the Tech Prep graduate sample was drawn, a random sample of about 300 individuals was drawn from a group of 1995, 1996, and 1997 non-Tech Prep graduates from the same six high schools using the same upper and lower limits on class rank percentile as the Tech Prep group, ensuring a comparable distribution on class rank at high school graduation. This sampling procedure was consistent with the procedure used for other cases in this study.

Demographics and Personal Characteristics

The majority of Tech Prep and non-Tech Prep high school graduates were White; however, 33% of Tech Prep and 28% of non-Tech Prep graduates were of Hispanic origin, similar to the demographics of the respective high school populations. The sample consisted of a small percentage of African American, non-Hispanic, and Asian/Pacific Islander graduates in both the Tech Prep and non-Tech Prep groups. With regard to gender, females constituted slightly more than half of Tech Prep group, while the non-Tech Prep group was almost equally divided. Most members of both groups were single. Nearly 60% of the Tech Prep and 52% of the non-Tech Prep groups resided with their parents. Total family income was fairly well distributed, with most graduates reporting between $15,000 and $60,000.

In reporting their parents' education level, most Tech Prep graduates indicated their fathers and mothers had either completed high school or had some college, but no degree. Only about 10% indicated their parents had completed a four-year college degree or higher. Non-Tech Prep graduates reported a similar pattern of parental education, though about 23% of the non-Tech Prep group reported that their mothers had a four-year college or graduate degree.

Table 8

Percentage Distribution on Selected Demographics by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=130	1995 Grad. n=18	1996 Grad. n=42	1997 Grad. n=70	Total Grad. n=95	1995 Grad. n=12	1996 Grad. n=31	1997 Grad. n=52
Gender								
Male	45.4	38.8	44.3	48.6	51.0	46.8	51.9	51.9
Female	54.6	61.2	55.7	51.4	49.0	53.2	48.1	48.1
Race/Ethnicity								
White, non-Hispanic	57.3	59.1	49.0	62.8	61.5	62.2	50.0	70.0
Hispanic	32.7	27.3	39.0	29.9	27.6	28.9	38.0	19.2
Black, non-Hispanic	9.6	11.4	12.0	7.3	10.2	8.9	10.0	10.8
Asian/Pacific Islander	0.4	2.3	0.0	0.0	0.7	0.0	2.0	0.0
Marital status								
Single	86.0	77.8	85.7	88.4	84.0	91.7	77.4	86.3
Single with children	5.4	5.6	4.8	5.8	6.4	0.0	6.5	7.8
Married	3.1	5.6	4.8	1.4	1.1	0.0	3.2	0.0
Married with children	5.4	11.1	4.8	4.3	8.5	8.3	12.9	5.9
Father's education level								
Less than HS graduate	16.4	5.9	15.4	19.7	16.9	27.3	25.0	10.0
High school graduate	32.8	29.4	33.3	33.3	30.3	27.3	35.7	28.0
Some college, no degree	32.0	52.9	25.6	30.3	27.0	18.2	7.1	40.0
Two-year associate's degree	7.4	0.0	10.3	7.6	7.9	27.3	3.6	6.0
Four-year bachelor's degree	9.8	11.8	12.8	7.6	10.1	0.0	10.7	12.0
Graduate degree	1.6	0.0	2.6	1.5	7.9	0.0	17.9	4.0

Table 8 (cont.)

Mother's education level								
Less than HS graduate	15.7	16.7	15.0	15.9	13.3	8.3	18.5	11.8
High school graduate	26.8	22.2	45.0	17.4	25.6	33.3	18.5	27.5
Some college, no degree	33.1	16.7	25.0	42.0	26.7	25.0	25.9	27.5
Two-year associate's degree	15.0	33.3	10.0	13.0	11.1	16.7	11.1	9.8
Four-year bachelor's degree	6.3	5.6	2.5	8.7	16.7	16.7	14.8	17.6
Graduate degree	3.1	5.6	2.5	2.9	6.7	0.0	11.1	5.9
Family income								
$14,999 or less	10.4	5.6	10.8	11.7	9.1	18.2	4.0	9.8
$15,000-$29,999	17.4	22.2	16.2	16.7	24.7	36.4	36.0	14.6
$30,000-$44,999	20.9	22.2	21.6	20.0	22.1	0.0	20.0	29.3
$45,000-$59,999	27.0	33.3	24.3	26.7	24.7	27.3	20.0	26.8
$60,000-$74,999	15.7	5.6	18.9	16.7	10.4	0.0	16.0	9.8
$75,000-$89,999	7.0	11.1	8.1	5.0	2.6	0.0	0.0	4.9
$90,000 or more	1.7	0.0	0.0	3.3	6.5	18.2	4.0	4.9
Present residence								
Live with my parent(s)	59.0	37.5	58.5	64.6	52.3	70.0	35.5	59.6
Live alone	7.4	6.3	12.2	4.6	8.0	0.0	12.9	6.4
Live with spouse or significant other	12.3	25.0	12.2	9.2	13.6	10.0	22.6	8.5
Live with a friend or roommate	21.3	31.3	17.1	21.5	26.1	20.0	29.0	25.5

Source: Education-To-Careers Follow-up Survey (n = 225) for all items except gender and race, which come from TP high school transcripts (n = 584)

Note: Details may not sum to 100 due to rounding.

Educational Characteristics

In relation to class rank percentile, over 60% of the Tech Prep graduates were between the 26th and the 75th percentile, and another 26% of the Tech Prep group was in the top 25% of the graduating class. Less than 15% of the Tech Prep cohorts and 20% of the non-Tech Prep cohorts had class rank levels below the 25th percentile. With regard to high school cumulative GPA, 22% of Tech Prep graduates had GPAs between 70-79%, 38% earned GPAs of 80-89 and 12% earned GPAs of 90-100. Although there were no significant differences in cumulative GPA or class rank percentile between the Tech Prep and non-Tech Prep groups, a significant difference was found between the cohorts within the non-Tech Prep group, showing that the 1995 Tech Prep graduate cohort had a higher GPA than the 1997 cohort (F = 4.28, df = 2, p = .015). The cumulative GPA also fell for Tech Prep graduates, but the difference between cohorts did not reach a statistically significant level. Taking into account the academic performance of both groups of high school graduates is important in the interpretation of additional findings reported in this case.

Graduates were queried about their perceptions of high school using the Education-To-Careers follow-up survey. Very small percentages of graduates indicated that high school learning was either not at all useful or extremely useful. Most perceived of the utility of their high school education as very, fairly, or somewhat useful, and there were no differences between the Tech Prep and non-Tech Prep groups on this matter.

Table 9

Percentage Distribution on Selected Educational Characteristics and Attitudes by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=295	1995 Grad. n=49	1996 Grad. n=106	1997 Grad. n=140	Total Grad. n=289	1995 Grad. n=47	1996 Grad. n=106	1997 Grad. n=136
Class rank percentile at HS graduation								
1 – 25%	12.0	5.9	14.3	13.3	14.6	8.8	16.7	16.0
26 – 50%	34.8	35.3	36.7	33.3	31.8	29.4	29.2	34.7
51 – 75%	27.2	29.4	22.4	29.3	29.3	29.4	27.1	30.7
76 – 100%	25.9	29.4	26.5	24.0	24.2	32.4	27.1	18.7
Cumulative GPA at HS graduation								
Less than 60	17.6	5.7	29.1	15.2	18.3	7.7	24.1	19.3
60 – 69	10.4	8.6	3.6	15.2	12.8	10.3	6.9	18.1
70 – 79	22.0	28.6	20.0	20.7	18.9	17.9	19.0	19.3
80 – 89	37.9	37.1	32.7	41.3	34.4	38.5	34.5	32.5
90 – 100	12.1	20.0	14.5	7.6	15.6	25.6	15.5	10.8
Utility of high school learning								
Extremely useful	4.6	0.0	4.8	5.7	8.4	8.3	3.2	11.5
Very useful	30.8	27.8	45.2	22.9	29.5	25.0	41.9	23.1
Fairly useful	33.8	44.4	23.8	37.1	40.0	33.3	38.7	42.3
Somewhat useful	26.9	27.8	19.0	31.4	18.9	25.0	16.1	19.2
Not at all useful	3.8	0.0	7.1	2.9	3.2	8.3	0.0	3.8

Source: Tech Prep High School Transcript File for all items except utility of high school learning, which came from the Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Math and Vocational Course-Taking Patterns

Whereas nearly all graduates in both groups had taken five to six semesters of math, many had gone beyond this level and exceeded the minimum high-school graduation requirement of three years mathematics. In fact, nearly 40% of Tech Prep and an equal percentage of non-Tech Prep graduates had taken seven or more semesters of math. There was no significant difference in the amount of math taken between Tech Prep and non-Tech Prep groups, yet significant differences were found within the three Tech Prep cohorts ($F = 10.461$, $df = 2$, $p = .000$). Over the three years, math course-taking increased from 25% (as evidenced by seven or more semester courses) by 1995 Tech Prep graduates to over 40% by the 1997 Tech Prep graduate cohort. This shift was not evident in the non-Tech Prep group since already about 40% of the 1995 cohort was taking seven or more math courses, and this percentage remained constant through the 1997 cohort. It is also important to point out that virtually none of the 1996 or 1997 Tech Prep graduates took less than three to four semesters of math, compared to 12% of the 1995 cohort of Tech Prep graduates.

The majority of Tech Prep and non-Tech Prep graduates reported Algebra 1 as the lowest (and first) math course taken, and this finding is consistent with the state's new graduation policy indicating that all students will graduate having taken at least Algebra 1. Looking at the total Tech Prep and non-Tech Prep graduates, we can see that a higher percentage of graduates completed Algebra 1 or higher mathematics each year from 1995 to 1997. (See Appendix E for course titles that correspond to the categories discussed here.) In fact, only a very small percentage of graduates in either group stopped math course-taking at Algebra 1. Of the total group of Tech Prep graduates, about 26% took Geometry, approximately 34% took Algebra 2 and about 25% took more advanced math (e.g., trigonometry, calculus) as their highest math course by high school graduation.

Very few graduates in either group enrolled in applied math courses, but this finding is not surprising since high schools in the Southern Partnership offered only a very limited number of applied academics courses. Rather than designating courses as applied, teachers were more likely to infuse applied concepts into their traditional courses. Further, only about one-quarter of the Tech Prep and non-Tech Prep graduates took honors math, with most students taking only one course.

Table 10

Percentage Distribution on High School Math Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=295	1995 Grad. n=49	1996 Grad. n=106	1997 Grad. n=140	Total Grad. n=289	1995 Grad. n=47	1996 Grad. n=106	1997 Grad. n=136
Total math courses:								
None	2.0	8.2	0.9	0.7	4.5	6.4	5.7	2.9
1 – 2	.7	4.1	0.0	0.0	.3	0.0	0.9	0.0
3 – 4	2.4	6.1	0.9	2.1	4.2	6.4	5.7	2.2
5 – 6	57.6	57.1	59.4	56.4	53.3	46.8	54.7	54.4
7 – 8	32.2	24.5	32.1	35.0	31.1	36.2	29.2	30.9
9 or more	5.1	0.0	6.6	5.7	6.6	4.3	3.8	9.6
Lowest math course								
Basic math	2.1	2.2	1.9	2.2	6.1	6.1	7.0	6.0
General math	.3	0.0	1.0	0.0	.4	0.0	0.0	0.8
Applied math	9.7	11.1	9.5	9.4	7.6	9.1	4.0	9.8
Pre-Algebra	9.0	24.4	10.5	2.9	10.9	25.0	13.0	4.5
Algebra 1	67.1	35.6	67.6	77.0	63.1	36.4	64.0	71.3
Geometry	6.9	22.2	3.8	4.3	7.2	13.3	6.0	6.1
AP geometry	4.5	2.2	5.7	4.3	3.6	4.5	6.0	1.5
Algebra 2 / AP Algebra 2	.3	2.2	0.0	0.0	1.1	6.8	0.0	0.0
Highest math course								
Basic math	0.0	0.0	0.0	0.0	1.4	0.0	2.0	1.5
General math	0.0	0.0	0.0	0.0	1.4	0.0	0.0	3.0
Pre-Algebra	.7	2.2	1.0	0.0	.4	2.3	0.0	0.0
Algebra 1	3.8	2.2	3.8	4.3	5.4	4.5	5.0	6.1
Geometry	26.6	28.9	24.8	27.3	26.1	22.7	27.0	26.5
Algebra 2/AP Algebra 2	35.6	33.3	39.1	33.8	28.3	18.2	33.0	28.0
Advanced math/AP advanced math	33.4	33.3	31.5	34.6	37.0	52.3	33.0	34.9

Table 10 (cont.)

Total applied math by semester:								
None	90.5	89.8	90.6	90.7	92.4	91.5	96.2	89.7
1 – 2	8.8	10.2	7.5	9.3	7.3	8.5	3.8	9.6
3 – 4	.7	0.0	1.9	0.0	.3	0.0	0.0	0.7
Total honors math by semester:								
None	76.9	83.7	73.6	77.1	75.1	72.3	76.4	75.0
1 – 2	10.8	10.2	12.3	10.0	13.1	12.8	10.4	15.4
3 – 4	10.2	6.1	10.4	11.4	8.7	14.9	8.5	6.6
5 – 6	2.0	0.0	3.8	1.4	3.1	0.0	4.7	2.9

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding.

Vocational Course-Taking

Nearly all graduates had taken at least one semester of vocational education during high school with the most popular C/T areas being business, agriculture, and consumer and family studies. No doubt these traditional vocational specialty courses had been taught in these small rural high schools for many years. Of the three most popular, business courses were taken the most often, with 93% of Tech Prep and 76% of non-Tech Prep graduates having taken a business course during high school. Though participation by both groups was high, Tech Prep graduates were even more likely to enroll in business courses than non-Tech Prep (χ^2 = 33.03, *df* = 1, *p* = .000) (refer to Table 11).

Tech Prep graduates were also more likely than their non-Tech Prep counterparts to have taken a sequence of progressively more advanced business courses, indicating they had taken business courses at Level 1 (introductory), Level 2 (intermediate), and Level 3 (specialty) (χ^2=47.65, *df* = 4, *p* = .000). However, in other areas Tech Prep graduates did not exceed non-Tech Prep graduates in enrolling in C/T. In fact, the only other area where the Tech Prep and non-Tech Prep groups differed was in specific labor market courses (e.g., co-op, work experience) (χ^2=8.4, *df* = 1, *p* = .004). In this case non-Tech Prep graduates (13.5%) were about twice as likely to enroll as Tech Prep graduates (6.4%).

Offering some explanation for these results, local consortium and state Tech Prep leaders suggested many high schools in this consortium had limited C/T offerings available for students, particularly at the intermediate and specialty levels, Levels 2 and 3. Moreover, most of the schools were operating on 6- or 7-period days, restricting the number of elective courses students could take outside the recommended academic curriculum. As explained by one leader, "as electives, C/T courses are considered less important than an extra math course or another foreign language course that might be needed for college." Therefore, having students take C/T courses represents a trade-off with traditional college preparatory courses, and many high school counselors are not encouraged or willing to make this recommendation to students. To some extent, the state recognizes this dilemma and has attempted to equalize the importance of traditional academic and C/T courses for college bound students by ensuring that Tech Prep courses meet the recommended college preparation requirements for high school graduation. Still, C/T courses are perceived by many counselors, teachers, and sometimes others as a lesser option, possibly causing them to limit student enrollment in any more than an introductory level course, as is evidenced in results shown in most vocational specialty areas in Table 11.

Table 11

Percentage Distribution on Vocational-Technical Education Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=295	1995 Grad. n=49	1996 Grad. n=106	1997 Grad. n=140	Total Grad. n=289	1995 Grad. n=47	1996 Grad. n=106	1997 Grad. n=136
Course-taking in C/T area:								
Business	93.2	91.8	91.5	95.0	76.1	78.7	73.6	77.2
None	6.8	8.2	8.5	5.0	23.9	21.3	26.4	22.8
Agriculture	30.5	22.4	26.4	36.4	31.1	19.1	28.3	37.5
None	69.5	77.6	73.6	63.6	68.9	80.9	71.7	62.5
Consumer/family studies	42.7	36.7	41.5	45.7	40.1	23.4	43.4	43.4
None	57.3	63.3	58.5	54.3	59.9	76.6	56.6	56.6
Health	6.1	4.1	5.7	7.1	5.2	10.6	2.8	5.1
None	93.9	95.9	94.3	92.9	94.8	89.4	97.2	94.9

Table 11 (cont.)

Construction	21.0	10.2	21.7	24.3	15.2	4.3	14.2	19.9
None	79.0	89.8	78.3	75.7	84.8	95.7	85.8	80.1
Technical/Communications	21.0	14.3	19.8	24.3	19.0	29.8	15.1	18.4
None	79.0	85.7	80.2	75.7	81.0	70.2	84.9	81.6
Precision production	7.5	4.1	4.7	10.7	7.6	6.4	6.6	8.8
None	92.5	95.9	95.3	89.3	92.4	93.6	93.4	91.2
Mechanics/repairers	3.7	6.1	4.7	2.1	3.5	8.5	1.9	2.9
None	96.3	93.9	95.3	97.9	96.5	91.5	98.1	97.1
Marketing	3.1	0.0	3.8	3.6	5.5	8.5	3.8	5.9
None	96.9	100.0	96.2	96.4	94.5	91.5	96.2	94.1
Specific labor market	6.4	8.2	3.8	7.9	13.5	14.9	12.3	14.0
None	93.6	91.8	96.2	92.1	86.5	85.1	87.7	86.0
Business								
None	6.8	8.2	8.5	5.0	23.9	21.3	26.4	22.8
Only level 1	41.7	55.1	33.0	43.6	40.1	55.3	34.0	39.7
Only level 1 and 2	6.4	2.0	8.5	6.4	2.4	0.0	2.8	2.9
Only level 1 and 3	35.3	30.6	39.6	33.6	22.5	17.0	24.5	22.8
Minimum 1 in each level	4.1	0.0	5.7	4.3	1.0	2.1	0.9	0.7
Other	5.7	4.0	4.7	7.1	10.0	4.2	11.3	11.0
Agriculture								
None	67.8	77.6	73.6	63.6	67.1	80.9	71.7	62.5
Only level 1	16.6	8.2	7.5	5.7	15.2	2.1	3.8	2.9
Only level 1 and 2	4.7	0.0	0.0	0.0	8.0	0.0	1.9	0.7
Only level 1 and 3	5.1	12.2	17.9	28.6	7.3	17.0	22.6	29.4
Minimum 1 in each level	5.8	0.0	0.0	1.4	2.4	0.0	0.0	2.9
Other	0.0	2.0	0.9	0.7	0.0	0.0	0.0	1.5
Consumer/Family Studies								
None	57.3	63.3	58.5	54.3	59.9	76.6	56.6	56.6
Only level 1	16.6	16.3	13.2	19.3	15.2	8.5	14.2	18.4
Only level 1 and 2	4.7	2.0	5.7	5.0	8.0	6.4	6.6	9.6
Only level 1 and 3	5.1	4.1	3.8	6.4	7.3	2.1	10.4	6.6
Minimum 1 in each level	5.8	6.1	8.5	3.6	2.4	4.3	2.8	1.5
Other	10.5	8.1	10.4	11.4	7.2	2.1	9.4	7.4
Health								
None	93.9	95.9	94.3	92.9	94.8	89.4	97.2	94.9
Only level 1	4.4	2.0	4.7	5.0	2.8	6.4	0.9	2.9
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.3	0.0	0.9	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	1.4	2.1	0.0	2.1	2.4	4.2	1.9	2.2

Table 11 (cont.)

Construction								
None	79.0	89.8	78.3	75.7	84.8	95.7	85.8	80.0
Only level 1	13.6	6.1	14.2	15.7	11.8	4.3	11.3	14.7
Only level 1 and 2	0.3	2.0	0.0	0.7	0.3	0.0	0.0	0.7
Only level 1 and 3	3.1	0.0	4.7	2.1	0.3	0.0	0.0	0.7
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	2.1	2.0	2.8	5.9	2.7	0.0	2.9	3.7
Technical/Communications								
None	79.0	85.7	80.2	75.7	81.0	70.2	84.9	81.6
Only level 1	1.0	2.0	0.0	1.4	1.7	6.4	0.0	1.5
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0
Only level 1 and 3	1.0	0.0	0.0	2.1	1.0	0.0	0.0	0.7
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	19.0	12.3	19.8	20.7	16.2	23.4	13.2	16.2
Precision production								
None	92.5	95.9	95.3	89.3	92.4	93.6	93.4	91.2
Only level 1	2.4	2.0	0.0	4.3	3.1	4.3	0.9	4.4
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	5.1	2.1	4.7	6.4	4.5	2.1	5.7	4.4
Mechanics/repairers								
None	96.3	93.9	95.3	97.9	96.5	91.5	98.1	97.1
Only level 1	1.4	2.0	1.9	0.7	2.8	4.3	1.9	2.9
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	2.3	4.1	2.8	1.4	.7	4.2	0.0	0.0
Marketing								
None	96.9	100.0	96.2	96.4	94.5	91.5	96.2	94.1
Only level 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	3.1	0.0	3.8	3.6	5.5	8.5	3.8	5.9
Specific labor market								
None	93.6	91.8	96.2	92.1	96.2	85.1	87.7	86.0
Only Level 1	2.7	0.0	2.8	3.6	0.0	0.0	0.0	0.0
Only level 1 and 2	1.0	0.0	0.0	2.1	3.8	0.0	2.8	5.9
Only Level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	2.7	8.2	1.0	2.2	9.7	14.9	9.5	8.1

Source: Tech Prep High School Transcript File

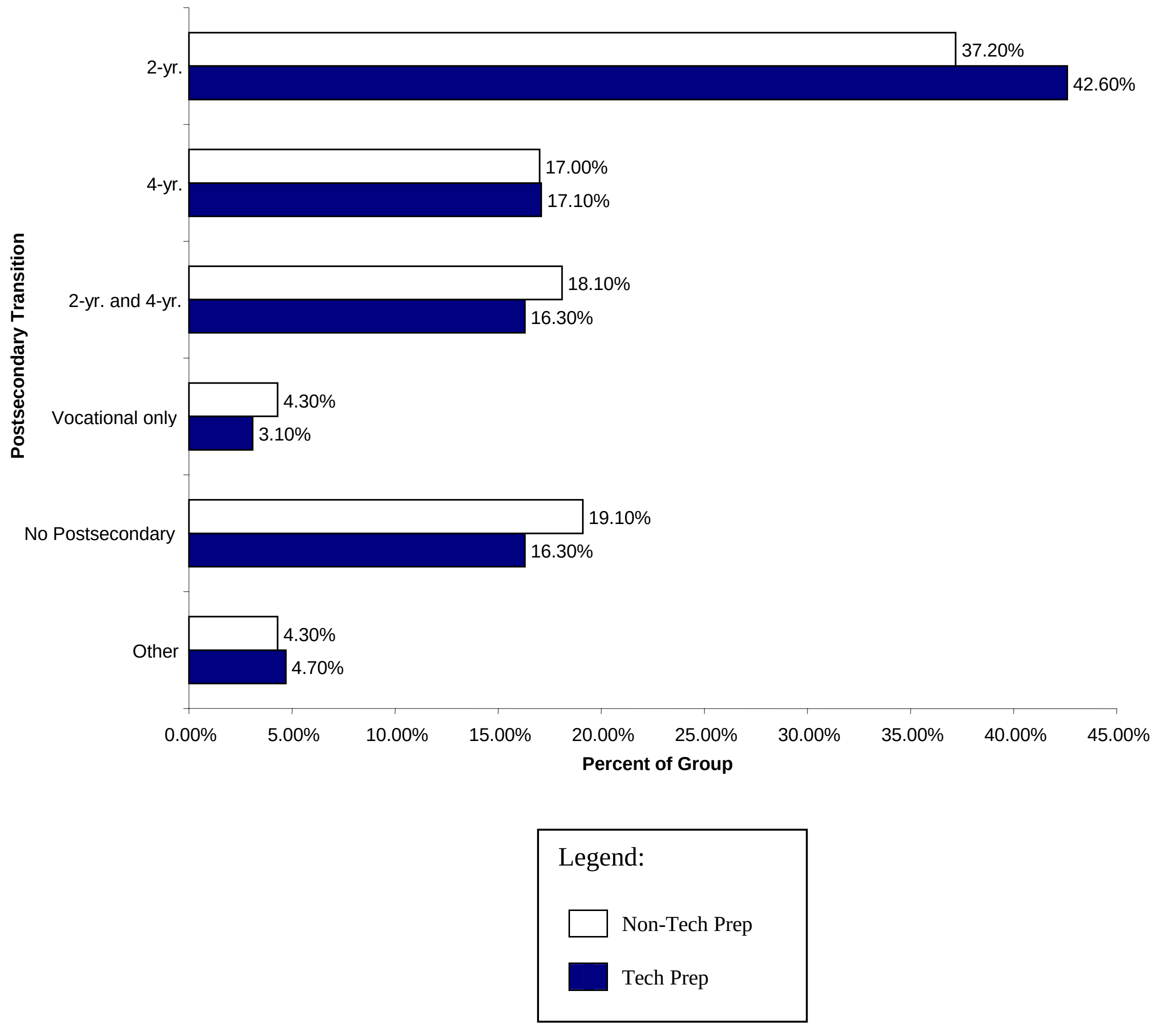
Note: Details may not sum to 100 due to rounding. The "other" category includes course combinations other than those specified, and this category was not included in significance testing. Between group differences were computed on the total groups, but not cohorts by year due to small cell sizes.

Transition to Postsecondary Education

With regard to student transition to postsecondary education, the pattern of participation in postsecondary education was very similar for the Tech Prep and non-Tech Prep groups. In fact, a sizeable percentage of graduates in both groups were identified as having transcripts at the community college. Overall, 52% of the total group had transcripted credits with SRC, with a higher percentage of Tech Prep graduates (58%) having college transcripts compared to the non-Tech Prep group (46%) (see Figure 3). Most high school graduates who had continued on to postsecondary education after high school had gone to a two-year college, according to the follow-up survey results. Nearly 43% of the Tech Prep graduates and 37% of the non-Tech Prep graduates reported attending a two-year college only, and another 16% of the Tech Prep and 18% of the non-Tech Prep graduates had attended both two- and four-year colleges. An equal percentage of Tech Prep and non-Tech Prep students had enrolled in four-year college (17%). Finally, less than 20% of either group had finished high school, gone directly to work, and–bypassed college altogether (thus far).

Figure 3

Transition to Postsecondary Education by Tech Prep Status



Work Experience During and After High School

The vast majority of both groups were employed at some time while in high school (see Table 12). Two-thirds of the Tech Prep group worked for some period of time while attending high school compared to three-fourths of the non-Tech Prep group. A majority of graduates in both groups earned less than $5.25 an hour in their high school jobs. Most worked from 11-20 hours a week, but a sizeable proportion worked 21-30 hours a week as well. No significant differences were found between the groups on employment during high school.

Table 12

Percentage Distribution in Employment Experiences During High School by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=130	1995 Grad. n=18	1996 Grad. n=42	1997 Grad. n=70	Total Grad. n=95	1995 Grad. n=12	1996 Grad. n=31	1997 Grad. n=52
Employed during high school								
No	34.1	29.4	47.6	27.1	24.2	33.3	25.8	21.2
Yes	65.9	70.6	52.4	72.9	75.8	66.7	74.2	78.8
Estimated hourly wages in last job held before high school graduation								
Zero – unpaid	1.2	0.0	0.0	2.0	1.4	0.0	4.3	0.0
Less than $5.25 /hr	57.0	61.5	50.0	58.8	55.6	75.0	52.2	53.7
$5.26 to $6.00 /hr	29.1	30.8	31.8	27.5	30.6	25.0	30.4	31.7
$6.01 to $7.00 /hr	8.1	0.0	13.6	7.5	9.7	0.0	13.0	9.8
$7.01 to $8.00 /hr	2.3	0.0	4.5	2.0	2.8	0.0	0.0	4.9
More than $8.00 /hr	2.3	7.7	0.0	2.0	0.0	0.0	0.0	0.0
Total hours worked during typical week in high school								
Less than 5 hours	1.2	0.0	0.0	2.0	1.4	0.0	4.3	0.0
6 – 10 hours	14.0	23.1	4.5	15.7	9.7	0.0	4.3	14.6
11 – 20 hours	44.2	23.1	68.2	39.2	36.1	50.0	26.1	39.0
21 – 30 hours	25.6	30.8	13.6	29.4	37.5	50.0	34.8	36.6
31 – 40 hours	12.8	15.4	13.6	11.8	8.3	0.0	17.4	4.9
More than 40 hours	2.3	7.7	0.0	2.0	6.9	0.0	13.0	4.9

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Work After High School

Most graduates held one to four jobs since finishing high school (see Table 13), and the majority of both groups identified only having one position at the present time. Current employment status revealed that an equal percentage of Tech Prep graduates (40%) was employed part-time and full-time. Among non-Tech Prep graduates, slightly more were working part-time (40%) than full-time (36%). About one-third of the members of each group had worked 6 to 12 months in their current position, with slightly less working less than 6 months or 13-24 months. In terms of wages per hour, 59% of Tech Prep graduates earned between $5.26 and $7.00 per hour, and a similar percentage of non-Tech Prep graduates were making equivalent wages. Although slightly more Tech Prep graduates were earning higher wages than non-Tech Prep, there was no significant difference between the groups on earnings. No differences were found in change in wages between high school and current primary employment either.

When asked to identify their current primary jobs, many graduates in the Tech Prep (56%) and non-Tech Prep (58%) groups reporting having entry level/unskilled jobs, but roughly 20% of Tech Prep and 24% of non-Tech Prep graduates had positions classified as skilled or technical. Looking to the future, the vast majority of members of both groups desired professional jobs.

Finally, most Tech Prep and non-Tech Prep graduates reported being very satisfied or fairly satisfied with their jobs. When describing their level of confidence in reaching the career goals, over 50% of Tech Prep graduates reported being extremely confident and 30% were very confident. Non-Tech Prep graduates responded similarly.

Table 13

Percentage Distribution of Post-High School Employment by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=130	1995 Grad. n=18	1996 Grad. n=42	1997 Grad. n=70	Total Grad. n=95	1995 Grad. n=12	1996 Grad. n=31	1997 Grad. n=52
Number of jobs since HS								
1 – 2	29.5	17.6	23.8	35.7	27.7	25.0	19.4	33.3
3 – 4	26.4	23.5	26.2	27.1	34.0	33.3	38.7	31.4
5 – 6	24.8	35.3	26.2	21.4	21.3	25.0	22.6	19.6
7 – 8	10.1	17.6	16.7	4.3	10.6	8.3	12.9	9.8
9 or more	7.0	5.9	4.8	8.6	4.3	8.3	3.2	3.9
None	2.3	0.0	2.4	2.9	2.1	0.0	3.2	2.0
Number of jobs held currently								
0	17.6	21.4	10.0	21.5	16.1	16.7	19.2	14.3
1	70.6	71.4	80.0	64.6	74.7	75.0	69.2	77.6
2	10.9	7.1	10.0	12.3	9.2	8.3	11.5	8.2
3 or more	0.8	0.0	0.0	1.5	0.0	0.0	0.0	0.0
Current employment status								
Full-time (35 hours or more per week)	39.7	41.2	48.8	33.8	36.3	58.3	27.6	36.0
Part-time (less than 35 hours per week)	39.7	29.4	39.0	42.6	40.7	25.0	41.4	44.0
Unemployed seeking employment	8.7	23.5	4.9	7.4	8.8	8.3	17.2	4.0
Unemployed not seeking employment	7.1	5.9	2.4	10.3	6.6	8.3	6.9	6.0
Military full-time	0.8	0.0	2.4	0.0	4.4	0.0	3.4	6.0
Other	4.0	0.0	2.4	5.9	3.3	0.0	3.4	4.0
Months worked in current primary job								
Less than 6 months	24.5	8.3	20.0	31.4	26.4	18.2	23.8	30.0
6 – 12 months	31.6	50.0	34.3	25.5	34.7	45.5	33.3	32.5
13 – 24 months	24.5	33.3	20.0	25.5	23.6	27.3	23.8	22.5
25 – 36 months	11.2	0.0	20.0	7.8	5.6	0.0	9.5	5.0
36 months or more	8.2	8.3	5.7	9.8	9.7	9.1	9.5	10.0
Wages per hour, current primary job								
zero	2.1	8.3	0.0	2.0	1.4	8.3	0.0	0.0
$5.25 or less	4.1	0.0	8.8	2.0	12.5	16.7	9.5	12.8
$5.26 – $6.00	28.9	8.3	26.5	35.3	36.1	33.3	33.3	38.5
$6.01 – $7.00	29.9	41.7	23.5	31.4	20.8	25.0	14.3	23.1

Table 13 (cont.)

$7.01 – $8.00	14.4	16.7	17.6	11.8	8.3	0.0	19.0	5.1
$8.01 – $9.00	6.2	16.7	5.9	3.9	5.6	8.3	4.8	5.1
$9.01 – $10.00	5.2	0.0	8.8	3.9	4.2	0.0	9.5	2.6
$10.01 – $11.00	2.1	0.0	2.9	2.0	5.6	0.0	4.8	7.7
$11.01 – $12.00	3.1	8.3	5.9	0.0	0.0	0.0	0.0	2.6
More than $13.00	2.1	0.0	0.0	3.9	4.2	8.3	4.8	2.6
I don't know	2.1	0.0	0.0	3.9	1.4	0.0	0.0	0.0
Change in wages per hour from HS to present								
-$1.00	7.0	11.1	0.0	9.1	9.5	0.0	9.1	12.0
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
+$1.00	31.6	11.1	26.7	39.4	33.3	33.3	9.1	44.0
+$2.00	26.3	33.3	33.3	21.2	19.0	33.3	18.2	16.0
+$3.00	15.8	33.3	13.3	12.1	11.9	0.0	27.3	8.0
+$4.00	7.0	11.1	0.0	9.1	14.3	16.7	27.3	8.0
+$5.00 or more	12.4	0.0	26.7	9.0	12.0	16.7	9.1	12.0
Type of current primary job								
Entry level/unskilled	56.1	50.0	51.4	60.8	58.3	54.5	57.1	60.0
Semi-skilled	33.7	41.7	37.1	29.4	26.4	27.3	23.8	27.5
Skilled or technical	7.1	8.3	8.6	5.9	8.3	9.1	4.8	10.0
Professional	3.1	0.0	2.9	3.9	6.9	9.1	14.3	2.5
Type of primary job desired								
Entry level/unskilled	4.7	11.8	2.4	4.3	0.0	0.0	0.0	0.0
Semi-skilled	7.0	5.9	7.1	7.1	4.3	8.3	3.2	4.0
Skilled or technical	20.0	11.8	19.0	22.9	23.7	16.7	19.4	28.0
Professional	68.2	70.6	71.4	65.7	72.0	75.0	77.4	68.0
Satisfaction with primary job								
Extremely satisfied	18.2	8.3	20.0	19.2	15.3	27.3	4.8	17.5
Very satisfied	25.3	8.3	25.7	28.8	23.6	9.1	38.1	20.0
Fairly satisfied	30.3	58.3	25.7	26.9	33.3	27.3	28.6	37.5
Somewhat satisfied	18.2	25.0	17.1	17.3	18.1	18.2	23.8	15.0
Not at all satisfied	8.1	0.0	11.4	7.7	9.7	18.2	4.8	10.0
Confidence in reaching career goals								
Extremely confident	54.3	70.6	50.0	52.9	47.3	50.0	54.8	42.0
Very confident	29.5	17.6	33.3	30.0	30.1	25.0	29.0	32.0
Fairly confident	10.9	11.8	14.3	8.6	14.0	16.7	9.7	16.0
Somewhat confident	4.7	0.0	2.4	7.1	6.5	8.3	6.5	6.0
Not at all confident	0.8	0.0	0.0	1.4	2.2	0.0	0.0	4.0

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Summary

The Southern Partnership's approach to Tech Prep implementation was based on the identification of existing high school C/T courses, or the addition of state-approved C/T courses not previously offered, with content that aligned with courses taught at the community college, namely SRC. These alignment activities were conducted by joint secondary and postsecondary subject-area faculty, resulting in an articulation agreement and competency profile. The courses were then identified in an articulation agreement that outlined criteria for award of college credit and a six-year curriculum plan that served as a road map for course-taking at the high school and college levels. These six-year plans were based on the state's "recommended college-preparatory plan" for high school graduation which included a coherent sequence of C/T courses. Articulated courses were identified in the high school portion of the plan, and the college counterpart was also identified.

When approved by the state as Tech Prep, students selecting the six-year plans could be reported to the state as Tech Prep students, though this designation was not used within local high schools to avoid the stigma that labeling sometimes engenders. At the postsecondary level, AAS degrees affiliated with six-year plans were officially identified as Tech Prep, though students in these programs were not designated as Tech Prep students either. Preferring an approach that would not track students into a particular program, the Southern Partnership considered its Tech Prep model multiple-entry/multiple-exit to encourage participation by students considering various post-high school options, including four-year college. By using a multiple-entry/multiple-exit approach, students could take articulated courses at the high school level did not have to repeated at the college level, whereas students entering the college-level Tech Prep program without articulated credits had to take all courses in the college degree plan.

Various strategies were employed by the partnership to support and enhance the articulated curriculum associated with Tech Prep. The partnership encouraged the use of contextual learning strategies and the integration of academic and C/T competencies through professional development workshops for faculty and by purchasing supplemental curriculum materials. Though teachers were not encouraged to create separate applied academics courses, changes in classroom instruction was recommended to make learning more engaging for students and relevant to the work world. Faculty were also encouraged to integrate workplace experiences with their classes, ranging from business/industry tours and guest speakers, to job shadowing, cooperative (co-op) education, clinical experiences, apprenticeships, and internships.

The partnership also offered a variety of activities to enhance career guidance and counseling activities among partnership members, but the extent of implementation of career counseling was uneven. Individual high schools and the SRC determined the extent to which career guidance and counseling was offered, leading to a great deal of variation across the consortium. To bring about greater consistency, the partnership offered a variety of professional development activities for counselors on career plans and career portfolio development, and sponsored career fairs and related student activities. Publication of marketing and career information materials supported guidance staff, but the extent of use of these materials or their impact on student selection of Tech Prep and related career pathways was uncertain.

Recognizing that the Southern Partnership's approach to Tech Prep was based on an evolving systemic approach emphasizing sequential and articulated academic and C/T six-year plans, this study sought to identify student demographics, educational and work experiences, and transition patterns to college. The high school Tech Prep graduates were middle majority or above on class rank percentile. Overall, 60% of Tech Prep graduates were from the middle two quartiles, with another 26% in the top quartile of the high school graduating class, and a comparable non-Tech Prep graduate group was selected for the analysis. Looking at math course-taking, most Tech Prep and non-Tech Prep graduates had taken more than five or six semesters of math, exceeding the minimum high-school graduation requirement of 3 years set by the state. In fact, just over one-third of both groups had taken seven or more semesters of math. Over the years investigated, Tech Prep graduates took progressively more math courses, with the level of math taken by 1997 graduates significantly higher than the 1995 graduates. Among 1997 Tech Prep graduates, nearly 70% had Algebra 2 or taken advanced math such as trigonometry or calculus (including AP courses) by high school graduation.

In terms of C/T course-taking, nearly all individuals included in the study had taken at least one semester of C/T education during high school in traditional vocational areas, typically business, agriculture, and CFD or vocational home economics, with business being the most popular option. Tech Prep graduates were also more likely to have taken a sequence of business courses than the non-Tech Prep graduates. However, high levels of C/T course-taking were not evident for either the Tech Prep or non-Tech Prep group, and local consortium and state Tech Prep leaders suggested this result had several possible explanations. Most importantly, leaders believed minimal C/T course offerings in the small rural high schools combined with 6- or 7-period days limited student opportunities to take C/T courses. Combined with the low prestige of some vocational education, C/T course-taking was not encouraged by high school counselors so students limited their participation in it.

Most high school graduates continued on to postsecondary education after high school by attending a two-year college. In fact, over one-half of the total group had transcripted credits with SRC, with a higher percentage of Tech Prep graduates (58%) having college transcripts compared to the non-Tech Prep group (46%). Only 17% of the Tech Prep and non-Tech Prep students had enrolled in four-year college only, but nearly another 20% had attended both two- and four-year colleges. Finally, less than 20% of either group had finished high school and gone directly to work, bypassing college altogether. Current employment status revealed that 40% of Tech Prep graduates were employed part-time and another 40% were employed full-time. Approximately 60% of the Tech Prep graduates reported that they were earning between $5.26 and $7.00 per hour.

Overall, the inclusive nature of the partnership's governance and membership structures facilitated the implementation of Tech Prep and related STW activities. SRC, which served as the fiscal agent for both Tech Prep and STW grants, played a pivotal role in the partnership and the development of workforce education programs for the region. The dual role of the partnership as the developer of regional labor market information added to the cohesion of the partnership and to the implementation of Tech Prep and related activities that helped prepare the workforce to meet the needs of the regional economy. Yet, the size and rural nature of the partnership made it difficult for the high schools to implement a large number of articulated courses, restricting student opportunities to courses commonly offered in other localities in the state, for example, computer courses included in business-related programs.

In the future, consortium leaders plan to work more extensively with high school and SRC counselors to ensure that they are well-informed about Tech Prep pathways. Further emphasis on curriculum change at SRC is also planned, though consortium leaders acknowledge a strong preference for traditional classroom teaching on the SRC campus. Changing instructional approaches will not come easily at SRC. Finally, efforts to enhance accurate identification and tracking of Tech Prep students are to be implemented in the Southern Partnership to ensure that local evaluation processes yield meaningful results for accountability and program improvement purposes.

SUNLAND COUNTY TECH PREP CONSORTIUM

W. M. Reger IV

Community Context

The Sunland County Tech Prep Consortium (Sunland Consortium) is located in a medium-sized state in the southern region of the country. The county comprises an area of approximately 1,000 square miles of land, with nearly one million inhabitants as of 1998. Sunland City is the third largest city in the state, approximately 170 square miles in area, with about 300,000 inhabitants.

The Sunland Consortium consists of the Sunland County School District, including 19 high schools, 34 middle schools, and five two-year postsecondary schools; three adult technical centers which provide classes and training for both secondary and postsecondary adult technical students; Sunland Community College (SCC) and Tyler Community College, a public community college founded in 1964, located in a different county; and the University of South State. The Sunland County School District is the twelfth largest district in the United States, with nearly 150,000 students. It is comprised of 109 elementary schools, 34 middle schools, 19 high schools, and 27 alternative schools and technical and adult education centers. Its 19 high schools counted nearly 38,000 students during the 1997-98 school year, of which 9.8% were students with disabilities and 5.4% were Limited English Proficiency (LEP). The county is home to the second largest public university system in the state, with a current enrollment of more than 35,000. Also located in the county is a large private college with an enrollment of nearly 2,500 students.

SCC enrolls more than 46,000 students and is the seventh largest community college in the state's 28-member community college system. It was founded in 1968 and comprises four campuses. Ninety percent of its faculty is full-time with a master's or doctoral degree. The college's state-of-the-art technology building, which houses the allied health and technical programs, is located on the Lois Campus. The Columbus Campus is situated in a corporate park and many of its courses are held on the premises of area businesses. The North Park Campus contains the college's horticultural greenhouse, autotronics (automobile electronics) laboratory (eliminated in 1997), and the Institute of State Studies Program, which focuses on the study of the state's environment and ecology. The 14th Street Campus is located in the center of Sunland City and specializes in the program areas of business management, computer programming, office education, fire science, and criminal justice training. A Tech Prep student at SCC could attend any one of its campuses, depending on the program of study.

Economic and Political Context

Economically, the county is relatively strong. It is based in a mixed rural and urban center, with a large number of service-based industries, such as hospitals, hotels, resorts, and athletic venues. The per capita income is close to $25,000 annually, with a median household income of around $35,000. The county and city contain more than 30,000 business and industry establishments, which employ more people than live in the county. The vast majority of employees are concentrated in the service industry (560,000) and wholesale and retail trades (370,000), with large numbers also employed in finance, insurance, real estate (118,000), manufacturing (115,000), transportation and public utilities (80,000), construction (58,000), and agriculture (8,000). Unemployment in Sunland County is low at 3.5%. Over 600 private-sector businesses and industrial firms, ten labor organizations, three public community-based organizations, and several student leadership organizations are affiliated with the Sunland Consortium.

With a thriving local economy, the push for Tech Prep seemed to emanate from the educational community, though businesses strongly supported the goals of Tech Prep. Tech Prep became a facet of educational reform in this state through a combination of state legislation and a perceived need among some members of the college administration, such as the director of technical programs at SCC, to reform curriculum at the secondary and postsecondary levels, to raise expectations. When state policies were in place and a Perkins Tech Prep grant was awarded in 1990-91, almost immediately, the governance and staff were put into place. Administrators at the community college felt that faculty needed a more relevant curriculum, explaining the heavy emphasis on faculty inservice and integration that developed at this site. The director of technical programs saw a need for integrated curriculum and for work-based learning experiences to enrich occupational education at the community college. She faced resistance from members of the associate of arts faculty, though the technical faculty understood and supported the Tech Prep process. Support and advocacy of Tech Prep, therefore, appears to have begun at the postsecondary level, and has subsequently worked its way into the high school, junior high, and elementary grade levels.

Some key components were in place prior to the implementation of Tech Prep and later School-to-Work (STW), in the form of a few articulation agreements, and college-level clinical and co-operative education (co-op) experiences. The reforms supported by the Perkins Tech Prep funding augmented these activities with more integrated academic and vocational curriculum, as well as fostering stronger administrative and faculty support. An important goal at the secondary level was the elimination of the general track, with its inevitable replacement with an applied curriculum and Tech Prep. This endeavor began with the elimination of general education math and other lower level math courses, encouraging higher academic course-taking to take place. An important feature of Tech Prep in this state is the combination College Prep and Tech Prep to create a technical course of study in which students must complete the foreign language component and thus be considered Tech Prep. At the high school level, however, students may not take any course with a prefix of “consumer” or “business” and be considered college prep. STW added the work-based learning component to the integration of curriculum. Faculty and administrators in the consortium perceived the transition to STW as an increase in interconnectedness between the academic and work-related aspects “through internships and faculty visits to business and industry.” STW was seen as “more in the community” than Tech Prep.

Tech Prep Implementation

This section examines the goals of Tech Prep and STW and presents key definitions for Tech Prep used by the Sunland Consortium.

Tech Prep Goals

The consortium's Tech Prep implementation goals included creating educational opportunities for the "neglected majority," providing students with multiple options beyond high school, and enhancing workforce preparation. An important goal of Tech Prep and STW was to increase the number of business partners without overtaxing relations with any one business (see Figure 1). In 1997 the consortium defined issues of funding, dual enrollment, and articulated credit as of primary importance, especially with respect to how SCC counts students who articulate and whether the community college receives funding for occupational completers who articulate. The STW initiative sought to accomplish "economic independence" for each student and to achieve the "quality of life to which he or she aspires," by establishing "full partnerships" with the 186 business and industrial partners listed in the state STW handbook, in order to create a workforce that fosters and sustains the state's competitive edge in the global marketplace. Its principle goals included raising academic standards, reducing the dropout rate, improving career opportunities for all students, and achieving a more highly skilled workforce. The implementation of STW is the consortium's response to the changing nature of the marketplace and the workplace, and the increasing need for highly skilled technical labor.

Figure 1

Snapshot of the Local Tech Prep Approach

Primary Goal: To create educational opportunities for the "neglected" majority, provide students with multiple options beyond high school, and enhance workforce preparation; to increase relationships with business partners without overtaxing relations. The STW initiative seeks to raise academic standards, reducing the dropout rate, improving career opportunities for all students, and achieving a more highly skilled workforce.

Tech Prep Student: All Tech Prep consortia adopt the state definition with minor local modifications. This consortium defines a Tech Prep student as any student at grade level by eleventh grade, who has completed at least one technical course in an articulated study, and two courses each of English, science, mathematics at level II or III (see Table 4) prior to graduation.

Tech Prep Course of Study consists of articulated sequence technical courses taken during the final two years of high school and the two years of postsecondary education leading to an associate of science degree.

Primary Articulation Approach:

- 4+2 (six-year) articulated programs (some 4+2+2)
- Dual enrollment, time-shortened
- Course-to-course articulation of technical courses
- 15 credit hours within technical specialization possible [within 36 months (SCC) or 15 months (TCC)]

Predominant Tech Prep Approach:

- Vocational Tech Prep
- College Prep/Tech Prep – Tech Prep with foreign language and no courses with the prefix "consumer" or "business"
- Academy Model

Sources: NCRVE Tech Prep Implementation Survey (1997); Local Tech Prep Graduate Follow-Up Survey (1995-96)

Definition of a Tech Prep Student

According to the definition of Tech Prep, adopted by all Tech Prep consortia in the state with some local modification, a Tech Prep student is enrolled in an articulated, sequential program of study; enrolled in level II or above courses; at grade level or above by eleventh grade in mathematics, science, and communications; and enrolled in a technical component leading to a minimum of a two-year postsecondary certificate or degree and-or apprenticeship program. The consortium defines a Tech Prep student as any student at grade level by eleventh grade, who has completed at least one technical course in an articulated study, and two courses each of English, science, mathematics at level II or

III prior to graduation. Guidance counselors in the consortium define a Tech Prep student, in their 1997-98 Tech Prep Program of Study Information Manual, as any student "at any time during grades 9-12," who meets the basic requirement of "at least two level II and-or III courses in English, mathematics and science...upon graduation." The technical component at the high school level need not necessarily be completed for a student to be defined as Tech Prep by guidance counselors, because the completion of the academic requirements is the defining characteristic of a Tech Prep student, in particular if the student completes an AS degree at the community college. At the secondary level Tech Prep students graduating after 1993 must complete at least 24 credits for graduation, including required technical-career courses with a cumulative grade point average of 2.5 on a 4.0 scale, earn an overall grade point average of 2.0 on a 4.0 scale, and must have fulfilled all requirements necessary to receive a diploma from a public school in the state.

How a Tech Prep student is defined and identified varies slightly according to the institution or group concerned, especially students. To several of the students we interviewed the distinction between Tech Prep and non-Tech Prep was unclear. One student considered herself Tech Prep simply because she "didn't have a foreign language." Although she understood the course-taking requirements that distinguished a non-college prep student, the defining distinction for her was that "if we had a foreign language, then we were considered college prep as long as we had all of the requirements of the Tech Prep." Another student in the Sign Language Interpreter program, considered a Tech Prep program at SCC, did not consider herself a Tech Prep student because she thought a Tech Prep program was a fast-paced technical program that "gets you out and gets you going with a job." When asked, "Do you think of yourself as a Tech Prep student?" her response was "No, this is a very long procedure. [This program] is supposed to be two years, and supposed to be fast-paced ... but it's really not." An accounting Tech Prep student in high school who applied for the Gold Seal Scholarship, when asked whether he took part in Tech Prep, responded that he "always heard of it, but never joined it." These responses confirm that some students do not understand their participation in Tech Prep programs of study, even when they are involved.

Table 1 shows the number of graduates and Tech Prep participants in the fifteen high schools in the Sunland County School District. As revealed in the table, roughly 300 to 600 students graduated from each of the high schools in the consortium between 1995 and 1997. A total of about 6,000 students graduated from the Sunland County district schools each year from 1995 to 1997. Of these graduates, a small percentage were identified as Tech Prep participants during high school, however, the percentage has grown from 6% in 1995 to 15% in 1997. Looking at the schools individually, over half have seen steady growth in Tech Prep graduates over the three-year period.

Table 1

Number of Graduates and Tech Prep Participants by High School

High School Code	**Number of Graduates**			**Number of Graduates Participating in Tech Prep**		
	1995	**1996**	**1997**	**1995**	**1996**	**1997**
401	320	319	323	20	34	64
402	636	609	524	24	29	17
403	464	441	481	17	37	63
404	515	512	493	2	20	20
405	NA	NA	362	NA	NA	97
406	358	341	355	2	48	94
407	645	625	663	13	57	74
408	410	458	454	35	46	59
409	288	288	300	NA	13	35
410	382	371	450	12	29	40
411	442	388	358	29	34	84
412	290	360	316	NA	NA	14
413	523	539	416	44	71	92
414	209	206	222	6	27	48
415	315	300	343	144	125	120
Total	**5797**	**5757**	**6060**	**348**	**570**	**921**

Source: Official NCRVE worksheet for determining TP/STW population

Note: NA means Not Available

In terms of overall enrollment and Tech Prep participation in high school, in 1996, the Sunland County School District counted 4,174 students (grades 9-12) as Tech Prep, out of a total 33,263 (12.5%). According to the district, 59% of these Tech Prep students were special populations: students with disabilities, at risk of dropping out, academically and/or economically disadvantaged, with limited English abilities, migrant students, or enrolled in non-traditional programs. At the end of 1997, the consortium claimed 6,833 students, or 16.3% of its total student population, as Tech Prep students. At the postsecondary level the Tech Prep student is defined as a student who continues to participate in an articulated program of study. The Tech Prep students are identified when they sign the Course of Study Agreement in the eighth grade, which is updated annually. Enrollment figures for postsecondary Tech Prep students were not available.

Demographic characteristics of the student population, including Tech Prep students, are shown in Tables 2 and 3. The number of students in the general population eligible to participate in Tech Prep has increased over the last four years, especially among the black, Hispanic, and special population students. Significant increases in the number of Tech Prep students have taken place as well, as more Tech Prep students are recruited in the eighth grade; however, the distribution of Tech Prep students actually entering the program does not mirror the overall student population. Especially among females, the number of students entering Tech Prep in 1997 has not increased since 1994 proportionally to the number of female students eligible to participate. A significant increase among African-American students has occurred in relation to the number eligible to participate.

Table 2

Demographic Characteristics of General Population Students Eligible to Participate in Tech Prep (1997)

	Grade 9		Grade 10		Grade 11		Grade 12		Grade 13		Grade 14	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	8118	54.0	5869	51.9	4165	49.2	3558	49.3	NA	---	NA	---
Female	6903	46.0	5440	48.1	4293	50.8	3665	50.7	NA	---	NA	---
White	8368	55.7	6580	58.2	5190	61.4	4406	61.0	NA	---	NA	---
Black	3684	24.5	2541	22.5	1672	19.8	1411	19.5	NA	---	NA	---
Hispanic	2648	17.6	1893	16.7	1332	15.7	1161	16.1	NA	---	NA	---
Nat. Am.	32	0.2	32	0.3	28	0.3	26	0.4	NA	---	NA	---
Sp. Pop.	8425	56.1	4300	38.0	2689	31.8	2325	32.2	NA	---	NA	---

Source: State Tech Prep Consortia Annual Report (1997)

Note: NA means Not Available

Table 3

Demographic Characteristics of Current Tech Prep Students (1997)

	Grade 9		Grade 10		Grade 11		Grade 12		Grade 13		Grade 14	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	1411	58.6	1132	56.9	728	53.2	556	52.1	10	29.4	30	40.0
Female	995	41.4	859	43.1	640	46.8	512	47.9	24	70.6	47	60.0
White	1168	48.5	1021	51.3	773	56.5	596	55.8	NA	---	40	51.9
Black	682	28.3	533	26.8	336	24.6	269	25.2	NA	---	12	16.0
Hispanic	523	21.7	407	20.4	226	16.5	185	17.3	NA	---	---	---
Nat. Am.	1	>.1	10	.5	8	.5	4	.3	NA	---	1	1.3
Sp. Pop.	1628	67.7	984	49.4	571	41.7	434	40.6	NA	---	NA	---

Source: State Tech Prep Consortia Annual Report (1997)

Note: NA means Not Available

Governance and Funding

Tech Prep governance began simultaneously with Tech Prep funding. A Tech Prep steering committee was organized in 1991, at the same time a full-time Tech Prep coordinator and staff were hired. The Tech Prep marketing and evaluation committees were not organized until 1993. In that year also, the state Tech Prep team began to conduct site visits at the consortium. In 1994, a part-time coordinator was hired to manage the GOALS 2000 grant, which became a full-time position in 1995. Not until 1995 when STW legislation was passed did the Tech Prep coordinator assume responsibility for the school-based component of STW. Later that year, however, a STW project manager was hired. The original Tech Prep steering committee was dissolved in the wake of STW implementation and replaced by a STW steering committee in 1996. The local workforce development board oversees the Sunland County STW initiative and, in 1996, was given an orientation to STW in order to familiarize board members with on-going activities related to implementation of STW. A technical and career advisory council, organized before Tech Prep was instituted, assumed the responsibilities of the governing body for STW, with committees for marketing, program relations, and community needs. (See Milestone Chart shown in Figure 2.)

FIGURE 2
SUNLAND CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
FUNDING			Consortium awarded Perkins TP funds ($250,000).	Second year funding ($175,000).	Third year funding ($150,000).
PERSONNEL			Full-time TP coordinator and secretary hired; technology education resource teacher (50%) funded.	Full-time TP coordinator resigned. Part-time coordinator hired. Resource teachers absorbed by Perkins funds.	Part-time TP coordinator becomes full-time.
LEGISLATION		State policies.			First site visit by state TP team.
STRUCTURE/ PARTNERS			TP steering committee organized. Efforts to transition to industrial arts teachers to technology ed teachers begun with USF.	Chamber of Commerce conducts survey on workplace skills needed by local businesses and industry. 14 high schools offer Tech Prep programs. Project labor force with the chamber begins in business technology education classes at the high school.	Project labor force partners conduct monthly classroom presentations, field trips and updating of technical teachers' skills. Marketing and evaluation committees organized. Business and industry assist in the development of the Academy of Travel and Tourism.
EVALUATION			Three program areas targeted to be Tech Prep.	School Board adopts Tech Prep as a course of study. Three year marketing plan developed.	Evaluation plan developed.

FIGURE 2
SUNLAND CONSORTIUM MILESTONES

	1994	1995	1996	1997	1998
FUNDING	Forth year funding ($77,800). Goals 2000 funds received for training technical teachers in teaching higher order thinking skills.	Fifth year funding ($150,885). Funding received to begin planning for STW.	Sixth year funding ($248,254).	Seventh year funding ($263,076).	
PERSONNEL	Part-time coordinator for GOALS 2000 hired to manage GOALS 2000 grant.	TP coordinator assumes responsibility of school-based component of STW. STW project manager hired. Full-time coordinator hired for GOALS 2000 grant.	Superintendent retires; interim community college president. Youth apprentice TSA hired for STW through STW grant.	New college president with changes to mission and goals.	
LEGISLATION	Second state site visit.	STW legislation.	Third state site visit.	State mandates to level all CC AS degrees to approximately 60 hours to include general education requirements.	
STRUCTURE/ PARTNERS			Steering committee dissolved due to the STW committee. City of Sunland assists in enhancing criminal justice assisting by adding 911 instructional curriculum.	Chamber of commerce offers "educators in business" program as a middle school pilot. State restaurant association assists in implementation of ProStart curriculum.	
EVALUATION	First TP student awareness survey conducted.	First follow-up on pilot TP graduates. Employers surveyed of identified graduates.	First follow-up dropped. Second follow-up of TP graduates initiated with comparison group. College students surveyed regarding applied teaching strategies. TP expanded to include college prep. High school TP staff survey conducted.	Follow-up continues of 1996 graduates. TP parent awareness survey conducted. college's applied math strategies evaluated regarding achievement.	Follow-up begun on 1997 TP graduates. Completing second evaluation of math strategies to determine achievement.

Figure 2
Sunland Consortium Milestones

	PRE-1990	1990	1991	1992	1993
INTEGRATED CURRICULUM		Health magnet at STHS implemented.	Developing a computerized accounting I curriculum begun. Tech student's curriculum revised. Integration writing teams for electronics, welding, childcare, autobody and agribusiness.	Completed accounting I curriculum and piloted.	Began revising accounting II curriculum and piloted. Academy of Travel & Tourism implemented at one high school. College accounting curriculum revised to include SCANS and to parallel high school curriculum.
ARTICULATED CURRICULUM	Two articulation agreements with community college and adult technical centers.		Eight agreements in place from secondary to college. Dual enrollment efforts begun.	Agreements from accounting to SCC; agreements to Sunnyside Technical Center. 21 agreements in place. Ten TP programs of study.	Agreements in place for all secondary programs. 26 TP programs of study.
PROFESSIONAL DEVELOPMENT				Applied math workshop for high school teachers. Curriculum integration workshop for 11 high schools for University of South State (USS).	Workshop for accounting teachers on revisions. Career choices workshop for secondary English teachers and O.S.'s. Summer institute for technical teachers on "teaching higher order thinking" skills. Summer institute on applied biology and chemistry com for secondary science teachers.
GUIDANCE				Articulation workshops conducted by college for secondary and postsecondary counselors. Course of study agreement revised to include TP. Students begin selecting TP as a course of study.	Guidance counselor manual developed. Workshop for middle school through postsecondary counselors. Fact sheets and brochures supplied to counselors.
WORK-BASED LEARNING	Co-op in place for job prep programs. School-based enterprises. Clinicals for CC health programs.				Criminal justice assisting and teacher assisting add work-based learning to curricula. Academy of Travel & Tourism develops summer internship.

FIGURE 2
SUNLAND CONSORTIUM MILESTONES

	1994	1995	1996	1997	1998
INTEGRATED CURRICULUM	Accounting II curriculum at all high schools. Integration occurring at various levels of school sites. High School 415 begins cluster formation. Engineering Academy implemented at TBT.	Academy of Multimedia Productions at one high school. Applied strategies implemented at college.	Communications 2000 implemented in senior high language arts courses at one high school. College and secondary health sciences programs enhanced with medical terminology targeted for ESOL students.	Construction Academy initiated at one high school. Five high schools adopt Communications 2000 curriculum. Civil engineering aide offered at one high school. FACS adopts National Restaurant Associations' ProStart curriculum.	Reading strategies integrated into context of technical curricula.
ARTICULATED CURRICULUM	Agreements to Univ. of South State's college of education. 28 Tech Prep programs of study.	Agreements for DCT programs. 29 Tech Prep programs of study.	Tech Prep expanded to include community college. 31 Tech Prep programs of study.	Due to realignment of college's AS programs as a result of state mandates, there were a reduction in number of articulation agreements. Agreement to college's environmental sciences to secondary forestry/natural resources program. 26 Tech Prep programs of study. Agreement to SCC for secondary forestry program.	
PROFESSIONAL DEVELOPMENT	Reading in the content area workshops for technical teachers with school district's reading teachers. Integration workshop for college's AS and English and mathematics faculty. GOALS 2000 grant targeted for technical teachers to teach high order thinking skills.	SCANS workshop for 1 high school and its three feeder schools as a pilot. Speaking & listening workshops for technical teachers. Goals 2000 expanded to include selected academic areas. Hosted state Tech Prep conference.	Combined workshops with high school-college English faculty; high school-college math faculty. Additional SCC mathematics instructors inserviced on applied strategies. Middle school and high school special education teacher workshop on STW. STW kickoff conducted for business partners and government. GOALS 2000 expanded to include middle school and technical teachers.	Two SCC math instructors participate in CORD's math project for students in remediation. Reading in the content area workshop for selected secondary and AS faculty. Middle school and high school. Middle school teachers participate in a pilot "educators in business" program. FACS faculty inserviced on ProStart curriculum.	Writing workshop for selected secondary technical faculty. All secondary faculty inserviced on integrating reading into curriculum. Senior high language arts teachers inserviced on Communications 2000. Business mentors trained for ProStart curriculum.

FIGURE 2
SUNLAND CONSORTIUM MILESTONES

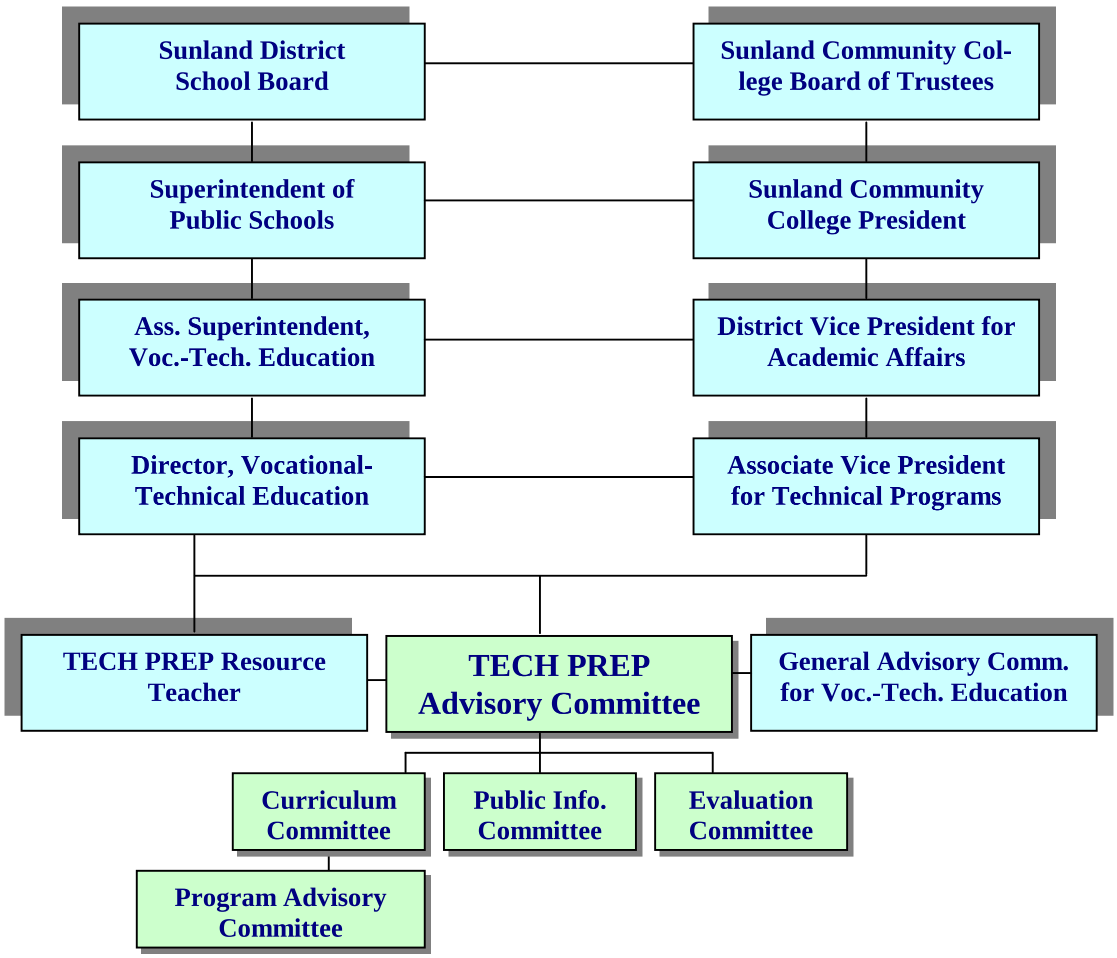
GUIDANCE	Second Tech Prep workshop for guidance. Revisions to manual.	Third workshop for middle school through postsecondary guidance counselors. Elementary counselors introduced to Tech Prep.	Return to industry workshops initiated for middle school through college counselors. Second elementary counselor workshop on Tech Prep.	Forth middle school through college guidance workshop on TP/STW. Guidance manual revised to reflect WBL. Third elementary counselor workshop. Two return to industry workshop for guidance counselors.	Forth elementary counselor workshop. Tech Prep brochures revised to reflect STW. One return to industry workshop for guidance counselors.
WORK-BASED LEARNING	Youth apprenticeship program in carpentry. Camp Kaleidoscope students participate in business related field trip.	Youth apprenticeship programs expanded to include welding, HVAC, auto, and electricity.	Camp Camelot students participate in worksite tours.	SCC begins adding WBL in non-health technical programs. Secondary job shadowing begun with ninth grade students. PACE program for special populations students middle school students include industry tours. Career related field trips with hands on learning.	Technology education receives approval for WBL component from state.

Figure 3 shows the Sunland Consortium's organizational chart for 1992. This chart portrays Tech Prep as a bridge between the Sunland School District and the Sunland Community College. Three committees provided leadership for Tech Prep namely the curriculum, public information, and evaluation committees. A program advisory committee provided input to the curriculum committee.

By 1997, two of the Sunland Consortium's major Tech Prep committees (curriculum and evaluation) were still functioning, but the Tech Prep public information committee had assumed the role of developing marketing strategies for STW. The Tech Prep evaluation committee continues to lead the evaluation of Tech Prep, and has also been responsible for follow-up data collection from Tech Prep graduates, and assessing perceptions and awareness of high school personnel. The consortium has received the support of administrators. Support is particularly evident in recent years from middle management of high schools, including teachers, counselors, and support staff.

Figure 3

Sunland Consortium Organizational Chart (1992)



Funding

Tech Prep in Sunland County was initially funded by federal funds in 1991, when a quarter of a million dollars was received for program administration, curriculum development, staff development, and the purchase of necessary curriculum and instructional materials. Funding continued at widely varying levels throughout the next seven years, according to the consortium's statements on the NCRVE Milestone Activity. In 1992-93, the consortium received more than $350,000, followed by a decrease in funding in the fourth year of funding in 1994. At that time funds were diverted to other consortia in the state, according to the Tech Prep resource teacher, so the consortium received only slightly more than $80,000 to cover staff salaries and program expenses. In 1995, funding rose again to slightly more than $150,000, and even more steeply in 1996-97 to more than $248,000. Seventy-five percent of Tech Prep funds were allocated to the secondary level, where Perkins monies purchased equipment and software, supported staff development activities and special needs conferences, provided for consultants for workshops and evaluation, and provided substitute teacher salaries and curriculum development.

Other funding utilized by the consortium included federal grants in 1991-92 and 1992-93 to purchase equipment, textbooks, library holdings, videotapes, software, and teacher staff development, for the Academy of Health Professions at High School 415, and a $50,000 grant in 1990-91 to develop core curriculum for health occupations. Refunded through 1994-95 for $10,000 a year, this grant supported curriculum development, software purchases, textbooks, videotapes, and staff development at the secondary level, and at the adult technical centers. At SCC, Perkins funding supported staff development (integration workshops, Tech Prep conferences, consultants, and substitutes), and purchased equipment and software for postsecondary Tech Prep program areas. In 1995, also, funding was received to begin planning for STW.

In 1995, the state mandated increased fiscal accountability in public education. Postsecondary technical education must respond to performance-based funding, meaning that funding is tied to outcomes. Schools receive money for the number of students who complete their programs with marketable skills. Student completers are tracked in a statewide placement follow-up system; if they work in the field they studied, the schools receive money. According to the consortium Tech Prep director and the SCC vice president, when special population students are enrolled, the schools receive $69.70; when the same student graduates from the program, the school receives $630.00. Related to performance-based funding is performance-based budgeting, which is practiced at all levels of the educational system, and is based on outcomes. The state legislature instituted fiscal accountability in order to encourage students to continue on to postsecondary education without a need for remediation.

In 1996, the state in which Sunland City is located was awarded a five-year $54.6 million grant to implement STW. The state developed 28 regional governing bodies, including representatives from the private sector and from state agencies responsible for education, economic development, employment, workforce development, and job training. These partnerships parallel the 28 community college consortia, and include all 67 state school districts. In 1996 only seven partnerships were funded for implementation, while 21 remained in the planning stage. The partnership for SCC was not among the initially funded partnerships, so it didn't receive STW implementation funds until 1997. Federal funding for the consortium during the years 1996 and 1997, however, remained high in support of Tech Prep.

Key Components

The key components of Tech Prep reflect the consortium's on-going emphasis on extending Tech Prep and career awareness into the elementary schools, in order to prepare students to enter Tech Prep programs of study in high school. Another major component is the professional development of faculty and guidance counselors. Program evaluation has been a strong component of this consortium as well. Finally, the Gold Seal Scholarship has been awarded to Tech Prep students as an incentive to go to college. Each of these components is discussed briefly in this section.

Marketing and Student Recruitment

Early in its history, a public relations firm was contracted to help develop a marketing plan for Tech Prep (in May, 1993). A three-year plan comprising six goals and accompanying products came out of meetings between this firm and the Tech Prep teacher on special assignment (similar to the Tech Prep coordinator position in other sites), the coordinator of planning and VSO, and the supervisor of diversified and marketing education. It was directed toward the "middle majority" with emphasis on special populations, and its primary objective was to orient students, parents, and business and industry to Tech Prep. The plan was within the purview of counselors at the secondary level who were assigned to assist with its implementation. Its objectives included recruiting more students, introducing Tech Prep to the community, and continuing on-going inservices internally at both the secondary and postsecondary levels. Products included 28,000 printed brochures, "back-to-school" posters, a video series, a Tech Prep news article to be printed in school papers, buttons and printed pads of paper, and fact sheets for counselors, parents, and teachers. A Tech Prep student awareness survey was conducted in order to obtain baseline data, and the Tech Prep guidance counselor handbook was completed and revised.

The emphasis in 1996 was to expand marketing efforts into the elementary schools. The consortium adopted a mascot, in the form of a two-foot bee sporting the Tech Prep colors of the consortium, for use by elementary counselors when they talk with students about careers. The bee theme is continued through promotional materials at the elementary level. A video was also purchased. Media releases in local newspapers were produced at the school, rather than the district, level. The district disseminated new information about unique programs, such as a seminar for incoming ninth grade girls. The consortium distributed information on Tech Prep programs outside the county in state and national venues, and published information regarding progress made recruiting special population students into Tech Prep programs. The consortium developed promotional materials to support Tech Prep. Brochures, videos, display boards used in school and college activities, as well as in mall displays, and 49,000 student folders were printed with information on Tech Prep programs at the high school and community college.

By 1997, the marketing focus for Tech Prep continued to emphasize support for Tech Prep among occupational specialists and faculty. District-wide poetry and poster contests involved the students in a positive way. The winning poster in 1997, developed by an elementary class, used a dinosaur theme with the message: "Don't Become Extinct—Develop a Career." Elementary counselors distributed career exploration materials, animated videos were produced, and a library of career-referenced materials was purchased for middle schools for the 1997-98 school year. At the high school level the emphasis was on articulation opportunities available to completers of Tech Prep programs, and scholarships available to Tech Prep graduates. Brochures and flyers were sent to parents and teachers in Tech Prep programs and guidance counselor offices.

Guidance and Counseling

Concomitant with its marketing and recruitment initiatives, the consortium has taken steps to assist students in making better informed career path choices. Guidance counselors play a central role in this effort. Central to their role is a student information form that collects middle school students' career interest information, transcripts, and academic improvement plans (for those students who do not meet specific reading performance levels) into one career guidance document to be used by faculty, students, and parents. In addition, in 1997, an Educational and Career Plan (ECP) was implemented for grades 8-12, which requires students to explore and declare a career major. The ECP was designed to introduce eighth grade students to career choices, and help them understand how to choose a course of study, plan high school coursework, and to understand acceptable graduation standards. It includes several activities and exercises to help the student identify courses of study and correlate them with possible career choices, and it uses interest areas to increase career awareness.

The consortium has recognized, through its marketing initiatives, the role played by parents in helping students to make career decisions. One student credited her father with helping her make career decisions. "He didn't really gear me toward it, he just made suggestions.... He suggested [drafting] so I decided just to try it." Tech Prep has a strong career guidance component because it prepares the student to enter the workplace or higher education. According to a 1998 Tech Prep parent awareness survey, the number of parents who expressed awareness of the capacity of Tech Prep to augment students' career potential increased slightly from 77% in 1997 to 80% in 1998, which is a very high percentage of parents who know about Tech Prep. The perception among parents that Tech Prep would provide students with employment skills increased more dramatically from 65% in 1997 to 76% in 1998.

Counselors have been supportive of the Tech Prep initiative, in part because of the significant inservice training they have received. The counselors developed a handbook that provides a definition of Tech Prep for guidance counselors. Guidance counselors are trained to recognize a Tech Prep student's transcript, based on the Tech Prep definition supplied in the Tech Prep Guidance Manual. Counselors have been instrumental in providing teachers of applied courses, representatives from the chamber of commerce, business, and middle- and high school counselors with a working knowledge of Tech Prep.

The development of Tech Prep awareness among guidance counselors, through a continuing series of workshops and through the production of a Tech Prep Guidance Manual, has been a significant component of Tech Prep in the consortium. Career guidance initiatives began in 1992 when course of study agreements were revised to include Tech Prep and students began to select Tech Prep as a course of study. Guidance counselors in the district developed a Tech Prep Guidance Manual in 1993 to assist them with giving students career guidance. They revised it in 1994, following a Tech Prep workshop. In 1995, elementary school counselors also began to introduce Tech Prep to their students, and their initial efforts were revised and reinforced the following years, 1996-98, in workshops on Tech Prep for elementary counselors. The Tech Prep Guidance Manual was again updated in 1997 to include documentation of work-based learning for Tech Prep students. At the middle school level, more career information was made available to guidance counselors to assist students who did not meet performance specifications in reading, writing, and/or mathematics.

Professional Development of Teachers, Counselors, and Administrators

Professional development is another fundamental aspect of Tech Prep in the Sunland Consortium. Effective faculty training and involvement in the Tech Prep initiative requires that all the various stakeholders, especially faculty, are aware of Tech Prep and what it means for the students. Professional development encourages stakeholders to cooperate in such a way that all elements of the consortium can support Tech Prep and make it a viable program. According to SCC's director of technical programs, inservice is important "because teachers need to change the way they teach. They need to relate more to active learning, applied strategies.” Inservices and workshops to train and encourage faculty to adopt applied academics have been prominent in building up Tech Prep from the very beginning in 1991. A professional development plan has been in place since at least 1992-93. The topics of these workshops have included curriculum integration, and training faculty and staff in career awareness and thinking, speaking, listening, and reading skills. Participants in these activities have included, in addition to faculty, counselors and business and industry representatives. Faculty in the core areas of science, math, language arts, and vocational-technical education have participated, especially at the secondary level.

Community college faculty became involved in professional development in 1991, taking part in the first presentations of Tech Prep. Selected community college faculty attended workshops in 1994 as part of their preparation for developing integrated “interdisciplinary” strategies. University of South State faculty played a unique role in the professional development of the consortium by providing leadership for workshops. SCC also offered to secondary teachers a course called “Teachers in Industry” that encouraged faculty to visit industry sites and return to class to develop integrated lesson plans.

To establish a culture of communication and cooperation can be a difficult aspect of Tech Prep implementation. One of the more persistent barriers encountered by the Sunland Consortium is providing more faculty time for professional development, such as planning and innovative projects. The consortium began by calling for a group of volunteers, to whom the Tech Prep program was explained as an “instructional strategy.” This initial group consisted mostly of high school English and math teachers, and their response to Tech Prep was enthusiastic. Their role was to act as catalysts and provide leadership for the rest of the teachers in their schools. Math teachers were especially successful: “Even our calculus faculty person is using more applied strategies.... We’re seeing it grow into the college prep faculty.” An important aspect of developing this kind of communication and support has been providing material support to back it up. If the academic faculty commit to Tech Prep, the Technical Center purchases books, calculators, and other supplies. Strong administrative support was considered helpful, as well, particularly from the community college president who, before he retired in 1996, was considered “a very good champion” of Tech Prep and the community college’s role in assisting in the inservice and training of secondary and postsecondary faculty. Professional development of the secondary teachers, therefore, has taken place successfully in a supportive environment.

Professional development of math teachers at High School 413 was a key factor in the successful progression of students from Applied Math I to Applied Math II. Students have had difficulty progressing to higher level mathematics throughout the district, to which the math faculty responded that the success of the student depends on “learning how to deal with the [applied] labs, the different strategies you need to use.” Teachers who do not undergo this sort of training before teaching Applied Math I and II tend to be “unhappy” and therefore less successful, which impacts the students because “the students who have the teachers who are not trained have a bigger difficulty.” Professional development fosters interaction and the sharing of ideas among teachers, and helps the teachers to build on their own “repertoire of strategies.” Commitment to training has to be more or less equal across the board so that students are not caught between an untrained teacher in Applied Math I and a trained teacher in Applied Math II with correspondingly higher expectations and complex teaching strategies. At High School 413 specific barriers have occurred. Teachers either have not availed themselves of training in applied academics, or new classes are opened up at the last minute and the teachers appointed to fill these classes have not had time to undergo training before they began teaching.

Guidance counselors and occupational specialists, like academic and technical faculty, received professional development primarily through workshops beginning in 1993. At that time, a Career Choices workshop was organized for secondary academic teachers and occupational specialists. Guidance counselors, advisors, and occupational specialists from junior and senior high schools, adult technical centers, and SCC, attended a consortium-wide inservice session in November, 1993. Tech Prep teachers from the technical areas, mathematics, science, and language arts areas were guest presenters. A perceived outcome was the more active participation of secondary and postsecondary counselors. An inservice program in 1994 for counselors and department heads at High School 410 featured business and industry representatives who spoke on the necessary entry-level skills for prospective employees. They also spoke to high school English teachers about workplace writing skills, and involved the teachers in activities that helped them develop and address strategies for teaching workplace-oriented technical writing. This inservice program was repeated for mathematics teachers who developed lesson plans that related to workplace experiences.

In the summer of 1997, the school district's Technical and Career Education Division began a project to encourage technical teachers to integrate more reading and writing projects within their curricula, with the intention of connecting these projects to situations in the workplace. At the same time, computer training was made available to faculty and staff of the district and teacher-as-advisor coordinators and occupational specialists received inservice training on how to implement the Educational and Career Planner (ECP), and Tech Prep and applied reading benchmarks.

Business and industry provided training programs for faculty, allowing faculty to return to the workplace to gain career awareness and work-based learning experiences for themselves. At the elementary level, business partnerships have been formed with elementary schools that help students learn social and academic skills, and gain positive work attributes. Lucent Technologies held partnership training with an elementary school called KAPOW (Kids and the Power of Work). The entire third grade participated in a site visit to Lucent Technologies, where they learned about careers in telecommunications. The Greater Sunland City Chamber of Commerce completed its pilot "Educators in Business" program with a middle school, attended by close to 45 teachers who job shadowed on the district's monthly early release day. At the level of student participation, job fairs supported by large numbers of area businesses have been organized in the district.

Program Evaluation & Student Outcomes Assessment

The state's objective of Tech Prep evaluation has been "to obtain and maintain the highest possible quality, effectiveness, and goal-attainment." A state evaluation plan was developed in 1993 based on site visits to all the consortia, with follow-up visits in 1994, to document the extent to which Tech Prep had been implemented and to recommend actions for program improvement. Consortia in the state were encouraged to develop internal evaluation efforts, in response to a perceived void in systematic evaluation at the local level.

In 1994, the Sunland Consortium developed and conducted the first Tech Prep student awareness survey. Employers of identified Tech Prep graduates were surveyed, and the first follow-up study of Tech Prep graduates was begun in 1995, but subsequently dropped because many of the Tech Prep graduates surveyed did not fulfill the definition of a Tech Prep student. In 1996, three studies were conducted. A second Tech Prep graduate follow-up study was begun using a comparison group. A survey of college students was conducted regarding applied teaching strategies. And finally, a high school Tech Prep staff survey was conducted. In 1997 the follow-up study continued. In addition, a Tech Prep parent awareness survey was conducted. SCC's applied math strategies were evaluated regarding achievement. The beginning of a follow-up of 1997 Tech Prep graduates was begun in 1998. A second evaluation was conducted on math strategies to determine achievement.

A committee on evaluation and outcomes was established in 1993-94, according to a state quarterly report, to work with school administrators and develop inservice training for technical staff. A sub-committee of district measurement specialists was also formed. A computer system was begun to collect data from various sources. Evaluation data were being collected from the school systems and from the state, as well as from survey instruments disseminated to students by occupational specialists, guidance counselors and teachers. Data have also been gathered through Success Centers, which were set up in the high schools to provide students with career guidance, connected to the Internet and the Technical Career Education Supervisory Offices network at four pilot sites for the purpose of evaluating site specific activities. A high school competency test (HSCT) is required of all graduating students in order to earn the high school diploma.

Scholarships

The State Gold Seal Vocational Scholars Award program was implemented in 1990, and is now a part of the state's Bright Futures Scholarship Program, which also includes the Florida Academic Scholars Award and the Florida Merit Scholars Award. According to district guidelines, as of 1998, students are eligible if they complete a sequential program requiring at least three vocational credits, not including job training, completed over at least two academic years, and are continuing in a "planned, related post-secondary education program." Students must pass a college placement test; earn a GPA of at least 3.0 in subjects required for high school graduation, not including electives, and a 3.5 GPA in required vocational courses. The scholarship will pay up to 75% of tuition and fees for up to 45 semester credit hours per academic year. The high school student handbooks specify that the awards may also cover summer school if funding exists and if the student has not yet completed the 45 semester hours required. The scholarship is not limited to Tech Prep, but the Tech Prep curriculum provides students with eligibility for the scholarship.

Secondary teachers consider the Gold Seal Scholarship Program to be "a real incentive [to] get them [Tech Prep students] through the junior college, pay their books and just about everything." Students going to college are more "serious about it and they're not just taking a class here and a class there.... They have a set plan. Even if it's not a four-year plan, still they know that they have to do this and then this, and they're more directed." The consortium's annual report reflected administrative support for the Gold Seal Scholarship because it strengthens the quality of the state's workforce development initiative.

The requirements for retaining the Gold Seal Scholarship while in college are rigorous. According to a consortium follow-up survey, more than half of the 233 first-year gold seal students in attendance at SCC in 1996-97 did not qualify for renewal of a second year because they did not meet GPA requirements (3.0/4.0) or exceeded the 45 credit hour limit. Similarly, in 1998-99, 77 of 162 first year gold seal recipients at SCC did not renew because of insufficient GPAs. More importantly for the present study, only five students in the first year of this study and 14 in the second year were considered Tech Prep graduates.

Student recipients of the Gold Seal Scholarship agreed that the award was instrumental in their ultimate transition into the community college. One student applied for the Gold Seal Scholarship because she was not eligible for the State Academic Scholarship. "Actually, if it wasn't for gold seal, I probably wouldn't have gone back to school. I may have gone to a technical center, but I wouldn't have gone to SCC or a community college." Another student met with her high school guidance counselor to apply for and win the gold seal, and also belonged to a student organization that helped her go through the application process. She was not aware that the gold seal was a vocational award, though she was aware that it "had to be some kind of professional program."

Tech Prep Curriculum Reform

This section details elements of change to the core academic and vocational curriculum at the secondary and postsecondary levels.

Core Curriculum in the High School and Community College

The required core curriculum at the secondary level is outlined in the Tech Prep Guidance Manual. Students are expected to exit eighth grade capable of level II course work; level I is considered a safety net for those who are not (see Table 4). Tech Prep high school students are required by definition to be in level II or III core courses by the eleventh grade, and must complete two level II or higher courses prior to graduation.

Table 4

High School Core Curriculum

Level	Science	Mathematics	Language Arts
Level I	Fundamentals of Biology Fund. of Anat. and Physiology Fund. of Earth-Space Science Fundamentals of Gen. Science Fundamentals of Phys. Science Fundamentals of Chemistry	Pre-Algebra Business Mathematics I Consumer Mathematics Mathematics Competencies	Functional Basic Skills in Communications I Funct. Basic Skills in Comm. II Funct. Basic Skills in Reading Funct. Basic Skills in Writing English Skills I-IV
Level II	Biology I Anatomy and Physiology Ecology Marine Biology Earth-Space Science Astronomy Solar-Galactic General Science, Gifted Space, Tech, Engineering Physical Science Chemistry I Physics I Principles of Tech I Principles of Tech II Applied Biology Chemistry Com	Algebra I Algebra II Geometry Integrated Mathematics Liberal Arts Mathematics Algebra Ia Algebra Ib	English I English II English III English IV World Literature, Gifted British Literature, Gifted American Literature, Gifted
Level III	Biology I Honors AP Biology Anatomy-Physiology Honors Physical Science Honors Chemistry I Honors AP Chemistry Physics I Honors AP Physics B AP Physics C AP Environmental Science Biology I, Honors Gifted Chemistry I, Honors Gifted Phys. Sci., Honors Gifted Physics I, Honors Gifted	Algebra I Honors Algebra II Honors AP Calculus AB AP Calculus BC AP Statistics Geometry Honors Analytic Geometry Probability & Statistics Trigonometry Discrete Mathematics Analysis of Functions Mathematical Analysis	English Honors I English Honors I, Gifted English Honors II English Honors II, Gifted English Honors III English Honors III, Gifted English Honors IV AP English Literature and Composition AP English Language and Composition

Source: Tech Prep Guidance Manual (1997)

The high school graduation requirements are the same throughout the district, and each high school provides its students with a standardized description of these requirements in its student handbook. The credits required for graduation are listed in Table 5. The Tech Prep graduation requirements differ from the college prep requirements in the core curriculum primarily in the fact that Tech Prep students can begin their baseline mathematics requirement at Pre-Algebra rather than Algebra 1. Neither are they required to take fine or practical arts credits, or foreign language, which is a principle difference for the students themselves. Tech Prep students also have more flexibility in the number of electives they can take, in order to allow them time to take technical and career credits. The number of technical and career credits required to graduate as a Tech Prep student is the defining feature of the Tech Prep graduation requirement schedule.

Table 5

Credits Required for Graduation

	Min. Graduation Requirements	**College Prep Graduation Requirements**	**Tech Prep Graduation Requirements**	**Academic Scholars Program**
English	4	4	4	4
Math	3	3 (Algebra or above)	3 (Pre-Algebra or above)	4 (Algebra Geometry, Calculus)
Science	3 (1 Biology, 1 Physics, 1 other)	3 (1 Biology, 1 Physics, 1 other)	3 (1 Biology, 1 Physics, 1 other)	4 (Biology, Chem-istry, Physics, 1 other)
Social Studies	3	3	3	3
Physical Education	1	1	1	1
Health-Life Management Skills	½	½	½	0
Fine Arts --OR--	½	½	0	1
Practical Arts	½	½	0	0
Foreign Language	0	2	0	2
Technical and Career	0	0	3-6	0
Electives	8 ½	6 ½	2 ½ - 6 ½	5
TOTAL CREDITS	24	24	24	24

Source: High School Student Handbooks

Language Arts Curriculum

The core curriculum is described for counselors and teachers at the secondary level in a district scheduling guidelines manual, and we can trace a Tech Prep student's potential coursework from middle school through twelfth grade. Middle school students can choose from three levels of language arts courses and can move between levels of course difficulty. Students entering ninth grade in the highest language arts level have more course choices than students in lower-level courses. Upon entering high school, Tech Prep high school students must take English I-IV in order to graduate. These courses “integrate educational experiences in ... reading, writing, listening, viewing, speaking, language, and literature,” and contain reading and writing strategies, vocabulary building, speaking, listening and viewing strategies, exposure to literary forms, and using language (English I & II), and understanding and analyzing literary texts, critical thinking, and exposure to American (English III) and British (English IV) authors. High School 401, which has integrated 30% of its college prep and honors English curriculum, reports that an integrated language arts curriculum has increased student retention and performance to levels acceptable for college prep students on standardized tests.

Mathematics Curriculum

The mathematics curriculum in the middle school and junior high differs from language arts because students in the lower- and middle-level courses can potentially move into or out of lower-level math courses in middle school. Academic performance, teacher recommendations, parental involvement, and student motivation affect placement. When students enter high school, mathematics course sequences become more complex because of the variety of courses of study available to the students. At the basic level, students who have completed an Individualized Education Program (IEP)/Student Performance Plan, follow a series of courses from Pre-Algebra through Consumer Mathematics. The Tech Prep sequence begins with the Algebra Ia-Ib sequence or with Algebra I, but students at the ninth grade level can also begin with Geometry, if they attain a level of competence before entering ninth grade. At the tenth and eleventh grade levels, Tech Prep students can also take Algebra II and Trigonometry. Tech Prep students take three math credits, of which two must be at level II or III, and if a fourth credit is sought, it must also be level II or III (see Table 4). The courses suggested on the Tech Prep program checklist for High School 413, for example, are Pre-Algebra, Algebra I, Geometry, Algebra II, and another elective. A student who declares himself or herself to be Tech Prep in the eighth grade can conceivably enter ninth grade at a high enough level to fulfill the mathematics graduation requirement by tenth grade, and then go on to higher math courses later in high school. But, to be considered Tech Prep, the student must be at the minimum level of Algebra I or higher by eleventh grade. In 1997, the consortium reported an increase in passing scores on the eleventh grade HSCT among students in Applied Mathematics II (68%) compared with passing scores among students in Algebra I (54%), meaning students in applied math courses performed better on the HSCT than students in Algebra I.

Science Curriculum

The science curriculum in the middle school is structurally more straightforward than the mathematics or language arts curricula. Students can reach ninth grade at four initial course levels, through which they proceed to further science study in the upper high school grades. Student performance in a course determines the level of science attained in the tenth grade, according to the pattern illustrated in Table 6. Tech Prep students are required to complete three science credits, including Physical Science and Biology I. The third and fourth credits must be level II or III courses. Tech Prep students should begin with Physical Science in ninth grade, according to the consortium's scheduling guidelines, though if their grades are not sufficient, they could also complete Fundamentals of Physical Science. In either case, they then proceed to take either Applied Biology or Biology I. If they fail science in ninth grade, however, they must return to Fundamentals of General Science in tenth grade and proceed to Biology I in eleventh grade, and either a Chemistry Com course or some other science elective at level II or III in twelfth grade. Tech Prep students must follow this sequence unless they completed Physical Science Honors in the eighth grade and entered high school in Biology I.

Table 6

High School Science Curriculum

Initial Course	Student Performance	Subsequent Courses
Fundamentals of Physical Science (Ninth Grade)	Failure	Fundamentals of General Science
	Below Average	Fundamentals of Biology
	Average-Successful	Biology I
Physical Science (Ninth Grade)	Failure	Fundamentals of General Science
	Below Average	Fundamentals of Biology
	Average	Biology, Applied Biology (Tech Prep)
	Successful	Biology I, Biology I Honors (with approval), Applied Biology (Tech Prep)
Physical Science Honors (Ninth Grade)	Failure	Fundamentals of Biology, General Science (if Physical Science is not passed in summer school)
	Below Average	Biology I or other science electives
	Average-Successful	Biology I Honors
Biology I, Honors (ninth Grade)	Failure	Biology I
	Below Average	Fundamentals of Chemistry or other science elective
	Average	Chemistry I, Chemistry I Honors (with approval)
	Successful	Chemistry I Honors

Source: Sunland Public School Scheduling Guidelines, Science Course Sequences, (1998-99)

Postsecondary Curriculum

At the postsecondary level, students seeking an associate in science (AS) degree in a technical career at SCC must complete two semesters of Freshman English and a semester each of Speech and Computers. Freshman English I and II focus on the writing process: students must write “unified, coherent essays” and demonstrate an understanding of word choice, sentence structure, and grammar and usage. Freshman English II cannot be taken without having received at least a “C” in Freshman English I. According to a state rule, students must write at least 6,000 words in each of the courses. Students seeking an AS degree must take one course from a range of courses from Introductory Mathematics with Applications to College Algebra for Calculus, and students in occupational degree programs (Health Sciences-Nursing or Technical) are required to have at least Introductory Mathematics with Applications. No hard sciences (as opposed to social sciences) are required to fulfill general education requirements because science courses are embedded in and pertinent to the individual Tech Prep program of study (see Table

7). For example, students in the health sciences-nursing programs are required to take Anatomy and Physiology I and Laboratory, as part of the health sciences general education component, while students in other technical programs take science courses pertinent to their degree program.

Table 7

Community College General Education Requirements (AS Degree)

Group I – Communications-Humanities (8 credits required)	**Group II – Mathematics-Natural Sciences** (3 credits required)	**Group III – Social Sciences** (3 credits required)
Freshman English I & II Speech Improvement Introduction to Computers & Technology Introduction to Information Processing Computers in Society	College Algebra College Algebra for Calculus Introductory Mathematics with Applications College Mathematics	Introduction to Anthropology General Psychology Introduction to Sociology Early American History Modern American History The Western World I & II Introduction to Political Science American Government

Source: SCC Catalog

SCC maintains, according to its catalog, an "open-door" policy allowing anyone entrance to the college who can show a standard high school diploma or GED, or who applies as with transient, transfer, or special status (early admission, co-enrollment, dual enrollment). Degree-seeking students must present passing test scores from standard tests such as ACT, or SAT prior to registration. Students with prior degrees or who have completed college-level English and mathematics courses may be exempt from this requirement.

Significant numbers of students arriving at SCC require remediation. As many as 25-30% of high school students in the district required some sort of remediation in 1997, according to one administrator. Among students attending SCC, that number is higher at 52%. High school teachers interviewed identify the problem as an early loss of a "striving for excellence" among students, which then grows to a pattern of remediation throughout high school and into the community college. Students entering SCC who test below state-adopted minimum scores in two or more subjects (English, reading, and/or mathematics) on the college placement exam must enter college remedial courses, which in this consortium are referred to as "college *preparatory*" courses because they *prepare* students for college. Students who test below minimum scores in one subject are given the option to participate in the preparatory program.

Students enter the preparatory area at their lowest competency level, after which diagnostic testing within the discipline will determine course placement. Table 8 illustrates the college preparatory course requirements available to SCC students, together with suggested electives. College-level program requirements must be completed before suggested electives can be taken. State legislation mandates that students must either complete all college preparatory courses before accumulating 12 college credit hours or be registered simultaneously in the required preparatory courses and maintain satisfactory progress in college-level courses. The average high school GPA of remedial students entering SCC in 1995 was 2.38 out of 4.0, though the state had recently raised the minimum score for required remediation.

Table 8

College Preparatory Courses

College Preparatory Program Requirements	**College Level Program Requirements**	**Suggested Electives**
• ENC 0010C College Preparatory Writing Skills I (5 credits) • ENC 0020C College Preparatory Writing Skills II (5 credits) • REA 0001C College Preparatory Reading Skills I (5 credits) • REA 0002C College Preparatory Reading Skills II (5 credits) • MAT 0002C College Preparatory Mathematics (5 credits) • MAT 0024C College Preparatory Algebra (5 credits)	• SLS 1101 Orientation (1 credit) • REA 1605 College Study Skills (2 credit) -- OR -- • MGF 1050 Math Study Skills (1 credit) • SLS 1501 College Success (May serve for a Study Skills course) *Students must complete these courses before taking an elective.	• CGS 1500 Applied Word Processing (1 credit) • CLP 1000 Psychology of Personal Growth (3 credits) • FIN 1100 Personal Finance (3 credits) • OST 1142 Keyboarding I (1 credit) • OST 1142 Keyboarding II (1 credit) • OST 1701 Word Processing Concepts (3 credits) • OST 1731 Word Processing I (1 credit) • REA 1105 College Reading (3 credits) • REA 2505 Vocabulary Improvement (3 credits) • SLS 1301 Career Decision-Making (3 credits) • SLS 1501 College Success (3 credits)

Source: SCC Catalog

Articulation Agreements and the Vocational Curriculum

Articulated credit between area high schools, the adult technical centers, and the community college enhances preparation for the post-high school experience by encouraging successful students to go into further educational experiences. Articulated programs of study increased steadily from 1992 when 10 programs were in place until 1996 when 31 Tech Prep programs were in place. This number fell to 26 articulated programs in 1997 when the state established state-wide program lengths and forced schools to eliminate elective credits, hence reducing the number of articulated courses (see Table 9).

In 1997, the consortium reviewed all the articulation agreements in place with SCC and reduced the number of articulation agreements to 34 agreements with secondary schools and 38 agreements with the adult technical centers. Articulation agreements to the adult technical centers only remained in place when there was no occupational completion point (OCP) system in place. Using OCPs, students could complete a portion of a program and still be considered a completer for performance-based accounting purposes. If students crossed into a different discipline area, however, articulation agreements continued to be used; for example, if a high school student completes a high school program in food production, part of a family and consumer science program, the student must articulate to the Technical Center's culinary arts program, which is part of the industrial arts program.

Faculty at the secondary level and at the adult technical centers are developing, as of 1997, two additional agreements with SCC. Another 74 articulation agreements exist between the secondary schools and the adult technical centers. Only two agreements were available with the University of South State; and three agreements were generated with a community college in a neighboring county, Tyler Community College.

Table 9

Articulation Agreements for Courses Between Secondary Schools and SCC

Secondary Education	Sunland Community College	Credits
Academy of Desktop Publishing	Office Systems Technology	7
Academy of Fashion Marketing	Business Administration Management	3-6
Academy of Fashion Marketing	Marketing Management	3-6
Academy of Travel & Tourism	Marketing Management	3
Accounting	Accounting Technology	3
Accounting	Business Administration & Management (Management Option)	3
Accounting	Business Administration & Management (Purchasing Option)	3
Accounting	Computer Information Systems Analysis	4
Accounting	Computer Programming & Applications	3
Accounting	Office Management Technology	3
Accounting	Office Systems Technology	8
Business Management	Accounting Technology	3
Business Management	Computer Information Systems	5
Business Management	Office Systems Technology	8
Carpentry	Architectural Design and Construction Technology	3
Commercial Art	Computer Information Systems Analysis	3
Commercial Art	Interior Design Technology	6
Commercial Art	Marketing Management	3
Commercial Art	Office Systems Technology	6
Criminal Justice Assisting	Criminal Justice Technology	6
Data Entry	Office Management Technology	3
Data Entry	Office Systems Technology	7
DCT – Culinary Technology	Culinary Management (Culinary Arts Option)	2-4
DCT	Marketing Management	3
Drafting	Architectural Design and Construction Technology	6
Drafting-Illustrative Design Technology	Architectural Design and Construction Technology	6
Early Childhood Education	Child Care Center Management	9
Electricity	Architectural Design and Construction Technology	6
Electricity	Computer Engineering Technology	3
Electricity	Electronics Engineering	3
Electronics	Computer Engineering Tech	15
Electronics	Electronics Engineering	15
Electronics Technology	Biomedical Equipment	3
Electronics Technology	Electronics Engineering	3
Engineering Technology	Architectural Design and Construction Technology	6
Environmental Horticulture (Science and Service Cluster)	Ornamental Horticulture	19
Environmental Horticulture	Ornamental Horticulture	7

Table 9 (cont.)

Financial Records	Computer Information Systems Analysis	5
Food Production and Services	Culinary Management (Culinary Arts Option)	10
Food Production and Services	Culinary Management (Restaurant Management)	6
Forestry-Natural Resources	Environmental Science	3
Marketing & Distribution	Business Administration and Management (Management Option)	6-9
Marketing & Distribution	Marketing Management	6-9
Principles of Materials and Processes	Architectural Design and Construction Technology	6
Technology Studies	Architectural Design and Construction Technology	6
Vision Care Assisting	Ophthalmic Dispensing	5

Source: Addenda to Tech Prep Implementation Survey, (1997)

Though all Tech Prep programs are 4+2, the technical content of articulated courses begins in the eleventh or twelfth grades. Because some of the community college's AS degree programs are articulated to the university, Tech Prep students could potentially participate in a 4+2+2 or a 4+4 Tech Prep program model. Articulation agreements existed between the school district and the adult technical centers which, according to the consortium's Tech Prep director, slowed down the articulation process for students by adding another stage. In 1995-96, the Sunland Consortium reconsidered these articulated agreements since the centers exist within the school system, and the creation of "progression plans" to replace "in-house" articulation streamlined the passage of students into the technical centers. Nonetheless, participation among secondary completers in an articulated program of study with the community college remained low at 25%, according to the Tech Prep graduate follow-up survey in 1995-96.

The consortium uses the time-shortened articulation model, when a student can complete graduation requirements within a shorter time period by gaining early admission into college and securing dual enrollment status. Students who place at the college level on the entry-level placement test can enroll as full-time college students and earn 20 credits, and can be excused from the final two semesters of high school. These students must have a GPA of at least 3.5 overall, must pass an entry level placement exam as determined by the college or university, obtain written recommendation from the principal, and must be accepted by an accredited college. The consortium also uses dual enrollment, when a student is enrolled full-time at the high school and part-time at a college or university. After successfully completing four or six high school semesters, depending on the course, the student can enroll at a college or university. The student may then take specially designated courses at the high school as stipulated in the articulation agreement between the school board of Sunland County and the participating college or university. The difference between co-enrolled and dually enrolled students lies in where students physically attend most of their classes. The co-enrolled student attends classes primarily on the college campus; the dually enrolled student attends primarily at the high school, but takes college-credit courses. The consortium also uses advance placement to encourage participation in articulated courses.

According to the Tech Prep Guidance Manual from 1997-98, Tech Prep students are eligible for articulated credit for technical-career coursework if they earn a high school diploma, enroll in an articulated Tech Prep program, and maintain a GPA of 2.5 at SCC or 3.0 at TCC. They must then complete 15 college credits within their technical specialization at both SCC and TCC, and they must do it within three years of graduation from high school at SCC, or within 15 months at TCC.

A guidance counselor can identify the qualified Tech Prep student with the "Educational and Career Plan" (ECP), which includes the student's course of study, high school grades, all test and inventory results from the seventh through the tenth grade, and a matrix that records the student's planned course sequences. This plan is forwarded to the school district's Management Information Systems (MIS) clerk, and the student is thus recorded as seeking articulated credit. If the student changes the ECP, those changes must be forwarded to the MIS clerk. An SCC counselor completes a "Request for Articulated Credit" when a Tech Prep graduate requests articulated credit. Before obtaining articulated credit from SCC or TCC the Tech Prep student must successfully complete a final examination, which is approved by the appropriate community college for the specific discipline. High school seniors who may be exempt from the final examination still have to take the exam in order to obtain articulated credit at the community college level.

The results of these exams are kept on file for up to five years. A certificate of completion is the only document accepted by college-level counselors and advisors for determining whether a Tech Prep student is qualified to earn and receive articulated credit, according to the 1997-98 Tech Prep Guidance Manual.

Development of Articulation Agreements

SCC has encouraged the development of articulation agreements in order to enhance the secondary curricula. One development strategy has been to include SCC when new technical programs are developed at the secondary level. To facilitate this process, workshops between the community college and the school district have been held. Another positive aspect of articulation agreements with SCC has been the collaboration between college and high school faculties. The director of technical programs remarked, “Our faculty became more respective of what the high schools need. Our faculty and their faculty decided on these courses. We were just facilitators.”

The principle barriers to articulation have been few but significant. Primarily articulation agreements have undergone changes due to the consortium’s realignment of AS degree programs to state mandates; when the college’s program electives were deleted the agreements were called into question. The consortium has identified a tendency among secondary Tech Prep graduates not to take advantage of articulated courses because they do not always enter and continue a Tech Prep program at the college level. Some students we interviewed had little idea about what opportunities are available to them in high school, in terms of articulated courses. One student claimed that dual enrollment was not offered to her in a timely manner: “Had it been, I probably would have taken advantage of the opportunity.” Only when she witnessed another student receiving an award did she realize that it was possible to be dual enrolled. More than half of the 1994-95 Tech Prep high school graduates who enrolled at SCC entered an associate of arts degree program, according to the consortium’s Tech Prep graduate follow-up survey, and of the 36% of students entering an associate of science program, only 29% entered an articulated program of study.

Integration of Academic and Vocational Curriculum

Integration of curriculum began in 1990 when High School 415 implemented its health magnet program, presently called the Academy of Health Professions, and an Engineering Academy, a magnet program for students interested in engineering careers and related occupations. Integrated curriculum activities continued to expand in 1991 and 1992 as faculty teams wrote integrated curricula for electronics, welding, childcare, auto-body, and agribusiness programs. (Refer again to Milestones in Figure 2.) In all, 11 different curriculum integration modules were completed in 1991-92. In 1993, revisions of the accounting curriculum at both the secondary and postsecondary levels continued. The accounting curriculum at SCC was revised to include SCANS, and to parallel the high school curriculum. One high school implemented the Academy of Travel and Tourism.

High School 403 was a pilot site in 1994 for a district-wide applied communications model, which included English III and IV, and was transferable to the university system. The district did not adopt the model, however, because the curriculum was not considered rigorous enough. Six high schools offered Applied Mathematics I and II, as of 1994, and when results were compared between the students in these courses and those in Algebra I, it was found that, in five out of six schools, the applied mathematics students scored higher. These comparative results may be explained by the fact that the number of applied mathematics students was fairly smaller, but even the scores from the larger classes at High School 411 and High School 413 were impressive. Funding was provided for the implementation of Applied Mathematics in the remaining eleven high schools by 1994-95. By 1997, however, it was decided to eliminate the Applied Mathematics courses and replace them with an applied Algebra I as part of the consortium's involvement in Equity 2000, according to the Tech Prep resource teacher. The emphasis on rigorous academics has persuaded administrators to keep students in core academic courses as opposed to applied courses, such as Applied Mathematics, thus encouraging students to become college prep/Tech Prep.

By 1994, integration initiatives appeared at various levels of school sites. High School 415 implemented a cluster formation, in which students were grouped together according to their technical major in a class on electricity, electronics, drafting, or the like, and assigned to faculty and counselor teams for development. As one 1997 graduate described it, “If I was in their [her fellow students] electronics ‘shop,’ more than likely I was put into all their academic classes.” The students in each “shop” remained together throughout their high school career, unless they changed majors. A few students reported their academic teachers did not attempt to draw connections with the technical curricula offered in the “shop” clusters, though academic and technical faculty were encouraged and given time to develop integrated curricula.

One difficulty was the role faculty played in developing academic integration at the secondary and postsecondary levels. The perception of some administrators was that integration “was a scary thing for academic people.” The consortium began extensive staff development to provide training during the consecutive academic years 1993-94 and 1994-95, in order to assist secondary and postsecondary personnel in developing integrated curricula. During the preceding academic years of 1992-93 and 1993-94, integration activities included inservice workshops, a summer institute, and the opportunity to return to the workplace for job shadowing and mentoring experiences. Integration efforts at the secondary level included integration teams, establishing partnerships in the community, developing integration modules, and co-teaching activities. At both the secondary and postsecondary levels, existing courses were augmented with academic or technical supplemental material, applied courses were added to the curriculum, articulation agreements were constructed, and work-based learning and career exploration experiences were enhanced. Integration activities specific to the secondary level also included sequencing academic and vocational-technical courses, organizing courses around career clusters, and creating career academies that combine vocational-technical and academic content.

In 1995, the consortium’s emphasis on the implementation of the academy model continued. In 1996, implementation of integration continued to be developed in the English and medical fields. Communications 2000 was implemented in language arts courses at one high school. Secondary and postsecondary health science programs were enhanced with medical terminology targeted for English as a Second Language (ESOL) students. A Goals 2000 Educational Reform grant also supported the restructuring of lesson plans in 1995-96.

Looking back, the consortium has encouraged more integration of curricula as one of its most important objectives from the very beginning of Tech Prep. One teacher at High School 413 recognized that “Tech Prep has brought some departments a lot closer together.” Integration took place primarily in science, mathematics, agribusiness and desktop publishing, but because it relied on collaboration among individuals rather than programs, it did not receive consistent application. No integration teams had been formalized by 1996 and little teacher training supported the offering of integrated courses in math and science at High School 413, where curriculum integration suffered because of a lack of cooperation. One attempt to develop an integrated course between desktop publishing, journalism, and art never materialized despite planning meetings. Small-scale collaboration among teachers did result in some integration; for example, a math teacher and a technology teacher had their students design scale drawings and then reproduce them in class. “That came about maybe because they [the math and technical teachers] were friends and they were talking about what they could do together.” Certain teachers were more motivated to implement integration activities within their own classrooms. One math teacher required her students to write weekly book reports because she thought the writing experience would help them read word problems more effectively, and also because she wanted the students to perform at a higher level.

Math and English faculties at SCC have been successful at integrating applied teaching strategies into academic curricula. Because of the increased diversity in science requirements in technical programs, the science faculty has made little effort to integrate, although in 1992-93 applied biology and chemistry courses were added at some high schools. Technical faculty at SCC have also shown some recalcitrance to integrate applied methods. The business technology faculty are particularly notorious for their concerns about entry-level courses.

Work-Based Learning

A STW partnership between Sunland City Education Foundation, Sunland County Public Schools, including Sunnydale Technical Center, and the City of Sunland Parks Department, was formed in 1995 to increase skill levels among disadvantaged youth. The program provides technical training and applied academics, work-based learning experiences, and activities including integrated methodologies, job shadowing, workplace mentoring, field experiences, supported employment for disabled students, apprenticeships, and formal articulation agreements with SCC.

Students receive work-based experiences in the twelfth grade according to the Tech Prep resource teacher. Such experiences are through youth apprenticeship programs, and business and industry cooperative training. Students at High School 413 developed portfolios throughout high school that recorded their career-related work-based learning experiences. In March, 1997, a consultant from the United Kingdom held a workshop with business partners to help them create more productive work-based learning experiences for students. As part of this workshop school and business partners have co-written a curriculum that helps students make career choices. They visited work sites and met with representatives of businesses and industries in the classes.

Students usually began to receive work-based experiences in their senior year in high school; however, youth apprenticeship programs (described below) and diversified cooperative training were available in the summer prior to their senior year. School-based enterprises were also in place in the food production, automotive, and early childhood education programs. Other work-based learning programs included Out-of-School Youth Work-based Partnerships and Elementary School Work-Based Partnerships. In March, 1997, a consultant from the United Kingdom held a workshop with business partners to help them create more productive work-based learning experiences for the students. As part of this workshop, school and business partners have co-written a curriculum that helps students make career choices. They visited work sites and met with representatives of businesses and industries in the classes. In 1997, several work-based learning programs were in place in the consortium. Job shadowing, youth apprenticeships, and specialized academies were the most prominent vehicles.

Job Shadowing

Job shadowing began in 1997 with ninth grade students and was identified as an important means for helping students focus on career decisions, and a manual was developed in the Sunland County School System to assist with implementation. Job shadowing, therefore, was intended to be an "out-of-school experience to be completed on the student's own time," but there could also be "an integration of reports and assignments among teachers" that would help students put their experience into an educational context. Business and industry in the region has sponsored job shadowing (health occupations, criminal justice assisting, teacher assisting), internship (Academy of Travel and Tourism), and co-operative education (business technology education and industrial co-operative education) experiences for students. Two high schools provided, through their respective Academies of Travel and Tourism, job shadowing experiences called "Students at Work" and "Hospitality Day on the Job." Because tourism is a significant part of the local economy at this site, many opportunities existed for this kind of activity within the field of travel and tourism.

Though job shadowing has been done on the student's own time during half days, holidays, weekends, or after school, it has been a component of a course titled "Blueprint for Professional Success." The advantages of this program to the students have included not only practical exposure to the world of business, but also a more accurate perspective on how education should fit into the student's life goals. It is perceived by local educators to make for more interesting coursework as well, as new ideas and "real-world topics" are infused into the classroom. Businesses also benefit from better relations with schools and the community at large, and from the opportunity job shadowing provides them to influence the development of the future workforce, and to generate positive relations in the community.

Youth Apprenticeships

STW encompasses three kinds of apprenticeships, according to the state's STW Handbook. Youth apprenticeships are composed of academic and technical classes combined with a "coordinated paid work experience component." A career major strategy was written for the student involved in a youth apprenticeship, based on career ladders. A youth apprenticeship could result in advanced placement higher level apprenticeships or involvement in similar postsecondary occupational and technical programs. Preapprenticeships are courses designed to prepare students to become apprentices. These courses are approved and registered by the Bureau of Apprenticeship of the Division of Jobs and Benefits, but must be part of a registered apprenticeship program. Finally, registered apprenticeships are also courses designed to contain "all terms and conditions for the qualifications, recruitment, selection, employment, and training of apprentices."

Several other work-based experiences have been provided. Clinical and practicum experiences have allowed students to work with practicing professionals, and result in credit toward certification, licensure, or a professional degree. Cooperative education programs provided students with "job preparatory instruction" of 40 or more hours in a paid position on a work-site coordinated with instruction. Internships can be exploratory or preparatory, paid or unpaid, and can center around any kind of special project or specially determined cluster of tasks drawn from a single occupation or set of occupations. Job shadowing allows the student to spend four or more hours with an experienced employee at a work site to get an impression of what a particular occupation involves. Mentoring, like job shadowing, pairs a student with an employee who possesses skills and knowledge in a particular occupation, but with the objective of encouraging the student to perform rather than observe. Mentoring is frequently implemented as part of apprenticeships, clinicals, practica, internships, cooperative education programs, and on-the-job training experiences.

Student Demographics, Experiences, and Preliminary Outcomes

The following section provides a summary of findings for a sample of 1995, 1996, and 1997 high school graduates in the Sunland Consortium who participated in Tech Prep, along with a comparison group of non-Tech Prep participants. The sample was selected from 15 of the 19 high schools in the Sunland County School District, and these schools were selected because they had implemented Tech Prep since the early 1990s and reported Tech Prep student enrollments during the 1995-1997 period this follow-up study was conducted. In this section results are discussed relative to student demographics and educational characteristics; math and vocational course-taking patterns; transition to postsecondary education; and employment during and after high school.

Following the state definition, this consortium defines a Tech Prep student as "any student at grade level by eleventh grade, who has completed at least one technical course in an articulated program of study, and two courses each of English, science, mathematics at level II or III prior to graduation." Level II courses include grade-level English, Algebra I or above in mathematics and Biology I or above in science. Most level III courses carry the honors or Advanced Placement (AP) label. Based on definitions adopted by the consortium (based on the state's prescription), a Tech Prep course of study consists of "an articulated sequence of technical courses taken during the final two years of high school and the two years of postsecondary education leading to an associate of science degree." Students engaged in Tech Prep are counseled to create an individualized program of study that fits the Tech Prep curriculum specification, but they are not labeled as Tech Prep students or treated as though they are part of special program. Besides the curriculum emphasis, Tech Prep in this consortium also involves a concerted effort at professional development for faculty and counselors, career guidance, and marketing.

The sample for the Sunland Consortium was selected by an institutional researcher employed by the Sunland School District, based on specifications provided by

NCRVE staff. The sample of Tech Prep graduates was identified using a computer program that sorted students into Tech Prep and non-Tech Prep groups based on an algorithm created to replicate the high school academic and vocational course-taking requirements specified locally for Tech Prep. Once the Tech Prep graduates were identified, they were arrayed according to class rank percentile separately by high school, and a random sample of approximately 300 was drawn, ensuring that the sample was reflective of the total population of Tech Prep graduates in each school and by graduation year. A comparable sample of non-Tech Prep graduates was selected at random from the same high schools using the same upper and lower limits on class rank percentiles as the Tech Prep group. Though a difference was not expected because the two groups were equivalent on class rank percentile, a difference was noted on cumulative GPA, with non-Tech Prep graduates showing a higher GPA than Tech Prep (t = 4.67, df = 592, p = .000). These results may have occurred because weighted grades were treated differently in the class rank percentile and cumulative GPA calculations by the local school district. Specifically, the difference may be due to more non-Tech Prep graduates having a weighted GPA of *over* 4.0 (all high school grades were converted to a 4.0 scale in this study) compared to the Tech Prep group, as opposed to the class rank percentile where academic performance was measured relative to peers. (Refer to Table 11 for frequency distributions for the two groups on class rank percentile and cumulative GPA.)

Demographic and Personal Characteristics

Sunland Consortium graduates were primarily White, but a higher percentage of Tech Prep high school graduates were Black (15%) or Hispanic (16%) than the non-Tech Prep group where 13% were Black and 13% were Hispanic. A slight majority of Tech Prep graduates were female, while non-Tech Prep graduates were evenly divided along gender lines. Most were single and without children, but slightly more Tech Prep graduates were married and had children than the non-Tech Prep group. Only a small percentage of graduates from either group reported living outside the parents' residence, either with a spouse, significant other, or friend or roommate (see Table 10).

The level of parents' education was lower for Tech Prep graduates than non-Tech Prep graduates. Fathers of Tech Prep graduates were more likely to have some college but no college degree (75%) than fathers of non-Tech Prep graduates (60%) (t = 3.20, df = 247, df = 247, p = .002). Mothers of Tech Prep graduates were also less likely to go to college but not complete a college degree (75%) than non-Tech Prep graduates (63%) (t = 2.19, df = 260, p = .03). Correspondingly, annual family income during the period the graduates' high school years, as reported on the follow-up survey, was lower among Tech Prep graduates (57% with an income of less than $45,000) than among non-Tech graduates (46% with an income of less than $45,000) ($t$ = 2.32, df = 214, p = .02). Notwithstanding this difference, the percentage of Tech Prep and non-Tech Prep graduates reporting an annual family income between $30,000 and $60,000 was identical (43%).

Table 10

Percentage Distribution on Selected Demographics by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=130	1995 Grad. n=16	1996 Grad. n=38	1997 Grad. n=75	Total Grad. n=141	1995 Grad. n=16	1996 Grad. n=50	1997 Grad. n=75
Gender								
Male	46.3	43.5	44.7	48.3	50.0	40.9	55.8	48.6
Female	53.7	56.5	55.3	51.7	50.0	59.1	44.2	51.4
Race/Ethnicity								
White, non-Hispanic	63.8	56.5	60.2	68.5	70.9	72.7	69.2	71.6
Black, non-Hispanic	15.4	19.6	15.5	14.1	12.5	9.1	12.5	13.5
Hispanic	16.1	19.6	18.4	13.4	12.8	18.2	13.5	10.8
Asian/Pacific Islander	3.4	2.2	5.8	2.0	3.7	0.0	4.8	4.1
Am. Indian/Alaskan Native	1.3	2.2	0.0	2.0	0.0	0.0	0.0	0.0
Marital status								
Single	84.5	87.5	81.6	85.3	92.8	81.3	91.8	95.9
Single with children	4.7	6.3	5.3	4.0	2.2	6.3	2.0	1.4
Married	7.0	0.0	10.5	6.7	3.6	12.5	4.1	1.4
Married with children	3.9	6.3	2.6	4.0	1.4	0.0	2.0	1.4

Table 10 (cont.)

Father's education level								
Less than high school graduate	13.6	7.7	8.8	16.9	11.5	12.5	12.8	10.3
High school graduate	39.0	46.2	38.2	38.0	26.7	37.5	31.9	20.6
Some college, no degree	22.0	23.1	32.4	16.9	21.4	6.3	14.9	29.4
Two-year associate's degree	10.2	7.7	8.8	11.3	4.6	0.0	10.6	1.5
Four-year bachelor's degree	12.7	15.4	11.8	12.7	25.2	31.3	25.5	23.5
Graduate degree	2.5	0.0	0.0	4.2	10.7	12.5	4.3	14.7
Mother's education level								
Less than HS graduate	11.7	12.5	10.5	12.2	9.7	0.0	12.8	9.9
High school graduate	40.6	62.5	26.3	43.2	33.6	50.0	27.7	33.8
Some college, no degree	22.7	6.3	31.6	21.6	20.1	12.5	23.4	19.7
Two-year associate's degree	12.5	6.3	18.4	10.8	10.4	6.3	10.6	11.3
Four-year bachelor's degree	7.0	0.0	10.5	6.8	18.7	25.0	19.1	16.9
Graduate degree	5.5	12.5	2.6	5.4	7.5	6.3	6.4	8.5
Family income								
$14,999 or less	13.7	14.3	10.0	15.5	6.1	0.0	12.5	3.4
$15,000 – $29,999	21.6	21.4	33.3	15.5	15.8	18.8	10.0	19.0
$30,000 – $44,999	21.6	21.4	23.3	20.7	24.6	18.8	32.5	20.7
$45,000 – $59,999	21.6	14.3	23.3	22.4	18.4	31.3	12.5	19.0
$60,000 – $74,999	5.9	7.1	3.3	6.9	15.8	18.8	15.0	15.5
$75,000 – $89,999	7.8	7.1	0.0	12.1	4.4	0.0	7.5	3.4
$90,000 or more	7.8	14.3	6.7	6.9	14.9	12.5	10.0	19.0
Present residence								
Live with my parent(s)	65.9	68.8	54.1	71.2	67.9	56.3	67.3	70.8
Live alone	7.1	18.8	5.4	5.5	4.4	6.3	6.1	2.8
Live with spouse or significant other	13.5	6.3	27.0	8.2	8.0	18.8	8.2	5.6
Live with a friend or roommate	13.5	6.3	13.5	15.1	19.7	18.8	18.4	20.8

Source: Education-To-Careers Follow-up Survey (n = 271) for all items except gender and race/ethnicity, which came from the Tech Prep High School Transcript File (n = 594)

Note: Details may not sum to 100 due to rounding.

Educational Characteristics

Overall results on class rank percentile and cumulative GPA show that the majority of Tech Prep graduates were in the 50th to 75th percentile and between 2.5 (B-/C+) and 3.5 (B+/A-) on a 4.0 scale at high school graduation (see Table 11). Almost no students were in the bottom quartile and only a small percentage were below the 50^{th} percentile, showing that the vast majority of both groups were not necessarily "middle majority" graduates but situated in the upper half of the high school graduating class. Based on cumulative GPA, non-Tech Prep graduates had even higher academic performance than Tech Prep ($t = 4.67$, $df = 592$, $p = .000$), and these results need to be taken into consideration when interpreting other findings.

Using information regarding whether students took the ACT or SAT during high school, we could determine their possible interest in enrollment in a four-year college or university. Results showed the non-Tech Prep graduates were much more likely to have taken either the ACT or SAT tests than Tech Prep graduates (ACT: $\chi^2=13.53$, $df = 1$, $p = .000$; SAT: $\chi^2 = 90.66$, $df = 1$, $p = .000$), indicating the possible inclination of non-Tech Prep graduates to attend four-year college over their Tech Prep counterparts.

Using high school transcripts, it was evident that both groups of high school graduates exceeded the minimum number of credits needed to graduate from high school. In fact, most graduates exceeded the minimum number of credits by at least 0-2 credits, with over 20% of each group exceeding the minimum by 3-5 credits. A slightly larger percentage of non-Tech Prep students (9.8%) exceeded the minimum by 6 or more credits than Tech Prep (4.3%), but this result was not statistically significant.

Follow-up survey results provided information on graduates' perceptions of their high school experiences, including a question on the utility of high school education. When asked how useful what students learned in high school was to what they had done since high school graduation, the responses were distributed predictably, with the largest percentage of both groups responding "fairly useful". Slightly more Tech Prep graduates indicated their high school education was very or extremely useful than the non-Tech Prep graduates, particularly in 1996 and 1997, but the difference between the total groups and cohorts within groups was not statistically significant.

Table 11

Percentage Distribution on Selected Educational Characteristics and Attitudes by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=298	1995 Grad. n=46	1996 Grad. n=103	1997 Grad. n=149	Total Grad. n=296	1995 Grad. n=44	1996 Grad. n=104	1997 Grad. n=148
Class rank percentile at HS graduation								
1 – 25%	1.1	0.0	0.0	2.1	0.7	0.0	0.0	1.4
26 – 50%	11.2	10.9	12.1	10.7	15.8	13.6	24.2	10.6
51 – 75%	53.3	41.3	50.5	59.3	54.7	50.0	44.4	63.4
76 – 100%	34.4	47.8	37.4	27.9	28.8	36.4	31.3	24.6
Cumulative GPA at HS graduation								
2.00 or less	0.3	0.0	0.0	0.7	0.0	0.0	0.0	0.0
2.01 – 2.50	4.4	2.2	6.8	3.4	3.6	0.0	6.2	2.8
2.51 – 3.00	36.7	39.1	44.7	30.4	31.0	36.6	34.0	27.3
3.01 – 3.50	38.0	32.6	31.1	44.6	33.1	19.5	23.7	43.4
3.51 – 4.00	12.8	17.4	12.6	11.5	15.7	7.3	21.6	14.0
4.00 and up	7.7	8.7	4.9	9.5	16.7	36.6	14.4	12.6
Took ACT								
Yes	19.8	19.6	19.4	20.1	33.1	25.0	36.5	33.1
No/Unknown	80.2	80.4	80.6	79.9	66.9	75.0	63.5	66.9
Took SAT								
Yes	28.9	28.3	22.3	33.6	67.9	70.5	72.1	64.2
No/Unknown	71.1	71.7	77.7	66.4	32.1	29.5	27.9	35.8
Credits beyond minimum graduation requirement (24)								
None	12.0	14.9	9.7	12.6	10.5	11.4	7.7	12.2
0 – 2	62.5	68.1	69.9	55.6	50.7	47.7	55.8	48.0
3 – 5	21.3	17.0	17.5	25.2	29.1	34.1	26.0	29.7
6 – 8	4.0	0.0	2.9	6.0	7.4	4.5	7.7	8.1
9 and up	0.3	0.0	0.0	0.7	2.4	2.3	2.9	2.0
Utility of high school learning								
Extremely useful	18.1	13.3	21.6	17.3	12.1	25.0	10.0	10.7
Very useful	24.4	26.7	21.6	25.3	24.8	6.3	34.0	22.7
Fairly useful	33.1	20.0	32.4	36.0	41.8	43.8	40.0	42.7
Somewhat useful	21.3	40.0	21.6	17.3	18.4	25.0	12.0	21.3
Not at all useful	3.1	0.0	2.7	4.0	2.8	0.0	4.0	2.7

Source: Tech Prep High School Transcript File for all items except utility of high school learning, which came from the Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Math and Vocational Course-Taking Patterns

State graduation requirements indicate that students should complete a minimum of three year-long math credits while enrolled in high school. As evident from Table 12, very few students took less than five or six semesters (two and one-half to three years) of math while in high school. However, especially for the Tech Prep group, the majority did not take more than six semesters of math, indicating they were probably meeting but not exceeding the minimum requirement for mathematics for high school graduation. By comparison, the majority of non-Tech Prep graduates (68%) went beyond the minimum to accumulate seven or more credits in contrast to only 36% of the Tech Prep graduates who took an equivalent amount (t = 7.09, df = 592, p = .000). It is important to point out, however, that the 1996 and 1997 cohorts of Tech Prep graduates were taking more math courses than earlier cohorts, and this positive change was approaching statistical significance at the .05 level (F = 2.66, df = 2, p = .07).

Looking at the specific math courses taken, Tech Prep graduates started the high school math curriculum at a lower level than non-Tech Prep graduates (t = 6.05, df = 592, p = .000). (See Appendix E for examples of math course titles corresponding to the categories discussed here.) Approximately 70% of the Tech Prep group started high school math with Pre-Algebra or below, compared to about 50% of the non-Tech Prep group. Consequently, non-Tech Prep graduates participated in higher math courses than Tech Prep by the time they graduated, with nearly 50% of the non-Tech Prep group taking advanced math (e.g. Trigonometry, Calculus) compared to only 19% of the Tech Prep group (t = 10.26, df = 592, p = .000). Honors and Advanced Placement (AP) courses in math followed a similar pattern, with non-Tech Prep students taking more honors/AP math courses than the non-Tech Prep group (t = 8.0, df = 592, p = .000). Almost half of the non-Tech Prep group took honors/AP math compared to approximately one-fourth of the Tech Prep group; however, participation in honors/AP math was increasing for the Tech Prep graduates. More 1997 Tech Prep graduates took honors/AP math than the previous cohorts, and this result was statistically significant (F = 4.12, df = 2, p = .017).

It is important to point out that there was an increase in higher-level math course-taking among the Tech Prep cohorts with approximately 60% of the 1997 cohort taking Algebra 2 or more advanced math compared to 50% of the 1995 cohort group ($F = 3.51$, $df = 2$, $p = .03$). The level of applied math courses differed for the total Tech Prep and non-Tech Prep groups, with more Tech Prep graduates taking applied math than non-Tech Prep ($t = 4.38$, $df = 592$, $p = .000$). Though the Tech Prep cohorts did not differ significantly, applied math course-taking appeared to be at its highest level in 1996, when approximately 50% of the 1996 Tech Prep cohort took at least one applied math course.

Table 12

Percentage Distribution on High School Math Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=298	1995 Grad. n=46	1996 Grad. n=103	1997 Grad. n=149	Total Grad. n=296	1995 Grad. n=44	1996 Grad. n=104	1997 Grad. n=148
Total math courses by semester:								
None	1.0	2.1	0.0	1.3	0.0	0.0	0.0	0.0
1 – 2	0.0	0.0	0.0	0.0	0.3	0.0	1.0	0.0
3 – 4	1.7	2.1	1.0	2.0	0.7	2.3	1.0	0.0
5 – 6	61.1	74.5	61.2	57.0	30.7	25.0	35.6	29.1
7 – 8	30.9	19.1	34.0	32.5	58.1	63.6	52.9	60.1
9 or more	5.3	2.1	3.9	7.3	10.1	9.1	9.6	10.8
Lowest math course								
Basic math	6.4	17.4	7.8	2.0	3.7	6.8	4.8	2.1
General math	7.7	2.2	10.7	7.4	1.7	0.0	1.9	2.0
Applied math	34.6	17.4	38.8	36.9	26.0	18.2	27.9	27.0
Pre-Algebra	20.8	30.4	18.4	19.5	16.2	11.4	12.5	20.3
Algebra 1	26.1	30.5	20.4	28.8	35.1	43.1	30.7	35.8
Geometry	4.3	2.2	3.9	5.4	16.9	20.4	22.1	12.2
Algebra 2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.7
Highest math course								
Basic math	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
General math	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Applied math	0.7	2.2	1.0	0.0	0.0	0.0	0.0	0.0
Pre-Algebra	5.4	4.3	4.9	6.0	1.7	4.5	1.9	0.7
Algebra 1	16.1	10.9	23.3	12.8	2.4	0.0	4.8	1.4
Geometry	24.2	32.6	26.2	20.2	9.4	9.1	15.4	5.4

Table 12 (cont.)

Algebra 2	34.6	36.9	30.1	36.9	38.2	34.0	27.8	46.6
Advanced math	19.1	13.0	14.6	24.2	48.4	52.3	50.0	45.9
Total applied math by semester:								
None	58.1	78.7	50.5	57.0	70.9	77.3	68.3	70.9
1 – 2	33.2	19.1	39.8	33.1	27.7	20.5	31.7	27.0
3 – 4	8.3	2.1	9.7	9.3	1.4	2.3	0.0	2.0
5 – 6	0.3	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Total honors and advanced placement (AP) math by semester:								
None	78.4	80.9	86.4	72.2	52.4	47.7	51.0	54.7
1 – 2	14.0	8.5	10.7	17.9	17.9	15.9	14.4	20.9
3 – 4	6.0	6.4	2.9	7.9	14.9	15.9	14.4	14.9
5 – 6	1.3	4.3	0.0	1.3	12.5	18.2	16.3	8.1
7 – 8	0.3	0.0	0.0	0.7	2.4	2.3	3.8	1.4

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding.

Vocational Course-taking

Business was the most popular vocational specialty area for both groups of high schools graduates (Tech Prep and non-Tech Prep), with subjects such as consumer and family studies (eg., child development, foods preparation), specific labor market courses (e.g., co-op), marketing and distribution, and health (e.g., dental, nursing) also attracting sizeable enrollments. Less popular vocational areas, meaning those attracting less than about 20% of Tech Prep or non-Tech Prep graduates, included construction (e.g., carpentry, plumbing), mechanics/repairers (e.g., air conditioning, refrigeration, and heating; mechanics trades), technical/communications (e.g., telecommunications, manufacturing technology), agriculture (e.g., agriculture business, horticulture), and precision production (e.g., electronics, graphic arts).

The two groups showed significant differences in participation in a number of vocational specialty areas, with more Tech Prep graduates enrolling in vocational education than non-Tech Prep. Results showing significant differences between groups follow:

- More Tech Prep than non-Tech Prep graduates took business courses (χ^2 = 4.59, *df* = 1, *p* = .03);
- More Tech Prep graduates took agriculture courses than non-Tech Prep graduates (χ^2 = 7.23, *df* = 1, *p* = .000);
- More Tech Prep graduates enrolled in health courses than non-Tech Prep graduates (χ^2=9.43, *df* = 1, *p* = .002);
- More Tech Prep graduates were engaged in courses in the mechanics/repairers area than non-Tech Prep graduates (χ^2 = 8.56, *df* = 1, *p* = .003); and
- More Tech Prep graduates were enrolled in courses in the precision production area than non-Tech Prep graduates (χ^2=13.16, *df* = 1, *p* = .000).

Though enrollments beyond the introductory level were uncommon in any specialty area, significant differences were noted between the Tech Prep and non-Tech Prep groups in the levels of courses taken within several Secondary School Taxonomy (SST) coding categories, indicating differences in sequential course-taking in vocational specialty areas. The levels referred to here relate to the SST coding typology where taking the first course in a vocational sequence is represented by Level 1, taking the second course is represented by Level 2, and taking a specialty course is represented by Level 3. (Appendix F provides further identification of vocational courses that fit the Level 1, 2 and 3 categories.) When interpreting results in Table 13 below, it is important to note that most high schools do not offer three levels of many vocational specialty areas or the number of advanced courses is limited, so few students have the opportunity to enroll. Knowing this, results comparing Tech Prep and non-Tech Prep groups follow:

- More Tech Prep than non-Tech Prep graduates took sequential courses in business (χ^2 = 15.63, *df* = 4, *p* = .004);
- More Tech Prep than non-Tech Prep graduates engaged in sequential course-taking in agriculture (χ^2 = 14.42, *df* = 4, *p* = .006);

- Fewer Tech Prep than non-Tech Prep graduates engaged in sequential course-taking in health (χ^2 = 13.56, *df* = 4, *p* = .009);

- More Tech Prep than non-Tech Prep graduates engaged in sequential course-taking in the precision production area (χ^2 = 17.26, *df* = 4, *p* = .004); and

- More Tech Prep than non-Tech Prep graduates participated in sequential course-taking in the mechanics/repairers area (χ^2 = 13.50, *df* = 3, *p* = .004).

Table 13

Percentage Distribution on Vocational-Technical Education Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=298	1995 Grad. n=46	1996 Grad. n=103	1997 Grad. n=149	Total Grad. n=296	1995 Grad. n=44	1996 Grad. n=104	1997 Grad. n=148
Course-taking in vocational area:								
Business	41.2	42.6	44.7	38.4	33.1	36.4	27.9	35.8
None	58.8	57.4	55.3	61.6	66.9	63.9	72.1	64.2
Agriculture	17.6	14.9	13.6	21.2	10.1	11.4	6.7	12.2
None	82.4	85.1	86.4	78.8	89.9	88.6	93.3	87.8
Consumer/family studies	25.6	31.9	25.2	23.8	30.4	43.2	30.8	26.4
None	74.4	68.1	74.8	76.2	69.6	56.8	69.2	73.6
Health	15.6	12.8	18.4	14.6	26.0	40.9	29.8	18.9
None	84.4	87.2	81.6	85.4	74.0	59.1	70.2	81.1
Construction	13.0	4.3	10.7	17.2	9.5	2.3	7.7	12.8
None	87.0	95.7	89.3	82.8	90.5	97.7	92.3	87.2
Technical/communications	14.6	10.6	10.7	18.5	13.9	4.5	10.6	18.9
None	85.4	89.4	89.3	81.5	86.1	95.5	89.4	81.1
Precision production	20.3	17.0	20.4	21.2	9.8	6.8	5.8	13.5
None	79.7	83.0	79.6	78.8	90.2	93.2	94.2	86.5
Mechanics/repairers	9.6	8.5	10.7	9.3	3.7	2.3	4.8	3.4
None	90.4	91.5	89.3	90.7	96.3	97.7	95.2	96.6
Marketing	21.9	10.6	22.3	25.2	17.2	13.6	14.4	20.3
None	78.1	89.4	77.7	74.8	82.8	86.4	85.6	79.7

Table 13 (cont.)

Specific labor market	23.6	19.1	28.2	21.9	20.9	13.6	19.2	24.3
None	76.4	80.9	71.8	78.1	79.1	86.4	80.8	75.7
Business								
None	58.8	57.4	55.3	61.6	66.9	63.6	72.1	64.2
Only level 1	21.3	17.0	22.3	21.9	21.3	31.8	18.3	20.3
Only level 1 and 2	12.6	10.6	14.6	11.9	7.8	2.3	7.7	9.5
Only level 1 and 3	0.7	0.0	1.9	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	4.3	14.9	2.9	2.0	0.7	2.3	0.0	0.7
Other	2.3	0.0	3.8	2.6	3.4	0.0	1.9	5.4
Agriculture								
None	82.4	85.1	86.4	78.8	89.9	88.6	93.3	87.8
Only level 1	6.6	2.1	4.9	9.3	3.0	2.3	2.9	3.4
Only level 1 and 2	8.6	10.6	6.8	9.3	5.1	6.8	1.9	6.8
Only level 1 and 3	0.3	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	1.7	0.0	1.0	2.6	0.0	0.0	0.0	0.0
Other	.3	2.1	0.0	0.0	2.0	2.3	2.1	2.1
Consumer/family studies								
None	74.4	68.1	74.8	76.2	69.6	56.8	69.2	73.6
Only level 1	22.3	31.9	25.2	17.2	16.9	13.6	18.3	16.9
Only level 1 and 2	2.7	0.0	0.0	5.3	1.4	0.0	0.0	2.7
Only level 1 and 3	0.0	0.0	0.0	0.0	0.7	2.3	1.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	.7	0.0	0.0	1.3	11.5	27.3	24.0	6.8
Health								
None	84.4	87.2	87.6	85.4	74.0	59.1	70.2	81.1
Only level 1	3.0	0.0	2.9	4.0	3.0	0.0	5.8	2.0
Only level 1 and 2	8.6	6.4	12.6	6.6	13.9	34.1	10.6	10.1
Only level 1 and 3	0.0	0.0	0.0	0.0	0.7	0.0	1.9	0.0
Minimum 1 in each level	1.3	0.0	0.0	2.6	5.1	4.5	8.7	2.7
Other	2.6	6.4	2.9	1.4	3.4	2.3	2.9	4.0
Construction								
None	87.0	95.7	89.3	82.8	90.5	97.7	92.3	87.2
Only level 1	4.3	0.0	1.0	7.9	2.7	0.0	1.9	4.1
Only level 1 and 2	8.6	4.3	9.7	9.3	6.8	2.3	5.8	8.8
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	3.0	4.3	.7	7.2	9.5	2.3	7.7	12.8
Technical/communications								
None	85.4	89.4	89.3	81.5	86.1	95.5	89.4	81.1
Only level 1	11.3	10.6	10.7	11.9	10.5	2.3	7.7	14.9
Only level 1 and 2	3.3	0.0	0.0	6.6	2.7	0.0	1.9	4.1

Table 13 (cont.)

Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	.7	2.2	1.0	0.0
Precision production								
None	79.7	83.0	79.6	78.8	90.2	93.2	94.2	86.5
Only level 1	7.6	6.4	7.8	7.9	5.1	4.5	2.9	6.8
Only level 1 and 2	12.0	10.6	12.6	11.9	4.4	2.3	1.9	6.8
Only level 1 and 3	0.0	0.0	0.0	0.0	0.3	0.0	1.0	0.0
Minimum 1 in each level	0.7	0.0	0.0	1.3	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mechanics/repairers								
None	90.4	91.5	89.3	90.7	96.3	97.7	95.2	96.6
Only level 1	3.7	0.0	5.8	3.3	3.0	2.3	3.8	2.7
Only level 1 and 2	5.6	8.5	4.9	5.3	0.7	0.0	1.0	0.7
Only level 1 and 3	0.3	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marketing								
None	78.1	89.4	77.7	74.8	82.8	86.4	85.6	79.7
Only level 1	2.7	0.0	1.0	4.6	1.4	0.0	1.0	2.0
Only level 1 and 2	8.6	4.3	9.7	9.3	6.8	2.3	5.8	8.8
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	10.6	6.3	11.6	11.3	9.1	11.3	7.7	9.5
Specific labor market								
None	76.4	80.9	71.8	78.1	79.1	86.4	80.8	75.7
Only level 1	5.6	2.1	6.8	6.0	10.8	4.5	10.6	12.8
Only level 1 and 2	0.7	0.0	1.9	0.0	0.7	0.0	0.0	1.4
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	17.3	17.0	19.5	15.9	9.4	9.1	8.6	10.1

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding. The “other” category includes course combinations other than those specified, and this category was not included in significance testing. Between group differences were computed on the total groups, but not cohorts by year due to small cell sizes.

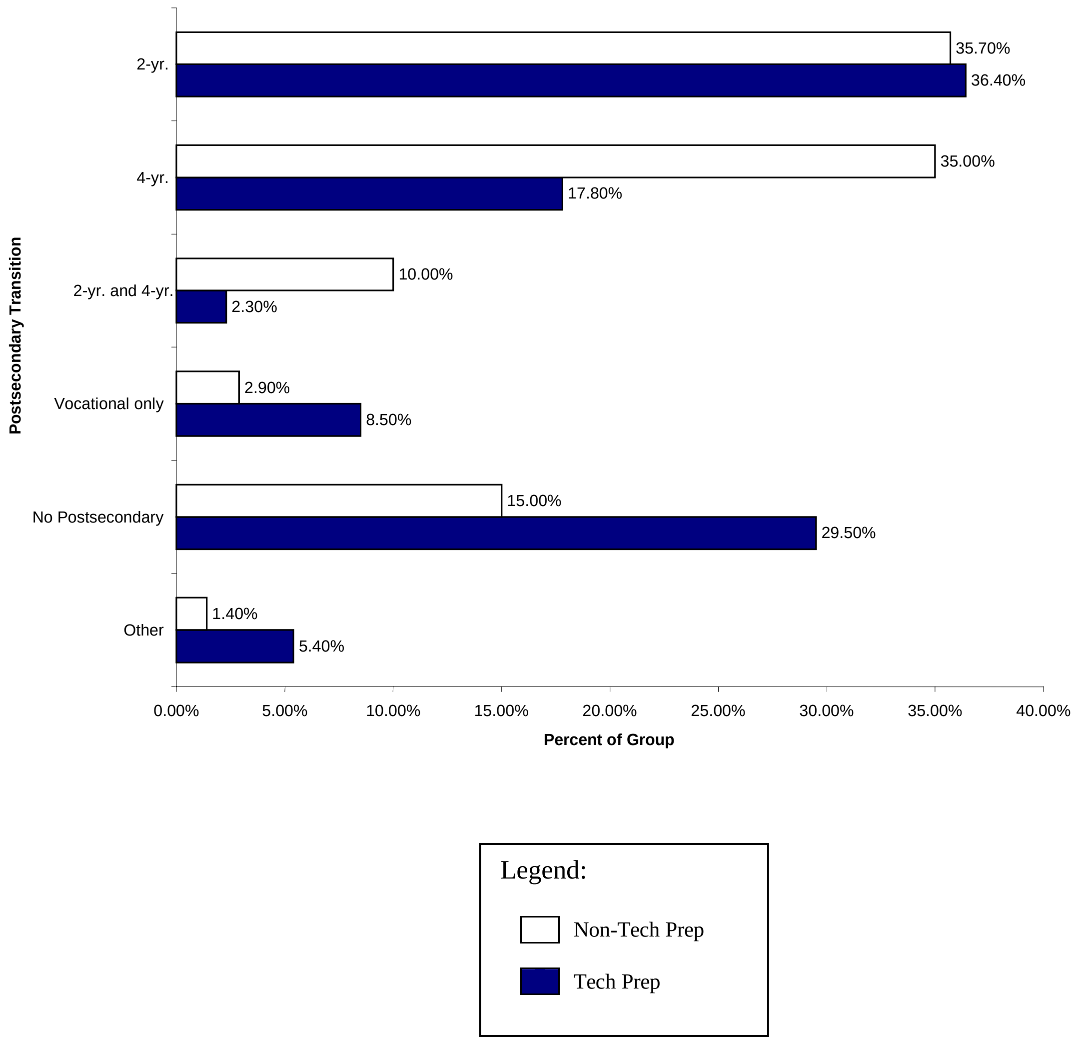
Transition to Postsecondary Education

Overall, a large proportion of Tech Prep and non-Tech Prep high school graduates, nearly 50%, were identified has having a transcript at SCC, revealing that slightly over 40% of Tech Prep graduates had matriculated to SCC, compared to just over 50% of the non-Tech Prep group. Based on follow-up survey results, a very large proportion of all graduates studied had continued on to college after high school graduation in the Sunland Consortium. In fact, 70% of Tech Prep and 85% of non-Tech Prep high school graduates had continued to some form of postsecondary education within one to three years following high school graduation (see Figure 4).

When looking at the transition patterns reported in the follow-up survey results, slightly more than one-third of the Tech Prep and non-Tech Prep graduates indicated they had attended a two-year college only and another smaller group had also attended a two- and four-year college. Transition to four-year college was apparent for the Tech Prep and non-Tech Prep groups, but the percentage of graduates matriculating to four-year college differed. Over one-third of the non-Tech Prep group had attended four-year college compared to about 18% of the Tech Prep group. Also, nearly 30% of the Tech Prep group had gone directly to work without pursuing postsecondary education at all (as of yet), compared to 15% of the non-Tech Prep group. Also, nearly 10% of the Tech Prep group attended a postsecondary vocational school, but few non-Tech Prep students did so.

Figure 4

Transition to Postsecondary Education by Tech Prep Status



Employment During and After High School

The vast majority of graduates in both groups worked at some time during high school, with over 80% reporting having a job before they finished high school. Most graduates reported making $6.00 per hour or less in the jobs they held during high school. Slightly over 30% of the Tech Prep graduates made $6.01 or more compared to 22% of the non-Tech Prep group. Differences in wages between the two groups were not significantly different, however. In terms of hours worked per week, most graduates reported working between 11 and 30 hours in the jobs they held during high school. Tech Prep graduates tended to work fewer hours than their non-Tech Prep counterparts, but the groups did not differ on a statistical level. Even so, more Tech Prep graduates worked 11 to 20 hours per week than 21 to 30 hours, whereas non-Tech Prep graduates were evenly divided between working 11 to 20 and 21 to 30 hours per week.

Table 14

Percentage Distribution in Employment Experiences During High School by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=130	1995 Grad. n=16	1996 Grad. n=38	1997 Grad. n=75	Total Grad. n=141	1995 Grad. n=16	1996 Grad. n=50	1997 Grad. n=75
Employed during high school								
No	13.3	18.8	10.5	13.5	17.1	25.0	18.0	14.9
Yes	86.7	81.3	89.5	86.5	82.9	75.0	82.0	85.1
Estimated hourly wages in last job held before high school graduation								
Zero – unpaid	0.9	0.0	2.9	0.0	0.0	0.0	0.0	0.0
Less than $5.25 /hr	27.7	30.8	29.4	26.2	30.7	16.7	40.0	27.4
$5.26 to $6.00 /hr	39.3	61.5	35.3	36.9	47.4	50.0	42.5	50.0
$6.01 to $7.00 /hr	22.3	0.0	26.5	24.6	10.5	16.7	7.5	11.3
$7.01 to $8.00 /hr	8.0	7.7	2.9	10.8	6.1	16.7	2.5	6.5
More than $8.00 /hr	1.8	0.0	2.9	1.5	5.3	0.0	7.5	4.8

Table 14 (cont.)

Total hours worked during typical week in high school								
Less than 5 hours	0.0	0.0	0.0	0.0	2.6	8.3	2.4	1.6
6 – 10 hours	4.5	0.0	0.0	4.6	6.9	8.3	2.4	9.5
11 – 20 hours	43.8	15.4	52.9	44.6	37.9	33.3	43.9	34.9
21 – 30 hours	31.3	15.4	26.5	32.3	39.7	50.0	39.0	38.1
31 – 40 hours	19.6	38.5	20.6	16.9	9.5	0.0	7.3	12.7
More than 40 hours	0.9	30.8	0.0	1.5	3.4	0.0	4.9	3.2

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Work After High School

Most graduates reported working in one to four jobs between the time they graduated from high school and the time they completed the follow-up survey one to three years later. More recent graduates held fewer jobs since finishing high school than longer-term graduates, probably because they had more time to experience different employment situations (Tech Prep: $F = 5.97$, $df = 2$, $p = .003$; non-Tech Prep: $F = 3.12$, $df = 2$, $p = .05$). In regard to current employment, few students worked more than one job; however, 1997 Tech Prep graduates were more likely to hold two jobs than the graduates of earlier cohorts ($F = 3.67$, $df = 2$, $p = .03$).

Most Tech Prep high school graduates worked full-time, though slightly over one-third worked part-time. Non-Tech Prep graduates were fairly equally divided between full-time and part-time status. Overall, most graduates in both groups worked in their current primary job 24 months or less, and earned between $6.01 and $10.00 per hour. The change in wages from high school graduation to current employment was significant for the cohort groups associated with both groups, with approximately 40% of the 1995 cohorts reporting a $5.00 or more positive change in wages compared to 10% to 15% of the 1997 cohorts (Tech Prep: $F = 3.55$, $df = 2$, $p = .03$; non-Tech Prep: $F = 8.39$; $df = 2$, $p = .000$). Most respondents were very or fairly satisfied with their current jobs, and there were no differences between the groups or cohorts within groups. Most graduates indicated their current jobs were entry level/unskilled or semi-skilled, but nearly all wanted a skilled, technical or professional job some day. Most graduates were very or extremely confident that they would attain their career goals.

Table 15

Percentage Distribution of Post High School Employment by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=130	1995 Grad. n=16	1996 Grad. n=38	1997 Grad. n=75	Total Grad. n=141	1995 Grad. n=16	1996 Grad. n=50	1997 Grad. n=75
Number of jobs since HS								
1 – 2	29.5	25.0	18.4	36.0	27.1	6.3	24.5	33.3
3 – 4	38.8	18.8	42.1	41.3	35.0	31.3	34.7	36.0
5 – 6	18.6	25.0	21.1	16.0	20.7	37.5	20.4	17.3
7 – 8	5.4	6.3	5.3	5.3	12.1	12.5	16.3	9.3
9 or more	5.4	25.0	7.9	0.0	3.6	12.5	2.0	2.7
None	2.3	0.0	5.3	1.3	1.4	0.0	2.0	1.3
Number of jobs held currently								
0	8.3	28.6	5.7	5.6	9.2	6.7	6.7	11.3
1	84.2	71.4	88.6	84.5	78.6	73.3	84.4	76.1
2	6.7	0.0	2.9	9.9	10.7	13.3	6.7	12.7
3 or more	0.8	0.0	2.9	0.0	1.5	6.7	2.2	0.0
Current employment status								
Full-time (35 hours or more per week)	56.1	53.3	61.1	54.2	45.8	60.0	43.5	44.3
Part-time (less than 35 hours per week)	34.1	20.0	30.6	38.9	42.0	26.7	43.5	44.3
Unemployed seeking employment	7.3	13.3	8.3	5.6	5.3	6.7	2.2	7.1
Unemployed not seeking employment	1.6	6.7	0.0	1.4	6.1	6.7	8.7	4.3
Military full-time	0.8	6.7	0.0	0.0	0.8	0.0	2.2	0.0
Months worked in current primary job								
Less than 6 months	24.3	40.0	18.8	24.6	31.9	28.6	31.0	33.3
6 – 12 months	28.8	10.0	31.3	30.4	18.5	7.1	14.3	23.8
13 – 24 months	24.3	30.0	9.4	30.4	27.7	35.7	23.8	28.6
25 – 36 months	9.0	10.0	15.6	5.8	10.1	14.3	19.0	3.2
36 months or more	13.5	10.0	25.0	8.7	11.8	14.3	11.9	11.1
Wages per hour, current primary job								
Zero	1.8	10.0	0.0	1.5	0.0	0.0	0.0	0.0
$5.25 or less	2.7	0.0	3.1	2.9	6.1	7.1	4.9	6.7

Table 15 (cont.)

$5.26 – $6.00	13.6	20.0	12.5	13.2	17.4	7.1	12.2	23.3
$6.01 – $7.00	16.4	0.0	18.8	17.6	24.3	7.1	26.8	26.7
$7.01 – $8.00	17.3	10.0	9.4	22.1	11.3	7.1	12.2	11.7
$8.01 – $9.00	18.2	20.0	21.9	16.2	15.7	21.4	14.6	15.0
$9.01 – $10.00	11.8	20.0	9.4	11.8	8.7	7.1	12.2	6.7
$10.01 – $11.00	9.1	0.0	15.6	7.4	5.2	7.1	7.3	3.3
More than $11.00	9.7	20.0	9.4	7.3	11.2	35.7	9.7	6.6
I don't know	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change in wages per hour from HS to present								
-$1.00	2.0	0.0	0.0	3.3	7.4	0.0	6.3	9.8
0	12.2	0.0	10.3	14.8	10.5	8.3	3.1	15.7
+$1.00	24.5	25.0	20.7	26.2	20.0	0.0	18.8	25.5
+$2.00	13.3	12.5	10.3	14.8	20.0	16.7	15.6	23.5
+$3.00	17.3	0.0	17.2	19.7	13.7	25.0	18.8	7.8
+$4.00	10.2	25.0	13.8	6.6	10.5	8.3	15.6	7.8
+$5.00 or more	20.4	37.5	27.4	14.7	18.0	41.6	21.9	9.9
Type of current primary job								
Entry level/unskilled	45.9	60.0	42.4	45.6	48.7	42.9	47.6	50.8
Semi-skilled	32.4	20.0	30.3	35.3	37.8	42.9	42.9	33.3
Skilled or technical	13.5	0.0	21.2	11.8	6.7	0.0	4.8	9.5
Professional	8.1	20.0	6.1	7.4	6.7	14.3	4.8	6.3
Type of primary job desired								
Entry level/unskilled	5.6	12.5	0.0	6.8	0.7	0.0	0.0	1.3
Semi-skilled	8.0	6.3	8.6	8.1	4.3	0.0	4.1	5.3
Skilled or technical	16.8	18.8	20.0	14.9	17.1	0.0	18.4	20.0
Professional	69.6	62.5	71.4	70.3	77.9	100.0	77.6	73.3
Satisfaction with primary job								
Extremely satisfied	25.5	30.0	24.2	25.4	16.8	14.3	9.5	22.2
Very satisfied	32.7	40.0	30.3	32.8	25.2	50.0	21.4	22.2
Fairly satisfied	20.0	20.0	27.3	16.4	37.0	21.4	38.1	39.7
Somewhat satisfied	15.5	10.0	9.1	19.4	12.6	7.1	21.4	7.9
Not at all satisfied	6.4	0.0	9.1	6.0	8.4	7.1	9.5	7.9
Confidence in reaching career goals								
Extremely confident	49.6	43.8	50.0	50.7	57.1	68.8	61.2	52.0
Very confident	30.4	31.3	19.4	35.6	21.4	18.8	18.4	24.0
Fairly confident	12.0	12.5	16.7	9.6	16.4	12.5	10.2	21.3
Somewhat confident	8.0	12.5	13.9	4.1	3.6	0.0	8.2	1.3
Not at all confident	0.0	0.0	0.0	0.0	1.4	0.0	2.0	1.3

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Summary

A primary goal of the Sunland Consortium was to improve education and work opportunities beyond high school for all students, but especially for the neglected majority. The consortium sought to accomplish this objective by replacing the general education track with Tech Prep curricula and by putting into place an articulation structure that would foster transition to the community college. The definition of a Tech Prep student was any student who was on grade level by the junior year who had completed at least one technical course in an articulated program and taken two courses each of English, science, and mathematics at levels II or III. The connection that bound the secondary and postsecondary levels together for students was the articulated program of study and the Gold Seal Scholarship that provided financial support for Tech Prep high school graduates entering the community college. The STW initiative contributed to the objectives of Tech Prep by placing even greater attention on raising academic standards, reducing the dropout rate, improving career guidance, and increasing work-based learning (WBL) opportunities.

To accomplish its objectives the consortium emphasized three closely related components: career guidance, professional development, and marketing. Early in the initiative the Sunland Consortium focused on the professional development of guidance counselors and faculty, emphasizing the role these individuals could play in facilitating students' career and educational decisions and encouraging them to consider a career that would require preparation through a Tech Prep program of study. More recently the consortium spent considerable effort in marketing Tech Prep and STW in the lower grades and recruiting students as early as the eighth grade, and these efforts were undertaken with STW funds. Business and industry also contributed to the training and development of faculty and counselors and to the increased emphasis on career awareness for students from the elementary grades through the community college. Local and state evaluation were a predominant force in this consortium, and evaluation results obtained through surveys of students, parents and employers were used to improve programs.

Integration of curriculum, one of the earliest aspects of Tech Prep implementation, had seen mixed success. Efforts at integration of curriculum took place most readily between language arts and health, engineering, and culinary arts. In other areas, integration was less evident. Applied academics courses were shown to yield positive outcomes, but, in recent years, these courses were replaced with standard academic courses supplemented with contextual teaching and learning strategies. In fact, results from this study suggested applied academics course-taking peaked during the 1995-96 academic year, though longer-term trend data are needed to confirm this result. No doubt, faculty had difficulty implementing more complex curriculum integration strategies, but some change occurred in recent years. In Sunland City Technical High School, career academies had begun to take hold and career clusters were used to organize an integrated curricular approach.

Students in the Sunland Consortium participated in a Tech Prep curriculum that was evolving over the years when data were collected for this study. The curriculum emphasized a core sequence of academics (math, science, and English/language arts) and at least one technical course at the secondary level. To be considered a Tech Prep high school graduate, completion of Algebra 1 was a requirement as well. When STW was incorporated into the local initiative in 1996 and 1997, students in this study were completing high school, so the key elements that STW contributed such as career guidance and WBE were not fully developed. Given this context, we learned that Tech Prep students did not take as much math as their non-Tech Prep counterparts, but most did complete three years, as required for high school graduation. Whereas Tech Prep students did not reach as high a level of math as non-Tech Prep graduates, more than one-half reached the Algebra 2 or even more advanced level. Later cohorts of Tech Prep students were taking more math courses than earlier ones, suggesting that they were meeting and surpassing the high school graduation requirements specified by the state. At the same time, Tech Prep graduates were taking more vocational-technical courses than their non-Tech Prep counterparts, especially in areas such as business, health, mechanics/repairers, and precision production. Transition to college was prevalent for both groups with at least 70% reporting having attended some type of postsecondary education institution within one to three years of high school graduation. Two-year college was chosen as a postsecondary option by over one-third or more of both groups. Still, more Tech Prep high school graduates chose to go to work without transitioning to college than the non-Tech Prep group. With respect to employment after high school, the significant change in wages between high school graduation to the current job was evident for both groups, with approximately 40% of the 1995 Tech Prep and non-Tech Prep cohorts reporting a $5.00 or more positive change in wages.

In the future leaders of the Sunland Consortium plan further development of integrated curriculum, in particular using the model of learning communities at the postsecondary level, while simultaneously replacing high school applied academics courses with contextual learning infused into traditional classes. In conjunction with this change, the consortium will probably continue to develop WBL and school-based cooperative enterprises, though the consortium has not given considerable attention to youth apprenticeships due to a lack of interest and support among the local partners. Overall, the Sunland Tech Prep Consortium has proven itself to be resilient in its approach to educational improvement, making some radical changes such as eliminating the secondary general track and replacing it with Tech Prep graduation requirements. Consortium leaders have shown a willingness to take risks. Experiments have often succeeded but sometimes failed, causing leaders to seek new alternatives. Of course there is no crystal ball view into the future of Tech Prep in this consortium, but it seems clear that the leaders who put Tech Prep in place will continue to strive to address the needs of the students of Sunland County.

NORTHWEST REGIONAL EDUCATIONAL CONSORTIUM

Frances B. Caldwell[1] and Carolyn J. Dornsife

Community Context

The Northwest Regional Educational Consortium (Northwest Consortium) comprises an area of approximately 950 square miles bordering the state's largest city. Northwest Community College (NWCC) is the consortium's fiscal agent and primary postsecondary partner. This region has a growing population of over 216,000 people, with a racial demography reflecting the state, primarily Caucasian (80%). Many residents work in the principal industries in the area: manufacturing, tourism, transportation, and the wholesale and retail trade. The largest manufacturers are in the aerospace, microchips and integrated circuits, computers and information processing, and telecommunications industries. The area also has a large manufacturer of windows and doors, forklift attachments, and metals. Community leaders target biotechnology, high tech, and metals as key developing industries. In 1997, most of the population enjoyed full employment with a low county unemployment rate of 3%. The median household income in 1990 was $31,833, and is undoubtedly higher today.

From the first days the Northwest Consortium formed in 1986, members have remained relatively stable, including representatives of Northwest Community College District and the Regional Educational Service District serving seven high schools. Other members have included a postsecondary propriety school, postsecondary apprenticeship programs, representatives from business and industry associations, and a labor group.

The consortium high schools are predominantly Caucasian, with a small percentage of Black, Hispanic, Asian, and Native American students. The dropout rates range from about 5% to 8% in the three high schools participating in our study (see Table 1). Consortium administrators indicated in a local handbook that they expected this rate to

[1] Frances B. Caldwell works as an educational consultant in the northwest region of the United States. She has written academic curriculum for numerous agencies and institutions and recently published an anti-violence youth workbook and teacher's guide for use with at-risk youth.

decrease due to the implementation of a variety of new programs that are designed to fit the individual interests of students.

Table 1

Enrollment of NWRC High Schools during 1996-97 School Year

School	Total Enroll-ment for 1996-97	Drop Out Rate for 1996-97	White	Black	Latino/ Hispanic	Asian/ Pacific Islander	Native American
501	1,643	7.9%	89.6%	1.8%	2.9%	8.2%	0.8%
502	1,982	4.8%	82.3%	1.3%	4.1%	9.4%	9.4%
503	2,240	6.9%	85.4%	2.8%	7.1%	4.0%	0.7%

Source: State Department of Education web site

Note: Table shows enrollment and demographics for the three high schools participating in this study.

NWCC, at the center of the consortium, opened its doors in 1966, and today over 30,000 students enroll annually, including a third of all graduating high school seniors in the Northwest Consortium district. The main campus is approximately 200 acres. NWCC students also attend classes at two other locations in the area and district high schools. In addition to the consortium, high school graduates have over 16 four-year universities and two other two-year colleges in the immediate area from which to choose.

The college offers a variety of degrees, including the Associate of Applied Science (AAS), Associate of Arts (AA), and the Associate of General Studies (AGS) degree with a set of articulated requirements for the attainment of each of these degrees. In addition it provides students with a wide range of professional-technical[2] classes that enable them to build skills in their area of interest. The college has over 150 faculty members in its various programs. Specialized program advisers act as the main resource for students' academic needs and inquiries.

The college also offers students resources and options to explore four-year universities and enables them to transfer to various state universities after completing two years of study at NWCC.

[2] In this state the term "professional-technical education" has been adopted statewide to replace the term "vocational education."

Economic and Political Context

Economic and political forces at the local, state, and national levels have played an important role in the development of Tech Prep for the Northwest Consortium. In the late 1980s and early 1990s, globalization of the marketplace brought about by improved technology required U.S. companies to compete on a worldwide basis. Employers throughout the nation called for new hires to possess strong academic skills and basic technological training. This northwest state was no exception to the trend. Reports from the workplace concerning the skills of high school graduates were not encouraging. Though for eight years in a row (1991-1998) high school SAT scores had been the highest of 23 states with at least 40% of their students taking the test, the state reported that employers thought the average student lacked basic work skills. Furthermore, dropout rates remained high. In 1996-97 a four-year date collection effort showed a 25% dropout rate for grades 9 through 12, according to the state report card for 1997-1998. Wanting to attract high tech industry, state lawmakers recognized as early as the late 1980s that more efforts needed to be made to produce a qualified workforce, and reform efforts during the past decade have attempted to address these challenges.

In 1991 the state legislature passed a major education reform bill. The state business council comprising of 44 of the state's largest employers endorsed the bill (and supported the federal Tech Prep efforts that was initiated at about the same time). The state education reform act is most noted for establishing the Certificate of Initial Mastery (CIM) awarded by the end of the tenth grade to students who satisfactorily demonstrate foundational academic and technical skills. It also set up the Certificate of Advanced Mastery (CAM) awarded at the end of the twelfth grade to students exhibiting advanced mastery in one of six career-related (endorsement) areas: arts and communications, business management, health services, human services, industrial and engineering systems, and natural resource systems. The 1998-99 school year is the first time for a CIM to be awarded to tenth grade students, and assessments for the certificate were taken in English and math. In theory, students in the class of 2001 will be the first to earn a CAM. In practice, for a myriad of political and economic reasons, many schools do not have the structures in place to award these certificates.

While the actual reform act adopting these new educational initiatives was not passed until 1991, there were significant implications at the local level for vocational education even prior to that time. In the region where Northwest Consortium is located, educators had been looking for viable educational programs for students who needed employability skills but were not necessarily looking for a four-year degree. The passing of CIM/CAM in 1991 offered educators in the area an opportunity to further refine what they wanted to accomplish in eleventh and twelfth grades and to create an avenue for students after high school to continue to enhance their skills. With the advisory committees driving much of the effort, reform of vocational education was well in motion in the early years of the decade of the ‘90s.

In addition to providing an avenue for the kinds of educational experiences area educators wanted their students to have, CIM/CAM implementation also provided an avenue for raising academic standards for students. From the time the reform act was passed to endorse CIM/CAM, discussions of standards and proficiencies have taken place among the educational and business/industrial communities – including discussions of academic standards and the set of standards and proficiencies desired by area employers. As the consortium’s Tech Prep coordinator indicated, “all the forces were coming together” in those years for educators to embrace reform that would incorporate the new state process as well as business/industry concerns. As he said, “all conversations at that time were standards-based conversations.” The end result of this early transition away from more traditional vocational education was that Tech Prep became a part of the solution in this region by providing a connection to business/industry and an opportunity for them to communicate what they needed in a future workforce.

In the early years of the reform act, CAM was not really defined except for six broad endorsement areas; therefore, local schools had a great deal of latitude to develop programs. For example, in the early 1990s allied health was modified from a local secondary program to a regional 2+2 program. This modification enabled students to be pro-

provided with opportunities for clinical experiences across the geographic region of the entire consortium rather than their being limited to clinical experiences provided through a local secondary school program. This strategy for developing this particular 2+2 Tech Prep program worked well over time, and the success in health/sciences encouraged further efforts in developing a 2+2 program in the area of microelectronics. Two major corporations located in the region wanted “connected paths” from educational institutions to their companies, and a microelectronics training center was set up to accomplish that goal.

However, like other regions of the country with volatile industries and fluctuating economies that are dependent on an increasingly global marketplace, this site continued to be faced with issues of how to build programs of preparation that were sustainable and relevant to a broad range of students and not completely dependent on local labor market volatility. To resolve this potential problem, the consortium solicited more input from business/industry to promote a more regional focus and to allow students more choices within pathways. By 1993-94 Tech Prep had begun to broaden its 2+2 efforts to extend beyond the two-pronged, regionally focused professional-technical education programs (i.e., microelectronics and allied health) that were predominant prior to the implementation of Tech Prep and during its very early years of existence.

Implementation of the CIM and CAM requirements has stimulated extensive debate among the state’s citizens, over the decade of the ‘90s and some criticism of state reforms has spilled over to Tech Prep as well. Many, including some consortium members, have questioned the need for 15-year-olds to select a career path (part of the CIM process). Others believe the standards are set too high. Despite the ongoing difficulties with implementing the CIM and CAM, in the mid-1990s community colleges and four-year colleges and universities followed suit by raising admission standards. Representatives from the community college system designed the Proficiency for Entry into Program (PREP) standards, and representatives from the state’s higher education system designed the Proficiency-based Admission Standards (PASS) program. These admission standards have yet to be fully implemented; however, there is a statewide implementation strategy, and model school sites operated during the 1998-1999 school year.

Implementation of Tech Prep was complicated when, under pressure to meet state-mandated reforms, the curriculum had to be covered within the CAM strands, or endorsement areas. Recently, the Northwest Consortium executive committee chose the business and management, industrial engineering systems, and natural resources endorsement areas for their initial implementation of the CAM.

One of the main goals of the state's Tech Prep agenda is to "insure that students acquire skills needed in a modern, technology-driven world." By providing new programs for students that are more challenging, the state hopes to build a consistent statewide standard by which employers can make hiring decisions. Tech Prep implementation is designed to assist in this effort by providing more skilled workers to fill in the economic needs of the state, thus leading to further statewide economic improvements. Across the state, Tech Prep is viewed as a way to help prepare students by giving them needed skills and knowledge for the 21st century workplace.

While no one group or agency who is a partner in the Tech Prep consortium was noted for having particular influence on local economic conditions, the business council was recognized locally as being very influential just prior to the passing of the first round of state workforce-related legislation.

Tech Prep Implementation

One major change that has taken place since the implementation of Tech Prep is a change in the definition of vocational education. While in the past vocational education was offered to adults seeking to build skills for sustenance, it is now offered as a choice even for school-aged students to seek a path of interest that might be different from the traditional subject areas offered in schools. The definition also changed to imply that vocational education has become a tool to provide skilled workers for a "technology-driven" and consumerist society. According to a state handbook, the newer model of vocational education (a model referred to by Hershey, Silverberg, Owens, and Hulsey [1998] as "vocational Tech Prep") offers two distinct advantages over previous approaches to vocational education: (1) it provides students who are geared more towards technological or vocational fields with earlier opportunities to experience work related to their area of interest; and (2) it complements the local and regional economy of the state.

In 1986 funds from the federal Carl D. Perkins (Perkins I) legislation, made available through the State Department of Education, were used to establish the Northwest Consortium. Consortium members all agree that Dale Parnell's book *The Neglected Majority* (1985) was the primary impetus for implementing Tech Prep. In fact, the dean of community and vocational education at NWCC was a protégé of Parnell's, and he spearheaded efforts to establish Tech Prep. Adopting the Parnell Tech Prep Associate Degree (TPAD) model, the Northwest Consortium embraced a 2+2 Tech Prep model, initially defining Tech Prep as a professional-technical career program beginning in high school and ending with a NWCC associate degree. Program completion would lead students either to employment in their chosen field or to higher education. The program was intended to provide technical preparation in at least one career area with a strong emphasis on core academic skills and the state's career-related learning standards. Recent federal and state educational reforms, particularly those establishing the CIM and CAM as requirements for all students, have impacted the Tech Prep initiative, with less emphasis on an end-goal of an associate degree.

In the fall of 1989, hoping to include more students, the consortium set up the VIP CHOICE program involving agreements among consortium high schools to share professional-technical programs not offered at each high school. This program made it possible for a student to enroll in a professional-technical program at a neighboring high school while also taking regular coursework at his or her home school. It opened the door for the development of new Tech Prep programs, such as the first regionally offered curriculum in Allied Health Science Technology, in the fall of 1990. A lack of health professionals, particularly in outlying areas, was a primary factor in its initiation.

Over time, new programs have continued to develop. For instance, in 1995, a program in customer service management, under the title of Management Development

Academy, was developed, and another serving as an introduction to engineering-related careers, Engineering Tech Exploration, took place in the summers of 1997 and 1998. Furthermore, the consortium established the Microelectronics Training Center in 1996 through a partnership with major corporations in the region. This program provides training for employees already in the industry, as well as those planning to enter.

In the 1996-97 school year, the consortium set up opportunities for educators to receive technical assistance in a professional development program supported through a federal academic and vocational integration grant. A federally-funded demonstration project, it is a model for the integration of academic standards with industry skill standards. Numerous business partners in retail, hospitality, and financial services have worked with the consortium to establish industry-recognized skills standards on which to base Tech Prep curriculum and school-awarded credentials.

Figure 1 provides a brief history of the implementation of Tech Prep in this consortium.

FIGURE 1
NORTHWEST CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
FUNDING	1986-1990 State Dept. of Education offered regional planning grants to community college service regions.	1. Transition year caused by reauthorization of Perkins. 1990-91 was last year for funding of state regional planning. 2. Community college and consortium receives a $250,000 US Dept. of Educ. Demonstration grant for hospitality & tourism.	Perkins IIIE Tech Prep funding becomes available to regional consortium. State regional planning funds are cut. State Perkins plan calls for use of Perkins funds to support local Tech Prep sustainability, including Regional Coordinator staffing.	Consortium adopts a funding strategy that includes contribution of local Perkins IIC funds to consortium operations. Consortium is recipient of Perkins IIIE Tech Prep funding.	1. Consortium maintains local funding strategy. 2. Consortium receives regional funding for Gender Equity. 3. Consortium receives a one year National Tech Prep Demonstration site grant.
PERSONNEL	Established state Dept. of Education's Network of Regional Coordinators, served as coordinators for regional planning efforts 1986-1990.	1. Coordinator named. 2. Consortium funds a full-time teacher for regional allied health program.	Because of state's implementation of Perkins reauthoriza-tion, regional coordinator network was unfunded causing a six month interruption in regional coordination. Coordinator seeks other employment; new Coordinator hired mid-year.	Coordinator named.	Grant coordinator named.
LEGISLATION	1989 state legislature passed the "Workforce 2000" act to fund tech prep efforts.		1991 state legislature does not renew funding for "Workforce 2000."		1993 state legislature passes state education reform act.
STRUCTURE/ PARTNERS	A consortium structure was adopted that included the community college, high schools within the service district, state employment division, Private Industry Council, and selected businesses.	1. Private Industry Council becomes less of an active partner because of consolidation of two metro service delivery areas. 2. Consortium becomes the educational agent to support major aircraft corporation with the implementation of their Tech Prep program.	School district representation on executive committee shifts from classroom teacher to administration because of the adoption of a local funding structure.		

FIGURE 1
NORTHWEST CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
EVALUATION	Early planning evaluation conducted by regional education laboratory and state university.	Local data collection was used to communicate the number of students participating in Tech Prep, number of credits transcripted and tuition dollars saved.	State annual reports for Perkins includes evaluation measures for Tech Prep.		State Dept. of Educ. implements a new student reporting procedure to comply with Perkins II. The State Professional Technical Educ.-Management Information System begins evolving into reliable reporting for local planning. Aggregate as well as individual student data are available.

Source: Local Consortium Coordinator

	1994	1995	1996	1997	1998
FUNDING	Consortium region becomes identified as one of three metro sub-regions to receive STW funds.	Community college and consortium receives a $739,000 U.S. Dept. of Educ. federal academic and vocational curriculum integration grant.	1. Coordinator maintains funding strategy and districts agree to increase local contribution from 14% to 24% of local Perkins II allocation. 2. Consortium receives a $14,000 Perkins gender equity grant.	1. $20,000 Goals 2000 grant for contextual teaching and learning in the Natural Resource System CAM. 2. A $22,000 grant from State Metals Council was received for industry skill standards integration with CAM development. 3. $16,000 Perkins gender equity grant.	Consortium receives a $16,000 Perkins gender equity grant.
PERSONNEL		1. Coordinator retires in December. Previous coordinator returns. 2. Consortium increases regional allied health teaching staff by .4 FTE. (1.4 FTE total.)		Consortium agrees to fund .50 FTE for Microelectronics Training Center HS program coordinator.	

Figure 1
Northwest Consortium Milestones

	1994	1995	1996	1997	1998
LEGISLATION		1995 state legislature amends state education reform act. Consortium begins alignment of Tech Prep with certificates of advanced mastery.	The Regional Quality Committee structure sunsets and is replaced with the Workforce Development Board. The PIC and its staff becomes the host for the Metro Workforce Development Board.	1. Certificates of Initial and Advanced Mastery implementation timelines are established by the 1997 session of the state legislature. 2. Teachers' Standards & Practices Commission (TSPC), state's teacher licensing agency, establishes a continuing professional development requirement for all teachers beginning 2002.	Consortium begins planning how the community college and the NWREC can provide member districts with support to implement the TSPC continuing professional development requirement. One member school district is participating in a pilot implementation project during 1998-99.
STRUCTURE/ PARTNERS	Executive Committee becomes administrative body for sub-regional STW budget.	Business involvement is shifted to curriculum design teams/advisory committees. Executive committee focus on educational issues.	Separate executive committee meetings from the general NWREC meetings are canceled and merged into a single monthly meeting. Separate executive committee meetings are held only for program of work and budget planning. Two levels of member participation are established; 1) executive, voting members; and 2) general, non-voting members.	1. Business involvement with articulation design teams is coordinated with the region's STW business development coordinator. 2. Business/industry involvement is enhanced by engaging representatives with the design of curriculum, classroom activities, or work-site experiences.	1. A workforce development board staff member is invited to join the NWREC as a general member. 2. The community college and the NWREC becomes an expansion site for a summer welding technology camp sponsored by the regional strategies board and the workforce development board.
EVALUATION	Consortium provides data and participates in national Tech Prep evaluations.	With consortium input, local ESD enhances their student data system to streamline state Professional Technical Education-Management Information System reporting.		A first time consortium member state Professional Technical Education-Management Information System training was conducted. Policy-level administrators as well as system users attended to become acquainted with the data that is reported back to the schools. The data is stable enough to begin making program decisions.	Consortium participates in NCRVE Tech Prep/STW evaluation.

FIGURE 1
NORTHWEST CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
INTEGRATED CURRICULUM		Demonstration grant for hospitality & tourism has focus on program development and curriculum integration.	1. Regional allied health program identifies core academic standards in science and math. 2. Concept of integration curriculum is introduced by sponsoring a selected group of academic/professional technical instructors to attend the integration conference		State legislation begins consortium discussion regarding transformation of Tech Prep into Certificates of Advanced Mastery.
ARTICULATED CURRICULUM	Prior to 1986, course articulation was in place between the Community College (CC) and high schools in office systems and lower-division college transfer courses. October 1986 began active design and implementation of articulation in most vocational technical program areas. Formal articulation agreements were signed between CC and district/high school administrators.	CC begins systematic implementation of articulation agreements. High School students begin transcripting CC credits.	Regional allied health is designed with CC allied health staff to meet student entrance requirements for CC program.	General "servicing" of articulation agreements is maintained.	Original Tech Prep articulation begins to deteriorate as high schools begin to shift curriculum to meet higher academic standards—some vocational technical courses suffer a decline in enrollment.
PROFESSIONAL DEVELOPMENT	General vocational technical and specific program area teacher teams participated in articulation professional development.	Structured workplace professional development was designed and implemented for teachers of hospitality & tourism.	1. Articulation design teams meet twice yearly. At least one meeting has business & industry participation for professional development. 2. Consortium sponsorship of a team to attend the integration conference.	Structured workplace internships are created for Tech Prep teachers.	Workshop and clinic-based professional development is conducted for high school teachers wishing to instruct Year 1 allied health on site at their high school.
GUIDANCE	An established network of high school and CC counselors is utilized as a vehicle for the guidance element of student services for Tech Prep.	Hospitality & tourism labor market and industry information was assembled and shared for student guidance.	Counselors are briefed on regional allied health program and student recruitment materials are provided to the schools.		

FIGURE 1
NORTHWEST CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
WORK-BASED LEARNING		Students work-based learning was encouraged, but not required as a part of hospitality & tourism. High school work-experience receives CC internship credit.	Regional allied health program is a clinical-based program taught on-site at local hospital.		With year 1 allied health moving to the high schools, year 2 becomes exclusively work-based with a weekly classroom seminar.

	1994	1995	1996	1997	1998
INTEGRATED CURRICULUM		Federal integration begins. English/language arts and math/science are aligned with industry skill standards for business & management and industrial & engineering systems.	Federal grant collaborates with state Dept. of Education assessment staff to design integrated performance assessments.	1. High school microelectronics program identifies core academic standards for math/science. High school program is designed to support state's CIM/CAM math & science standards. 2. With the receipt of a Goals 2000 grant, development of integrated natural resource systems curriculum begins. Technical natural resource content is integrated with science, English, and social studies. Content standards are anchored to state academic standards for CAM.	1. Management Development Academy (MDA) design team meets to develop integrated curriculum using state career-related career standards, CAM academic standards, and industry skill standards. 2. Consortium adopts a philosophical position that "integrated curriculum" can also include other school improvement efforts such as "contextual teaching and learning" or "rigorous and relevant curriculum."

FIGURE 1
NORTHWEST CONSORTIUM MILESTONES

	1994	1995	1996	1997	1998
ARTICULATED CURRICULUM	CC makes the decision to transform their automotive program to dealer-specific training (e.g. Ford, Chrysler) reducing the opportunities for articulation from the high school general automotive programs.	To sustain articulation, attention is expanded to lower-division college transfer courses as a part of the Tech Prep pathway for student articulation.	Assessment design aligned with PREP (community college program entry standards) and PASS (university system entrance standards).	1. Microelectronics program design establishes an articulated pathway for students. 2. High school natural resource systems program development is informed and guided by the postsecondary programs at CC. The high school program is designed with the consortium's articulation model. 3. Plans initiated to expand articulation beyond professional technical courses exclusively and integrate articulation with the lower-division college transfer courses. This integration is endorsed by consortium schools as a way to support their CAM development.	1. Tech prep articulation expands to address support for certificates of advanced mastery. High school principals and CC administrators discuss CC role with CAMs. 2. Revision of all articulation agreements is begun to respond to the new CC initiative of *High School+/Jump Start College*. Tech Prep pathways will be designed to reflect the CAM framework and include academic and professional technical articulated sequence of coursework.

FIGURE 1
NORTHWEST CONSORTIUM MILESTONES

	1994	1995	1996	1997	1998
PROFESSIONAL DEVELOPMENT	Consortium budgets allocation to each member school for attendance at the yearly Regional Education Laboratory Conference (Funding continues through 1997).	Cross-disciplinary teacher teams are formed to design integrated curriculum that is also articulated to CC. Professional development is both in the classroom and workshops.	Blueprint teachers have structured workplace internship with business & management or industrial & engineering systems partners.	1. Blueprint teachers have structured workplace internship with the same business & management or industrial & engineering systems partners as summer, 1996. Consortium contracts with local education compact that offers workplace professional development. 2. Consortium designs a format for continuing professional development for counselors. Each year over a three-year cycle, two of the six CAM career pathways are showcased to include industry/pathway speakers, interaction with CC student services staff and tours of articulated programs at CC.	1. LSI Logic sponsors 10-week microelectronics workplace internship provided to high school teachers wishing to instruct a program course(s) on site at their high school. 2. Each articulation team meeting has a professional development element added. Examples of professional development elements include speakers from industry/pathway or instructional sessions on CAM design, integration or contextual teaching and learning.
GUIDANCE			Consortium/articulation information is provided at monthly meetings of high school and CC counselors. Student recruitment print materials are updated with the help of high school student focus groups.	1. Counselors are briefed on microelectronics program and student recruitment materials are provided to the schools. Consortium co-sponsors a “Parents Night” outreach with Regional Education Laboratory at the 1997 conference. 2. Consortium sponsors “Expanding Your Horizons” gender equity career workshop for young women grades 7-10.	Consortium sponsors “Expanding Your Horizons” gender equity career workshop for young women grades 7-10. In addition to hands-on career sessions for the young women, guidance sessions are provided for parents attending with their children.

FIGURE 1
NORTHWEST CONSORTIUM MILESTONES

	1994	1995	1996	1997	1998
WORK-BASED LEARNING	STW Opportunities Act emphasizes work-based learning; however, only joy shadows and low-level work-based learning is implemented.			1. Discussions begin to address labor & industry restrictions permitting only age 18 or over to work within semiconductor fabrication. 2. State has a broad definition for work-based learning to include school-based enterprises. School-based enterprises are being developed for business & management (e.g. school-site bank branches), human resources (e.g. early childhood education childcare laboratories) and natural resource systems (e.g. school-site greenhouses).	Management Development Academy will require a work-based internship. A focus will be to recruit currently employed teenagers and transform their employment into a work-based educational internship with the support of their employers.

The consortium works closely with the region 2 workforce quality committee and School-to-Work (STW) steering committee. It also is the fiscal agent for the distribution of the regional funding. The STW cadre is the STW coordinator forum for consortium schools. The consortium maintains or supports the Career Information System (CIS) and the STW Information System (SWIS). A major focus has been to design a plan for STW sustainability, as the 1996-97 school year was the final year for federal STW funding in this area.

The consortium has set up a STW academy to support currently employed students in connecting their classroom experience to success on the job. Weekly, students meet in a seminar to discuss and focus personal, educational, and career goals. Students document successful achievement through the development of an employment portfolio. Tech Prep and educational reform regarding the CIM and CAM are viewed by many as part of the STW system. STW is perceived as a framework for the programs affecting curriculum and assessment.

Tech Prep Goals and Definitions

Consortium literature indicates that three goals apply to schools across the consortium who are engaged in Tech Prep:

- To acquire a good foundation for an associate degree, certificates or college credits;
- To reduce the amount of course repetition in the first year of college; and
- To provide more opportunities for acceleration and advanced studies in college programs.

Using Parnell's model as a guide, the Northwest Consortium initially targeted the "middle majority" group of students—those typically not university bound. In recent years, the passing of various state and federal educational reforms has blurred the original focus, yet a student who participates in Tech Prep typically chooses it as an alternative to the university/college preparatory curricula. Figure 2 provides an overview of local definitions related to Tech Prep implementation.

Figure 2

Snapshot of the Local Tech Prep Approach

Primary goal: To provide technical preparation in at least one career area with a strong emphasis on core academic skills and the state's career-related learning standards.

Tech Prep Student: A student who chooses, in his/her junior or senior year, to enroll in a major course of study in a 2+2 Tech Prep Program. Tech Prep students must earn a minimum of two credits in professional-technical courses between their junior and senior year, and these programs should be linked to two-year a associate degree program at the community college.

Tech Prep Course of Study: (for grades 11 and 12) standard courses needed for a high school diploma plus electives that provide students with the best technical preparation for the given associate degree or certificate program. Students may choose to exceed or differ from recommended courses. Advanced credit options are also available for those students wanting to take classes to fulfill a college requirement or to receive college credit.

Primary Articulation Approach:
- 2+2 TPAD model
- High School and Jump Start College offering dual credit in academic and professional-technical courses

Predominant Tech Prep Approaches:
- Vocational Tech Prep

Sources: High School Course Catalogs

Students in this consortium explicitly select Tech Prep, and they must earn a minimum of two credits in professional-technical courses between their junior and senior year. Students enrolled in a 2+2 Tech Prep sequence can earn college credit while in high school. Ideally, this credit is transcripted to the community college permanent record. Participation in Tech Prep does not necessarily mean automatic enrollment in a community college certificate or degree program. The student must follow regular admissions procedures and meet program requirements; however, upon college enrollment the transcript includes the awarded credit.

Table 2 indicates the number of graduates and the number of Tech Prep graduates from all three high schools during the years 1995, 1996, and 1997. Although the number of graduates participating in Tech Prep composed only a small percentage of the whole graduating class, the data shows an increase in the number of Tech Prep participants overall. The percentage of Tech Prep to non-Tech Prep graduates grew dramatically in two

two schools, doubling in schools 502 and 503. Enrollments in Tech Prep grew by about 50% from 1996 to 1997 in school 501.

Table 2

Number of Graduates and Tech Prep Participants by High School

High School Code	No. of Graduates				No. of Graduates Participating in Tech Prep			
	1995	**1996**	**1997**	**TOTAL**	**1995**	**1996**	**1997**	**TOTAL**
501	282	238	242	762	24	20	34	78
502	291	368	378	1037	60	118	118	296
503	353	386	364	1103	34	64	58	156
Total	926	992	984	2902	118	202	210	530

Source: High School Course Catalogs

Note: Total graduation and Tech Prep graduation figures are available for the three high schools included in the study only.

Governance and Funding

The Northwest Consortium uses a shared governance approach. Northwest Community College is the fiscal agent and lead agency, but all members have an equal voice in determining consortium activities. Governance in the consortium has remained the same since it was first implemented prior to 1990. Each representative from the seven high schools, and one representative from NWCC (the regional coordinator) are considered voting members. All meetings are open and often many other people attend; however, only voting members cast a vote on action items.

Funding

Since its inception, consortium funding has evolved, but primary sources have been state and federal sources. Funding for consortium activities has come from various sources, including the State Department of Education, the federal Carl D. Perkins funds, and U.S. Department of Education, federal Demonstration Site Grant funds, Goals 2000 funds, federal School-to-Work funds, a U.S. Department of Education grant for curriculum integration, and a few major corporations and industry groups. A synopsis of the funding sources and amounts helps to clarify the resources available to the consortium since its inception.

Prior to and including 1990, the State Department of Education provided regional planning grants to the community college service regions. From 1990 through 1992, the Northwest Consortium received funds from the U.S. Department of Education. First, a demonstration grant to develop hospitality and tourism programs ($250,000), then Perkins Title IIIE Tech Prep funds were received and used to support the employment of a regional coordinator. One positive outcome of Perkin's monies dedicated to Tech Prep was that it "institutionalized" the articulation function and emphasized a way for local programs to develop, enduring a high school-postsecondary alignment. In 1993, the consortium received a U.S. Department of Education National Tech Prep Demonstration Grant, followed in 1994 with federal School-to-Work funds. In 1995, the consortium received a U.S. Department of Education grant to implement a federal curriculum integration project ($739,000). The consortium received two Perkins funded Gender Equity Grants ($14,000, and $16,000), a Goals 2000 grant ($20,000) for contextual teaching and learning in the Natural Resource System Certificate of Advanced Mastery (CAM), and funds from the State Metals Council for industry skill standards integration with CAM development ($22,000).

Key Components

This section focuses on guidance and counseling, professional development and program evaluation, and student outcomes assessment. Components linked to core curriculum are presented later in this chapter.

Guidance and Counseling

The consortium's regional coordinator provides high school counselors with up-to-date recruitment materials and descriptions of new or modified Tech Prep programs. These materials vary from colorful brochures to handouts describing the benefits of Tech Prep programs. The counselors at High School 502 help students think about a career early in their high school experience. The school's mentor program (referred to as PACE I and PACE II) involves all 125 staff members who counsel five to ten ninth and tenth graders each. They meet six times a year to review students' progress.

High School 503 has developed a career pathway system that connects high school coursework to future careers. Pathways are charted for each area in a course description handbook, and students meet at least once a year to select and review their pathway course selections. The pathways coincide with three state endorsement areas: (1) business and management systems, (2) arts and communication, health and human resource systems, and (3) industrial engineering and natural resource systems. In addition, the "freshmen focus" class is required for all entering ninth graders (as of 1997). This course provides an overview of all career pathways and helps students make a selection of course sequences.

As the counseling examples of High School 502 and 503 suggest, Tech Prep students are not recruited, per se. All high school students are informed about the Tech Prep option, and they select Tech Prep course sequences after discussions with their guidance counselor, parents, teachers, and other appropriate audiences.

NWCC offers career guidance through the Career Information System (CIS) and through a series of courses listed under human development, HD 209, that prepare students for entry into the job market by providing instruction in basic job searches and preparation of job-search documents. In addition, the career placement center helps students find part- and full-time employment as well as apprenticeships and internships.

Regional Gender Equity Team

Some consortium activities have served supportive roles for Tech Prep. For example, an annual conference is conducted by the Regional Gender Equity Team that disseminates career information to females on nontraditional occupations. All consortium members participate in this event. Based on a national model, this career conference targets seventh through tenth grade female students. Using Perkins funds, the first event took place in February of 1998. Mini-grants were offered to consortium high schools to pay for student participants who may be interested in such occupations as carpentry, construction, and engineering.

Professional Development of Faculty, Counselors, and Administrators

Professional development activities are determined by the voting consortium members. According to the consortium coordinator, the regional coordinator develops a scope of work and the voting members approve the plan. Over the years, the consortium has created valuable opportunities, particularly for teachers.

National Demonstration Project

Implemented in 1996-97 and 1997-98, a national demonstration grant on curriculum integration has probably been the consortium's most effective professional development activity because it brought teachers into the workplace and allowed them to work one-on-one with people in business and industry. This project was funded by the U.S. Department of Education and provided a model for integrating national industry skills standards and high academic standards into the content of classroom instruction. Partners from business and education who participated in the project included a major aerospace firm and retailer, the State Business Council, the Northwest Community College, High School 502, and two other high schools in the consortium.

The project consisted of a one-week, 40-hour experience for high school teachers who developed contextual learning activities based on actual workplace applications they observed at their worksite placements. The standards for student performance were matched with the state's educational standards and nationally-recognized workplace standards. Comments from teacher participants indicated that many were struck by the disparity between what students learn at school and what is required at the workplace, particularly concerning work ethic. The local project coordinator observed that many stated they would need to work on preparing students for the demands of the workplace.

Other Professional Development Activities

A two-week summer workshop in 1992 brought both high school and community college teachers together in the areas of automotive technology, computer-aided design (CAD), and manufacturing technology. According to the dean of language and literature at Northwest Community College at the time, "bringing academics teachers into the voc/tech labs demonstrated to them that students in these programs need to read technical material and think critically. It increased their respect for such students and got them to think how to make academic classes more relevant to what the students were learning."

In addition, workshops have been provided for high school teachers in hospitality and tourism. College instructors provided two- and four-day workshops, and teachers have an actual on-the-job experience. The teachers in turn use their knowledge to motivate and recruit students into the program.

Another successful professional development event occurred in 1998, when a major employer in the area sponsored a 10-week microelectronics workplace internship for high school teachers wishing to instruct a program on site at their high schools.

Northwest Consortium professional development opportunities make the workplace real for teachers and enable them to design instructional activities that include learning workplace skills. Professional development needs are ongoing, as today's workplace is in constant change. It is essential for teachers of tomorrow's workers to be knowledgeable of these changes.

To date, implementation efforts related to Tech Prep have help to address the ongoing need for professional development. Implementation of the [state] Education Act for the 21st century requires teachers and staff to design and operate educational experiences for students in a more interrelated and aligned way. According to the consortium coordinator, this approach to teaching differs significantly from what teachers learn from pre-service teacher preparation. New plans are also being implemented to design significant professional development opportunities for and by teachers that align with their district's comprehensive improvement plan.

Program Evaluation and Student Outcomes Assessment

A Regional Educational Laboratory (REL) served as the external evaluation contractor in 1993, as part of the consortium's U.S. Department of Education national Tech Prep demonstration grant. The evaluation activities undertaken by REL included the formation of an advisory committee of secondary and postsecondary personnel who reviewed draft documents, the documentation of consortium structure and the implementation process, the collection of survey data from participating high school students, and the development of a computerized database to track the progress of Tech Prep students.

A second evaluation effort took place in 1994 when the Northwest Consortium agreed to pilot test a regional quality assurance process for professional-technical education programs. Primary funding came from the Perkins grant with additional funding from a grant to support an assessment of articulation between the high schools and the college. The Office of Professional Technical Education (OPTE) in the State Department of Education assisted in arranging this special grant.

Researchers from REL conducted the assessment, and an independent contractor facilitated the pilot study of regional quality assurance. The study focused on 2+2 students enrolled in the eight high schools in the consortium during the six-year period of 1987-88 through 1992-93. The students involved had requested transcripts of credit earned in Tech Prep high school courses articulated with programs at the college. Findings indicated that quality improvement efforts in the consortium had taken a shift from an emphasis on process to an emphasis on outcomes, which was the result of the state's assessment movement and the increased emphasis on competency-based instruction, requiring students to achieve measurable competencies, preferably based on occupational standards. Measurable competencies can take many forms, such as the completion of specific tasks, a portfolio, or a standardized test. Traditional course grades, however, are probably the least useful according to emerging assessment standards.

Results of these evaluations have been used in several ways by the consortium. For example, the outcomes indicated a need to strengthen relationships with business partners and have them work directly on curriculum design teams, subsequently these relationships have been strengthened. In addition, the consortium gathered baseline data providing a Tech Prep student profile. For instance, students who participated in the program during 1987-88 and 1992-93 were described as "primarily female, Caucasian, and in the tourism-hospitality program or the office systems program."

Tech Prep Curriculum Reform

High school students graduating in 1998 and beyond will be impacted by recent state education reforms associated with the CIM and CAM. Specifically, if the state follows its implementation plan, current graduation requirements will become obsolete. The CIM and CAM will be the only certificates recognized for entrance into higher education or the workplace.

Prior to 1998, however, requirements for consortium students, including those who graduated in the years covered by this research project (1995, 1996, 1997) were as follows: a total of 24 credits at High Schools 501 and 503, and 25 credits at High School 502 (see Table 3). There is only a slight variation in the school's requirements for core academic classes (math, science, and English). All three schools (501, 502, and 503) require four years of English and a minimum of two years of mathematics. High School 501 requires three years of science, and High Schools 502 and 503 require only two years. At all three schools, nine elective credits are required, including courses from applied arts, fine arts, foreign language, and professional-technical education. At the same time, all three schools require at least one credit in the general categories of fine, applied, or performing arts and foreign language. Finally, only High School 502 requires one-half credit of keyboarding or computer for graduation. Table 3 and the text which follows provides more detailed examination of the core curriculum in math, English, and science. Minimum high school graduation requirements reflect the minimum graduation requirements established at the state level.

Table 3

Minimum High School Graduation, Tech Prep, and University Requirements in Core Academic Subjects

Courses	Minimum High School Graduation Requirements	Tech Prep Requirements	University Requirements
English	4 yrs. (all 3 high schools)	4 yrs. (all schools in the study)	4 yrs.
Mathematics	2 yrs. (all 3 high schools)	2 yrs. (1 high school) 3 yrs. (high school interactive math through level 3 or more)—1 high school 2 yrs. (including math analysis and advanced placement math)-- 1 school	3 yrs.
Science	2 yrs. (all 3 high schools)	2 yrs. (1 high school) 3 yrs. (2 high schools)	2 yrs.
Social Studies	3 yrs. (2 high schools) 1 yr. plus 1 yr. of other courses related to the subject (1 high school)	3 yrs. (2 high schools) 2 yrs. (1 high school)	3 yrs.
Foreign Language	1 yr. as an elective (2 schools) 1 yr. (1 school)	2 yrs. (1 school) As an elective (2 schools)	2 yrs.
Computer Skills	0.5 yr. (1 high school) 1 year (as an elective)—1 high school Not a requirement (1 high school)	1 yr. (recommended)—2 schools 0.5 yr. (1 high school)	Recommended, but not required
Electives	3 yrs. (2 high schools) 2 yrs. (1 high school)	2.5 yrs. (recommended electives—principles of technology, drafting design, computer app.)--1 school	Choice of electives important in college admission decision-making, but not required.
Total Credits	Varies by school (24-29 or more credits)		22 credits

Source: College and high school catalogs

Core Academic Curriculum: Math, English, and Science

Mathematics

All three high schools require a minimum of two years of mathematics for graduation. High School 501 offers the most comprehensive flow chart of five different sequences of mathematics courses. These sequences or pathways are “options” a student can select beginning in ninth grade. Shown in Table 4, from the less difficult sequence to the most difficult math sequence, a student can complete high school with the following courses: Mathematics Foundations and Introduction to Algebra/Geometry 1. No special courses are required for Tech Prep students in High School 501, Tech Prep students can potentially participate in any of these sequences, depending upon their abilities.

Table 4

High School 501 Mathematics Course Sequences

	Math Courses by Grade Level			
Levels	9	10	11	12
1	Math Foundations	Intro to Algebra/ Geometry 1	Into to Algebra/ Geometry 2 or Integrated Math 1	Integrated Math 1 or Math Topics or Integrated Math 2
2	Intro to Algebra/ Geometry 1	Into Algebra/ Geometry 2	Integrated Math 1 or Math Topics	Or Integrated Math 2 Integrated Math 1
3	Intro to Algebra/ Geometry 2	Integrated Math 1	Integrated Math 2 or Math Topics	Integrated Math 3 or Math Topics or Integrated Math 2
4	Integrated Math 1	Integrated Math 2	Integrated Math 3 or Math Topics	Pre-Calculus or Statistics or Integrated Math 3
5	Integrated Math 2	Integrated Math 3	Statistics or Pre-Calculus	Pre-Calculus or Statistics or Calculus

Like High School 501, students at High School 502 can graduate with a minimum of two mathematics courses. As presented in Table 5, the minimum requirements can be met by completing Mathematics I and Mathematics II. Only one advanced placement course is offered at one of the high schools that is also open to seniors, and both Integrated Math II and III are offered at the honors and standard level. Integrated Math II is described as Geometry in the course catalog, and Integrated Math III is described as Algebra II in the course catalog. Again, no special courses are required for Tech Prep students in High School 502 and Tech Prep students can participate in any sequence.

Table 5

High School 502 Mathematics Course Sequences

	Grade Level			
Levels	9	10	11	12
1	Math 1	Math I	Pre-Algebra	Integrated Math I (IM-I)
2	Pre-Algebra	IM-I	Math Survey IM-I	IM-II IM-III
3	IM-I	Math Survey IM-II	IM-II IM-III	IM-III Functions, Statistics & Trigonometry
4	IM-II (and honors IM-II)	IM-III (and honors IM-III)	Math Analysis	AP Math

Finally, at High School 503, a student can graduate after completing a minimum of two credits in the interactive mathematics series. As shown in Table 6, a student must complete either Basic Interactive Math 1 and 2 (a three-semester long course for one credit), or, Interactive Math 1 and 2 (a year-long course for one credit). There is one advanced placement course, Calculus, and several electives, including Technical Math, Computer Science, Information Services, and Network Services. Like the other two high schools engaged in the study, no special courses are required for Tech Prep students.

Table 6

High School 503 Mathematics Course Sequences

	Grade Level			
Levels	9	10	11	12
1	Math Preparation (does not meet graduation requirements)	Basic Interactive Math (IM) 1a, b, c (3-semester course)	Basic IM 2a, b, c (3-semester course)	cont. Basic IM 2a, b, c
2	Basic IM 1a, b, c or IM-1	Basic IM 2a, b, c or IM-2	Basic IM-2 (cont.) IM-2 IM-3	IM-4 (Advanced Algebra) College Algebra and Trigonometry
3	IM-2	IM-3	IM-4 College Algebra and Trigonometry	AP Calculus Adv. Math Topics
4	IM-3	IM-4 (Advanced Algebra)	College Algebra and Trigonometry	AP Calculus Adv. Math Topics

English/Language Arts

Four years of English/language arts are required for graduation at all three high schools. Specifically, at High School 501 students have two primary options for level of difficulty—grade level (9-12) English or honors English. Honors English is available to any student at any grade with a teacher recommendation, a grade of A or B in the most recent English class, or an average score of 5 or above on the state writing assessment.

At High School 502, students again have two primary options for level of difficulty—grade level English or advanced English. The latter is available by teacher recommendation at any grade. Students can move to the advanced level the following year or semester; however, most students remain in one level for all four years.

High School 503 also offers standard, grade-level English, and advanced English courses in grades 9 through 12. The latter is available by submission of student writing portfolio and teacher recommendation. Students can move to the advanced level the following semester or year; however, most students remain in one level for all four years.

Science

High School 501 requires three years of science for graduation, High School 502 and 503 require only two years. At High School 501, ninth graders are required to take General Science and may elect Global Science if they are also taking Integrated Mathematics 1 or Integrated Mathematics 2. Tenth graders are required to take Global Science, or if the mathematics prerequisites are met (completion of Integrated Mathematics 1 or Integrated Mathematics 2), may select from several other courses including: Biology, Physics, Chemistry, Principles of Technology 1-2, or Advanced Level Biology. Eleventh and twelfth graders may take any of the following Biology, Chemistry, Physics, Advanced Biology, Chemistry, or Physics; or Principles of Technology 1-2, or Principles of Technology 3-4. The most common science sequences are presented in Table 7.

Table 7

Most Common Science Sequences

	Grade Level			
Levels	9	10	11	12
1	General Science (required)	Global Science (required)	Biology Chemistry Physics PT 1-2 PT 3-4	Adv. Biology Chemistry Physics PT 1-2 PT 3-4
2	Global Science (taken w/Integrated Math 1 or 2)	Biology Principles of Technology (PT) 1-2	Adv. Biology Chemistry Physics PT 1-2 PT 3-4	Chemistry Adv. Chem Adv. Physics PT 1-2 PT 3-4
3	Global Science	Adv. Biology Chemistry Physics	Adv. Chem Physics Adv. Physics	Physics Adv. Physics

Only two science credits are required at High School 502 for graduation. The sequence begins with a selection of three courses in ninth grade: Science I, General Science, and Advanced General Science. The second required credit is completed by taking one of five available courses in the tenth grade: Science II, Biology, Advanced Biology, Chemistry, or Advanced Chemistry. Advanced placement courses in biology and chemistry are available to students in eleventh and twelfth grade. High school 502 also offers a variety of science electives, typically available to students in eleventh and twelfth grade. These include Geology, Anatomy and Physiology, Health Sciences, and Natural Resources I and II.

Students at High School 503 are also required to complete two science credits for graduation. Ninth grade students take Integrated Science 9 and 10, described as "a year long course that focuses on themes and develops students knowledge and skills in Earth Science, Chemistry, Physics Meteorology, Astronomy, and Biology." Tenth-grade students take either (1) Integrated Science 9 and 10, (2) General Chemistry, or (3) Advanced Biology. Having met the two required graduation credits, juniors and seniors can enroll in several courses including: General Chemistry, Advanced Biology, Chemistry in the Community, Human Anatomy and Physiology, Principles of Technology, Physics, Environmental Science 1 and 2, Advanced Earth Systems, and Independent Study ronmental Science 1 and 2, Advanced Earth Systems, and Independent Study Science. No advanced-placement science courses are offered at High School 503.

Along with integrated approaches to the curriculum, the Northwest Consortium high schools also offer a limited number of applied academic courses, but Tech Prep students are not required to take any of these classes. The applied courses are listed in Table 8.

Table 8

Applied Academic Courses by High School

High School	Applied Courses Offered	Grade
501	Math Foundations	9-10
	*Principles of Technology 1-2	10-12
	*Principles of Technology 3-4	11-12
502	English III (technical)	11
503	Basic Interactive Math	9-11
	Math Preparation	9
	Technical Math	11-12
	*Principles of Technology	11-12

Source: High School Course Catalogs

Note: *Meets college entrance requirements

Tech Prep and the Curriculum of the Community College

A planned sequence of study is mapped out for students who pursue Tech Prep. As presented in Table 9, each high school offers a variety of course sequences that articulate with any one of eleven professional-technical programs at Northwest Community College (NWCC). For example, High School 503 offers courses that articulate with ten NWCC programs, from accounting to office administration. High School 501 offers courses that articulate with four college program areas (early childhood education, engineering technology, manufacturing technology, and office administration), and High School 502 articulates in seven areas (automotive technology, early childhood education, electronic systems technology, engineering technology, hospitality/tourism, manufacturing technology, and office administration).

In a section of the college catalog that describes who can enroll, the following descriptions are provided:

- Graduates of accredited high schools who can benefit from the instruction may be admitted as regular students, and

- Applicants who have received G.E.D. certificate for high school equivalency for those who have successfully completed the test and who will receive the certificate prior to their first term at MHCC.

Once at NWCC, a student is required to complete a minimum number of credits for graduation in one of three degree programs, with Tech Prep students pursuing applied associate of science (AAS) degrees. The minimum credit requirements for these three degrees are presented in Table 9.

Table 9

Minimum Credit Requirements for

Northwest Community College Degree Programs

Curriculum Area	**AAS Degree requirements** (prof./tech. program)	**AA Degree requirements** (transfer program)	**AGS Degree requirements** (general studies)
Communications	6 quarter credit hours WR 101, WR 102 or WR 121, WR122 RD 117	Computer Lit./Proficiency 3 quarter hours of speech 9 quarter hours of writing	6 quarter hours in writing or 3 credit hours in speech and 3 credit hour in writing
Social Science/Humanities	6 quarter credit hours	NA	12 credit hours in humanities and 12 credit hours in social science
Science/Math/Computer Science	6 quarter credits hours of science, math (MTH 20 or higher) and/or computer science	4 quarter credit hours of college level math (MTH 111 or any with intermediate algebra or above)	12 credit hours in math or science
Health/Physical Ed.	Minimum of 3 credit hours	Minimum of 3 credit hours	NA
Distribution Requirements	3 additional quarter credit hours from any of the other curriculum areas	arts and letters: minimum of 12 credits Social Sciences: 15 credits Sc./Math/Computer Science: 15 credits	25 credits
Total Credit Hours	90 applicable credit hours	90 credit hours (some majors may require more)	90 applicable credit hours

Source: Northwest Community College Catalog

Articulation Agreements and the Vocational Curriculum

In the early 1980s, articulation agreements existed between NWCC and consortium high schools only in office systems and lower-division college transfer courses. By 1996-97, the college had over 82 articulation agreements, covering 16 associate degree areas, including:

- accounting,
- office administration,
- integrated natural resource technology/horticulture,
- automotive technology,
- cable and community,
- computer applications,
- early childhood education,
- electronics,
- marketing,
- engineering technology,
- manufacturing technology/welding technology,
- entrepreneurship/small business management,
- graphics technology,
- allied health science technology,
- hospitality/tourism,
- and journalism.

Table 10 provides a list of articulated credit courses offered by consortium schools.

Table 10

Articulated Credit Courses at NWCC

	Articulated High School Courses		
NWCC Prof/Tech Program	**HS 501**	**HS 502**	**HS 503**
Accounting	Marketing 3-4		Accounting 1 Accounting 2
Automotive Technology		Small Engines I Small Engines II	Automotive Tech. 1 Automotive Tech. 2
Early Childhood Education	Advanced Child Care	Human Devel. I Human Devel. II	Childhood Educ. 1 Childhood Educ. 2
Electronic Systems Technology		Electronics III	Principles of Technology Microelectronics
Engineering Technology	Drafting Design 3	Industrial and Engineering Systems Drafting II	Principles of Technology Drafting I Drafting 2
Graphics Technology			Graphics 1 Graphics 2
Information Processing Management			Business Technology Systems Business Production Systems
Medical Assistant			Health Occupations 1 Health Occupations 2
Hospitality/Tourism		Hospitality, Tourism, and Recreation 1	HT Management 1 HT Management 2
Manufacturing Technology & Machine Tool Technology	Manufacturing Systems 3-4 Manufacturing Systems 5-6	Manufacturing Tech III Industrial Mechanics II	Principles of Technology Metals Manufactur. 2
Office Administration	Keyboarding 2 Bus. Machines Office Systems Microsoft Word Desktop Publishing Wordperfect Personal Shorthand Personal Keyboardng Computer Applications	Word Processing I Word Processing II Electronic Calculator	

Source: NWCC Course catalog and high school catalogs

Several Tech Prep program areas have articulation teams that meet on a regular basis. These teams, made up of high school teachers, community college instructors, and other consortium members, discuss problems involved in articulation and devise solutions. Some articulation design teams meet twice yearly with at least one meeting including extensive input from business and industry representatives. In some areas, such as business education/office administration and Tech Prep, high schools submit course outlines for Tech Prep articulation credit. Instructors at NWCC review these outlines annually, and agreements are updated or added.

One high school course catalog indicated that, in order to receive credit for an articulated course, a student has to:

- complete the high school equivalent course or courses with an A, B, or C grade,
- take the final test, and
- complete a college registration form listing the college courses and credit values.

The college catalog indicates that students earn articulated credit through "examination or as detailed in the program agreements. Earned credit is transcripted on the NWCC permanent record," according to the NWCC 1997-98 course catalog. However, the numbers of articulating students in reports may be inaccurate, as many more NWCC students transition from high schools to community college than transcript credit. The catalogs did not provide information on whether or not students are limited in the number of credits they can receive for articulated courses.

Since 1997, the consortium has also marketed two opportunities for students to earn articulated credit—the Early College Opportunity program (ECO) and Tech Prep. This dual package, called High School + Jump Start College, is presented as a way for students to earn college credit for both academic (ECO) and professional-technical (Tech Prep) courses. As presented in a 1996-97 annual report, students are completing the following ECO courses: English composition (43%), history (19%), mathematics (16%), biology (13%), and foreign language (9%). The same report includes the following numbers for Tech Prep program areas: business and management (57%), industrial and engineering systems (21%), health services (10%), human relations (9%), and arts and communications (3%).

Career Pathways

The most comprehensive discussion of career pathways is presented in curriculum material for High School 503. High school administrators used the language of career pathways beginning in 1994, and they provided a detailed description in the 1997-98 program of studies. In general, High School 503's curriculum was divided into three career pathways, each with its own set of professional/technical career fields or majors. The pathways coincide with three state endorsement areas which are: (1) business and management systems, (2) arts and communication, health and human resource systems, and (3) industrial engineering and natural resource systems. Beginning with freshmen who entered in September 1997 (and will graduate in June 2001), the students are required to select one of the three career pathways and an associated professional or technical major. For instance, a student could select the industrial, engineering, and natural resource systems career pathway and the automotive technology major. In turn, a student making these selections would take the following sequence of courses: four years of English, three years of math (Interactive Math 1, 2, and 3), three years of science (Integrated Science 1 and 2, and Principles of Technology), and two years of courses selected from the pathway core. The pathway core courses are: Automotive Technology 1 and 2, Exploring Automotive and Metals, Drafting 1, Metals Manufacturing, math and science electives, and a work-based learning internship. The intent of including the pathway core classes is to insure active participation by the student in all four years of high school and active planning for postsecondary opportunities. Table 11 includes a breakdown of the three career pathway/endorsement areas along with a list of Tech Prep program areas that are included in each pathway.

Table 11

Professional-Technical Program Areas by Career Pathways/Endorsement Areas for Northwest Community College

Career Pathway/Endorsement Areas	Professional/Technical Program Area
Business Management Systems	Accounting Diversified Occupations Hospitality/Tourism/Restaurant Management Legal Studies Marketing Office Occupations Business Administration
Arts and Communications, Health and Human Resource Systems	Diversified Occupations Early Childhood Education Graphics Health Occupations Theater Technician Drama Health/Fitness Management Health Professions Humanities Music Visual Arts
Industrial, Engineering and Natural Resource Systems	Automotive Technology Cabinet Making/Millwork Construction Trades Engineering Technology/Drafting Environmental Studies Metals Manufacturing Technology Microelectronics Network Technician Computer Science

Source: NWREC published materials 1997-98

Integrated Academic and Vocational Curriculum

High School 503 has implemented several programs that integrate academic and vocational curriculum. The staff at 503 organized the curriculum around "houses" named after four mountains in the area. Each house consisted of a team of teachers, counselors, and an administrator for a homogeneous group of ninth and tenth graders. Academic subjects were taught by teachers who received training on how to implement curriculum that integrates vocational and academic content. Teachers received their training through participation in Project Vanguard, a national demonstration project dedicated to staff development and undertaken in 1997.

Local funding was dedicated to providing eight days of in-service for curriculum development where teachers learned about new theories involving multiple intelligences, emotional intelligence, brain compatibility, and learning styles. The teachers selected two endorsement areas to integrate arts and communication with industrial and engineering systems. The implementation of Contextual Learning and Integrated Curriculum (CLIC) resulted in the formation of a CLIC team comprised of six teachers and one principal team to integrate English, social studies, science, and health for a block of sixty ninth and tenth graders (referred to locally as the "Block" experiment). The students were of mixed ability levels ranging from honors to special education students, and teachers emphasized the use of hands-on, realistic learning activities. A primary goal was the development of student, self-directed learning skills. Block scheduling allowed more time for completion of projects and team teaching provided more one-on-one and small group instruction. Students were allowed to demonstrate learning in the way most appropriate to their individual learning styles.

The Industrial and Engineering Systems (IES) class at High School 502 was another example of integrated curriculum. The primary focus was a hands-on curriculum and collaborative learning approach that resulted in the design and construction of an electric race car entered in a local competition—the "General Electric Electron Run." This project-based integration activity engaged student teams. Those interested in business operations developed fund raising plans and solicited business partners, while others with artistic talent worked on developing a logo and brochure. In addition, students interested in mechanics and engineering designed and built the car. Numerous disciplines were involved, including math, English, science, social studies, business, art, and computer technology. Students used CAD programs to design a prototype of the car. The construction of a wooden model was later replaced with the milling of actual metal parts at a consortium business partner. Other business partners participating in the project contributed resources too. Volunteers from these companies were regular classroom visitors who provided consulting and offered professional advice.

The Engineering Tech Exploration (ETE) program provided a third example of efforts to develop integrated curriculum. Offered during the summers of 1997 and 1998, teachers focused on developing curriculum with a direct connection to manufacturing and engineering fields. Program facilitators hoped that ETE would become a Tech Prep sequence with students participating in a project-based learning activity that stressed core academic skills and CAD technical skills.

Finally, the consortium received funds in 1997 and 1998 to develop integrated curriculum in the endorsement area of natural resource systems. This federally-funded (Goals 2000) project targeted the integration of mathematics, science, English, and career education in natural resource systems. Teachers from five consortium high schools, and several faculty members from NWCC participated in this project. They received training in contextual learning and, using the learning site analysis format created by the Regional Educational Laboratory, participated in a natural resource work site experience to acquire workplace applications. Following this training, faculty members created projects, thematic units, lesson plans, and assessment processes in partnership with natural resource professionals during the summer of 1998. The final result, among other things, is the alignment of curriculum from high school and to community college in natural resources.

Work-Based Learning

Several examples of work-based learning were evident in this consortium. For instance, all high school students had access to the Allied Health Science Technology Program. Students who enrolled in this program received an overview of allied health professions, learned about health care issues, and practiced hands-on skills applicable to a clinical internship.

As part of a 1997 summer program, Engineering Tech Exploration, students visited engineering work sites, and they observed and interviewed CAD and engineering technology employees in action. Twenty-two students participated in the pilot course designed to fit in the CAM area of industrial and engineering systems. It was taught by an engineering technical instructor from NWCC.

Students in the Hospitality/Tourism (HT) program worked in a simulated travel agency on the NWCC campus. In addition, HT students were required to complete two internships for a total of 18 to 24 hours of workplace experience.

The Metals Skill Standards Implementation Project, a short-term grant shared among five consortium high schools and the community college, targeted the industrial and engineering systems endorsement area. Specifically, the project addressed concerns of 85 metals employers surveyed in a Metals Workforce Needs Assessment. Most employers had two major concerns: the projected small labor pool and the gap between basic skills of entry-level job applicants and employer's requirements. The project sought to address these concerns by raising teacher awareness of industry needs and requirements, integrating industry skill standards into existing curriculum or modifying curriculum, assisting students to understand and acquire industry skill standards, and providing metal industry employers with documentation of education attainment—an industry-validated skills certificate.

The consortium implemented a computer system to track students in work-based assignments and has developed a business-liaison marketing plan that includes a database of job opportunities listed by local/regional employers. In addition, a single consortium-wide form has been used as a training contract with any employer.

Student Demographics, Experiences, and Preliminary Outcomes

The following section summarizes findings for a sample of students from three selected high schools in the Northwest Consortium. Results are discussed relative to student demographics and educational characteristics, math and vocational course-taking patterns, transition to postsecondary education, and employment during and after high school. Descriptive results are provided for Tech Prep and non-Tech Prep graduates, and comparisons between groups are made, when relevant.

Sample selection for this consortium was conducted by local education officials, using a computerized database maintained by the state and regional education offices. A total of 263 Tech Prep students was selected for the study, and these students were 1995, 1996, or 1997 graduates of one of three high schools in the Northwest Consortium. The three high schools selected for the study were chosen because they could identify Tech Prep enrollees, and they had provided adequate information to the regional office to be able to flag Tech Prep students.

The sample used for this consortium were identified based on the following definition of a Tech Prep student: Tech Prep students were those who had enrolled in a 2+2 Tech Prep program and earned a minimum of two credits in professional-technical courses by the time they graduated from high school. The two credits were earned during the junior and senior years, suggesting that enrollment in professional-technical education had been substantial. The academic component of the Tech Prep student's course of study was not specified, although Tech Prep students were encouraged to take integrated academic and professional-technical studies, including applied academics. Tech Prep students were not labeled as such by the schools and little special attention was brought to Tech Prep in the schools, partly to avoid the stigma of tracking. Therefore, students may or may not have known that they were considered a Tech Prep student. Other key features of Tech Prep implementation in this consortium included professional development of teachers and counselors and curriculum development to enhance academic and technical integration. Concerted efforts were made by educational leaders to connect Tech Prep to the educational reform agenda initiated by the state but also the federal government, including school-to-work (STW) and workforce development.

Once the Tech Prep sample was drawn, a similar sample of non-Tech Prep graduates was selected at random from the same high schools using the same upper and lower limits on class rank percentile as the Tech Prep group, ensuring a comparable distribution on class rank at high school graduation. The total number of students selected for the non-Tech Prep group was 269. (Refer to Table 13 showing similar frequency distributions for Tech Prep and non-Tech Prep groups on class rank percentile and cumulative GPA.)

Demographics and Personal Characteristics

Similar local demographics, Northwest Consortium graduates were primarily White, non-Hispanic, with 84% of the Tech Prep and 81% of the non-Tech Prep groups classifying themselves as such. The majority were also male, single, and living at home with their parents (see Table 12). Few of the graduates' parents had obtained either a two- or four-year college degree, with most graduates' parents having completed high school only or participated in some college, but no degree. While the graduates were in high school and living with their parents, the average annual family income was between $30,000 and $60,000 for 42% of the Tech Prep and 48% of the non-Tech Prep graduates.

Table 12

Percent Distribution on Selected Demographics by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=114	1995 Grad. n=20	1996 Grad. n=40	1997 Grad. n=54	Total Grad. n=108	1995 Grad. n=29	1996 Grad. n=43	1997 Grad. n=36
Gender								
Male	58.2	67.2	54.6	56.4	53.9	47.5	54.5	57.0
Female	41.8	32.8	45.4	43.6	46.1	52.5	45.5	43.0
Race/Ethnicity								
White, non-Hispanic	84.1	74.1	86.5	87.5	81.0	75.0	83.7	82.4
Black, non-Hispanic	7.5	5.3	10.8	5.9	6.7	14.3	4.7	2.9
Hispanic	2.3	10.0	0.0	0.0	3.7	3.4	2.3	5.6
Asian/Pacific Islander	4.7	5.3	2.7	5.9	7.6	3.6	9.3	8.8
Am. Indian/Alaskan Native	0.9	5.3	0.0	0.0	1.0	3.6	0.0	0.0
Marital status								
Single	85.1	65.0	85.0	92.6	81.5	72.4	79.1	91.7
Single with children	5.3	20.0	5.0	0.0	6.5	6.9	9.3	2.8
Married	5.3	10.0	5.0	3.7	7.4	10.3	7.0	5.6
Married with children	4.4	5.0	5.0	3.7	4.6	10.3	4.7	0.0
Father's education level								
Less than HS graduate	5.4	5.0	7.7	3.8	8.1	7.7	2.5	15.2
High school graduate	34.8	30.0	35.9	35.8	28.3	23.1	27.5	33.3
Some college, no degree	26.8	25.0	28.2	26.4	28.3	30.8	32.5	21.2
Two-year associate's degree	13.4	10.0	15.4	13.2	9.1	7.7	15.0	3.0

Table 12 (cont.)

Four-year bachelor's degree	13.4	25.0	10.3	11.3	19.2	26.9	17.5	15.2
Graduate degree	6.3	5.0	2.6	9.4	7.1	3.8	5.0	12.1
Mother's education level								
Less than HS graduate	9.0	5.3	7.7	11.3	6.7	3.4	4.9	11.8
High school graduate	28.8	26.3	33.3	26.4	31.7	27.6	22.0	47.1
Some college, no degree	32.4	47.4	25.6	32.1	33.7	44.8	36.6	20.6
Two-year associate's degree	13.5	0.0	20.5	13.2	9.6	10.3	14.6	2.9
Four-year bachelor's degree	12.6	21.1	5.1	15.1	14.4	13.8	17.1	11.8
Graduate degree	3.6	0.0	7.7	1.9	3.8	0.0	4.9	5.9
Family income								
$14,999 or less	14.9	23.1	15.6	11.9	10.8	28.0	0.0	7.4
$15,000 – $29,999	11.5	15.4	6.3	14.3	16.9	16.0	19.4	14.8
$30,000 – $44,999	26.4	7.7	34.4	26.2	30.1	24.0	32.3	33.3
$45,000 – $59,999	16.1	23.1	15.6	14.3	18.1	12.0	22.6	18.5
$60,000 – $74,999	18.4	15.4	21.9	16.7	7.2	8.0	9.7	3.7
$75,000 – $89,999	5.7	7.7	6.3	4.8	9.6	4.0	16.1	7.4
$90,000 or more	6.9	7.7	0.0	11.9	7.2	8.0	0.0	14.8
Present residence								
Live with my parent(s)	60.4	50.0	51.3	70.4	54.8	46.4	50.0	66.7
Live alone	4.5	5.6	7.7	1.9	4.8	7.1	5.0	2.8
Live with spouse or significant other	17.1	27.8	20.5	11.1	18.3	25.0	27.5	2.8
Live with a friend or roommate	18.0	16.7	20.5	16.7	22.1	21.4	17.5	27.8

Source: Education-To-Careers Follow-up Survey (n = 222) for all items except gender, which comes from the Tech Prep high school transcript file (n = 514)

Note: Details may not sum to 100 due to rounding.

Educational Characteristics

The majority of Tech Prep graduates (65%) were in the middle two quartiles of their high school graduation classes, with another 15% above the 25th percentile and 20% below. About 25% of Tech Prep graduates had a 3.0 (B grade) average or better and nearly all had above a 2.0 (C grade) average at the time they graduated from high school. Most graduates earned between .5 and 5 credits beyond the minimum high school requirement of 24 credits. Tech Prep graduates earned more credits than non-Tech Prep, but this result was not statistically significant.

Follow-up survey results provided information on students' perceptions of their educational experiences, including a question on the utility of their high school education. When asked how useful what they learned in high school was to what they had done since graduation, there are similar results for Tech Prep and non-Tech Prep graduates. Most responses of both groups were distributed across the very useful, fairly useful and somewhat useful categories, and there were no significant differences between the groups.

Table 13

Percent Distribution on Selected Educational Characteristics and Attitudes by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=256	1995 Grad. n=58	1996 Grad. n=97	1997 Grad. n=101	Total Grad. n=258	1995 Grad. n=59	1996 Grad. n=99	1997 Grad. n=100
Class rank percentile at HS graduation								
1 – 25%	20.0	32.1	15.7	20.2	17.0	20.0	16.3	16.7
26 – 50%	36.1	39.3	38.6	33.0	36.0	36.7	33.8	37.8
51 – 75%	28.8	17.9	32.5	28.7	28.5	26.7	30.0	27.8
76 – 100%	15.1	10.7	13.3	18.1	18.5	16.7	20.0	17.8
Cumulative GPA at HS graduation								
1.00 or less	0.8	0.0	0.0	2.0	0.8	0.0	0.0	2.0
1.01 – 1.50	5.1	3.4	6.3	5.0	3.9	1.7	5.1	4.0
1.51 – 2.00	16.9	24.1	12.5	16.8	14.8	11.9	16.3	15.2
2.01 – 2.50	23.9	25.9	28.1	18.8	25.8	32.2	22.4	25.3
2.51 – 3.00	27.8	27.6	27.1	28.7	29.7	35.6	30.6	25.3
3.01 – 3.50	17.3	12.1	17.7	19.8	16.0	11.9	17.3	17.2
3.51 – 4.00	8.2	6.9	8.3	8.9	9.0	6.8	8.2	11.1
Credits beyond minimum graduation requirement (24)								
None	19.9	17.2	23.7	17.8	24.8	18.6	31.3	22.0
.50 – 2.0	33.6	53.4	32.0	23.8	37.2	40.7	35.4	37.0
2.50 – 5.0	39.8	27.6	43.3	43.6	34.1	39.0	32.3	33.0
5.50 – 8.0	6.3	1.7	1.0	13.9	3.5	0.0	1.0	8.0
8.50 or more	0.4	0.0	0.0	1.0	0.4	1.7	0.0	0.0

Table 13 (cont.)

Utility of high school learning								
Extremely useful	3.5	0.0	2.5	5.6	5.6	0.0	9.3	5.7
Very useful	27.2	20.0	22.5	33.3	22.4	17.2	30.2	17.1
Fairly useful	35.1	30.0	45.0	29.6	36.4	37.9	34.9	37.1
Somewhat useful	26.3	45.0	20.0	24.1	28.0	34.5	23.3	28.6
Not at all useful	7.9	5.0	10.0	7.4	7.5	10.3	2.3	11.4

Source: Tech Prep High School Transcript File for all items except utility of high school learning, which came from the Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Math and Vocational Course-Taking Patterns

Recalling the state graduation requirement of a minimum two years of mathematics, results show that many graduates were surpassing this requirement by at least one or two semesters, or even more. As presented in Table 14, whereas 38% of Tech Prep participants graduated with a total of three to four semester-length courses, approximately 60% completed more math. In fact, nearly one-quarter of the Tech Prep graduates had completed 7 or more semesters of math during high school. However, non-Tech Prep graduates were even more likely than the Tech Prep group to enroll in math courses during high school, and this result was statistically significant (t = 2.01, df = 512, p = .045).

Graduates started the math curriculum with a variety of courses, with about 30% of Tech Prep graduates starting with general or applied math, another 36% taking Pre-Algebra, and 30% starting with Algebra 1. More non-Tech Prep gradautes were starting math with either Pre-Algebra (32%) or Algebra 1 (42%) than the Tech Prep group. These results were statistically significant (t = 2.58, df = 510, p = .01), suggesting non-Tech Prep graduates were more likely to begin high school with more advanced courses than their Tech Prep counterparts. (See Appendix E for a description of math courses according to coding scheme used for this analysis.) There were also significant differences in the lowest math course taken within the three Tech Prep cohorts. Specifically, whereas most of the 1995 Tech Prep cohort (29%) had begun with general math, most of the 1997 cohort had begun with either Pre-Algebra (39%) and Algebra 1 (37%) (F = 3.10, df = 2, p

= .05). This finding represented a positive development since 1997 Tech Prep graduates were starting high school math at a higher level than their predecessors.

Given the sequential nature of mathematics, it is perhaps not surprising that there were significant differences in the highest math course taken by the Tech Prep and non-Tech Prep graduates, since differences were found in the first course taken (t = 2.96, df = 519, p = .003). The highest math course completed by the largest percentage of Tech Prep graduates was Geometry (35%); but almost 30% had finished Algebra 1 only. Geometry was also reported as the highest math course for 29% of the non-Tech Prep graduates, but another 22% had taken Algebra 2 and another 16% had completed advanced math (e.g., Trigonometry or Calculus).

Again, for the Tech Prep cohorts there were significant differences between the 1995 and 1997 cohorts with the later cohort much more likely to have completed advanced math (F = 3.32, df = 2, p = .04). Non-Tech Prep graduates' math course-taking ended at about the same point as the Tech Prep group, and there was no significant difference between groups. These results show advancement in the math curriculum for Tech Prep graduates, bringing them more in line with the math course-taking of non-Tech Prep graduates, even though many had started at a more fundamental level. These results confirm earlier findings on implementation that suggested that high schools were encouraging Tech Prep students to complete higher level math and continue on to take more advanced math before graduating from high school.

Few Tech Prep or non-Tech Prep graduates took applied math or honors math courses, though about 15% of the Tech Prep group had taken an applied math course compared to almost 9% of the non-Tech Prep group (and this result was approaching statistical significance at the .05 level: t = 1.88, df = 512, p = .06). Still, most graduates did not enroll in applied math courses during high school. Given the focus on the educational reform occurring in this state, these results are not unexpected because more emphasis was being placed on other approaches to integrated academic and vocational curriculum than applied academics. Similarly, though most students did not enroll in honors or advanced placement (AP) math courses, non-Tech Prep graduates were more likely than

Tech Prep to enroll (t = 2.37, df = 512, p = .02). Overall, 15% of the Tech Prep group enrolled in honors or AP math compared to 19% of the non-Tech Prep group.

Table 14

Percentage Distribution on High School Math Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=256	1995 Grad. n=58	1996 Grad. n=97	1997 Grad. n=101	Total Grad. n=258	1995 Grad. n=59	1996 Grad. n=99	1997 Grad. n=100
Total math courses by semester:								
0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	2.0
1 – 2	1.6	1.7	1.0	2.0	1.9	0.0	4.0	1.0
3 – 4	38.3	31.0	41.2	39.6	26.4	25.4	28.3	32.3
5 – 6	36.3	46.6	36.1	30.7	41.5	42.4	37.4	37.8
7 – 8	23.4	20.7	21.6	26.7	28.7	30.5	29.3	26.9
9 or more	0.4	0.0	0.0	1.0	0.8	1.7	1.0	0.5
Lowest math course								
Basic math	0.8	0.0	1.0	1.0	3.5	3.4	6.0	1.0
General math	20.3	29.3	20.6	14.9	12.5	23.7	6.1	12.2
Applied math	10.9	20.7	8.2	7.9	5.9	3.4	7.1	6.1
Pre-Algebra	35.9	24.1	40.2	38.6	32.0	30.5	32.3	32.7
Algebra 1	30.4	24.1	27.8	36.7	42.2	37.3	45.5	41.9
Geometry	1.6	1.7	2.1	1.0	3.6	1.7	3.0	5.1
Algebra 2	0.0	0.0	0.0	0.0	0.4	0.0	0.0	1.0
Highest math course								
Basic math	0.0	0.0	0.0	0.0	0.8	1.7	1.0	0.0
General math	3.5	6.9	3.1	2.0	2.0	1.7	3.0	1.0
Applied math	1.2	0.0	3.1	0.0	2.3	5.1	1.0	2.0
Pre-Algebra	8.6	6.9	14.4	4.0	9.0	13.6	10.1	5.1
Algebra 1	28.5	29.3	22.7	33.7	19.5	15.3	19.2	22.4
Geometry	35.5	43.1	36.1	30.7	28.5	35.6	23.2	29.6
Algebra 2	14.5	8.6	17.6	14.9	21.9	11.9	30.3	19.4
Advanced math	8.2	5.1	3.1	14.9	16.0	15.3	12.1	20.4
Total applied math by semester:								
None	84.8	77.6	84.5	89.1	90.7	89.8	90.9	91.0
1 – 2	14.5	19.0	15.5	10.9	8.5	10.2	8.1	8.0
3 – 4	0.8	3.4	0.0	0.0	0.8	0.0	1.0	1.0
5 – 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 – 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 14 (cont.)

Total honors math by semester:								
None	85.2	86.2	82.5	87.1	81.0	81.4	81.8	80.0
1 – 2	12.1	13.8	14.4	8.9	10.1	13.6	8.1	10.0
3 – 4	2.0	0.0	3.1	2.0	5.8	3.4	9.1	4.0
5 – 6	0.8	0.0	0.0	2.0	2.7	1.7	1.0	5.0
7 – 8	0.0	0.0	0.0	0.0	0.4	0.0	0.0	1.0

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding.

Vocational Course-Taking

Virtually all graduates in both groups took at least one professional-technical course during high school. The most popular courses for both the Tech Prep and non-Tech Prep graduates were business, precision production (e.g., electronics, graphic arts, welding), consumer and family studies (e.g., child care, food service), and specific labor market (e.g., co-op, work experience). Because the Northwest Consortium schools required students to complete a career exploration course (coded under specific labor market), it was not surprising to find that 96% of the Tech Prep and 94% of the non-Tech Prep graduates completed a course in this category. The widespread use of computers in all professional-technical areas, and the need to acquire computer literacy skills may also explain the finding that 87% of Tech Prep and 83% of non-Tech Prep graduates took at least one business course. Further results distinguishing the Tech Prep and non-Tech Prep groups on professional-technical enrollment follow:

- A higher percentage of Tech Prep than non-Tech Prep graduates enrolled in mechanics/repairer courses ($\chi^2 = 47.8$, $df = 1$, $p = .000$),
- A higher percentage of Tech Prep than non-Tech Prep graduates took precision production courses ($\chi^2 = 5.32$, $df = 1$, $p = .000$), and
- A higher percentage of Tech Prep than non-Tech Prep participants enrolled in technical/communications courses ($\chi^2 = 5.06$, $df = 1$, $p = .02$).

There are additional results of importance in terms of the level of professional-technical course-taking, with both groups Tech Prep and non-Tech Prep graduates indicating sequential course-taking in business. (Refer to Appendix F for examples of professional-technical courses that fit within the three-level schema associated with the Secondary Schools Taxanomy.) However, in several other professional-technical areas, the two groups differed significantly. Specifically, Tech Prep graduate enrollment exceeded non-Tech Prep in technical/communications, precision production, mechanics/repairers, and consumer and family studies as evidenced by higher percentages of Tech Prep graduates completing higher level courses than their non-Tech Prep counterparts. The specific findings comparing the two groups on sequential course-taking in professional-technical education follow:

- In precision production, more Tech Prep than non-Tech Prep graduates were engaged in sequential course-taking ($\chi^2 = 33.55$, $df = 3$, $p = .000$).

- For mechanics/repairers courses, more Tech Prep graduates engaged in sequential courses than non-Tech Prep ($\chi^2 = 44.46$, $df = 2$, $p = .000$).

- In technical/communications, more Tech Prep graduates were sequential course takers than non-Tech Prep ($\chi^2 = 12.35$, $df = 3$, $p = .006$).

- In consumer and family studies, more Tech Prep graduates took a sequence of courses than non-Tech Prep ($\chi^2 = 10.55$, $df = 4$, $p = .03$).

Table 15

Percentage Distribution on Vocational-Technical Education Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=256	1995 Grad. n=58	1996 Grad. n=97	1997 Grad. n=101	Total Grad. n=258	1995 Grad. n=59	1996 Grad. n=99	1997 Grad. n=100
Course-taking in vocational area								
Business	87.1	86.2	92.8	82.2	83.3	89.8	82.8	80.0
None	12.9	13.8	7.2	17.8	16.7	10.2	17.2	20.0

Table 15 (cont.)

Agriculture	3.1	6.9	0.0	4.0	6.2	3.4	5.1	9.0
None	96.9	93.1	100.0	96.0	93.8	96.6	94.9	91.0
Consumer/Family studies	43.4	34.5	46.4	45.5	41.5	50.8	39.4	38.0
None	56.6	65.5	53.6	54.5	58.5	49.2	60.6	62.0
Health	7.8	5.2	6.2	10.9	4.7	3.4	3.0	7.0
None	92.2	94.8	93.8	89.1	95.3	96.6	97.0	93.0
Construction	0.8	0.0	0.0	2.0	0.8	0.0	0.0	2.0
None	99.2	100.0	100.0	98.0	99.2	100.0	100.0	98.0
Technical/Communications	18.8	12.1	16.5	24.8	11.6	8.5	7.1	18.0
None	81.3	87.9	83.5	75.2	88.4	91.5	92.9	82.0
Precision production	62.5	62.1	62.9	62.4	40.3	37.3	42.4	40.0
None	37.5	37.9	37.1	37.6	59.7	62.7	57.6	60.0
Mechanics/repairers	30.9	48.3	24.7	26.7	7.0	6.8	5.1	9.0
None	69.1	51.7	75.3	73.3	93.0	93.2	94.9	91.0
Marketing	16.4	20.7	13.4	16.8	15.5	22.0	13.1	14.0
None	83.6	79.3	86.6	83.2	84.5	78.0	86.9	86.0
Specific labor markets	95.7	96.6	97.9	93.1	93.8	94.9	91.9	95.0
None	4.3	3.4	2.1	6.9	6.2	5.1	8.1	5.0
General labor markets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
None	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Business								
None	12.9	13.8	7.2	17.8	16.7	10.2	17.2	20.0
Only level 1	18.4	22.4	22.7	11.9	15.9	16.9	16.2	15.0
Only level 1 and 2	0.8	0.0	0.0	2.0	0.8	0.0	1.0	1.0
Only level 1 and 3	34.4	44.8	29.9	32.7	39.1	47.5	38.4	35.0
Minimum 1 in each level	12.1	15.5	12.4	9.9	6.2	5.1	6.1	7.0
Other	21.5	3.4	27.9	25.8	21.3	20.3	21.2	22.0
Agriculture								
None	96.9	93.1	100.0	96.0	93.8	96.6	94.9	91.0
Only level 1	2.7	6.9	0.0	3.0	5.0	3.4	3.0	8.0
Only level 1 and 2	0.4	0.0	0.0	1.0	0.4	0.0	0.0	1.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	.8	0.0	2.1	0.0
Consumer/Family studies								
None	56.6	65.5	53.6	54.5	58.5	49.2	60.6	62.0
Only level 1	16.8	19.0	18.6	13.9	19.8	22.0	20.2	18.0
Only level 1 and 2	5.9	0.0	9.3	5.9	6.6	5.1	8.1	6.0
Only level 1 and 3	8.2	8.6	6.2	9.9	7.0	8.5	7.1	6.0
Minimum 1 in each level	8.6	0.0	11.3	10.9	2.3	6.8	1.0	1.0
Other	3.9	6.9	1.0	4.9	5.8	8.4	3.0	7.0

Table 15 (cont.)

Health								
None	92.2	94.8	93.8	89.1	95.3	96.6	97.0	93.0
Only level 1	2.0	1.7	2.1	2.0	1.2	1.7	0.0	2.0
Only level 1 and 2	0.0	0.0	0.0	0.0	0.4	1.7	0.0	0.0
Only level 1 and 3	0.4	0.0	0.0	1.0	0.4	0.0	1.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	5.5	3.5	4.1	7.9	2.8	0.0	2.0	5.0
Construction								
None	99.2	100.0	100.0	98.0	99.2	100.0	100.0	98.0
Only level 1	0.8	0.0	0.0	2.0	0.8	0.0	0.0	2.0
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Technical/Communications								
None	81.3	87.9	83.5	75.2	88.4	91.5	92.9	82.0
Only level 1	11.3	1.7	9.3	18.8	8.1	6.8	3.0	14.0
Only level 1 and 2	2.7	3.4	0.0	5.0	2.3	1.7	3.0	2.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	3.9	6.9	6.2	0.0	0.0	0.0	0.0	0.0
Other	.7	0.0	1.0	1.0	1.1	0.0	1.0	2.0
Precision production								
None	37.5	37.9	37.1	47.6	59.7	62.7	57.6	60.0
Only level 1	19.1	13.8	15.5	25.7	29.7	20.3	24.2	18.0
Only level 1 and 2	39.8	46.6	46.4	29.7	17.8	15.3	18.2	19.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.4	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Other	3.1	1.8	0.0	7.0	1.5	1.7	0.0	3.0
Mechanics/Repairers								
None	69.1	51.7	75.3	73.3	93.0	93.2	94.9	91.0
Only level 1	14.1	19.0	7.2	17.8	4.7	5.1	1.0	8.0
Only level 1 and 2	15.2	25.9	17.5	6.9	2.3	1.7	4.0	1.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	1.6	3.5	0.0	1.9	0.0	0.0	0.0	0.0
Marketing								
None	83.6	79.3	86.6	83.2	84.5	78.0	86.9	86.0
Only level 1	12.5	13.8	10.3	13.9	10.5	10.2	8.1	13.0
Only level 1 and 2	2.0	5.2	1.0	1.0	3.5	6.8	4.0	1.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	1.9	1.7	2.1	1.9	1.5	5.1	1.0	0.0

Table 15 (cont.)

Specific labor markets								
None	4.3	3.4	2.1	6.9	6.2	5.1	8.1	5.0
Only Level 1	93.4	86.2	97.9	93.1	93.8	94.9	91.9	95.0
Only level 1 and 2	2.3	10.3	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding. The "other" category includes course combinations other than those specified, and this category was not included in significance testing. Between group differences were computed on the total groups, but not cohorts by year due to small cell sizes.

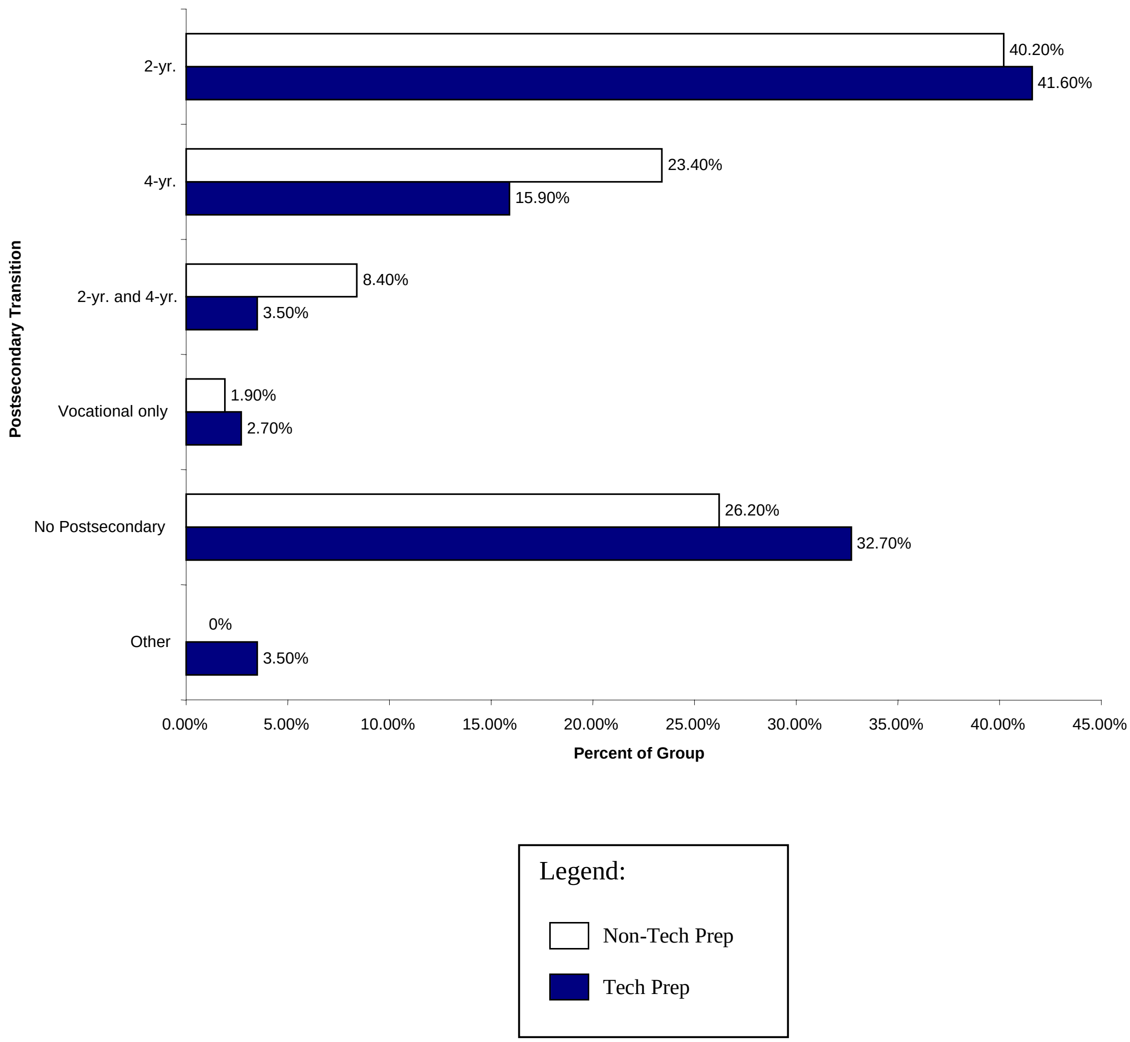
Transition to Postsecondary Education

The majority of graduates associated with both groups had continued to some form of postsecondary education within one to three years of high school graduation, based on transcript and follow-up survey information. Almost half of the Tech Prep and non-Tech Prep graduates had transcripted credits with the lead community college in the Northwest Consortium, NWCC, with a slightly higher percentage of Tech Prep graduates (50%) having college credits than non-Tech Prep (48%) (see Figure 3).

Looking at responses on the follow-up survey, about 40% of both groups had continued their postsecondary education at the two-year college level only, and another 3.5% of Tech Prep and 8% of non-Tech Prep graduates reported a combination of two-year and four-year college. Fewer Tech Prep graduates (23%) had enrolled in four-year college only than non-Tech Prep graduates (16%), though the percentage of four-year college enrollments was not high for either group. Finally, more Tech Prep graduates (33%) had gone directly to work bypassing college than non-Tech Prep graduates (26%), but the percentage was substantial for both groups. Overall, the predominance of two-year college or no college was striking in these results as compared to most of the other cases examined for this study, with a relatively small percentage of graduates in either group (less than 25%) going to four-year college.

Figure 3

Transition to Postsecondary Education by Tech Prep Status



Work Experience During and After High School

Most Tech Prep and non-Tech Prep graduates answered "yes" when asked about whether they were employed at any time during high school. In fact, the distribution for the two groups was exactly alike, with nearly 80% of each group reporting that they worked during high school. Most graduates were paid $5.26-$6.00/hour or even less in their high school jobs (see Table 16). However, Tech Prep graduates made more in wages per hour than non-Tech Prep (t = 1.95, df = 175, p = .05). Tech Prep graduates also tended to work longer hours, with over 60% of them working 21 hours per week or more compared to 45% of the non-Tech Prep group working the same hours, and this result was approaching statistical significance at the .05 level (F = 2.69, df = 2, p = .07). Depending upon how a "typical week" was configured, almost one-half of the Tech Prep graduates could have been working two to three hours for seven days a week, or, four to five hours for five days a week, indicating a fairly substantial amount of work for students still enrolled in high school.

Table 16

Percentage Distribution in Employment Experiences During High School by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=114	1995 Grad. n=20	1996 Grad. n=40	1997 Grad. n=54	Total Grad. n=108	1995 Grad. n=29	1996 Grad. n=43	1997 Grad. n=36
Employed during high school								
No	20.4	10.0	32.5	15.1	20.4	20.7	16.3	25.0
Yes	79.6	90.0	67.5	84.9	79.6	79.3	83.7	75.0
Estimated hourly wages in last job held before high school graduation								
Zero – unpaid	3.3	5.6	0.0	4.3	2.3	0.0	0.0	7.4
Less than $5.25/hr	24.2	44.4	25.9	15.2	33.7	52.2	22.0	33.3
$5.26 to $6.00/hr	31.9	27.8	33.3	32.6	32.6	26.1	36.1	33.3
$6.01 to $7.00/hr	17.6	5.6	11.1	26.1	18.6	17.4	16.7	22.2
$7.01 to $8.00/hr	11.0	11.1	11.1	10.9	10.5	4.3	19.4	3.7
More than $8.00/hr	12.1	5.6	18.5	10.9	2.3	0.0	5.6	0.0

Table 16 (cont.)

Total hours worked during typical week in high school								
Less than 5 hours	3.3	5.6	0.0	4.3	4.7	4.3	8.3	0.0
6 – 10 hours	7.6	0.0	3.7	12.8	12.8	8.7	16.7	11.1
11 – 20 hours	28.3	44.4	22.2	25.5	37.2	30.4	41.7	37.0
21 – 30 hours	42.4	22.2	44.4	48.9	27.9	43.5	19.4	25.9
31 – 40 hours	15.2	22.2	25.9	6.4	17.4	13.0	13.9	25.9
More than 40 hours	3.3	5.6	3.7	2.1	0.0	0.0	0.0	0.0

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Work After High School

There were some distinct differences in post-high school employment patterns for the Tech Prep and non-Tech Prep graduates, but there were also strong similarities. About 90% of both groups worked after graduating from high school, with most working full-time jobs (50% of Tech Prep compared to 42% of non-Tech Prep). Most of the graduates held one job at the time they completed the follow-up survey, and most had held between one and four jobs since high school graduation (see Table 17). Non-Tech Prep graduates held more jobs than Tech Prep graduates (though this result did not reach statistical significance at the .05 level), and within the non-Tech Prep group, the 1997 cohort held significantly more jobs since high school graduation than the 1995 cohort (F = 4.66, df = 2, p = .01). Also, Tech Prep graduates tended to maintain employment in their primary job longer than non-Tech Prep graduates, with 20% reporting holding their primary job 36 months or more compared to 10% of the non-Tech Prep group. A significant difference was found in the longevity of primary employment between the Tech Prep cohorts, with a much higher percentage of the 1995 cohort holding the primary job for 36 months or more compared to subsequent Tech Prep cohorts (F = 4.66, df = 2, p = .01).

There was wide variation in wages earned at the current primary job, but a fairly large percentage of both groups reported making $10.00 or more per hour, with 24% of the Tech Prep and 16% of the non-Tech Prep group making more than $13.00 per hour. Less than 15% of either group made less than $6.00 per hour in their current primary job.

In addition, there were significant differences between the Tech Prep cohorts in terms of the change in wages per hour from high school to the current primary job (F = 4.56, df = 2, p = .01). One-half of the 1995 Tech Prep cohort reported a +$5.00 or more wage change from high school to current employment, which was substantially more than the 1996 or 1997 Tech Prep cohorts.

The majority of both groups indicated their current primary job was entry level/unskilled or semi-skilled. A total of 20% of the Tech Prep graduates reported their current primary job as skilled or professional as compared to a total of 25% of non-Tech Prep graduates who recorded similar responses.

Nearly one-half of all graduates were fairly satisfied with their current primary job with about another one-quarter being very satisfied. Finally, the majority of Tech Prep and non-Tech Prep graduates desired a professional job, and they reported being extremely or very confident in their ability to reach their career goal.

Table 17

Percentage Distribution of Post-High School Employment by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=114	1995 Grad. n=20	1996 Grad. n=40	1997 Grad. n=54	Total Grad. n=108	1995 Grad. n=29	1996 Grad. n=43	1997 Grad. n=36
Number of jobs since HS								
1 – 2	30.1	35.0	27.5	30.2	26.2	6.9	30.2	37.1
3 – 4	29.2	35.0	17.5	35.8	31.8	37.9	30.2	28.6
5 – 6	23.9	15.0	35.0	18.9	17.8	13.8	23.3	14.3
7 – 8	8.0	5.0	7.5	9.4	8.4	13.8	7.0	5.7
9 or more	8.0	10.0	12.5	3.8	15.9	27.6	9.3	14.3
None	0.9	0.0	0.0	1.9	0.0	0.0	0.0	0.0
Number of jobs held currently								
0	11.9	0.0	11.8	17.0	10.3	11.5	13.2	6.1
1	77.2	95.5	73.5	72.3	77.3	76.9	81.6	72.7
2	10.9	5.0	14.7	10.6	12.4	11.5	5.3	21.2
3 or more	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 17 (cont.)

Current employment status								
Full-time (35 hours or more per week)	49.5	60.0	48.7	46.2	41.9	41.4	41.5	42.9
Part-time (less than 35 hours per week)	27.0	30.0	23.1	28.8	39.0	34.5	36.6	45.7
Unemployed seeking employment	9.0	0.0	10.3	11.5	9.5	6.9	9.8	11.4
Unemployed not seeking employment	11.7	0.0	15.4	13.5	7.6	13.8	9.8	0.0
Military full-time	2.7	10.0	2.6	0.0	1.9	3.4	2.4	0.0
Months worked in current primary job								
Less than 6 months	18.2	5.0	23.3	21.1	33.0	21.7	24.2	50.0
6 – 12 months	27.3	20.0	20.0	36.8	22.7	26.1	24.2	18.8
13 – 24 months	22.7	25.0	23.3	21.1	22.7	30.4	21.2	18.8
25 – 36 months	11.4	5.0	16.7	10.5	11.4	4.3	21.2	6.3
36 months or more	20.5	45.0	16.7	10.5	10.2	17.4	9.1	6.3
Wages per hour, current primary job								
zero	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
$5.25 or less	2.3	0.0	3.3	2.6	3.4	4.3	3.0	3.0
$5.26 – $6.00	13.6	15.0	20.0	7.9	5.6	4.3	6.1	6.1
$6.01 – $7.00	12.5	10.0	10.0	15.8	22.5	17.4	21.2	27.3
$7.01 – $8.00	15.9	0.0	16.7	23.7	18.0	13.0	18.2	21.2
$8.01 – $9.00	11.4	15.0	3.3	15.8	11.2	8.7	15.2	9.1
$9.01 – $10.00	12.5	10.0	16.7	10.5	10.1	4.3	12.1	12.1
$10.01 – $11.00	6.8	0.0	6.7	10.5	9.0	17.4	6.1	6.1
$11.01 – $12.00	5.7	20.0	3.3	0.0	3.4	8.7	0.0	3.0
$12.01 – $13.00	6.8	10.0	10.0	2.6	2.2	8.7	0.0	0.0
More than $13.00	11.4	20.0	6.7	10.5	10.1	8.7	12.1	9.1
I don't know	1.1	0.0	3.3	0.0	4.5	4.3	6.1	3.0
Change in wages per hour from HS to present								
-$1.00	5.6	0.0	14.3	3.1	1.4	0.0	3.7	0.0
0	7.0	5.6	9.5	6.3	8.6	0.0	11.1	12.5
+$1.00	19.7	5.6	23.8	25.0	15.7	15.8	22.2	8.3
+$2.00	15.5	16.7	9.5	18.8	21.4	10.5	18.5	33.3
+$3.00	14.1	16.7	4.8	18.8	15.7	15.8	14.8	16.7
+$4.00	12.7	5.6	14.3	15.6	14.3	21.1	11.1	12.5
+$5.00 or more	25.3	50.0	23.8	12.4	22.8	36.8	18.5	16.7
Type of current primary job								
Entry level/unskilled	42.5	35.0	44.8	44.7	46.1	47.8	39.4	51.5
Semi-skilled	37.9	40.0	41.4	34.2	30.3	30.4	30.3	30.3
Skilled or technical	13.8	20.0	6.9	15.8	19.1	13.0	27.3	15.2
Professional	5.7	5.0	6.9	5.3	4.5	8.7	3.0	3.0

Table 17 (cont.)

Type of primary job desired								
Entry level/unskilled	3.5	0.0	0.0	7.5	3.7	3.4	4.7	2.8
Semi-skilled	8.8	5.0	12.5	7.5	7.4	10.3	7.0	5.6
Skilled or technical	23.9	25.0	25.0	22.6	22.2	6.9	27.9	27.8
Professional	63.7	70.0	62.5	62.3	66.7	79.3	60.5	63.9
Satisfaction with primary job								
Extremely satisfied	9.2	20.0	0.0	10.5	12.4	8.7	15.2	12.1
Very satisfied	26.4	15.0	20.7	36.8	25.8	21.7	24.2	30.3
Fairly satisfied	48.3	60.0	65.5	28.9	42.7	39.1	54.5	33.3
Somewhat satisfied	11.5	0.0	6.9	21.1	13.5	17.4	3.0	21.2
Not at all satisfied	4.6	5.0	6.9	2.6	5.6	13.0	3.0	3.0
Confidence in reaching career goals								
Extremely confident	41.6	35.0	42.5	43.4	50.0	44.8	51.2	52.8
Very confident	38.1	35.0	35.0	41.5	24.1	31.0	23.3	19.4
Fairly confident	13.3	20.0	10.0	13.2	17.6	10.3	20.9	19.4
Somewhat confident	7.1	10.0	12.5	1.9	4.6	6.9	2.3	5.6
Not at all confident	0.0	0.0	0.0	0.0	3.7	6.9	2.3	2.8

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Summary

Development of the Tech Prep curriculum in this consortium was influenced heavily by not only what was happening at the local level, but also the state. The State Department of Education, state officials, and representatives from the school districts made a substantial investment in the management and evaluation of Tech Prep to coincide with educational reforms advocated throughout the state. At the local level, the high schools provided the opportunity for members of local communities to take part in the decision-making process, and the state's reform initiative highly encouraged this activity. High schools, in turn, encouraged parents and members of the community to actively participate in site council meetings, open houses, information nights, parent meetings, and other committees that worked actively to create opportunities for planning, implementation, and evaluation of Tech Prep (and subsequently STW) at the local level. According to the consortium coordinator, the relationship between the state and local decision-making bodies provided a more complete picture of the needs and achievements of various related reform initiatives.

The consortium set three goals for Tech Prep and they were to ensure that students would acquire a good foundation for an associate degree, certificates, or college credits; advance into the first year of college without having to repeat course work; and be able to advance in their college programs. The consortium used Parnell's model as its guide as it established Tech Prep associate degrees, but over time, with passage of related reforms such as STW and heightened concern for raising academic standards for all students, the consortium's target population for Tech Prep blurred. Still, it seems most students who chose Tech Prep in this consortium were doing so as an alternative to the university/college preparatory curricula.

Emphasis was placed on a number of key components by this consortium. First, articulation of professional-technical classes, dual credit and advanced placement was encouraged, even though small percentages of students had taken advantage of articulated credits as of yet. (Note, further investigation will be done to analyze this phenomenon in all sites involved in this study). Moreover, greater emphasis was placed on the articulation of academic courses, particularly for the middle majority population. Second, core curriculum increasingly relied upon career pathways, guided by state policy that encouraged a standard set of career-pathways for the entire educational system. In the Northwest Consortium, some career pathways had fallen into place quite easily, but others had been challenging, and further work was needed to make all the career pathways viable in the schools. Third, consistent with the state's reform of high school certification, consortium officials worked diligently to link Tech Prep and STW to the CIM and CAM standards, and related academic standards. Changes in core curriculum having to do with mathematics was particularly prevalent in the high schools more students being encouraged to achieve higher levels of mathematics.

Success in acquiring state and federal funds to develop and implement various initiatives related to professional-technical education, STW, and workforce development assisted this consortium with its goals, although management of the sometimes competing goals and accountability requirements of the various funding streams was burdensome for local consortium leaders. Partly due to the mixing of multiple, compatible goals, a few years ago this consortium elected to change its name to an "Educational Consortium," dropping the Tech Prep and School-To-Work distinction in favor of a more inclusive title. Examining the impact of the various initiatives, a heavy emphasis on professional development linked to curriculum reform (including raising standards and infusing more academic and vocational integration) became a pervasive theme.

Looking at the Tech Prep participants and their demographics, educational experiences, and transition patterns, results showed the majority of Tech Prep graduates were in the middle two quartiles of their graduating classes, with another 15% above the 25th percentile and 20% below. About one-quarter of these had a 3.0 (B average) or better, and nearly all had above a 2.0 (C average) at the time they graduated from high school. Looking specifically at math course-taking behavior, students in this consortium started math at a variety of levels (considering basic math the lowest level and advanced math the highest), with about one-third of Tech Prep graduates starting with general or applied math, about another one-third starting with Pre-Algebra, and about the same percentage starting with Algebra 1. By comparison, non-Tech Prep graduates were starting at a higher level in the math curriculum, with 32% starting math with Pre-Algebra and 42% with Algebra 1. Results regarding highest math course taken showed a similar pattern, with non-Tech Prep graduates advancing slightly higher in the math curriculum than Tech Prep. However, it is important to point out that, over the 1995-1997 time period, Tech Prep graduates were starting at higher points in the math sequence and ending with higher levels of math as well, so that by 1997 the math course-taking pattern of Tech Prep graduates was comparable to non-Tech Prep graduates. By 1997, 29% of the Tech Prep graduates were taking Algebra 2 or more advanced math, compared to only 14% in 1995. Few Tech Prep graduates enrolled in applied academics, and it is difficult to know if math teachers' instructional practices included contextual learning strategies through review and analysis of transcripts.

With respect to professional-technical course-taking, more Tech Prep graduates were enrolled in professional-technical specialties and also more were enrolled in sequential courses within professional-technical areas, including precision production, mechanics/repairers, technical/communications, and consumer and family studies. A very high percentage of both the Tech Prep and non-Tech Prep groups took business and specific labor market courses (e.g., co-op, work experience), with the latter area explained by the fact that the high schools required a career exploration course for all students. In terms of employment, approximately 80% of the Tech Prep and non-Tech Prep groups worked during high school in part-time jobs offering minimum wage. Taking into account survey responses, the majority of graduates continued their postsecondary education at the two-year college level. Almost half of the Tech Prep and non-Tech Prep graduates had transcripted credits with the lead community college in the consortium, with a higher percentage of Tech Prep having college credits at NWCC compared to the non-Tech Prep group. More Tech Prep graduates had gone directly to work bypassing college as compared to non-Tech Prep, though over one-quarter of each group had chosen this path. Most graduates were employed when responding to our follow-up survey one to three years post-high school, and most reported that their current primary job was in an entry-level/unskilled or semi-skilled position. However, Tech Prep graduates tended to maintain employment in their primary job longer than non-Tech Prep graduates, proving a plausible explanation for why Tech Prep graduates had also experienced a significant positive change in wages from high school to current employment.

Looking to the future, the Northwest Consortium will continue to work to blend the various educational reforms that it has started during the decade of the '90s. In integrating the needs of the local community (both education and employers) with the legislative mandates of the state, the consortium has attempted to upgrade professional-technical education and link it to more rigorous academic instruction for all students. In the future, consortium leaders hope to continue the progress they started with Tech Prep as a key component of reforming education to meet more student needs and raising the quality of academic and professional-technical education in the region.

METROPOLITAN CITY TECH PREP CONSORTIUM

Manuel Vallee and Carolyn J. Dornsife

Community Context

The Metropolitan Tech Prep Consortium (Metropolitan Consortium) is comprised of one technical college, the City Technical College, fifteen high schools (including High Schools 601 and 602, which are the focus of this study), and one upstate/downstate partnership between the consortium and an innovative agriculture program. The consortium is located in a large city in the northeastern region of the United States, in an area whose population is diverse, ethnically and culturally.

The lead institution in the Metropolitan Consortium is the City Technical College (CTC), a career-oriented institution that offers three certificate programs, twenty-eight associate degrees, six bachelor of technology degrees, two bachelor of science degrees, and two bachelor of science in education degrees. Of particular salience to the Metropolitan Consortium is that CTC offers three career divisions: engineering technology, business and communications technology, and health and human services, all of which lead to associate and/or baccalaureate degrees and career placements in various fields of technology and the health sciences.

The CTC serves 10,000 degree students and 8,000 continuing education adults from the greater metropolitan area, of which 84% are minority students, 65% are first generation college students, 44% have family incomes under $12,000 per annum, and 36% are foreign-born (from over 50 countries). CTC is the alma mater of 17% of all African-American and Latino technicians in the United States, as well as the alma mater of 41% of such technicians working in the area. Given the size of the metropolitan area and the diversity of its educational opportunities, students have numerous other two- and four-year postsecondary institutions from which to choose, including state universities, private universities, specialty trade schools, and technical colleges.

A local Tech Prep profile developed in 1996 shows that the school district associated with Metropolitan Consortium is comprised of 90,000 students—49% African-American, 23% Hispanic, and 19% Caucasian. In addition, 16% of all students come from households that receive public assistance. Furthermore, 51% of all students report English is not the "first language" spoken at home, and 13% of the high school students have limited English proficiency. In general, the high school attendance rate is 79%, while the dropout rate is 4%, and the suspension rate is 5%.

Like CTC, High School 602 is also a career-oriented institution, as it offers a variety of student majors from three career departments: electronics, building trades, and specialty trades. Moreover, the school has a long history of relationships with CTC in the various fields of electronics, drafting, and health sciences. Also like CTC, High School 602 caters to a disadvantaged student population, with one indicator being that during the 1991-92 academic year, 600 of the school's 1,600 students were receiving reduced priced meals. As for High School 601, it has a Tech Prep relationship with CTC for its health services division. Table 1 shows the population of the two high schools according to gender and ethnicity.

Table 1

Enrollment of Schools in the Consortium (1998)

School	**Total Enroll-ment**	**Drop Out Rate**	Females	White	Black	Latino/ Hispanic	Asian/ Pacific Islander	Native American
HS 601	NA	NA	81.9%	0.0%	84.3%	1.0%	14.5%	0.0%
HS 602	1,600	NA	20.6%	0.0%	76.0%	2.2%	21.2%	0.0%
CTC	NA	NA	51.1%	16.1%	53.0%	8.1%	22.8%	0.0%

Source: Information available from the Tech Prep consortium

Note: NA means Not Available

Economic and Political Context

This urban area is an international center for industry and commerce, finance, media, health care, fashion, advertising, and culture. The fastest-growing occupations can be summed up in two words -- computers and medicine. The computer-related occupations reflect both the growing importance of computers for businesses and the area's expanding role as a center for the information and entertainment industries.

Throughout the 1990's the area has enjoyed an economic renaissance, with numerous developments providing opportunities for technicians in architecture, civil engineering technology, computer-aided drafting and design, computer systems automation, construction, electrical engineering technology, environmental control, and mechanical engineering technology. One particular construction project is the largest ever developed in the immediate area, and is located in an area adjoining the campuses of City Technical College and High School 602. The project is designed to serve as a regional technology center and promises to offer many training employment and school/business linkages in the near future.

Tech Prep Implementation

The Metropolitan Consortium began in 1991 with primary participation from the City Technical College (CTC), and High School 602. These schools are located next to each other and have similar student populations: predominantly male minority students who are economically disadvantaged. The curriculum structure for the two institutions is also complementary: both are career-oriented institutions with strong vocational and technical programs. CTC offers three career divisions: engineering technology, business and communications, and health and human services, each of which leads to associate and/or baccalaureate degrees. High School 602 offers three career departments: electronics, building trades, and specialty trades.

The two schools have a history of collaboration enhanced by their location, course offerings, and student population. For example, in the mid-1970s the schools collaborated on a bridge program in electronics that provided an introductory college course for the high school seniors. In 1985 the schools collaborated on PROJECT CARE, a state-funded effort to provide academic and counseling services to approximately 50% of the students in High School 602 with the hire of a director. In 1991, the two schools expanded their outreach efforts with the implementation of Tech Prep. CTC also initiated

Tech Prep with a second high school, a comprehensive one with a large population of students with limited English proficiency. Figure 1 summarizes the major milestones this consortium has experienced since Tech Prep implementation started when a director was hired at CTC and a state university collaborative program began in 1985.

In 1992, two schools were added to the consortium, with one being an elite, entrance by examination school offering courses in multiple areas including architecture, electrical and mechanical engineering and media communications. The other high school, High School 601, is a career magnet school offering "majors" in various health professions ranging from pre-medicine to nursing to medical laboratory technology.

Since 1992, the consortium has expanded to now include fifteen high schools with Tech Prep programs that feed into one or more of the career divisions offered at CTC. These high schools range from comprehensive neighborhood schools with particular career cluster areas (e.g., health professions, agricultural sciences) to vocational-technical schools to small, theme-based or career-based (e.g., Afro-centric, business and technology) sites.

Finally, in recent years the Metropolitan Consortium has added three more high schools, as well as the upstate/downstate partnership with the innovative agriculture program. This partnership was pursued as a means of developing a city retail outlet for upstate farm and food products, as well as for products produced by the local school district. It was envisioned that the Tech Prep project staff would work with the school board to establish a retail outlet. In addition, the staff planned to develop a Tech Prep program to use the store as a contextual learning experience and to interact with upstate students.

In recent years, STW has emerged as a parallel reform. Staff for STW is housed at a different office on the CTC campus and its focus is more on outside or off-campus programs, the Tech Prep office serves as a liaison with local high school participants.

FIGURE 1
METROPOLITAN CITY CONSORTIUM MILESTONES

	PRE-1990	1990	1991	1992	1993
FUNDING	9/85: State budget: State University Collaborative Programs	Funding continued to present	7/91: State tech prep funding	Continued (diminishing TP funding in each implementation year) NCRVE summer institute funding	Additional State tech prep sex equity funding
PERSONNEL	9/85 Director hired at college; co-director; high school/counselor	Same	9/91: Project CARE director added TP; became TP project director	Added HS coordinator, faculty, counselors part time at other HS sites	Same
LEGISLATION	5/85: State legislative item for state university to develop HS partnerships: five colleges involved	Same	Perkins	Same	Same
STRUCTURE/ PARTNERS	State Community Tech College (SCTC) grade 9 to 12 retention project (project CARE)	Same	SCTC lead agency: four HS's	Same	
EVALUATION	Quantitative Eval. Design; measuring academic skills [State University Basic Skills Tests and career interest (Campbell) Problems]: 1) HS wanted school-wide activities; --control group impossible. Coll. Researcher retrenched in budget cuts (1987); formal evaluation stopped	Data collection activities	Evaluation design; data collection TP students grade 11 and 12; initial variables; sex, age, SES, GPA, career interest (workwise); data collection at one HS	Data collection at four schools	Same

	1994	1995	1996	1997	1998
FUNDING	Additional state tech prep through subcontract center	Same	Added urban STW partnership; funding (TP project responsible for school-based activities); DDE funding staff dev. for chemistry for all sites	Same/added Project CARE staff dev. Funding to support staff dev. for Eng.-SS integration at one HS	Same
PERSONNEL	Same	Same personnel/faculty and counselor funding decreased as functions institutionalized	Same/continued decrease	9/97 added HS coord. At two new sites; original sites costs institutionalized	Continuing academic year
LEGISLATION	Same	STWOA; State grants	Same	Same	
STRUCTURE/ PARTNERS	Same	9/5 – Added HS site co-op classes	Same	9/97 added two HS sites	Continuing academic year; planning expansion with upstate BOCES (retail project) and additional urban voc. schools.

FIGURE 1
METROPOLITAN CITY CONSORTIUM MILESTONES

	1994	1995	1996	1997	1998
EVALUATION	Same; added survey for college plans etc. for grade 12; emphasis began on tracking postsecondary	Same	Same 9/96 to 3/97; participated in state general eval. and pairs study with SCTC/HS site	Participating in state post-secondary follow-up study; entered NCRVE post-secondary study	Continuing participation in state and NCRVE post-secondary follow-up studies; began own tracking via mail

	PRE- thru 1990	1991	1992	1993	1994
INTEGRATED CURRICULUM	Developed and offered an integrated English/legal studies class; team-taught HS site and SCTC; ran for three years; dropped when HS site interest waned (no teacher)	9/91 – Beginning of tech prep; preliminary integration activities with 3 TP schools	School specific core integration activities at four sites: general model English, math, science for health sciences, and for tech	Continued integration activities; added packaged physics curriculum (Tools for Scientific Thinking)	Integrated curriculum in all projects; spring, fall, 1994 – began developing Eng/health sciences curriculum modeled on ProTech (hospital experience); model cities integrated tech project begun at HS site based on TP proposal; introduced Great Thinkers in Science course as grade 12 transition for two HS's
ARTICULATED CURRICULUM	Meetings of paired faculty in many academic and technical areas; initial review of related curriculum; students in some college courses for credit	9/91: departmental articulations; paired SCTC/HS departments in health sciences, engineering tech and business tech; 13 departments total with 4 HS's	Process continued		Added articulation of optical programs at HS site and SCTC
PROFESSIONAL DEVELOPMENT	Free tuition for HS teachers taking SCTC courses in fields related to license; remained in effect through 1992 when level funding for Project CARE caused cuts; project director attended pre-Perkins TP conferences		TP meetings; state meeting for TP administrators; NCRVE USN Summer Institute SCTC/HS teams)	Statewide network activities increased; added state TP conference; fall and spring NCRVE regional meetings for SCTC/HS team; tech teachers included in three year NSF MST teacher training project (1993-96); 9/93 added NCRVE full year benchmarking project; led to increased use of projects-based teaching at both schools involved	Spring, 1994; completed benchmarking project; visited two sites which led to TP proposal on model cities integrated; curriculum; NCRVE regional meeting; continued statewide activities

FIGURE 1
METROPOLITAN CITY CONSORTIUM MILESTONES

	PRE- thru 1990	1991	1992	1993	1994
GUIDANCE	Counselor scheduled part time; Big Brother/Big Sister (grades 11 and 12 paired with grades 9 and 10) peer tutoring–now institutionalized; college/HS mentor start-up activities	No additions	Began college transition program; visits (workshops on financial aid, etc.); early testing of seniors in state university basic skills tests	Added college transition program including college shadowing, early remediation program for seniors planning to enter state university; linked with college pre-freshman summer program	
WORK-BASED LEARNING	None	None	Summer tech at HS site for 70 students	Continued	Fall, 94 – added grade 11 hospital visit program; paid hospital internship in grade 12; SBE in RICOH fax machine repair at HS site

	1995	1996	1997	1998
INTEGRATED CURRICULUM	Great Thinkers course expanded to HS side grade 12 co-op classes	9/96: Great Thinkers in Industry at HS site; inquiry-based physics/mechanical engineering course at HS site	2/97 Linking Great Thinkers at SCTC and HS site; exploring intro. at new schools	
ARTICULATED CURRICULUM			Added two high school's health sciences and engineering technology to articulation agreements	
PROFESSIONAL DEVELOPMENT	NCRVE summer meeting; adapted Great Thinkers to Industry model	Summer NCRVE institute; developed plan for additional SBEs at HS site (computer repair and building trades); TP program developed mentoring manual for schools and recommendations for high school credit for work experience	Hosted spring staff development on SBE resulting in STW partnership funding five mini-grants for start-ups; English/soc. st. integration modeled on Great Thinkers being piloted in grades 9-12 at HS site; TP project responsible for STW partnership staff dev. On career clusters	Continuing activities for STW

FIGURE 1
METROPOLITAN CITY CONSORTIUM MILESTONES

	1995	1996	1997	1998
GUIDANCE		Increased college counseling component to include academic interventions (tutoring, study groups)	Added counselors at two new sites; began electronic mentoring for college students; fall, responsible for staff dev. activities for STW partnership focusing on integration of career dev. skills across the curriculum	
WORK-BASED LEARNING	Continued all; added SBE (optical store)	Fall began set up of computer SBE	Manufacturing SBE (funded through STW partnership	Computer repair SBE started with college TP students; proposal to add manufacturing component; added hospital internships

Tech Prep Goals and Definitions

Since its initial implementation, the consortium has embraced five goals: (1) to increase high school students' awareness of and access to technical education and technical careers; (2) to increase the comprehensiveness and coordination of their technical education; (3) to accelerate student progress through the associate degree by consolidating the grade 11 to 14 curriculum; (4) to increase the collaboration between high schools, college, and local industry in the education and placement of qualified technicians; and (5) to increase student retention.

Over time, consortium staff has sought to meet those goals by implementing a Tech Prep model comprised of five main components: (1) applied and integrated curriculum, (2) transition activities, (3) work-based learning experiences, (4) career guidance activities, and (5) professional development activities for high school teachers and college faculty and staff. More specifically, Tech Prep students complete a sequence of courses that integrate vocational and academic content. Transition activities that help students move from high school to college include the earning of articulated credit, and participation in workshops aimed at helping students with college and financial aid applications, or providing tutoring in math, writing, and reading.

The consortium offers work-based learning experiences such as internships, paid work placements, and school-based enterprises. Career guidance activities include visits to college and work sites, as well as in-school visits by professionals. Lastly, professional development activities, such as curriculum development workshops, are primarily directed at the high school teachers and staff, where the majority of Tech Prep students are recruited initially. As the Tech Prep program has grown and an increasing number of students have made the transition to college, a greater emphasis has been placed on professional development at the college level. Based on local consortium reports, secondary enrollments have grown in all high schools from 388 in 1992-93 to 827 in 1998-99. Enrollment has grown substantially at the postsecondary level as well, from 28 in 1993-94 to 165 in 1998-99.

In pursuing its goals, the consortium has veered away from the notion that Tech Prep should target the middle two quartiles or “middle majority (Parnell, 1985) and instead has regarded Tech Prep as a program potentially for all students who express an interest in technical careers. The consortium defines a Tech Prep student as any junior or senior who was selected as part of a recruitment process and participated in a minimum of Tech Prep math and Tech Prep English courses, a technical career cluster and transition to CTC activities. The math component includes sequential math classes offered at the high school and that infuse basic math skills into technical curriculum. The English class is titled “Great Thinkers in Science,” and is team taught by a high school teacher and CTC English instructor. Great Thinkers is an English course option offered to selected high school seniors at CTC; there is a regular Tech Prep English Sequence offered in grades 11 and 12 at High Schools 601 and 602. Assessment of the Great Thinker’s course is based upon completion of a written portfolio and group projects presented to a panel of instructors.

With its commitment to curriculum integration as a centerpiece, the Metropolitan Consortium is best described as using an integrated Tech Prep approach. According to Bragg (1995), the integrated Tech Prep model utilizes academic and vocational faculty as local curriculum developers, rather than relying extensively on off-the-shelf applied courses. In so doing, faculty play a key role in making decisions about how the core curriculum of Tech Prep will be designed and delivered. In the Metropolitan Consortium, the Tech Prep curriculum emphasizes specific vocational-technical areas that are associated with career pathways to provide a framework for academic and vocational courses and related learning experiences. In its heavy emphasis on integrated curriculum in the form of interdisciplinary studies, project-based instruction, performance-based assessment, and some limited use of applied academics courses, the Metropolitan Consortium exemplifies an integrated Tech Prep approach.

Figure 2

Snapshot of the Local Tech Prep Approach

Primary Goals: (1) to increase high school students' awareness of and access to technical education and technical careers; (2) to increase the comprehensiveness and coordination of their technical education; (3) to accelerate student progress through the associate degree by consolidating the grade eleven to fourteen curriculum; (4) to increase the collaboration between high schools, college, and local industry in the education and placement of qualified technicians; and (5) to increase the retention of high school students.

Tech Prep Student: Any junior or senior who was selected as part of a recruitment process and participated in a minimum of Tech Prep math and Tech Prep English courses, a technical career cluster and transition to CTC activities.

Tech Prep Course of Study: A Tech Prep student completes a sequence of applied classes as well as courses that integrate vocational and academic content.

Primary Articulation Approach:
- 2+2 and 2+2+2 articulated programs
- Advanced placement articulated credits

Predominant Tech Prep Approach:
- Integrated Tech Prep

Source: Local consortium materials

Governance and Funding

Leadership of the Metropolitan Consortium is shared by the CTC, the local school district, and a research/service unit of a local four-year university. Together, these partners have developed a seamless, non-duplicative (grade 11-14, or 16) course of study leading to associate or baccalaureate degrees in the areas of engineering technology, business technology, and health sciences. As the lead institution and fiscal agent, CTC is responsible for project planning, administration, and implementation. For instance, staff at CTC provide leadership for curriculum implementation, career awareness, work experience, recruitment and retention, linking Tech Prep with local STW initiatives, and expanding exemplary program components to other schools.

The local board of education serves as the liaison, through the Division of High Schools' Office of Occupational Education, between CTC and the participating high schools. The staff at each high school are responsible for collaborating fully in the development of the program for their schools. They are also in charge of coordinating their “in-house” student program, including managing student recruitment, program and curriculum development, delivery of career and work experience activities, and selecting teachers and counselors to supervise the work experience placements.

Funding

The Metropolitan Consortium began in 1991 with Tech Prep funding authorized by the federal Carl D. Perkins II Act Amendments. Over time, these funds have been supplemented with various grants and in-kind contributions. For example, during the 1993-94 school year, CTC received a Dwight D. Eisenhower Demonstration Grant. The consortium also received a gender equity grant from the state to develop a comprehensive gender equity program to increase the recruitment of females into Tech Prep. The consortium also received funds from the National Science Foundation (NSF) for a teacher training program, the Urban Math, Science, & Technology Leadership program, which provided team members with stipends for participating in the NSF summer program. The NSF project was written and directed by a teacher who serves as the Tech Prep site coordinator at the elite, entrance-by-exam high school, but teachers in multiple high schools in the consortium benefited from the grant.

More recently, CTC has supplemented Tech Prep with major grants from federal, state and city agencies. A FIPSE grant, begun last year (1998-99), to create postsecondary internships using a college-based enterprise model; a (1999-2000) NYC Board of Education funded professional development grant, the City Tech Literacy Standards Project, which builds off of the Great Thinkers course and our Tech Prep staff development institute on integrating instructional technology to create interdisciplinary curricula to address the new English Language Arts state standards; and a (1999-2000) state-funded Teacher Opportunity Center pre-service program which will match teachers enrolled in the college’s Occupational/Technology Education department with Tech Prep teachers at our high school sites. The most significant addition of funds has come from Tech Prep’s linkage to STW. For instance, from the fall of 1992 until the spring of 1996, the state supported Tech Prep as a STW transition program, investing $30 million in federal money and $30 million in matching funds throughout the state. In the 1997-98 academic year the consortium received $127,000 of federal Tech Prep funds, and $20,000 from STW funds. Aside from federal funding, the consortium received $50,000 from the state and $35,000 from local sources.

Key Components

This section provides a brief discussion of key components besides curriculum. The specific components discussed are marketing and student recruitment, guidance and counseling, business/industry partnerships, professional development, and program evaluation and student outcomes.

Marketing and Student Recruitment

Since the early 1990's, the recruitment process has evolved into a multi-year plan targeted at students who would benefit from a four-year articulated course of study. Recruitment for Tech Prep begins at the middle school level. For instance, Tech Prep is featured in High School 602's articulation program with feeder schools, and a description of Tech Prep has been added to the high school's section of the local school district's high school directory. Also, during the spring semester, counselors distribute a recruitment packet to sophomore students that includes a Tech Prep contract explaining the importance of a four-year commitment and the purpose of articulation and how to earn advanced standing credits. This contract requires signatures by the student and parent(s).

Once the recruitment packets have been distributed the counselor explains that their signed contract does not require a student to continue Tech Prep for all four years. Final selection of the students is done by a recruitment team composed of high school counselors, the high school coordinator, the project coordinator, the college program director, and a college counselor. These team members review the student's contract, transcripts, and interest survey.

Staff has learned from experience that tenth graders change their minds frequently, so various retention activities and services are conducted for declared Tech Prep juniors and seniors. For instance, counselors conduct orientation sessions where they explain the distinctions between associate and bachelor's degree programs, they discuss program differences between engineering technology and engineering, and they explain how Tech Prep associate degrees link easily to bachelor's degree programs at CTC and other colleges.

During the fall semester of the students' senior year, counselors hold additional meetings with the students to reiterate the distinctions between two- and four-year programs. Counselors also discuss the possibility of advanced standing at CTC and conduct workshops to help students fill out applications for admission and financial aid. In addition, CTC offers departmental tours, pre-testing of students for public universities, remediation workshops for students who fail one or more exams, advanced standing workshops for credits by examination or project-based assessment, and a shadowing program where seniors spend a day on campus with a Tech Prep college student mentor.

Still, missing from the recruitment efforts is any mention of the Tech Prep program in CTC's catalog—this is not unexpected or undesirable since Tech Prep students enter as a pre-selected cohort. The only mention remotely related to it is the following paragraph, taken from the "Division of Continuing Education and External Partnerships" section of the catalog: "The Metropolitan School-to-Work Partnership is a collaborative initiative among local businesses, schools, student councils, parent associations, community-based organizations, unions, governmental organizations and higher education to develop and sustain a coordinated effort that ensures all [City] youth have equal access to high quality STW opportunities. Career exploration and staff development are essential components of this program."

Guidance and Counseling

At the high school level a number of career guidance activities are offered presently. Eleventh graders undertake visits to appropriate college departments at CTC and have in-school visits from professionals in their related career field. In addition, health science students are given the opportunity to participate in CTC's Health Science Career day, which allows them to meet health professionals. Twelfth graders are offered career advisement counseling, visit related college career departments, and visit work sites.

Current efforts of CTC and the Tech Prep staff are to conduct four different activities for career guidance. The first is to run a Tech Prep club, where students meet to discuss career-related and academic issues. The Tech Prep club meets regularly (three meetings each semester), with an average attendance of 30 students. Secondly, the staff provides a tele-mentoring activity, where students are paired with professionals in their related fields. For the 1998-99 academic year, 15 Tech Prep students were successfully paired and communicated regularly with their mentors. Third, the college runs Career Information Seminars to inform students regarding resume writing and job search and interviewing skills. During 1998-99, 20 students received training on the Internet for use in job searches and resume writing. Two additional Internet workshops occurred in June, 1999, for about 15 students. Lastly, Tech Prep students who attend CTC can participate in a college-based enterprise, which serves as an internship site for students in mechanical and electromechanical engineering technology.

Business/Industry Partnerships

CTC and High School 602 have developed an impressive array of work preparation programs and linkages with area industry. The high school has developed successful working relationships with a number of local organizations and businesses such as Partners for the Advancement of Electronics, the Ricoh Corporation, Securities Industry Automation Corporation, and the City's Transit Authority. Moreover, these business partnerships have results in a range of work-based learning experiential programs for students. Among these programs are the summer work programs with co-ops, as well as internships with the School Construction Authority, School Food Services, the local park conservancy, AT&T, and others. In addition, High School 602 has developed the Career Development and Employment Center with the assistance of several public and private city and state partners and the United Way. This program offers a variety of work preparation and employment opportunities, including cooperative education and Learn Program.

The college also has extensive collaboration with professional organizations, such as the American Society of Engineering Education, [City] Engineering Technology Association, Industrial Technology Assistance Corporation, the Concrete Industry Board, General Motors, and [City] Navy Yard Development Corporation. CTC has a foundation comprised of leaders in area businesses and industry to work with the college administration in an advisory and fundraising capacity. Each career department has an industry advisory council, comprised of representatives of business and industry to give input into department curricula, placement, and program development. Each Industry Advisory Council includes representatives from business, public service firms, secondary schools, higher education, government agencies, and private industry councils.

Professional Development of Faculty, Counselors, and Administrators

For the consortium, the majority of the professional development activities have targeted high school teachers, counselors, and administrators. As an increasing number of students matriculated to the postsecondary institution, consortium staff have provided professional development activities for CTC faculty and staff. In general, professional development activities fall under one of three categories: workshops and institutes, year-long pilot projects, and special projects.

Workshops and Institutes

Several workshops devoted to curriculum development have been led by the Tech Prep coordinator from one of the consortium high schools who serves as project director for an NSF program entitled the "Urban Math, Science, and Technology Leadership Project." For instance, Tech Prep project staff collaborated with NSF project staff in developing applied math and science curriculum and project-based assessments. This curriculum was disseminated to several teachers, and in subsequent years, Tech Prep staff was able to place additional teachers in two-week summer institutes that were implemented by NSF staff.

English curriculum workshops have been provided to help teachers learn how to integrate the writing process and the computer as a tool for writing. These workshops were designed to assist teachers in revising English classes so that student academic performance would improve on four-year university entrance tests, as well as the state's high school exit exams in English. To help teachers prepare students to succeed on new state assessments in English begun during the 1998-99 academic year, the staff offered workshops at a Summer Institute for the English Language Arts. Participants shared strategies on preparing students to meet the new curriculum standards, they were given training on using the Internet to access information on the new standards as they relate to learning experiences, and they were assisted in how to establish e-mail networks to facilitate communication on developing instructional activities.

Most recently, several high school teachers were selected to attend a three-day institute to initiate a multi-year collaboration with college faculty for developing telecommunications curriculum. A second recent effort has been holding workshops to introduce CTC faculty to Tech Prep as a vehicle for improving student performance at the postsecondary level. Topics discussed at these workshops include: alternative assessments, the impact of standards, core curriculum, articulation, and integrated academic and technical curriculum. Workshops are also planned to disseminate information on the impact of Tech Prep at CTC; the actual and potential enrollment of Tech Prep students in the engineering, business, and health divisions; and the increased integration of Tech Prep into these divisions.

Using funds from their state gender equity grant, CTC faculty, administrators, and high school counselors accompanied female Tech Prep students to a one-day program at the headquarters of a large corporation located in the area. CTC has also hosted a one-day sex equity symposium on non-traditional career opportunities and produced a video featuring female students in non-traditional careers and career programs. This video was intended to be used for staff development with counselors and faculty.

High school counselors have participated in two-day workshops designed to introduce the Internet as a tool to help students make career choices and apply for work; and in workshops to provide information on the microcomputer operating system, DOS. Middle school guidance counselors also participated in various events, including a capacity building effort called the Middle School Guidance and Career Development Cadre where they learned about Tech Prep.

To increase awareness among administrators, new secondary school principals and district administrators have participated in one-day workshops devoted to sharing fundamental information about these reform initiatives. Ultimately, an Introductory Staff Development Institute was provided to teams of secondary administrators, teachers, and counselors and to postsecondary faculty and staff. The purpose of this institute was to customize a proposed program for each school, including a timeline for start-up activities.

Year-Long Pilot Projects

Since 1996 the Tech Prep staff have conducted professional development activities to introduce and implement a collaborative, student-centered, model chemistry curriculum. To this end, faculty from four schools have held several meetings to develop a process for implementing Workshop Chemistry, an NSF-developed college level curriculum that utilizes collaborative and inquiry-based teaching methodologies.

Over time, several chemistry teachers participated in a year-long project to implement elements of the Workshop Chemistry curriculum. For example, high school teachers participated in a two-day workshop with an CTC chemistry instructor, demonstration workshops were conducted collaboratively with two high school classes, and teachers received training on using high school students as workshop leaders. Wide-scale implementation of the curriculum occurred in 1998, and the curriculum development process has been extended to biology.

To broaden Tech Prep's impact, staff used alternative funding to conduct a year-long English Language Arts curriculum project using the state's new standards as a framework. The goal of this project was to institutionalize the writing approach used in the Great Thinkers program (described more fully in the curriculum section). Project participants developed theme-based writing plans for students in grades 9 through 12. These plans were aligned with the standards and organized by related readings and common assessments. Implementing this English curriculum project provided an opportunity for secondary English teachers to collaborate with postsecondary English faculty.

Special Projects

One special professional development activity was dedicated to the application of benchmarking strategies. Specifically, the Tech Prep staff collaborated with staff of a research institute affiliated with a large private university in the area. In addition to attending team meetings, participants agreed to maintain a journal, complete selected readings, participate in arranged site visits to other high schools, and complete an action plan for subsequent implementation in the 1994-95 academic year. A major project outcome was that participants agreed to develop an interdisciplinary portfolio assessment plan.

A second and more comprehensive project was the Metropolitan Consortium's six-year participation in the Urban Schools Network, sponsored by the National Center for Research in Vocational Education (NCRVE). Beginning in 1992, NCRVE designated funds to implementing two, one-week national summer institutes. The purpose of these institutes was to provide technical assistance to representatives of urban school districts for developing a strategic plan to implement Tech Prep and integrated, academic and vocational curriculum. A major outcome of these institutes was the creation of a network of urban schools. In turn, the network nurtured cross-collaborative relationships between NCRVE and urban practitioners around the country. Among the many outcomes associated with participation in the Urban Network (e.g., extensive technical assistance in implementing all Tech Prep program components), the consortium created an "all aspects of the industry" curriculum for seniors participating in a high school co-op program. This curriculum was linked to the development of a school-based enterprise in concert with the CTC Manufacturing Technology Center. In developing this linked curriculum, the Tech Prep program staff had college and high school English faculty visit each others' classrooms so they could develop the "all aspects of the industry" curriculum and master the learning technology to be employed in the course.

Professional development activities have changed over the period of our study in the sense that they built off of one another from year to year. Site personnel learned from feedback which aspects of the workshops were helpful and then offered same aspects again, as a capacity-building effort. Once the number of high school teachers were beyond a core of one or two in a high school and the staff felt comfortable about their knowledge of Tech Prep, they concentrated on the postsecondary faculty. Pursuing this strategy did not mean postsecondary faculty were left out of the loop from the beginning; however, it did assume that working on the secondary piece would provide a solid base for the postsecondary curriculum component.

Program Evaluation and Student Outcomes Assessment

The consortium has employed an independent program evaluator in 1992 and has pursued a longitudinal repeated measures design, emphasizing both cognitive and affective student outcomes, since that time. The number of measurable goals for Tech Prep has increased over time, as students have matriculated to CTC. The sample of Tech Prep students in the first year of the evaluation (1991-92) was limited to 100 high school students, by the fourth year (1994-95) the sample had increased to 384 students and 119 were enrolled at CTC.

As reported by the independent evaluator, in general, the overall goals of Tech Prep have remained constant, i.e., to improve students' understanding, awareness, interest, and attitude toward technical careers; and to improve grade point average and attendance. A 90-item questionnaire was used to assess most of the affective variables. In addition, student academic and career sense of self, was assessed by a 40-item questionnaire focusing on four self-concept factors, including math, verbal, academic, and problem-solving abilities. The cognitive variables included the cumulative high school grade point average and attendance. These data were collected from student transcripts.

A variety of independent variables were also examined, including gender, English as a Second Language (ESL), socioeconomic status, and high school major. As participants matriculated to CTC a new set of college-related performance and competency indices were identified. These measures included a local university's math and reading exams, college grade point average, number of semesters at college, transfer to baccalaureate program, and job placement. The program evaluator planned to create a comparison group of college students who did not participate in Tech Prep during high school.

For the consortium, evaluation results showed Tech Prep students were staying in school, improving their self-esteem on problem-solving abilities, and passing the math and reading admission exams for CTC on their first attempt. The consortium's current goals center on expanding their efforts into more classrooms and offering different learning activities. For instance, the implementation of a joint (high school and college) school-based enterprise for computer repair entered its second year, with plans to incorporate middle school teachers into the effort. In addition, the consortium continued to refine the use of portfolio assessments in various classes, and a "transition math class" (calculus equivalent) was piloted for high school students who plan to attend CTC. Information on job placement for CTC graduates who completed the 2+2 Tech Prep sequence should be available in the future.

Tech Prep Curriculum Reform

This section focuses on the core curriculum utilized by this consortium to deliver Tech Prep programs. Specific requirements associated with the academic and vocational curriculum at the high schools and CTC are discussed as well as other features, including integrated curriculum, career pathways, and work-based learning.

Core Curriculum and High School Graduation Requirements

At each high school, the Tech Prep curriculum consists of a two-year program for students in grades 11 and 12. The academic core is comprised of courses in English, math, and science, each integrated to some extent with the school's vocational-technical courses. Table 2 shows the credits required for graduation from High School 602.

Table 2

Credits Required for Graduation from High School 602

High School	Total Credits to Graduate	Math	English	Science	Social Studies	Foreign Lang.	Phys. Ed.*	Health Ed.	Other
HS 602	44	6	8	6	8	2	0	1	10 shop 1 elective 1 art 1 music

Source: High School 602 web page

Note: 2 credits = 1 year. *0 credits are required, but 7 terms are required for graduation.

In addition, the academic curriculum is supplemented with courses related to a Tech Prep career pathway offered by the school. While the state does not designate career pathways as such, vocational programs of study are titled Vocational Program Areas by Career Pathways. Based on information provided by the consortium coordinator, these pathways equate to Tech Prep course sequences.

One career pathway is health sciences (offered by High School 601 and two other high schools participating in the consortium), and a second career pathway is engineering technology, which is offered at High School 602 and three other consortium high schools. The third pathway is business technology, which is also offered at High School 602, as well as three other consortium high schools. The alignment of vocational program areas by career pathway is shown in Table 3.

Table 3

Vocational Program Areas by Career Pathway

Career Pathway	Vocational Program Area
Engineering Technology	Construction Technology Drafting and Design Technology Environmental Control Technology Architectural Technology Civil Engineering Technology Electrical Engineering Technology Electromechanical Engineering Technology Mechanical Engineering Technology
Business Technology	Computer Systems Technology Graphic Arts Technology
Health Sciences	Dental Hygiene Medical Laboratory Technology Nursing Opthalmic Dispensing Technology Radiological/Medical Imaging Technology

Considering the Health Sciences pathway, one example of Tech Prep course sequences is as follows: The eleventh-grade core curriculum consists of Medical Labs, Chemistry, Tech Prep English, Sequential Math, and Social Studies; and the twelfth-grade sequence includes Anatomy and Physiology, Physics, Sequential Math, Tech Prep English, and Social Studies. In contrast, a second example of Tech Prep course sequence is the engineering technology pathway. For instance, at High School 602 Physics and vocational-technical classes, such as Tech Electronics or Computer Tech, are infused with academic content (e.g., math and English). Table 4 gives an example of the sequence of courses that Tech Prep students would follow, depending on whether they were in the engineering technology or health sciences clusters.

Table 4

Tech Prep Core Curriculum (Academic and Technical)

	High School		College	
Core Courses Acad./Technical	**Grade 11**	**12**	**13**	**14**
Math	Sequential Math II or III	Sequential III, or Pre-Calculus	Precalculus, Calculus I, Calculus II	Varies by major
Science (Engineering Technology Cluster)	Physics Applied Physics	Chemistry (Optional) Tech Theory/Applied Projects	Physics (Precalculus or Calculus Base)	Materials Science (Some Majors)
Science (Health Sciences Cluster)	Medical Laboratory (2 Periods) Chemistry (1 Period)	Anatomy & Physiology (2 Periods) Physics (1 Period)	Medical Imaging & Radiologic Technology Dental Hygiene Technology Medical Laboratory Technology Nursing or Opthalmic Dispensing Technology	Medical Imaging & Radiologic Technology Dental Hygiene Technology Medical Laboratory Technology Nursing or Opthalmic Dispensing Technology
English	TP English English/Career Awareness	TP English or Integrated English: Great Thinkers Course	English, Communications/ Effective Speaking	None
Social Studies	1 Period	1 Period	NA	NA
Technical (Engineering Technology Cluster)	Tech Electronics or Computer Tech	Tech Electronics or Computer Tech	Electrical Engineering Technology or Telecommunications Technology or Electro-mechanical Engineering Technology	Electrical Engineering Technology or Telecommunications Technology or Electro-mechanical Engineering Technology

Source: Local consortium materials and high school and college catalogs

Note: NA means Not Applicable

These academic and technical course sequences were developed at High School 602 (engineering/electronics) and High School 601 (health sciences), and have served as Tech Prep models for several new secondary school partners in the MTPC. For instance, another high school in the consortium implemented a sequence of courses for juniors and seniors including: English, applied physics, and "workshop chemistry," and a fourth consortium high school followed the health sciences model of High School 601, implementing a sequence in English, anatomy, and workshop chemistry.

Most recently, three high schools implemented variations of the engineering/technology model. At two of these schools, teachers and staff selected courses in electronics and computer technology for their Tech Prep initiative. One of these two also has a Tech Prep sequence in business technology, with several of these courses articulating with CTC's department of computer systems technology and department of art and advertising design. The Tech Prep initiative at the third high school includes courses in business technology and engineering technology, with the two departments articulating with CTC's legal studies (e.g., law and design courses) and manufacturing departments (e.g., computer-aided design [CAD]), respectively.

Applied Academics Courses

The Metropolitan Consortium chose to develop a number of applied academics courses, particularly in math, physics and chemistry. For example, in 1993-94 the staff developed two applied courses for High School 602. One was an applied math course for ninth- and tenth-grade students; the second was an applied math course for the school's optical curriculum.

The consortium also selected applied academics courses developed externally, and these selections were made very carefully. For physics courses, the consortium added a national demonstration curriculum developed at Tufts University titled "Tools for Scientific Thinking." One of the high schools implemented an applied physics course that uses the methodologies presented in an NSF-funded teacher training institute, incorporating hands-on, problem-solving, performance-based assessment, and cooperative learning strategies. The curriculum integrates English, math, and mechanical engineering and provides an alternative approach to teaching the physics knowledge needed to pass the state standardized tests.

Finally, applied chemistry was offered through Workshop Chemistry, a college-level course using NSF-approved curriculum and collaborative learning. This course was implemented at four high schools and used as a model to adapt the “workshop” process into biology courses at two health science high schools.

Table 5 lists the applied academics courses offered at High Schools 601 and 602 and CTC.

Table 5

Applied Academics Courses by School

Schools	Applied Academics Courses Offered	Grade Level
High School 601	Great Thinkers in Science – English	11-12
	Health Sciences/English	
	Workshop Chemistry	11-12
	Sequential Math	11-12
High School 602	Pre-Tech Prep Math	9-10
	Great Thinkers in Industry - English	11-12
	TP English	11-12
	Sequential Math	11-12
	Math for Optical Curriculum	11-12
	Physics	
Metropolitan City Technical College	<u>English</u>	13
	English Composition (EG101)	
	<u>Math</u>	
	Math Concepts and Applications (MA 180)	
	Business Math (AC 123)	
	<u>Science</u>	
	Principals of Science I (SC 111)	

Source: Various end-of-the-year reports and applications for funding

Tech Prep and the Curriculum of the Community College

At the college level, the core curriculum associated with Tech Prep includes work-based learning activities to develop technical skills. Table 6 provides a comparative look at minimum high school graduation requirements, minimum requirements for two Tech Prep pathways, and technical college requirements, as provided by High School 602.

Table 6

Minimum High School Graduation, Tech Prep and Technical College Requirements in Core Academic Subjects for High School 601 and 602

Courses	Min. High School Grad. Requirements	Min. Requirements for Engineering Tech Prep	Min. Requirements for Health Science Tech Prep	CTC Requirements
English	4 years	1 period in grade 11 1 period in grade 12	1 period in grade 11 1 period in grade 12	4 units
Math	3 years	1 period in grade 11 1 period in grade 12	1 period in grade 11 (sequential math)	2 units
Science	3 years		chemistry in grade 11 (1 period) medical lab. in grade 11 (2 periods) anatomy and physiology in grade 12 (2 periods)	1 unit of lab science
Social Studies	4 years	1 period in grade 11 1 period in grade 12	1 period in grade 11 1 period in grade 12	2 units
Foreign Language	1 year	NA	NA	NA
Electives	3 semesters	NA	NA	NA

Source: CTC 1998-2000 Catalog

Note: NA means Not Applicable

CTC is part of an open admissions public university; as such, all city high school graduates are guaranteed a spot in either a senior or junior college based on high schools average and corresponding number of college preparatory units.

Students entering a senior college in this area are expected to have 13 units of high school education in academic courses, including the minimums listed in Table 6 above. For admission to the senior colleges and to four-year degree programs, the student's high school grade point average, the academic courses taken, and SAT/ACT scores are considered. After admission, all entering freshmen must take skills assessment tests in reading, writing, and mathematics. The scores on these tests are used in academic advisement and placement. All students are expected to meet minimum standards before continuing to upper division courses.

Students entering CTC can choose from a variety of degree programs having different credit requirements, as indicated in Table 7. Students pursuing the AAS degree are expected to attain 60 to 68 hours of college credit, similarly to students pursuing other two-year degrees, though AAS-degree seeking students focus a preponderance of their course work in the technical area.

Table 7

Minimum Credit Requirements for Various College Degree Programs

Curriculum Area	A.A.S. Degree Reqs.	A.A. Degree Reqs.	A.S. Degree Reqs.	B.S. Degree Reqs.	B.S. Education Reqs.	B.S. Tech. Reqs.
Capstone course	-	3 credits	3 credits	-	-	-
Communica-tions	3 credits of either a COMM or TS course, depending on the major	12 credits	3 credits	6 credits -1 course of oral com. -1 course written com.	6 credits -1 course of oral com. -1 course written com.	6 credits -1 course of oral com. -1 course written com.
Foreign Lang.	-	6-9 credits	-	-	-	-
Humanities	varies by major	3 credits	3 credits in literature	-	-	-
Philosophy	varies by major	3 credits	3 credits	9 credits from PAL group	9 credits from PAL group	9 credits from PAL group
Mathematics	4-12 credits	4 credits	8 credits	7-8 credits	8 credits	7-8 credits
Science	varies by major	8 credits	16 credits in bio. science, chem., or physics and general sci.	8 credits, science with lab	8 credits, science with lab	8 credits, science with lab
History	-	6 credits	-	-	-	varies
Social/ Behavioral Sciences	varies by major	6 credits	3 social science 3 behavioral science	9 credits	9 credits	9 credits
Electives	varies by major	6 credits	15 from liberal arts		10 credits in l & s, with min. of 3 in lit. & 3 in soc. science	varies
Total Credit/hours	60-68 credits	60 credits	60 credits	120 credits	120 credits	60-64 credits, plus an A.A.S. degree

Source: CTC 1998-2000 catalog

Note: PAL is the abbreviation for the Philosophy/Aesthetics/Literature category of courses

All AA and AS majors must select a course from the capstone courses offered within the division. Required of all arts and science majors, the capstone course should be taken just prior to graduation. Serving as a culminating academic experience, the capstone course requires the use and integration of oral and written communication, critical thinking and analysis, problem solving, and teamwork. Additionally, the course requires the completion of a research paper or independent study, the process and results of which must be presented during a scheduled seminar.

Articulation Agreements and the Vocational Curriculum

To facilitate the Tech Prep students' transition from high school to college, the Tech Prep staff has conducted a number of activities. One activity offered by the consortium that is central to student transition is the "Great Thinkers" course. This high school interdisciplinary course is offered at the college site for a minimum of 40 twelfth-grade students, and at another four high school sites for a minimum of an additional 100 students. The course fulfills the students' senior English requirement (see additional explanation below). A second activity is for CTC departments to offer visits for a minimum of 100 students planning to continue into Tech Prep at CTC.

Staff pre-register Tech Prep students in core courses for their first semester. Another practice the staff undertakes is to group the first-year college students in sections of common courses, and organize student study groups into sections of three or four students. Still another service offered to ease the freshmen's transition is tutoring in math, physics and technical subjects, providing 25 hours per week for 30 weeks. Lastly, CTC counselors schedule academic advisement for all students at midterm and end-term points.

Seamless programs have been developed to connect high school and college curriculum and provide advanced standing through a traditional testing procedure conducted by the college departments. This process for awarding articulated credit has not attracted many students. The main barrier seems to be the college's policy of using departmental final exams or standardized exams as the criteria for credit.

To rectify the problem, a series of meetings were held with CTC deans, department chairs, and high school assistant principals. As a result, several strategies were developed to increase the continuation of students from grade 12 to grade 13. One strategy was to identify high school courses that partially or completely articulate with the college. These courses include: general chemistry, computer programming and problem solving, introduction to microcomputers, engineering drawing I, and introduction to paralegal studies. Students who only attain partial standing are offered summer modules as part of the pre-freshman summer so that they can achieve full advanced standing. To develop these summer modules, content specific high school teachers and college faculty will plan and implement the process for on-going and incremental curricular modifications. The selected courses for summer modules were chemistry, computers, engineering drawing, and paralegal studies. A second strategy was to "bundle" the courses into three modules, each containing an exit competency assessment administered by the high school.

Integration of Academic and Vocational Education

With the integration of academic and vocational education such a central component of the Metropolitan Consortium's Tech Prep approach, one might conclude curriculum integration has come easily, but that would be a mistake. Like other Tech Prep initiatives, consortium leaders have continually advocated for the implementation of academic and vocational integration, often over the passionate objections of "traditional" teachers. One consortium leader refers to this phenomenon as the "Beowulf to Virginia Wolfe" syndrome, where teachers worry about coverage of traditional content without considering whether students are learning. As one high school English teacher explained, "In a semester, I have to get from Beowulf to Virginia Wolfe, and there is no time for anything else." However, this Tech Prep leader cautioned against the other extreme that Tech Prep and STW can bring about and that is changing every English course into a technical writing class, emphasizing memo writing and report preparation. Finding the right balance is critical, according to this leader; finding that balance takes a continued commitment of time and talent.

Staff of the Metropolitan Consortium have used three primary strategies to integrate academic and vocational curriculum to this point. One strategy is the infusion of academic content (such as math, English, and science) into the vocational-technical courses or vocational-technical content into academic courses. A second is the development of applied academics courses, specifically in math, physics, and chemistry (discussed earlier). A third strategy is to implement interdisciplinary courses, often with project-based assessments. Two examples of this approach include the "Model Cities" project at High School 602, but especially the "Great Thinkers in Science" course at CTC, which has served as a prototype for other interdisciplinary courses developed by this consortium.

Infusion Strategies

The first strategy selected for curriculum integration was the infusion of academic content into the vocational-technical classes. This strategy was initially proposed to overcome a significant scheduling obstacle. Administrators early on realized that by grade 11 Tech Prep students had progressed at different speeds through the sequential math sequence. Consequently, a single Tech Prep math course could not be designed or offered for a majority of the grade 11 Tech Prep cohort. The infusion strategy emerged from this practical need to offer applied math to all Tech Prep juniors concurrently. As a result, the infusion strategy began at High School 602 with math and vocational-technical teachers collaborating on the development of an integrated math sequence. The collaboration began with a math teacher observing six different vocational-technical classes and identifying the math concepts used in the courses. Following these efforts, the teacher produced math workbooks for students and instructors in each of the major technology areas (i.e. electronics, architectural design, drafting and office equipment technology). To assess student outcomes, these workbooks included pre-tests and post-tests. The resulting curriculum was designed to increase student mastery of the math content, and assist students to gain credit for math content learned in their technical classes.

Interdisciplinary Strategies

At one of the consortium high schools the staff sought to develop a unified course of instruction for mechanical engineering students featuring common learning approaches, interdisciplinary content (technology, physics, math, and English), flexible scheduling arrangements, and team teaching. To this end, the staff integrated physics with English.

At High School 601 the Tech Prep curriculum featured an integration of medical technology, chemistry, English, math, and career awareness. The multiple academic content areas were unified through the use of major themes, shared assignments, and common projects.

An ambitious interdisciplinary effort was provided by the "Model Cities" redevelopment project at High School 602, which consists of the integration of various technical courses, math, and English. Using team teaching methods, technical instructors (graphic arts) helped students create CAD designs for the model city, while a math instructor worked with the students on various math applications required to complete the project. A teacher in industrial arts and another in construction provided instruction on building scale models for various "city" structures. For the culminating exercise, an English instructor worked with students on preparing formal presentations to a planning board.

The consortium's most long-standing, multi-faceted interdisciplinary studies activity is evident in the "Great Thinkers in Science" course, developed jointly by local high school teachers and CTC faculty. Initiated in 1994, the Great Thinkers course has been an important element on the core Tech Prep curriculum since its inception. The course is offered to high school seniors and it meets their senior English requirement, but the course serves the dual goal of facilitating high school-to-college transition. It is an interdisciplinary course team taught by a high school teacher and college instructor in blocks of three hours in a computer lab on the CTC campus on Saturdays. The course offers integrated content from English, math, science, and technology courses. The course includes Galileo, Kepler, Darwin, Freud, and Edison, and features a variety of instructional delivery approaches including lecture, discussion, reading, writing, library research, field trips, lab experiences, and the use of instructional technology. The Great Thinkers course varies from year to year and has included the 5 mentioned as well as DaVinci, Margret Mead, Einstein, etc with usually 3 or 4 units per course. The course awards students high school (but not college) credit in English. The end-of-course, capstone assessment is based on a written portfolio and related group projects presented to a panel of teachers and sometimes also community leaders.

By participating in the Great Thinkers course, students develop a variety of college readiness skills, including oral presentation, writing process and research skills, cooperative learning, observational thinking and problem-solving perspectives, adjustment to college rigor, time management skills, the ability to learn independently, and mastery of college resources. An explicit goal of the Great Thinkers course is to prepare students so they can pass CTC's academic entrance exams, and be placed in college-level English courses. Thus far, students who have taken the course have performed well on the placement tests, partly because of the course's heavy writing component and the use of writing assessments that mirror those used on CTC's placement exams.

The Great Thinkers course was documented with a broadcast quality video when it was first developed in 1994, and it has fostered several spin-off efforts. For instance, the Tech Prep staff developed a high school course titled "Great Thinkers in Industry", an interdisciplinary class that awards English credits to students and includes the integration of a required American history course. The course content includes an overview of America's transformation from the industrial revolution to the cybernetic revolution, thereby exploring the context of today's changing workplace. It connects school-sponsored and independent work experiences with a school-based curriculum, focusing on the development of industry-based competencies. Other versions of the Great Thinkers courses are evident in additional spin-off courses titled, Great African American Thinkers and Great Thinkers in Medicine. Consortium staff are currently working to create an interactive, online version of the Great Thinkers in Science course, which they intend to call Great Thinkers Online.

Work-Based Learning

Recently, over 300 students participated in one of several work-based learning (WBL) opportunities, including the hospital work experience program, technology programs for co-op and apprenticeship students, internships, school-based enterprises, and a FIPSE-funded college-based enterprise. Since WBL is an important component in the Metropolitan Consortium, staff has participated in a number of activities to strengthen relations with the business community. For instance, staff meet and consult regularly with a steering committee, and solicit additional technology partners who provide internships and mentoring for students. In addition, feedback on WBL experiences has been gathered by conducting focus groups with, and distributing questionnaires to, students.

Hospital Work Experience Program

The hospital work experience program is offered to junior and senior-level health science students at High School 601 and one other consortium high school. In grade eleven, students are introduced to various health careers through hands-on departmental orientations at CTC, and they are offered opportunities to volunteer for rotations at participating hospitals. In grade twelve, students are assigned to hospital departments compatible with their career interests, for 10 hours per week after school. In addition, Tech Prep English teachers accompany their students to observe their WBL experiences, and integrate these experiences into the English curricula.

Another effective approach used by the English teachers at these two high schools involves the ProTech case study approach. Students are presented with symptoms from a fictitious patient and then asked to present these symptoms to their hospital mentors in order to work through the procedures that would take place in response to the symptoms. Students present oral and written reports in their English class detailing how their department participates in the care of the patient.

School-Based Enterprises

Since 1994 three school-based enterprises (SBE) have been implemented at High School 602, and operated by juniors and seniors. The students choose to participate in a SBE because it relates to their selected major. One SBE is the RICOH Repair Center, and consists of having students perform repair orders for the RICOH corporation (primarily fax machines). The second SBE is the Vision Center where students produce and sell eyewear. The third is the Computer Repair Center, providing students with an opportunity to repair donated computers. Once repaired, the computers can be recycled back into the community or used inside the school. At another participating consortium high school (which joined the consortium in 1997-98) the SBE component consisted of an enterprise where students manufactured toys and name plates, an enterprise established with Metropolitan STW partnership seed money.

Co-op & Apprenticeship Programs

Another popular work experience component is the summer technology program that places students in technical assignments related to their majors at High School 602. Similarly, the grade 12 technology work program, offered through co-op funding, places students in an alternate week co-op experience linked to in-school curriculum. A similar work experience program offered in 1997-98 was the apprenticeship program with the School Construction Agency.

Postsecondary Work-Based Learning

In 1997 a college-based enterprise (CBE) was designed and implemented as an internship opportunity for students in technical career programs. Priority for this program was given to Tech Prep students. The first interns were students selected by the Tech Prep staff and the dean of engineering. The CBE internship lasts 12 weeks and students work five hours per week. Students have participated in soliciting and transporting an inventory of over 300 donated computers. A second project consisted of refurbishing 35 computers for lab use within the engineering technology departments. The college interns also provide technical assistance to high school students, and they donated their refurbished computers for in-class use. Lastly, the students developed a business plan to solicit and perform external technical assistance jobs. While the initial funding for this project came from a combination of work study and other grants, the project staff, dean and CBE coordinator developed a plan to generate income, thus making the enterprise more self sustaining.

Reflecting on the WBL component, the consortium has not had many problems in meeting student participation objectives. However, it has also not conducted a thorough evaluation of this aspect of the program on student outcomes. There does continue to be some difficulty soliciting the participation of representatives from business and industry.

Students Demographics, Experiences, and Preliminary Outcomes

The following section provides a summary of findings for a sample of students, Tech Prep and non-Tech Prep, who graduated from two high schools in the Metropolitan Consortium. Student follow-up results are discussed relative to demographics and educational characteristics; math and vocational course-taking patterns; transition to postsecondary education; and employment during and after high school. Descriptions of the Tech Prep and non-Tech Prep graduates are provided, including characteristics that define and distinguish the two groups.

The consortium defines a Tech Prep student as any junior or senior who was selected as part of a recruitment process and participated in a minimum of Tech Prep math and Tech Prep English courses, a technical career cluster and transition to CTC activities. The math component includes sequential math classes offered at the high school; however, basic math skills are also infused into technical curriculum. A sizeable proportion of Tech Prep graduates of the two high schools participated in the "Great Thinkers" course during their senior year, providing them with an opportunity to engage in an integrated course designed to ready them for college-level instruction. As a key part of Tech Prep, consortium leaders have emphasized numerous interdisciplinary approaches to academic and vocational education, secondary-to-postsecondary transition, work-based learning experiences, and professional development opportunities for high school teachers, college faculty, and educational administrators.

A random sample of 317 Tech Prep graduates was selected for the Metropolitan Consortium study by an external evaluator who has worked with consortium leaders for many years, conducting earlier evaluations of the local Tech Prep initiative. Using the consortium's database, a sample of Tech Prep graduates was identified from the two high schools having the longest history with Tech Prep implementation in the consortium. (Another high school that had begun Tech Prep implementation in 1992 was omitted from the study because of its elite student body, admitted by selective admission. Of the remaining high schools, none had been involved in Tech Prep implementation long enough to have Tech Prep high school participants graduating by 1995, the graduation year of the first cohort of Tech Prep students identified for this analysis.) Once the group of Tech Prep graduates was identified, a comparable sample of non-Tech Prep graduates (n = 326) was selected at random from the same high schools using the same upper and lower limits on class rank percentile as the Tech Prep group, ensuring an equivalent distribution on class rank. (Refer to the methods section for further details on sampling procedures. Table 9 shows frequency distributions of the two groups on class rank percentile and cumulative grade point average.)

Demographics and Personal Characteristics

The sample of Tech Prep graduates provided a fairly close representation of the general student population on racial and ethnic composition, though the overall Tech Prep group did not have as high a percentage of Black students as the non-Tech Prep (see Table 8). Still, most students were Black or Hispanic, with only a small percentage of White students enrolled in either school. Looking at cohorts within the Tech Prep and non-Tech Prep groups, the 1997 Tech Prep cohort had a higher percentage and more representative group of Black students than the 1995 and 1996 cohorts. Over half of the Tech Prep and non-Tech Prep graduates were female, and the vast majority of all graduates were single and living at home with their parents.

Approximately 60% of the Tech Prep and non-Tech Prep graduates reported that the highest level of their father's education was high school or below. Their mother's education level tended to be a little higher, especially for the Tech Prep group, but the majority of both groups held a high school diploma or less. Only 17% of the Tech Prep and 13% of the non-Tech Prep graduates reported their father's held a bachelor's degree or higher; the highest level of education obtained by the mothers of both groups was almost identical. While in high school, approximately 60% of both groups estimated that their family income was less than $30,000.

Table 8

Percentage Distribution on Selected Demographics by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=132	1995 Total n=28	1996 Total n=34	1997 Total n=70	Total Grad. n=139	1995 Grad. n=38	1996 Grad. n=40	1997 Grad. n=61
Gender								
Male	44.3	42.9	58.8	37.7	44.3	52.6	35.0	36.1
Female	55.7	57.1	41.2	62.3	55.7	47.4	65.0	63.9
Race/Ethnicity								
White, non-Hispanic	16.0	12.0	18.8	16.1	6.9	5.6	2.6	10.9
Black, non-Hispanic	60.5	68.0	56.3	59.7	76.2	80.6	82.1	69.1
Asian/Pacific Islander	3.4	0.0	6.3	3.2	1.5	0.0	5.1	0.0
Am. Indian/Alaskan Native	0.8	0.0	0.0	1.6	0.0	0.0	0.0	0.0
Hispanic	19.3	20.0	18.8	19.4	15.4	13.9	10.3	20.0
Marital status								
Single	87.1	78.6	91.2	88.6	89.9	78.9	90.0	96.7
Single with children	9.1	14.3	5.9	8.6	6.5	13.2	10.0	0.0
Married	0.8	3.6	2.9	0.0	1.4	5.3	0.0	0.0
Married with children	3.0	3.6	0.0	2.9	2.2	2.6	0.0	3.3
Father's education level								
Less than HS graduate	14.1	16.7	4.0	18.0	21.0	18.5	24.1	20.5
High school graduate	44.4	37.5	60.0	40.0	41.0	48.1	44.8	34.1
Some college, no degree	12.1	4.2	12.0	16.0	17.0	14.8	13.8	20.5
Two-year assoc. degree	12.1	16.7	12.0	10.0	8.0	3.7	6.9	11.4
Four-year bachelor's degree	12.1	12.5	12.0	12.0	11.0	14.8	6.9	11.4
Graduate degree	5.1	12.5	0.0	4.0	2.0	0.0	3.4	2.3

Table 8 (cont.)

Mother's education level								
Less than HS graduate	21.8	19.2	16.7	25.4	18.2	23.5	17.1	15.4
High school graduate	29.4	30.8	36.7	25.4	40.5	38.2	42.9	40.4
Some college, no degree	17.6	15.4	23.3	15.9	19.8	14.7	28.6	17.3
Two-year assoc. degree	15.1	15.4	6.7	19.0	11.6	5.9	2.9	21.2
Four-year bachelor's degree	9.2	15.4	3.3	9.5	5.8	11.8	5.7	1.9
Graduate degree	6.7	3.8	13.3	4.8	4.1	5.9	2.9	3.8
Family income								
$14,999 or less	28.7	11.1	37.9	29.6	22.0	23.3	23.5	20.0
$15,000 – $29,999	30.7	44.4	27.6	27.8	38.5	26.7	41.2	44.4
$30,000 – $44,999	19.8	27.8	10.3	22.2	25.7	26.7	29.4	22.2
$45,000 – $59,999	8.9	5.6	3.4	13.0	5.5	10.0	2.9	4.4
$60,000 – $74,999	5.9	11.1	10.3	1.9	5.5	10.0	0.0	6.7
$75,000 – $89,999	4.0	0.0	6.9	3.7	2.8	3.3	2.9	2.2
$90,000 or more	2.0	0.0	3.4	1.9	0.0	0.0	0.0	0.0
Present residence								
Live with my parent(s)	76.9	70.4	79.4	78.3	85.1	70.3	87.2	93.1
Live alone	9.2	11.1	8.8	8.7	5.2	13.5	2.6	1.7
Live with spouse or significant other	5.4	11.1	2.9	4.3	5.2	10.8	2.6	3.4
Live with a friend or roommate	8.5	7.4	8.8	8.7	4.5	5.4	7.7	1.7

Source: Education-To-Careers Follow-up Survey (n = 271) for all items

Note: Details may not sum to 100 due to rounding.

Educational Characteristics

Similar to the process used for all cases, we randomly selected a group of Tech Prep graduates and then identified a group of non-Tech Prep graduates, again at random, that had a comparable distribution on cumulative grade point average (GPA) at the time of high school graduation. When considering the overall group of Tech Prep graduates in the Metropolitan Consortium, 38% graduated in the top 25th percentile of their high school class and about 53% were in the academic middle (26th to 75th percentile) (see Table 9). Less than 10% of the Tech Prep graduates were at or below the 25th percentile. Whereas there were no differences between the groups, there were significant differences between the cohorts within the Tech Prep group. A much higher percentage of 1997 Tech

Prep cohort was in the top quartile of class rank (51%) than the 1995 and 1996 cohorts. The difference between the 1995 and 1997 graduate cohorts was statistically significant (F = 8.89, df = 2, p = .000). Since the Tech Prep cohorts were selected at random, these groups represented a significant change in Tech Prep over the three-year period, with later Tech Prep students showing higher academic performance than earlier Tech Prep students. Even so, results on cumulative GPA suggest most students earned cumulative grades of C to B/B+, but few were considered A students.

Follow-up survey results provided information on students' perceptions of their educational experiences, including a question on the utility of what they learned in high school. When asked how useful what they learned in high school was to what they'd done since graduation, similar results were evident for Tech Prep and non-Tech Prep graduates with most reporting their high school education to be very or fairly useful.

Table 9

Percentage Distribution on Selected Educational Characteristics and Attitudes by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=300	1995 Grad. n=79	1996 Grad. n=95	1997 Grad. n=126	Total Grad. n=309	1995 Grad. n=101	1996 Grad. n=91	1997 Grad. n=117
Class rank percentile at HS graduation								
1 – 25%	9.3	29.2	7.1	3.9	12.1	20.8	15.8	4.6
26 – 50%	21.7	25.0	21.4	20.8	13.6	12.5	5.3	16.9
51 – 75%	31.0	37.5	42.9	24.7	40.9	45.8	26.3	41.5
76 – 100%	38.0	8.3	28.6	50.6	33.3	20.8	52.6	36.9
Cumulative GPA at HS graduation								
Less than 60	0.0	10.9	18.1	0.0	0.4	0.0	0.0	1.0
60 – 69	12.6	71.9	59.0	9.6	14.3	12.1	19.7	12.4
70 – 79	60.9	17.2	22.9	56.1	58.8	65.9	52.6	57.1
80 – 89	26.1	0.0	0.0	33.3	25.4	20.9	26.3	28.6
90 – 100	0.4	0.0	0.0	0.9	1.1	1.1	1.3	1.0
Utility of high school learning								
Extremely useful	13.0	7.1	5.9	1.4	8.0	2.6	12.5	5.0
Very useful	30.5	14.3	20.6	15.9	35.5	15.8	22.5	16.7
Fairly useful	35.9	35.7	38.2	34.8	31.9	28.9	32.5	33.3
Somewhat useful	16.8	35.7	26.5	30.4	18.1	44.7	22.5	38.3
Not at all useful	3.8	7.1	8.8	17.4	6.5	7.9	10.0	6.7

Source: Tech Prep High School Transcript File (n = 609) for all items except utility of high school learning, which came from the Education-To-Careers Follow-up Survey (n = 271)

Note: Details may not sum to 100 due to rounding.

Math and Vocational Course-Taking Patterns

Recalling the graduation requirements for High School 602, specifically the requirement of at least three years of mathematics, Table 10 shows that most Tech Prep and non-Tech Prep graduates were meeting or surpassing the minimum number of math courses needed to graduate from high school. Specifically, 47% of Tech Prep graduates were taking five to six semesters of math courses, and another 45% were taking seven or more semesters of high school math courses, thereby exceeding the minimum by at least a semester. With the Tech Prep cohorts, a significant difference emerged indicating that more recent Tech Prep graduates had taken more math than previous Tech Prep cohorts. Among 1995 Tech Prep graduates, approximately 30% took seven or more math courses, but among the 1997 graduate cohort that percentage had doubled to about 60% taking seven or more math courses ($F = 15.87$, $df = 2$, $p = .000$). (Note, this finding parallels the increase in cumulative GPA for the Tech Prep cohorts.) The same pattern was found for the non-Tech Prep cohorts, but the finding was not as dramatic ($F = 3.91$, $df = 2$, $p = .02$).

Looking at the lowest math course taken, a significant difference emerged between the Tech Prep and non-Tech Prep graduates, with Tech Prep graduates more likely to have started taking high school math at a higher level than the non-Tech Prep graduates, with Sequential Math 1 ($t = 4.78$, df = 603, p = .000). (Refer to Appendix E for a listing of math course titles that exemplify the categories used in this analysis.) Over 50% of the non-Tech Prep graduates started high school math with basic math or general math, whereas only 22% of the Tech Prep graduates started at that same fundamental level. Examining the cohorts over the period of 1995 to 1997, it is evident that more graduates started with Pre-Algebra or Sequential Math 1 in 1997 than in 1995 and 1996. This finding is apparent for both groups, but statistically significant at the p = .05 level for the cohorts within the non-Tech Prep group only ($F = 17.03$, $df = 2$, $p = .000$).

Turning to the highest math course taken, 57% of the Tech Prep participants graduated with Sequential Math 3 or advanced math, whereas only 41% of the non-Tech Prep students graduated having taken these math courses, and this was a statistically significant difference (t = 3.0, df = 603, p = .000). There were significant differences between the cohorts for both the Tech Prep and non-Tech Prep groups as well, with more participants in the 1997 cohorts completing high school math with a higher-level course than previous cohorts, reflecting an increase in high school graduation requirements to some extent (Tech Prep: F = 8.62, df = 2 , p = .000; Non-Tech Prep: F = 7.64, df = 2, p = .001).

Virtually no applied math courses were evident in this consortium based on our analysis of student transcripts, therefore applied math results are not reported. In terms of honors or advanced placement (AP) math, the vast majority of Tech Prep and non-Tech Prep graduates did not take part in these courses during high school. However, an increase was evident among the Tech Prep cohorts between 1995 and 1997. In 1997, 17% of the Tech Prep graduates finished high school with one to two honors math courses (F = 8.15, df = 2, p = .000), compared to only 3% or 4% of the 1995 and 1996 cohorts, respectively.

Table 10

Percentage Distribution on High School Math Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=300	1995 Grad. n=79	1996 Grad. n=95	1997 Grad. n=126	Total Grad. n=309	1995 Grad. n=101	1996 Grad. n=91	1997 Grad. n=117
Total math courses by semester:								
0	1.0	0.0	3.2	0.0	0.3	0.0	0.0	0.9
1 – 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 – 4	7.3	15.2	8.4	1.6	4.5	5.0	6.6	2.6
5 – 6	46.7	53.2	51.6	38.9	55.3	63.4	60.4	44.4
7 – 8	35.0	29.1	30.5	42.1	32.7	28.7	23.1	43.6
9 or more	10.0	2.5	6.3	17.5	7.1	3.0	9.9	8.5
Lowest math course								
Basic math	19.2	11.4	29.3	16.7	22.1	10.9	42.9	15.6
General math	12.8	22.8	13.0	6.3	33.4	52.5	29.7	19.8

Table 10 (cont.)

Applied math	0.0	0.0	0.0	0.0	0.3	0.0	1.1	0.0
Pre-Algebra	15.8	1.3	3.3	34.1	9.7	3.0	0.0	23.3
Seq. math 1	52.2	64.6	53.3	42.9	34.4	33.7	26.4	41.4
Seq. math 2	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0
Seq. math 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Highest math course								
Basic math	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
General math	0.3	0.0	1.1	0.0	0.0	0.0	0.0	0.0
Applied math	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pre-Algebra	0.0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Seq. math 1	9.4	5.1	15.2	7.9	16.9	13.9	30.8	8.6
Seq. math 2	33.0	39.2	41.3	23.0	41.6	41.6	42.9	40.5
Seq. math 3	42.4	46.8	30.4	48.4	26.9	31.7	13.2	33.6
Advanced math	14.8	8.9	12.0	20.7	14.6	12.9	13.2	17.2
Total honors math by semester:								
None	91.0	96.2	96.8	83.3	93.9	95.5	95.6	91.5
1 – 2	9.0	3.8	3.2	16.7	6.1	5.0	4.4	8.5
3 – 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 – 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 – 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding.

Vocational Course-Taking

Tech Prep and non-Tech Prep graduates in both high schools took a great deal of vocational education, though this finding is not particularly surprising since both high schools have a historical commitment to a vocational mission. Still, it is important to note that vocational course-taking was not limited to students in the Tech Prep group, since nearly all members of the non-Tech Prep group had taken vocational education courses as well. Even within this group, nearly all graduates had taken more than one vocational course and also at least one course beyond the introductory level.

More specifically, the vocational specialties that drew the most students from both groups were business, health (e.g., dental, nursing), and technical/communications (e.g., telecommunications, data processing). The preponderance of course-taking in these particular vocational specialty areas reflects the fact that High School 601 offered numerous technical courses, and High School 602 has a health magnet curriculum. Furthermore, the Metropolitan Consortium selected business, engineering, and health content areas for its initial Tech Prep implementation efforts in 1992, so these areas became quite established as the focus of the Tech Prep curriculum. Knowing this, it is interesting to note that similar percentages of Tech Prep and non-Tech Prep graduates completed courses in business (70% of the Tech Prep and 76% of the non-Tech Prep) and health (55% of the Tech Prep and 51% of the non-Tech Prep). However, differences were found between Tech Prep and non-Tech Prep graduates in two areas:

- A higher percentage of Tech Prep than non-Tech Prep graduates enrolled in technical/communications courses ($\chi^2 = 11.93$, $df = 1$, $p = .003$), and
- A higher percentage of Tech Prep than non-Tech Prep participants enrolled in special labor market courses (e.g., coop) ($\chi^2 = 10.64$, $df = 1$, $p = .003$).

Perhaps some of the most interesting findings are revealed when vocational course-taking is examined by levels, referring to the SST course coding schema. In the SST typology, vocational classes are categorized into one of three categories: first in a sequence (Level 1), second in a sequence (Level 2), and a specialty course (Level 3). (Appendix F provides further identification of Level 1, 2 and 3 vocational courses by course titles.) However, it is important to note that high schools do not always offer three levels in all vocational specialty areas and/or the number of higher level courses may be extremely limited. If so, students may have access to only Level 1 and Level 2 courses in a particular vocational area. In the two schools involved in this analysis, enrollment in a sequence of vocational courses was evident for both the Tech Prep and non-Tech Prep groups in specialty areas such as business, health, and technical/communications. When sequential course-taking patterns were examined by course level for the two groups, significant differences became apparent in a number of vocational areas as follows:

- More Tech Prep than non-Tech Prep graduates took sequential courses in health ($\chi^2 = 93.87$, $df = 4$, $p = .000$);

- More Tech Prep graduates took sequential courses in technical/communications than non-Tech Prep ($\chi^2 = 20.21$, $df = 3$, $p = .000$);

- More non-Tech Prep than Tech Prep graduates took sequential courses in business ($\chi^2 = 19.88$, $df = 4$, $p = .001$);

- More non-Tech Prep graduates engaged in sequential course-taking in precision production (e.g., electronics, welding) than Tech Prep ($\chi^2 = 34.90$, $df = 3$, $p = .000$); and

- More non-Tech Prep than Tech Prep graduates took a sequence of courses in construction ($\chi^2 = 6.60$, $df = 2$, $p = .04$).

Table 11

Percentage Distribution on Vocational-Technical Education Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=300	1995 Grad. n=79	1996 Grad. n=95	1997 Grad. n=126	Total Grad. n=309	1995 Grad. n=101	1996 Grad. n=91	1997 Grad. n=117
Course-taking in vocational area:								
Business	69.7	74.7	70.5	65.9	76.1	79.2	64.8	82.1
None	30.3	25.3	29.5	34.1	23.9	20.8	35.2	17.9
Health	54.7	54.4	35.8	69.0	51.1	57.4	33.0	59.8
None	45.3	45.6	64.2	31.0	48.9	42.6	67.0	40.2
Construction	15.7	15.2	22.1	11.1	16.8	16.8	27.5	8.5
None	84.3	84.8	77.9	88.9	83.2	83.2	72.5	91.5
Technical/Communications	55.0	51.9	66.3	48.4	41.4	33.7	50.5	41.0
None	45.0	48.1	33.7	51.6	58.6	66.3	49.5	59.0
Precision production	40.3	32.9	58.9	31.0	39.8	35.6	57.1	29.9
None	59.7	67.1	41.1	69.0	60.2	64.4	42.9	70.1
Mechanics/repairers	4.7	3.8	8.4	2.4	4.5	3.0	7.7	3.4
None	95.3	96.2	91.6	97.6	95.5	97.0	92.3	96.6
Special labor market	49.3	45.6	56.8	46.0	62.5	71.3	53.8	61.5
None	50.7	54.4	43.2	54.0	37.5	28.7	46.2	38.5
General labor markets	7.3	8.9	8.4	5.6	7.1	5.0	13.2	4.3
None	92.7	91.1	91.6	94.4	92.9	95.0	86.8	95.7
Business								
None	30.3	25.3	29.5	34.1	23.9	20.8	35.2	17.9
Only level 1	50.0	48.1	53.7	48.4	39.5	38.6	36.3	42.7
Only level 1 and 2	5.3	10.1	7.4	0.8	13.9	13.9	15.4	12.8

Table 11 (cont.)

Only level 1 and 3	6.7	6.3	3.2	9.5	9.7	14.9	4.4	9.4
Minimum 1 in each level	3.0	5.1	3.2	1.6	5.5	8.9	3.3	4.3
Other	4.7	5.1	3.1	5.6	7.5	3.0	5.5	12.9
Health								
None	45.3	45.6	64.2	31.0	48.9	42.6	67.0	40.2
Only level 1	2.0	2.5	3.2	0.8	13.6	19.8	7.7	12.8
Only level 1 and 2	1.3	2.5	2.1	0.0	6.1	5.0	3.3	9.4
Only level 1 and 3	43.7	39.2	25.3	60.3	15.2	17.8	9.9	17.1
Minimum 1 in each level	5.0	3.8	5.3	5.6	15.5	14.9	12.1	18.8
Other	2.7	6.3	0.0	2.1	0.6	0.0	0.0	1.7
Construction								
None	84.3	84.8	77.9	88.9	83.2	83.2	72.5	91.5
Only level 1	11.0	12.7	13.7	7.9	7.4	5.0	13.2	5.1
Only level 1 and 2	4.3	2.5	8.4	2.4	8.7	10.9	13.2	3.4
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.4	0.0	0.0	0.8	0.6	1.0	1.1	0.0
Technical/Communications								
None	45.0	48.1	33.7	51.6	58.6	66.3	49.5	59.0
Only level 1	13.3	10.1	23.2	7.9	18.8	21.8	22.0	13.7
Only level 1 and 2	20.3	17.7	32.6	12.7	13.9	6.9	22.0	13.7
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	14.0	24.1	10.5	10.3	5.5	5.0	6.6	5.1
Other	7.3	0.0	0.0	17.4	3.2	0.0	0.0	8.5
Precision production								
None	59.7	67.1	41.1	69.0	60.2	64.4	42.9	70.1
Only level 1	0.3	0.0	0.0	0.8	1.3	2.0	2.2	0.0
Only level 1 and 2	11.3	3.8	23.2	7.1	21.4	17.8	28.6	18.8
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	5.8	5.9	11.0	1.7
Other	28.6	29.1	35.7	23.1	11.3	9.9	15.3	9.4
Mechanics/repairers								
None	95.3	96.2	91.6	97.6	95.5	97.0	92.3	96.6
Only level 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 2	0.0	0.0	00	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	4.7	3.8	8.4	2.4	4.5	3.0	7.7	3.4
Special labor market								
None	50.7	54.4	43.2	54.0	37.5	28.7	46.2	38.5
Only level 1	37.0	45.6	42.1	27.8	50.5	59.4	42.9	48.7
Only level 1 and 2	7.7	0.0	8.4	11.9	7.1	7.9	6.6	6.8
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 11 (cont.)

Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	4.6	0.0	6.0	6.3	4.9	4.0	4.3	5.9
General labor market								
None	92.7	91.1	91.6	94.4	92.9	95.0	86.8	95.7
Only level 1	7.3	8.9	8.4	5.6	7.1	5.0	13.2	4.3
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding. The "other" category includes course combinations other than those specified, and this category was not included in significance testing. Between group differences were computed on the total groups, but not cohorts by year due to small cell sizes.

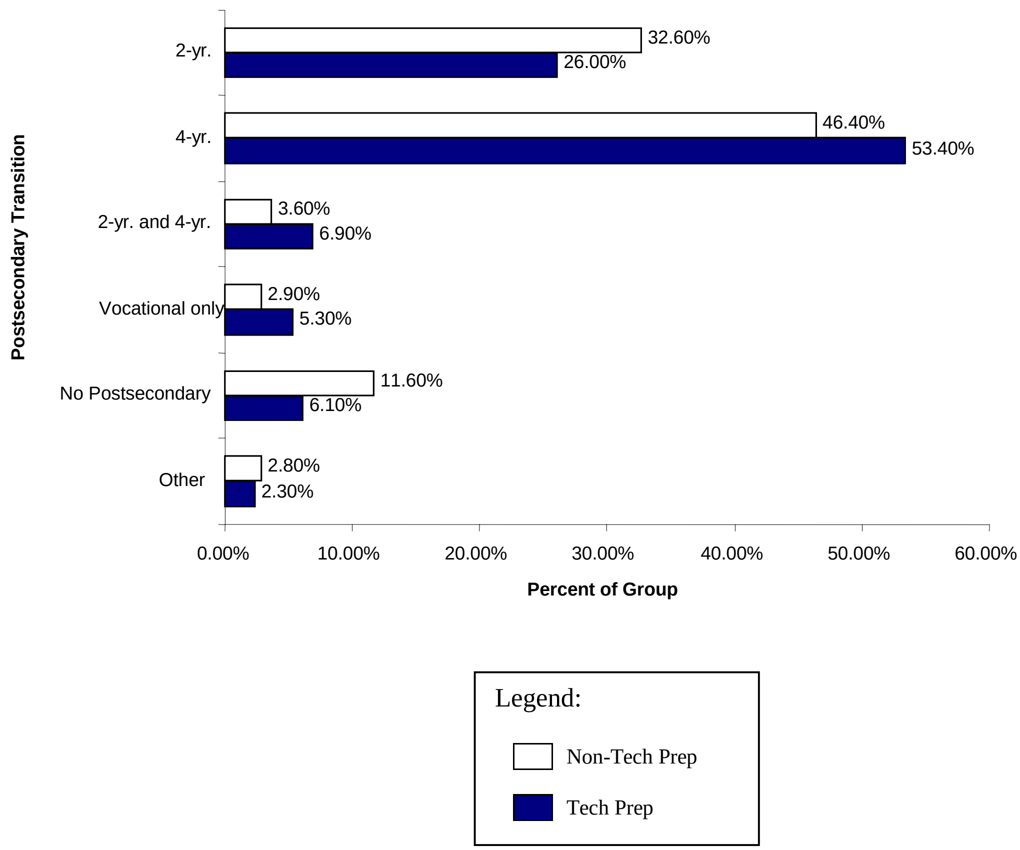
Transition to Postsecondary Education

By examining college transcripts and survey results, it was possible to determine that nearly all graduates in both groups had enrolled in some form of postsecondary education within one to three years of high school graduation. Looking at college transcripts, it was apparent that 18% of the entire group of graduates had enrolled at CTC. Based on our review of CTC transcripts, 23% of Tech Prep graduates had transcribed credits at CTC compared to only 13% of the non-Tech Prep group. However, follow-up surveys provided additional information about the secondary-to-postsecondary transition for students in this consortium.

According to follow-up survey results, nearly all high school graduates studied had enrolled in some form of postsecondary education after high school, with only 6% of the Tech Prep and 11% of the non-Tech Prep groups indicating they had not gone to college at all within one to three years after high school graduation (see Figure 3). Over 50% of the Tech Prep and 46% of the non-Tech Prep graduates reported going to a four-year college, with smaller percentages of each group going to a two-year college. Small percentages of students in either group reported going to multiple postsecondary institutions (i.e., two- and four-year colleges), but this might reflect the fact that students had not been out of high school for very long, so this analysis of postsecondary enrollment was limited in scope.

Figure 3

Transition to Postsecondary Education by Tech Prep Status



Work Experience During and After High School

When asked whether graduates were employed at any time during high school, and if so, what was the estimated hourly wage and total hours worked during a typical week, the groups responded similarly. The vast majority of Tech Prep and non-Tech Prep graduates indicated they had worked during high school (see Table 12). About half of the graduates earned $5.25 or less an hour, and another one-third made between $5.26 and $6.00. Most graduates worked between 11-30 hours during a typical week.

Table 12

Percentage Distribution in Employment Experiences During High School by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=132	1995 Grad. n=28	1996 Grad. n=34	1997 Grad. n=70	Total Grad. n=139	1995 Grad. n=38	1996 Grad. n=40	1997 Grad. n=61
Employed during high school								
No	29.2	39.3	18.2	30.4	34.3	34.2	34.2	34.4
Yes	70.8	60.7	81.8	69.6	65.7	65.8	65.8	65.6
Estimated hourly wages in last job held before high school graduation								
Zero – unpaid	4.3	0.0	0.0	8.3	4.5	0.0	4.0	7.5
Less than $5.25 /hr	51.1	41.2	55.6	52.1	51.1	56.5	56.0	45.0
$5.26 to $6.00 /hr	35.9	41.2	33.3	35.4	23.9	17.4	20.0	30.0
$6.01 to $7.00 /hr	3.3	11.8	3.7	0.0	9.1	17.4	8.0	5.0
$7.01 to $8.00 /hr	3.3	0.0	3.7	4.2	5.7	4.3	8.0	5.0
More than $8.00 /hr	2.2	5.9	3.7	0.0	5.7	4.3	4.0	7.5
Total hours worked during typical week in high school								
Less than 5 hours	2.2	0.0	0.0	4.1	2.2	0.0	4.0	2.6
6 – 10 hours	16.1	23.5	7.4	18.4	7.9	16.0	8.0	2.6
11 – 20 hours	38.7	29.4	51.9	34.7	41.6	40.0	48.0	38.5
21 – 30 hours	25.8	29.4	25.9	24.5	30.3	24.0	24.0	38.5
31 – 40 hours	17.2	17.6	14.8	18.4	18.0	20.0	16.0	17.9
More than 40 hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Work After High School

When asked about the current primary job, the majority of Tech Prep and non-Tech Prep graduates reported that they were working (see Table 13), but over one-third of both groups reported that their jobs were part-time. Perhaps because of the number of years since graduation, more 1995 high school graduates were working full-time (46% of the Tech Prep and 58% of the non-Tech Prep) than 1996 and 1997 graduates. However, over 30% of the Tech Prep graduates and 40% of non-Tech Prep graduates held three or more jobs since high school, with older graduates having more jobs than younger ones.

When considering wages, nearly half of the Tech Prep and non-Tech Prep graduates earned $6.00 per hour or less in their current primary job. For both groups, the 1995 cohort made more in hourly wages than the 1996 and 1997 cohorts, however this finding was statistically significant for the non-Tech Prep cohorts only (F = 6.17, *df* = 2., *p* = .003). Only 16% of the Tech Prep and 17% of the non-Tech Prep graduates were making $10.00 per hour or more after finishing high school one to three years earlier, according to follow-up survey results. The change in wages from the last job held during high school to the current primary job followed a similar pattern, with the Tech Prep and non-Tech Prep 1995 cohorts showing a greater change in wages than the 1996 cohorts, and the 1996 groups reporting more change than 1997 cohorts. Again, these results were statistically significant for the non-Tech Prep cohorts only ($F = 6.47$, $df = 2$, $p = 003$).

Slightly more than 50% of the Tech Prep and non-Tech Prep graduates worked in entry level or unskilled jobs at the time they completed the follow-up survey. Most also reported their desire for a professional job, and their confidence in ultimately obtaining their career goal. Perhaps the current level of job satisfaction would help to motivate students toward reaching their career goal, because most were only fairly satisfied or even less satisfied with their current primary job. There were no differences between the Tech Prep and non-Tech Prep groups on job satisfaction, but significant differences emerged for the cohorts within the non-Tech Prep group. A higher percentage of the 1996 non-Tech Prep cohort was somewhat satisfied or not satisfied with the primary job than the

1995 or 1997 cohorts (F = 5.16, df = 2, p = .000). Looking at the Tech Prep cohorts, a higher percentage of the 1995 cohort reported being extremely or very satisfied than the 1996 and 1997 cohorts, but these results were not statistically significant.

Table 13

Percentage Distribution of Post-High School Employment by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=132	1995 Grad. n=28	1996 Grad. n=34	1997 Grad. n=70	Total Grad. n=139	1995 Grad. n=38	1996 Grad. n=40	1997 Grad. n=61
Number of jobs since HS								
1 – 2	26.9	21.4	29.4	27.9	26.6	23.7	17.5	34.4
3 – 4	35.4	32.1	35.3	36.8	23.7	21.1	22.5	26.2
5 – 6	20.0	28.	32.4	10.3	23.0	21.1	30.0	19.7
7 – 8	6.2	14.3	2.9	4.4	9.4	15.8	5.0	8.2
9 or more	5.4	3.6	0.0	8.8	7.9	13.2	12.5	1.6
None	6.2	0.0	0.0	11.8	9.4	5.3	12.5	9.8
Number of jobs held currently								
0	27.7	22.2	25.0	32.1	21.0	8.8	27.3	25.0
1	64.3	63.0	71.9	60.4	70.6	82.4	63.6	67.3
2	7.1	14.8	3.1	5.7	7.6	8.8	9.1	5.8
3 or more	0.9	0.0	0.0	1.9	0.8	0.0	0.0	1.9
Current employment status								
Full-time (35 hours or more per week)	30.0	46.4	33.3	20.3	34.4	58.3	25.7	24.1
Part-time (less than 35 hours per week)	37.5	32.1	42.4	37.3	39.2	27.8	37.1	48.1
Unemployed seeking employment	29.2	17.9	24.2	37.3	20.0	8.3	25.7	24.1
Unemployed not seeking employment	2.5	3.6	0.0	3.4	4.8	2.8	8.6	3.7
Military full-time	0.8	0.0	0.0	1.7	1.6	2.8	2.9	0.0
Months worked in current primary job								
Less than 6 months	29.1	14.3	20.0	42.5	32.3	25.0	24.0	43.6
6 – 12 months	31.4	28.6	36.0	30.0	30.2	31.3	28.0	30.8
13 – 24 months	18.6	28.6	20.0	12.5	17.7	12.5	28.0	15.4
25 – 36 months	5.8	9.5	8.0	2.5	10.4	21.9	4.0	5.1
36 months or more	15.1	19.0	16.0	12.5	9.4	9.4	16.0	5.1
Wages per hour, current primary job								
zero	2.4	0.0	4.0	2.6	1.1	0.0	0.0	2.6
$5.25 or less	3.6	0.0	0.0	7.9	6.3	9.4	0.0	7.7
$5.26 – $6.00	16.7	9.5	20.0	18.4	17.9	12.5	25.0	17.9

Table 13 (cont.)

$6.01 – $7.00	25.0	14.3	20.0	34.2	22.1	6.3	25.0	33.3
$7.01 – $8.00	15.5	28.6	8.0	13.2	13.7	15.6	8.3	15.4
$8.01 – $9.00	8.3	4.8	16.0	5.3	13.7	15.6	25.0	5.1
$9.01 – $10.00	9.5	14.3	12.0	5.3	7.4	3.1	8.3	10.3
$10.01 – $11.00	2.4	4.8	0.0	2.6	3.2	3.1	4.2	2.6
$11.01 – $12.00	3.6	0.0	4.0	5.3	2.1	3.1	0.0	2.6
$12.01 – $13.00	4.8	14.3	4.0	2.6	3.2	9.4	0.0	0.0
More than $13.00	4.8	4.8	8.0	2.6	8.4	21.9	0.0	2.6
I don't know	3.6	4.8	4.0	0.0	1.1	0.0	4.2	0.0
Change in wages per hour from HS to present								
-$1.00	4.6	0.0	9.5	3.3	5.8	9.5	0.0	6.5
0	4.6	7.1	0.0	6.7	11.6	0.0	5.9	22.6
+$1.00	23.1	14.3	33.3	20.0	23.2	19.0	35.3	19.4
+$2.00	23.1	7.1	14.3	36.7	17.4	9.5	23.5	19.4
+$3.00	16.9	28.6	14.3	13.3	10.1	4.8	17.6	9.7
+$4.00	9.2	14.3	9.5	6.7	8.7	9.5	5.9	9.7
+$5.00 or more	18.4	28.4	19.1	13.2	23.1	47.6	11.8	12.9
Type of current primary job								
Entry level/unskilled	56.0	47.6	52.0	63.2	53.7	32.3	64.0	64.1
Semi-skilled	28.6	33.3	24.0	28.9	23.2	35.5	12.0	20.5
Skilled or technical	9.5	9.5	16.0	5.3	14.7	22.6	16.0	7.7
Professional	6.0	9.5	8.0	2.6	8.4	9.7	8.0	7.7
Type of primary job desired								
Entry level/unskilled	3.8	0.0	0.0	7.4	2.2	2.6	5.0	0.0
Semi-skilled	6.2	7.1	2.9	7.4	9.4	2.6	12.5	11.7
Skilled or technical	18.5	21.4	32.4	10.3	22.5	26.3	17.5	23.3
Professional	71.5	71.4	64.7	75.0	65.9	68.4	65.0	65.0
Satisfaction with primary job								
Extremely satisfied	15.7	19.0	12.5	15.8	12.5	12.5	4.0	10.3
Very satisfied	14.5	28.6	4.2	13.2	15.6	25.0	8.0	20.5
Fairly satisfied	39.8	33.3	54.2	34.2	43.8	50.0	36.0	43.6
Somewhat satisfied	18.1	19.0	8.3	23.7	18.8	3.1	28.0	17.9
Not at all satisfied	12.0	0.0	20.8	13.2	9.4	9.4	24.0	7.7
Confidence in reaching career goals								
Extremely confident	51.5	60.7	38.2	54.4	52.2	55.3	43.6	55.7
Very confident	34.6	21.4	50.0	32.4	34.8	31.6	41.0	32.8
Fairly confident	10.0	3.6	11.8	11.8	7.2	10.5	7.7	4.9
Somewhat confident	3.8	14.3	0.0	1.5	5.1	2.6	7.7	4.9
Not at all confident	0.0	0.0	0.0	0.0	0.7	0.0	0.0	1.6

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Summary

Since its initial implementation, the Metropolitan Consortium has embraced five goals. One, to increase high school student awareness of, and access to, technical education and technical careers. Second, to increase the depth and coordination of technical education with secondary and postsecondary schools in the region. Third, to accelerate student progress through the associate degree by linking curriculum across grades eleven to fourteen. Fourth, to increase the collaboration between high schools, CTC, and local industry and facilitate the education and placement of qualified technicians. Finally, a fifth goal is to increase the retention of high school students at CTC. Over time, the consortium staff has sought to meet these goals by emphasizing several main components, especially interdisciplinary approaches to academic and vocational integration, secondary-to-postsecondary transition, work-based learning (WBL), and professional development opportunities for high school teachers, college faculty, and local administrators.

In pursuing the consortium's five goals, Tech Prep has emphasized a 2+2 or 2+2+2 articulated curriculum in technical areas, focusing on high school students as juniors and/or seniors who completed Tech Prep math and Tech Prep English courses, in addition to their vocational-technical courses. The math component included sequential math classes that infused math skills into the technical curriculum, and the Great Thinkers in Science class, which is actually a high school senior-level English class team-taught by high school and college instructors. Starting in 1994, the Great Thinkers curriculum provided a model for the development of several other Great Thinkers courses and additional project-based academic and vocational integrated courses.

In a highly diverse urban setting, Tech Prep has provided educational options focused extensively on integrated curriculum and technical careers. A fairly high percentage of participants (38%) in Tech Prep were drawn from the top quartile of the high school class, but more than half were in the middle two quartiles. Nearly half of Tech Prep graduates studied took five to six semesters of math, and most others had taken seven or more semesters, an increase of 30% between the 1995 to 1997 cohorts. The non-Tech

Prep graduates also increased math course-taking during this period, but not as dramatically as the Tech Prep group. By graduation, an equal percentage of Tech Prep and non-Tech Prep graduates (15%) had taken advanced math (e.g., trigonometry and calculus). Both Tech Prep and non-Tech Prep graduates took a great deal of vocational education, with nearly all having taken more than one vocational course and many having taken at least one course beyond the introductory level. Vocational areas that drew the most students from both groups were business, health, and technical/communications, although Tech Prep graduates were more likely to be enrolled in sequential courses in health and technical/communications than their non-Tech Prep counterparts. There were few differences in the work patterns of the groups during high school, since most held entry-level, low-wage jobs and worked between 11 and 30 hours per week. Nearly all graduates had enrolled in some form of postsecondary education after high school. Approximately half had go on to a four-year college, with smaller percentages of each group having chosen a two-year college. The vast majority of Tech Prep and non-Tech Prep graduates were still working in entry level or unskilled jobs, including those going to college. Most wanted and were confident they would obtain a professional job ultimately.

Reflecting on the efforts of the Metropolitan Consortium, several key components developed to an advanced stage over the period of this study. For instance, since the early 1990's the recruitment process had evolved substantially, beginning initially at the middle school level and developing at the high school level where students could sign a Tech Prep contract and counselors could conduct orientation sessions so that students could learn about CTC, the lead college in the Metropolitan Consortium. Various transition activities helped students move from the high school to the college, including workshops designed to help students fill out financial aid applications. The consortium offered various WBL experiences such as internships, paid work placements, and school-based enterprises. Career guidance activities included visits to colleges, work sites, and in-school visits from working professionals. Finally, the priority for professional development and curriculum materials was reflected in the numerous curriculum development workshops and institutes conducted by consortium leaders, including the Great Thinkers courses, the benchmarking project with local university professors, and the consortium's six-year participation in the NCRVE Urban Schools Network.

Though integrated curriculum development has been a predominant component of the Metropolitan Consortium, it has not overshadowed other important components but provided a sound foundation for their evolution. Consortium leaders believe that having a strong classroom experience helps to drive the maturity of the overall Tech Prep initiative. By targeting much of the Tech Prep grant funds for professional development for teachers, and, most importantly, by following up and creating the conditions for teachers to apply the new knowledge and skills to curriculum development, the consortium has made steady progress. Professional development has been the key to curriculum development and subsequent implementation of integrated curriculum, giving consortium leaders confidence that they have had a fighting chance at institutionalizing Tech Prep for the long term. Having committed leaders and involved teachers willing to engage in curriculum reform has been absolutely key for Tech Prep to take root in this consortium.

THE WORKFORCE DEVELOPMENT CONSORTIUM

Margaret Terry Orr

Community Context

The Workforce Development Consortium (Workforce Consortium) is a county-wide consortium located in the southeast region of the U.S., containing both large city and rural communities, with a total population of 389,000. The majority of the population is White (70%) and has at least a high school diploma (87%). The median per capita income was $25,462 in 1998 and the county has a very low unemployment rate of 2.3%. The county is part of a multi-county economic development region that has made aggressive efforts to diversify the local economy from its traditional base of textiles, apparel, and furniture manufacturing, into metals manufacturing, chemical processing, and heavy vehicle manufacturing. Many new corporate headquarters have relocated in the region. As a result, the local economy is diverse, divided among trade (26%), services (25%), manufacturing (23%), and other (26%).

In 1993, the three school districts in the county were merged and a new superintendent hired. The merged school district, Central County Schools (CCS), has 14 high schools, a state of the art vocational-technical center (which serves all high schools), 60 elementary and 17 middle schools. There are 15 magnet or theme schools and two high schools are Centers for Advanced Studies. CCS's student population was 53% White, 39% African-American, and 8% other for the 1997-99 school years. In 1997-98, the formal secondary school dropout rate was 3.1% (based on all students grades 7-12), reflecting only those students who dropped out formally. According to the state accountability assessment for 1997-98, nine of the district's 14 high schools are high performing and only one was rated as low performing. The district's low high school achievement levels were in algebra and English.

There is one county-wide community college, Central Technical Community College (CTCC). It is an open-admissions college established as an industrial education center in 1958, through a cooperative agreement among local school districts and the state department of vocational education. From its inception, the college was designed to train residents for local growth industries. It began granting associate of applied science (AAS) degrees in 1965 and added a college transfer program in 1983. In 1997-98, tuition for in-state students is $740 annually, with an additional $248.20 in required fees.

CTCC enrolled 6,647 curriculum (credit) students in 1995. Of these, 70% were part-time and 40% were new students. Fifty-one percent were young students, ages 18-24; the majority were white (72%). The college offers five degrees: associate in applied science (AAS), associate in arts (AA), associate in science (AS), associate in fine arts (AFS), and associate in general education (AGE). It has 90 one- and two-year programs of study, as well as various continuing education programs and adult literacy opportunities. The majority of its technical programs include a work-based learning option (cooperative education, internship, or apprenticeship). CTCC is regionally accredited and part of a regional consortium of higher education institutions that allows CTCC students to enroll in courses elsewhere. The county also includes several other public and private four-year colleges, including two regional campuses of the state university system.

During the early 1990s, the community college and school district were harshly criticized by the business community for the poor quality of programs and graduates. In 1991, CTCC's new college president recognized how much local business and industry were changing and made transformation of the community college as a workforce development institution a priority. Over the years, CTCC has aggressively revamped its own programs and curriculum, while partnering with business and industry and the local school district to do intensive job analysis and program quality review for both secondary and postsecondary programs. CTCC added a director of Workforce Preparedness to coordinate the college's efforts and role in using consortium funds for local workforce development.

In 1993, the newly hired CCS superintendent had a similar response. The district undertook several school improvement efforts, including making technological upgrades and workforce-focused curriculum a priority. The district collaborated with the community college and business and industry to pursue a joint educational agenda for K-14 (kindergarten through grade 14) education to improve students' academic skill development, enrollment in career-focused programs of study (secondary and postsecondary) and other workforce development efforts. The school district hired a director of workforce development, and a career development specialist to coordinate the efforts.

The two educational systems worked together to engage business and industry, particularly with the local chambers of commerce and economic development corporation. Local businesses were also initiating model workforce development strategies with the school district. As a result, beginning in 1996, the economic development corporation members pledged to create over a three-year period approximately 225 paid youth apprenticeships with community college scholarships. The two chambers of commerce collaborated and created a joint Education Council. They jointly hired a workforce development staff person to assist in forming industry councils to develop youth apprenticeships, raise scholarship funds, solicit resources for the technical programs of study, and support the workforce development reform efforts of CTCC and CCS.

Over time, the three-way collaboration of CTCC, CCS, and business and industry was formalized into an elaborate advisory structure to support the development of the College Tech Prep (CTP) in curriculum and instruction, including a youth apprenticeship program. By 1997-98, these efforts included 150 businesses participating in 10 industry councils and an operations committee. A workforce development board coordinated the Workforce Preparedness efforts and resources, including Tech Prep and School-To-Work Opportunities Act (STWOA) funds. CTCC and CCS staff and officials participated at all levels. By 1999, this effort was expanded to 11 industry councils.

The collaborative efforts of CTCC, CCS, and local business and industry to enhance workforce development have been recognized for increasing student achievement through the development of the College Tech Prep (CTP) program. CTP stresses the integration and completion of higher level academic and technical courses and the provision of multiple educational and career options for its graduates.

The local workforce development reform efforts have been strongly influenced by state policy reform efforts to facilitate academic reforms and workforce development and by facilitating student transition into community colleges and four-year institutions. The academic reforms included a new accountability system for higher academic standards (starting in high schools in the 1997-98 school year), evaluating schools' performance using growth targets and end-of-course testing in core subjects, and college prep and college Tech Prep completion rates. The state established a standard course of study for all academic curriculum and required end-of-course testing.

The state workforce development reforms include establishing CTP in 1993 as a replacement for both the general and vocational courses of study in secondary schools. The state also established competency-based courses of study in the technical areas to be used as blueprints for local courses. The state is working on a statewide articulation agreement for community colleges and secondary schools, and has reengineered the public community colleges beginning in the 1998-99 school year, by switching to a semester system, using career pathways rather than vocational areas of study, and re-writing community college courses to have common names, numbers, and descriptions.

Tech Prep Implementation

CCS has collaborated with local business and industry, CTCC, and other higher education institutions to recreate the secondary school system to facilitate higher academic achievement, increased college pursuits as part of career preparation, and higher quality, competency-based technical courses of study. It has used professional development and school restructuring to support these goals. CTCC, in turn, has supported CCS's efforts to improve the academic readiness of incoming students and to revamp and upgrade technical education programs to meet the demands of changing business and industry. Tech Prep, School-To-Work (STW) and other educational reforms were used in complementary ways by educational partners to support these goals. The primary strategies have been to (a) upgrade the technical programs (through curriculum improvement, creation of labs, and professional development); (b) promote technical education and CTP career pathways as a viable college preparatory alternative; (c) update and expand career planning and apprenticeship experiences; and (d) establish various transition mechanisms particularly scholarships and course articulation to encourage students to pursue a two-year degree. The consortium's approaches have been systemic in nature, using various steering committees, often with joint CCS and CTCC participation, and extensive professional development for all staff to pursue these four primary strategies.

Tech Prep was implemented through three strands—curriculum integration, career-focused courses of study that became career pathways and youth apprenticeship programs, and a career guidance program. To support these three strands, CCS purchased and implemented a computerized instructional management system (IMS) in all 14 high schools, with test item banks, instructional materials for academic and technical courses, and support for integrated lesson plans. STWOA funds were used to establish career pathways and career development activities K-14, extend professional development on career development and integrated instruction, and adopt the High Schools That Work (HSTW) school reform model.

Initial Tech Prep implementation efforts of the three school districts were replaced when the three school districts merged in 1993. Under the merged school district, all district management policies, procedures, and practices had to be created to reflect the new district structure and operations. The revised implementation of Tech Prep was one of many other policies and practices that had to be re-developed. As a result, a new integrated planning effort began in early 1994, followed by incremental implementation with seven high schools in the 1994-95 school year and the other seven the following year. Similarly, the development of youth apprenticeship programs began incrementally, starting with two pilot programs in 1994 and 1995 and expanding them to other high schools while developing additional youth apprenticeship models. The district also began adopting the High Schools That Work (HSTW) model, first as a pilot and then adding additional high schools as teachers in each participating high school took part in professional development.

Throughout the years, CCS and CTCC have worked on strategies that cut across institutionalized boundaries, including marketing and recruitment, career development and planning, upgrading technical training labs, using national standards and competencies to guide course and program revisions, and engaging business and industry in extensive collaboration efforts.

Figure 1 summarizes the milestones for the school district and the community college in the CTP implementation, particularly as supported through federal and state Tech Prep and STWOA funds.

FIGURE 1
WORKFORCE DEVELOPMENT CONSORTIUM MILESTONES

	1993-1994 (Planning Year)	1994-1995	1995-1996	1996-1997	1997-1998
FUNDING	CCS and CTCC received a $25,000 Carl Perkins Tech Prep planning grant.	CCS and CTCC received a $260,000 Tech Prep implementation grant (July 1994). Receipt of $100,000 grant to upgrade the technical center's TV broadcasting lab, $50,000 grant from a large local corporation for a manufacturing technology lab, and a $15,000 school-to-work planning grant. Receipt of $1 million from county commissioners and from state and federal sources to upgrade equipment and renovate labs.	Corporate foundation provided $45,000 to assist in equipping second metals lab. A $50,000 grant from a second corporate foundation was used to complete manufacturing technology lab at High School 704.		$115,000 was received from Perkins Tech Prep grant.
PERSONNEL	A college Tech Prep director was hired by CCS to implement College Tech Prep and to supervise Workforce Development (February 1994).			A career development coordinator was hired jointly by CCS and CTCC to coordinate secondary and postsecondary career development efforts (August 1996).	
LEGISLATION	The State Board of Education and the state's Community College Board announced a cooperative agreement establishing College Tech Prep as an educational program (March 1993).				
STRUCTURE/ PARTNERS	CCS was formed with the merger of three secondary schools into a unified district (July 1993). Seven high schools opted to use an instructional management system to pilot an integrated College Tech Prep curriculum and to establish a College Tech Prep team to receive training and to serve as future trainers for their schools (March 1994).	Metals manufacturing College Tech Prep course of study was developed by CCS, CTCC, a state university, and the area's Center for Advanced Manufacturing.	A local city's development corporation pledged funding for additional apprenticeships-50 in 96-97, 75 in 97-98, 100 in 98-99 totaling 3.1 million dollars for three-year period.	Two additional industry councils were formed – Banking & Finance and Electrical Trades.	

FIGURE 1
WORKFORCE DEVELOPMENT CONSORTIUM MILESTONES

	1993-1994 (Planning Year)	1994-1995	1995-1996	1996-1997	1997-1998
EVALUATION	Assessment of status of vocational/technical courses, applied curriculum, and facilities was implemented (February 1994).				

	1998-1999
FUNDING	
PERSONNEL	A CCS apprenticeship coordinator was employed.
LEGISLATION	
STRUCTURE/ PARTNERS	
EVALUATION	

	PRE-1994	1994-1995	1995-1996	1996-1997	1997-1998
INTEGRATED CURRICULUM	A Tech Prep integration workshop was conducted for selected high school academic and vocational teachers (May 1994).	College Tech Prep teams received software, curriculum alignment materials, integrated lessons, and additional training. Integrated College Tech Prep item banks were developed for 13 technical and academic courses.	The consortium obtained integrated item banks for all high school academic and technical courses (November 1995).		
ARTICULATED CURRICULUM	Curriculum alignment workshop was held with CCS and CTCC. Trades Prep teachers worked to align selected T & I courses with CTCC courses (May 1994).	Business and auto technology teachers worked with CTCC instructors to align courses and refine articulation agreements.			

FIGURE 1
WORKFORCE DEVELOPMENT CONSORTIUM MILESTONES

	PRE-1994	1994-1995	1995-1996	1996-1997	1997-1998
PROFESSIONAL DEVELOPMENT	Tech Prep integrated program team members received training in curriculum alignment and in use of computerized instructional management system (May 1994).	Teams for the other seven high schools received training on curriculum alignment, College Tech Prep curriculum integration, and IMS software and integrated item banks (February-June 1995). Teams from all elementary and middle schools were trained in implementing the instructional management system. (February-June 1995). Counselors and other career-oriented staff received training on College Tech Prep implementation and career development planning.			
GUIDANCE	Counselors on the pilot teams received orientation and training on using crosswalks of academic/technical enabling skills to help students plan high school courses.	Four-year academic/career development plans became a requirement for all ninth through twelfth graders. Guidance services added College Tech Prep information to the high school handbook and CTCC provided a College Tech Prep Resource Manual for all high schools.		A career development coordinator was hired jointly by CCS and CTCC to coordinate secondary and postsecondary career development efforts.	

FIGURE 1
WORKFORCE DEVELOPMENT CONSORTIUM MILESTONES

	PRE-1994	1994-1995	1995-1996	1996-1997	1997-1998
WORK-BASED LEARNING	Cooperative education opportunities were made available to students in business and marketing. Internships were made available to students in Health Occupations II and Child Care Services.	Metals manufacturing College Tech Prep course was developed with sponsoring companies committing to $9,500 for each youth apprenticeship student they sponsored. Sponsoring companies also donated labor and materials to update metals lab facility; paid teacher's salaries for summer work; assisted with curriculum development; and sponsored apprenticeship development training for CCS and CTCC counselors and faculty.		Electrical trades apprenticeship was opened at the area's technical center. Second metals program in CCS was established at one area high school (not in sample for NCRVE study). Pilot apprenticeship program with Nations Bank started with business students from five selected high schools. Six business councils added- Electrical Banking; Chemical Process; Automotive; Heating, Ventilation, and Air Conditioning; and Heavy Equipment. Total companies participating in industry council totaled 111.	
EQUIPMENT AND LAB UPGRADE		Two electronics labs were updated with 16 computer interactive stations. Seven computer aided design (CAD) /drafting labs were updated, each with 16 stations. Five business education labs were updated, each with 23 computer networked stations. Four auto tech labs were equipped with electronic systems and engine performance training boards. The area's technical center's metals lab were updated with 16 computer interactive CAD/computer aided manufacturing (CAM) stations and computerized numerical control (CNC) milling stations and lathes, and four medical careers labs were equipped with five computer interactive bio/technology instruction stations. Grants were received to upgrade the technical center's television broadcasting lab and to establish a manufacturing technology lab at High School 704.	Upgrades to remaining business labs in several high schools were completed, totaling 330 student stations, 15 teacher stations, and extensive wiring. All CCS auto tech teachers obtained certification. Second CCS metals lab opened at high school 704.		

Tech Prep Goals and Definitions

The state board of education and state community college board jointly established CTP as an educational program in March, 1993, as local Tech Prep planning grants were being developed. Subsequent plans and implementation strategies of the Workforce Consortium for the federal and state Tech Prep and STWOA grants to the local area reflected efforts to create extensive programs of study under CTP and to support development of related youth apprenticeship programs. The consortium's Tech Prep and STWOA grant resources, therefore, did not have separate local goals and objectives; these resources were used for separate strategies that contributed to the overall CTP courses of study and youth apprenticeship program opportunities and fostering a K-14 educational system.

The goal of CTP, as outlined in the high school course registration handbook, is to prepare students to "live and work in a highly technological society." The purpose of the youth apprenticeship programs is to prepare students for career opportunities in technical fields and for postsecondary education and to give them insight into multiple career options in expanding fields.

CTP has been further focused over the years through the creation of several career pathways that define student course-taking and preparation. A 1999 school district publication explained the purpose of career pathways as creating a K-12 system of career awareness, exploration, and career development programs. The goals of career pathways include: (a) eventually allowing all elementary school students at least one field trip/job shadowing experience; (b) having all eighth graders begin a six-year academic and career plan; (c) having all ninth graders select a career pathway area of interest; (d) eventually having all high school students have a documented workplace experience in a career-related area of interest (encouraging them to participate in co-op education, an internship, or youth apprenticeships); and (e) eventually having all seniors complete a career-related project as is currently done in a few high schools.

Any student is eligible to pursue a CTP course of study (see Figure 2). There are no restrictions to student eligibility into any CTP career pathway. In addition, students may begin a CTP course of study or take technical courses without having initially planned to be a CTP completer. Thus, students may switch between CP and CTP during their high school career, as they change their academic plans. There are, however, degree requirements that students must achieve in order to be counted as a CTP completer. There are also prerequisites for some of the advanced technical courses offered. The youth apprenticeship programs have more restricted eligibility, with different eligibility requirements for each program. At a minimum, the youth apprenticeship programs require a 2.0 GPA and good attendance to be eligible. Students in the youth apprenticeship programs must complete the CTP course plan requirements as well as the specific apprenticeship program requirements.

Generally, the school district's aim is to eliminate the traditional college-bound/non-college bound distinction among students. Programmatic designations are now similar to the community college's with a differentiation between liberal arts and technical specialization.

Figure 2

Snapshot of the Local Tech Prep Approach

Primary Goal: To prepare students to live and work in a highly technological society

Tech Prep Student: All students are targeted. As explained for career pathways, all students "need both the strong academic foundation and the technical skills to be successful in today's world." So, all students should design their course of study based on the recommended courses for a career path that would lead to a chosen career.

Tech Prep Course of Study: The core academic degree requirement is similar to College Prep, except that it requires four sequenced technical courses. The career pathways outline recommended academic and technical courses for 10 career pathways.

Tech Prep Occupations: A wide spectrum of postsecondary career opportunities is listed with each of the 10 career pathways in the high school course registration catalog.

Primary Articulation Approach:

- Advanced standing credit
- Concurrent enrollment

Predominant Tech Prep Approach:

- College Tech Prep
- Tech Prep/youth apprenticeship

Source: Local consortium materials

As can be seen in Table 1, the number of students who met the CTP completion requirements, indicating they were CTP graduates, grew over the 1996 and 1997 school years, from a total of 103 in 1996, 131 in 1997, and 174 in 1998. By 1998, CTP participants were approximately 10% of the graduating class of the six high schools involved in this study, but CTP participation seemed somewhat uneven across the three years fluctuating within the schools. By 1998, High School 704 had 57 CTP graduates, the highest number of participants in any of the six schools and the highest participation rate; 29% of the graduates of High School 704 were CTP participants.

Table 1

Number of Graduates and Tech Prep Participants by High School

High School Code	Number of Graduates			Number of Graduates Participating in Tech Prep		
	1996	1997	1998	1996	1997	1998
701*	229	238	214	14	18	31
702*	130	132	119	13	34	28
703*	256	289	245	17	13	12
704*	195	175	197	34	19	57
705*	193	172	180	9	15	13
706*	197	202	211	16	32	33
707	12	13	55	NA	NA	NA
708	22	66	147	NA	NA	NA
709	12	18	21	NA	NA	NA
710	61	64	52	NA	NA	NA
711	50	45	35	NA	NA	NA
712	7	29	25	NA	NA	NA
713	20	36	49	NA	NA	NA
714	15	20	40	NA	NA	NA
Total	**1399**	**1499**	**1590**	**103**	**131**	**174**

Source: Local school records

Note: *High schools included in the study. NA means Not Available

Governance and Funding

Both the school district and the community college are the lead agencies for Tech Prep, and the community college is the fiscal agent for the county STW initiative. CCS and CTCC have designated staff persons to coordinate the work internally and to represent the institutions in collaborating externally, particularly with the industry councils.

The intense involvement of the educational and business leadership in the community—from the community college president, school district superintendent, leading corporate CEOs and the two chambers of commerce—has helped to integrate efforts into a joint enterprise. The goals of local leaders focus on transforming the high schools and community college into learning organizations that prepare graduates with high academic and technical skills, particularly for local growth industries.

Tech Prep and STW are merged in the county as the Central Council Workforce Preparedness. It has a high level Workforce Investment Advisory Board, with four strands—the Workforce Development Board, The Workforce Investment Council (a prior existing council), two chambers of commerce, and economic development. The council is responsible for the youth apprenticeship programs and teacher training, while it shares STWOA implementation responsibility with the board. All four strands facilitate the career pathways in the high schools' CTP programs of study. The Workforce Investment Advisory Board meets monthly and includes leading business and industry representatives, the district superintendent, and the community college president.

A countywide operations committee facilitates the group's workforce development efforts, and includes key staff persons from CCS, CTCC, the chambers of commerce, and representatives of each industry council. It coordinates 10 individual industry councils (which include business and industry representatives as well as CCS and CTCC representatives) that develop the career pathways and related youth apprenticeship experiences. Each council has curriculum, industry recruitment, and marketing subcommittees to create marketing materials, develop courses of study, review national standards, and support articulation, and recruit other companies for apprenticeship placements, donated equipment and supplies, and scholarship funds. There is a countywide marketing committee and a career development steering committee for a K-14 guidance sequence.

(At the time the students in this study were in high school, only two industry councils had formed and those served as prototypes for others that developed later.)

To specifically support STW implementation, the school district created a CTP team with representatives from each high school. Each representative is responsible for implementing the workforce development initiatives in the school and facilitating curriculum integration and program accountability. These teachers were opinion leaders in their schools and could help identify implementation issues and problems as the various components of CTP developed.

Staffing

In 1993-94, CCS hired a CTP director, CTCC created a workforce development director position, and the two institutions jointly hired a career development coordinator in 1996-97 to coordinate secondary and postsecondary career development efforts. Subsequently, CCS hired a coordinator/program specialist for CTP and workforce development and, in 1998-99, hired a youth apprenticeship coordinator.

Funding

The county's CTP and youth apprenticeship program development efforts have been supported by federal and state Tech Prep and STWOA funds, corporate foundation grants, and other local funds, as shown in Table 2. In 1996-97, the county received Tech Prep funding of $100,000 for the school district and $50,000 for the community college. In 1997-98, the county received a similar allocation and the district used its Tech Prep funds for professional development on the Instructional Management System, criterion-reference testing and integrated lesson planning, HSTW summer conference and other professional development for secondary and postsecondary faculty, guidance, and administrator professional development. They also used the funds to mail out the CTP materials and course registration information to parents of all sophomores.

In 1997, the county received $220,000 in federal STWOA funds, the largest grant in the state. Although CTCC was the fiscal agent, 80% of the funds were allocated to the school district and the rest to the community college. These funds were used in part to support the shared career development coordinator at CCS and CTCC. Much of these grant funds were used for professional development, such as industry tours, and training on applied learning, curriculum integration, and cooperative learning strategies. It was also used to incorporate career guidance plans in K-12. The funds also helped to support PT-CAM staff training and district participation in HSTW. Finally, the funds were also used to produce materials on the career pathways and related education and career options for students, parents, and teachers.

In addition to this funding, the district and community college (as well as the consortium as a whole) have received extensive business and industry grants and contributions for equipment and lab upgrades and student scholarships. The consortium received several corporate foundation grants, particularly through the CIBA foundation and other companies, to support professional development and curriculum development.

Table 2

Funding for the Workforce Partnership by Source and Fiscal Year

Federal Program Year	Tech Prep	STWOA	Other
1993-94	$25,000 (Perkins Tech Prep planning grant	--	--
1994-95	$260,000 (Perkins Tech Prep implementation grant)	$15,000 (STWOA planning grant)	• $100,000 lab upgrade grant • $50,000 corporate grant to upgrade a lab • $1 million in federal, state, and county funds for equipment and labs
1995-96	Additional Tech Prep implementation grant	STWOA grant	• $45,000 corporate foundation grant for a new lab • $50,000 corporate grant for a new lab

Table 2 (cont.)

1996-97	$150,000 (Tech Prep implementation grant)	$260,000 (STWOA grant)	CIBA foundation grant
1997-98	$150,000 (Tech Prep implementation grant)	$260,000 (STWOA grant)	CIBA foundation grant
1998-99	--	--	CIBA foundation grant

Source: Local administrative data and records

Note: This is a partial listing of all Tech Prep, STWOA, and other funding to the county and CCS and CTCC from 1993 to 1999.

Implementation Challenges

The key challenges to implementation have included both generic Tech Prep issues and locally specific issues. The most challenging has been some difficulty in recruiting students for the youth apprenticeship programs and CTP, particularly for the new programs of study. Various local education officials observed that there is still a concern in the community that vocational-technical education might limit rather than expand students' lifelong career options.

In response to some recruiting problems and to promote career planning generally for all students, the consortium has improved its marketing, reaching out more substantially to counselors, teachers, and parents to educate them about the potential opportunities earlier in students' careers. The consortium is now introducing career planning in the eighth grade to influence students' course-taking plans earlier.

Other logistical challenges include the geographic dispersion of schools and businesses in the county and the lack of public transportation (except for the district-provided bus from the high schools to the vocational center). Students must provide their own transportation to be eligible for the apprenticeship positions. The dispersal of the high schools, vocational center, and apprenticeship worksites make it necessary for some students to drive great distances, creating scheduling problems and limiting extra-curricular activity participation. This is primarily an issue for students in the outlying areas of the county and for students who do not have a car. On the whole, CCS officials have found that youth apprenticeship students have been able to manage these logistical challenges and there have been only a few complaints. The unified school district schedule, to be instituted in the next one to two years, will help tremendously to reduce some of the logistical challenges in coordinating students' schedules between the high schools and the vocational center.

There have also been some challenges in recruiting qualified technical instructors at the high schools and community college, as well as math and science faculty. Although both the school district and community colleges have eventually found qualified instructors and no program has been stalled by this problem, this challenge has required local education officials to spend considerable time on staff recruitment.

Finally, the school district's other reform efforts (such as converting to block scheduling) and the state reform efforts (particularly in implementing high educational standards as part of a state accountability system) interfere somewhat with or compete with the implementation of Tech Prep and STWOA specifically, and CTP generally. The state's accountability-based education reforms take precedence and the district must strive to help teachers and administrators understand how to integrate several new reform initiatives with CTP, so that they are complementary.

Key Components

This section presents components of Tech Prep that are non-curricular, including marketing and student recruitment, professional development, and evaluation and student outcomes assessment.

Marketing and Student Recruitment

There has been extensive marketing for CTP and the youth apprenticeship program options since their inception, although the scope and nature of the marketing has changed over the years. The initial marketing strategy for CTP was internal to the district and community college communities, through CCS's publications and forums, and through CTCC forums (e.g. board of trustees). These presentations and discussions have never stopped, but continue as part of an overall marketing effort. In spring 1996, marketing and outreach efforts were broadened, both in the types of materials and audiences. The school district developed a CTP training video, general CTP brochures, and course of study brochures to distribute to schools, parents, students, and business and community groups in fall 1996. By 1998, the marketing and student recruitment efforts added an increased focus on parents, to educate them about the changing labor markets and technical career opportunities in mid-skill level industries and related educational preparation. The intent was to educate parents better about a less well-understood segment of the labor market, building on their knowledge of entry-level and professional career opportunities. The school district began sending CTP promotional materials to parents of all sophomores. By the 1998-99 school year, CTP career pathways and relevant technical careers were spelled out clearly in the high school student registration handbook. The handbook was distributed to all students and mailed to parents to help them in advising their children on program selection.

During the summer of 1999, CTCC produced a companion course of study booklet and pamphlet that clearly outlined the 2+2 courses of study for 11 career paths. The booklet described each career path, gave examples of possible careers and typical salaries, and listed the high school and community college course requirements, noting additional courses (such as foreign language) that would be required to transfer to a four-year college. The booklet also described the industry councils and participating businesses, as well as the work-based learning options available in the high schools and community college. This booklet was produced with STWOA funds on behalf of the Workforce Investment Council for use in high school and community college students' course planning.

Even more intensive marketing and recruitment has been done for CTP, youth apprenticeship programs, and the career pathways generally. Business and industry representatives from the respective industry councils annually made program marketing presentations to all 14 high schools. Each year, marketing efforts evolved and became more elaborate and inclusive of parents and students. In the spring of 1997, representative companies from seven industry groups visited the fourteen high schools to encourage students (primarily sophomores) to pursue CTP courses of study, consider industries for future careers, and plan to take entry-level courses that would lead to eligibility in one of the eight new youth apprenticeship programs or other work experience. During these presentations, company representatives explained the career paths and showed students the industry-specific program recruitment videos. Business representatives also talked with some students in depth and school staff provided some students with lab tours at the vocational-technical center.

These spring presentations were followed up with open houses and other industry-sponsored activities for parents to learn about the programs, work experience, and career opportunities for students. For example, in February 1998, four parent information sessions were made in addition to the high school presentations. In student recruitment efforts, the business and industry representatives were careful to emphasize that students have multiple options (career and postsecondary education) within each field of study. They were successful in generating student interest, and gaining more student applicants than placements in some fields, such as business and finance.

The district and community college's initial goal with the business and industry community had been to develop 1000 apprenticeship placements by the year 2000. This goal was revised to 1000 work-based learning (WBL) placements, including co-op and internship placements in addition to youth apprenticeships.

Some business councils did fundraising and sponsored events to recruit other business and industries to participate. For example, the heating, ventilation, and air conditioning (HVAC) council had a golf tournament to raise money for scholarships, and the construction council created a foundation to fund instructional activities. The chemical and process manufacturing council actively solicited other companies to participate. This council also helped raise funds to create a new technology lab for CCS and CTCC.

The consortium's operations committee continues to review marketing efforts and results and make changes. They plan to expand the eighth grade career and education planning efforts to better inform students of the variety of options available at high schools and CTCC needed for their career plans. The committee plans to have business representatives meet with the students when they are ninth graders and hold information sessions to encourage students to follow a CTP course of study. Using the overview video on CTP, the business representatives and school staff try to inform students about the full spectrum of educational and career options and opportunities. The consortium's plan is to involve businesses in recruitment in the earlier grades, to get involved with the PTA, and to take every eighth grader to the vocational-technical center and to CTCC to see the labs.

Once CTP students enroll in CTCC they are included with regular students within each technical program area. There is no separate community college program experience for them. Students who have earned advanced credit status through dual enrollment simply begin in the more advanced courses. The students enroll in the community college programs based on the same general eligibility requirements and processes. They must take the college placement tests and their course and program options are restricted based on placement test performance. Some programs of study, such as nursing, have course prerequisites that students must complete prior to being enrolled.

Guidance and Counseling

The school district broadly defines student advisement as the responsibility of teachers, guidance counselors, and the industrial education coordinators (IECs). The district has expanded professional development on career and educational advisement to encompass all three groups of staff. Career planning information is now integrated in the student registration handbook and is mailed to all parents of eighth to eleventh grade students, to educate them and encourage them in their child's advisement.

The school district, through its professional development and investment in career development activities and planning guides, has worked with counselors, IECs, and teachers to expand career and educational planning efforts with middle and high school students to incorporate technical careers and to encourage students to do extensive exploration and planning while in middle school and high school.

Each high school has at least one IEC (Industrial Education Coordinator) who assists students with their career plans, monitors their technical course sequences, and talks to them about their career goals. Students complete an information sheet and course plans that are followed up during their high school career. The IECs also track youth apprenticeships and other work-based learning experiences.

Intensive career counseling is provided through the Vocational-Technical Center as part of advanced technical course offerings. Among other activities, the IECs manage the students' career and postsecondary education plans (reviewing it at least twice a year with each student), provide a career center, and sponsor a postsecondary education opportunity night each fall.

CTCC has a career counseling center at its main campus that provides career planning services, including interest testing and a library of occupational and educational information. The community college also offers job placement services that provide job seeking advice, preparation, and referrals; however, much of the career advisement is done by college faculty, particularly as part of the technical course instruction.

Since the CTP courses of study were initiated, the school district began integrating a variety of career development planning activities into the educational programs for all students. Prior to the 1994-95 school year, school counselors in the pilot schools for CTP were given orientation and training on curriculum alignment efforts to help students plan high school course-taking. In the 1994-95 school year, CCS guidance services began requiring career development plans for all high school students and added information on CTP in the high school handbook. CTCC provided a CTP resource manual for all high schools. Middle and high school counselors were trained in CTP implementation and career development planning. Counselors from all the other high schools were trained on curriculum alignment and course planning. In the 1995-96 school year, CCS formed four committees to support implementation of CTP and guidance, each to develop a different program component: career plans and portfolio process, counseling activities manual and monitoring process, CTP staff development, and the job shadowing process and manual. The career development steering committee was a 36-member committee of principals, teachers, counselors, and parents that met monthly to plan out career development preparation, particularly in the middle and high school grades. A joint CCS and CTCC career development coordinator was hired in the 1996-97 school year to coordinate secondary and postsecondary career development efforts.

Professional Development of Faculty, Counselors, and Administrators

There has been extensive professional development provided on CTP, specific aspects of Tech Prep and STW, and workforce development generally, for either or both secondary or postsecondary level educators, and building upon the statewide offerings when available. First, there is the annual summer state workforce development conference that is attended by secondary-level workforce development teachers as paid for by STWOA funds. The last two conferences were held in this county.

Second, there has been extensive local professional development on workforce preparation of youth and improving K-14 education. It has consisted of three types of professional development: a) systemic change strategies fostered through teacher teams who pursued extensive study and turnkey training within the schools; b) training related to selected educational priorities of CTP, Tech Prep, and STW (such as integrated and applied curriculum, career development, and upgrading vocational-technical education); and c) training staff on changing labor markets and industries, particularly in the mid-skill level technical fields.

Systemic Change

The school district implemented CTP through a two-stage phase-in process. As a result, teachers and counselors were trained in two groups of seven high schools each, and then teams of elementary and middle school teachers. In addition, CCS and CTCC collaborated on an intensive study of models and approaches for the workforce preparation for youth, building on CTP, Tech Prep, and STWOA.

School district teams. Each high school had a team of academic and vocational teachers who were trained on curriculum alignment, CTP curriculum integration and IMS software and integrated item banks. Teams from seven high schools were trained in spring and summer 1994, while teams from the other seven high schools were trained in summer 1995.

K-14 study group. At the same time, through a consortium grant from the CIBA foundation, CCS and CTCC formed a consortium-wide teacher study team with one representative teacher from each of the 14 high schools, 10 CTCC faculty, and other key CCS and CTCC staff. This team was trained on work-based learning, curriculum integration, student-centered instructional strategies, and assessment.

The participating teachers and faculty of the study group wrote action plans and met four to seven times a year over a three-year period to study the CTP and youth apprenticeship models. The team eventually was comprised of 20 high school and community college math, science, and English teachers, two IECs, and two administrators. They attended math and science seminars, toured industries that supported youth apprenticeship throughout the state, and learned from employers about advanced skill requirements. This group became a sounding board for CTP and youth apprenticeship program developments of the district and community college, identifying concrete strategies to operationalize the consortium's goals. Moreover, the group served as opinion leaders in the schools and community college, and helped to plan how to further implement the consortium's goals for CTP, the career pathways, articulation, and work-based learning.

To address postsecondary educational issues, the team learned the Developing a Curriculum (DACUM) process and incorporated the process into program design. DACUM was used to identify employability skills and how to infuse these skills into curriculum. The group also looked at career pathways and how to articulate them between secondary and postsecondary education. When the district adopted HSTW, the committee's efforts complemented the implementation priorities of the HSTW model.

In 1999, this team was selected for a corporate foundation-funded trip (supported by six corporate foundations) to visit several industry-supported technical schools and a CIBA-Novartis training school in Switzerland and Germany. Through this process, the teachers and community college faculty developed better understanding and respect for each other and worked on articulating coursework. Following the trip, these teachers and faculty made presentations to schools and companies about youth apprenticeship programs.

Strategy-Related Professional Development

Tech Prep, STWOA, and other district and community college funds have been used to provide staff with extensive professional development to implement and use the following:

- CCS high school teacher teams were trained in the use of the Instructional Management System (IMS) and item banks to help develop integrated lessons for technical and academic courses;

- Both CCS and CTCC academic and vocational-technical faculty were trained to develop integrated and contextualized curriculum. At CTCC, academic faculty were paired with technical faculty to collaborate on such curriculum development;

- As the school district acquired new labs and equipment and upgraded existing resources, the staff was trained to use these resources instructionally. This training included attending conferences, being trained on-site by consultants, and making use of other sources of training;

- As each high school adopted the HSTW model (currently 11 of 14 high schools), the staff were trained in the model, attended HSTW conferences and the school hosted a HSTW visitation;

- All high school counselors were trained to advise students in constructing individual career development plans;

- GTCC core teachers were trained to use the DACUM outcomes for curriculum integration, as part of the STWOA funding. When completed, six faculty were trained as DACUM facilitators who, in turn, trained other faculty, beginning with the 15 department chairs;

- CCS staff were trained in the use of any applied academic courses purchased;

- In 1998-99, CTCC and CCS staff participated in Wheels of Learning certification in 18 standardized craft areas, as part of a statewide professional development effort, paid through local and STWOA funds;

- CTCC faculty received training in effective instructional strategies; and

- In 1999, CCS offered training in district-wide problem-based learning. In addition, one high school formed a five-member integrated teacher team to use this instructional approach with ninth graders and each teacher was to develop a three-step lesson plan on problem-based learning.

Business Tours

The consortium developed a pool of employers who were willing to offer summer tours for teams of teachers to learn about the industry, its workforce requirements and needed skills. The consortium intends to have all high school teachers attend at least two business tours as part of helping them to infuse career development activities into the curriculum. According to interviewed high school teachers, staff in the school had gone on field trips to several businesses. In addition, the county's business advisory board for science and mathematics provided monthly technical seminars for math and science teachers from both CCS and CTCC to discuss business applications and career relevant coursework as well as provide business tours to demonstrate the application of math and science in the workplace. The board is comprised of 11 corporations, many of which are active on their respective business and industry councils.

Career Development

The consortium has been addressing career development for high school students and planning for career development K-14 through its career development steering committee comprised of representative college and high school teachers, counselors and administrators as well as IECs. In the 1996-97 school, the committee met monthly to plan comprehensive career development for students K-14. The district then offered a three-day training for every high school in the first summer. The following fall, the district worked with a subgroup of five high schools and their feeder elementary and middle schools on career development planning. In the 1997-98 school year, the committee met less often, while the district worked with the subgroup of schools. Additional schools were trained in the second summer.

In 1998 and 1999, the committee developed a model for a comprehensive career development plan K-14, which outlined sequential and comprehensive guidance activities to be integrated in the curriculum. The intent was to develop career action plans for each school that outlined grade-by-grade sequenced activities. The K-14 guidance activity was termed STEPS for Career Success (STEPS stands for Self-knowledge, Technology, Exploration, Planning, and Skills). The committee's career development goals are based on the national career development competencies and state counseling goals. Its activities are based on the [State] Career Awareness Guide and guidance activities, and are linked to state competency goals to address career development needs and the state accountability requirements. The committee reasoned that it needed a narrower, more concise definition of career development competencies which teachers could integrate into their teaching across grade levels. The guide outlines grade level strategies and competencies, and lists career development activities available or being used by the school district. The intent of the guide is to connect career planning and advisement more directly into the middle school and high school classrooms, having teachers more involved in advisement.

In summer 1998, the district provided intensive three-day staff development training on the STEPS model, including trips to business and industry sites. The district subsequently reviewed the model for gaps, revised the model, and provided training in summer 1999 for elementary and middle school teachers.

Currently, the community college is using the STEPS model for its career development competencies, using a team of eight academic and technical teachers for planning. At CTCC, the faculty, rather than counselors, do much of the career and education planning for students. In addition, CCS and CTCC are planning to develop transition strategies to support students as they graduate from high school and enroll in the college. As part of this effort, math, science, and social studies teachers from all high schools have been meeting monthly with CTCC faculty to develop student advisement strategies on CTP, youth apprenticeship, and technical careers generally, as well as how to integrate employability skills into the curriculum.

There are several career development activities in place for K-12 students. Presently, the district requires all high school students to actively use and update career and education plans as they make course selection decisions. The district purchased a career guidance system, Infotracker, which was piloted in two schools and is being expanded to all high schools, to support on-going career and educational guidance for high school students. Infotracker is a career planning software, to monitor student career planning and preparation in all middle and high school grades and to track the CTP students. In the ninth grade, students are to begin considering whether to pursue a college prep or CTP course of study and to review options. By the end of tenth grade, students are to have been exposed to business and industry presentations about career pathways and apply for a youth apprenticeship program, if interested. Finally, as part of the high schools' participation in HSTW, the high schools have pledged to develop comprehensive student guidance and advising strategies, which the district's new STEPS model will support.

CCS has three career planning activities for middle school students. One is a Junior Achievement Program which is a business partnership, supported in part by STWOA funds, for students in grades 5, 6, and 8. Second, the district uses Ground Hog Day to sponsor job shadowing activities for seventh grade students. This activity started with 92 students in 1998 and expanded to 287 students and 20 businesses and industry by 1999. Third, all eighth graders begin career planning as they prepare for high school. All eighth graders must complete a four-year high school plan and select a career pathway, in preparation for high school.

The district also has an extensive variety of career awareness, career planning, and career development materials and resources for teachers, counselors and IECs to use, including interest assessment instruments, tours of the Vocational-Technical Center and CTCC, career planning videos, Internet resources, and career planning software. Throughout the past few years, the district has also provided a variety of professional development opportunities for middle and high school counselors and IECs on career awareness, exploration, and guidance activities for students.

Program Evaluation and Student Outcome Assessment

Annually, the school district prepares an evaluation report on the district's progress in implementing TP and STW, as encompassed in broader workforce preparedness efforts. These reports document the extensive central office efforts, professional development, creation of labs, and the contributions and other involvement of local business and industry. According to the district's own progress report, the schools varied in initial implementation of CTP, but much of the early work focused on IMS training, business and industry tours, and development of items for the item bank.

CTCC documents the postsecondary outcomes of Tech Prep graduates. In its analyses, CTCC has compared Tech Prep completers with noncompleters at the community college. The community college and school district have also used other assessment strategies to improve programs and prepare graduates better, including:

- DACUM process. In collaboration between GTCC faculty and business and industry representatives, GTCC has been doing a systemic DACUM analysis of various mid-skill careers for over 10 years, for jobs such as automotive technician, business administrator, customer service professional, early childhood educator, emergency medical technician/paramedic, fire fighter, and civil engineering technician.

- Benchmarking. The consortium is benchmarking itself against other similar cities (such as Forth Worth) to gain ideas on how to improve STW and workforce development efforts.

- Feedback on high school graduates' performance in college. To help each high school pinpoint areas for improvement, the college has begun reporting to each principal the number of graduates who enroll and who need developmental English and math courses.

Other Key Non-curricular Components

Other non-curricular components that seem quite essential to the operation of the Workforce Consortium are the areas of equipment, scholarships, block scheduling, senior projects, and transitions. A brief description is made of each of these components in this section.

Equipment

A key part of CTP has been lab upgrades to support advanced courses of study. In 1994-95, CCS used $1 million in federal, state, and local funding to upgrade equipment and labs. The district subsequently received corporate grants for further lab upgrades.

Corporate foundations gave grants to create a manufacturing technology lab, implement a process manufacturing curriculum at one high school, purchase joint software for CCS and CTCC business education faculty, and create a customer service and office technology co-op scholarship program. CTCC donated two automobiles to CCS as part of the Automotive Service Excellence (ASE) certification program. Recently, there have been more lab creations and upgrades, including new technology labs at 17 middle schools; upgraded labs for electronics, electrical training, metals manufacturing, health occupations, automotive at the high schools and community college, CAD/drafting labs, HVAC labs, and agri-science; and added Info-tracker software for the high schools. For example, one local corporation helped to raise funds from other corporations to create a hands-on training lab in chemical and process manufacturing technology for high school and community college students.

Scholarships

The community college has solicited scholarships for high school graduates as part of the youth apprenticeship programs. In spring 1996, CTCC's president announced his goal of creating community college scholarships for all high school graduates with good grades and an interest in technical careers. He and the superintendent of the school district incorporated this goal as part of the workforce preparation model based on the youth apprenticeship programs. The business partners in the pilot youth apprenticeship programs included some scholarship funds and the CIBA foundation was the first to add scholarships as part of CTP/youth apprenticeships. The various industry councils now raise scholarship funds for respective programs and several youth apprenticeship programs have scholarship options.

Block Scheduling

The school district is converting to block scheduling for all high schools to support technical courses of study as well as improve student learning. Some of the high schools are already using a block schedule. The school district is considering implementing a common block schedule for all high schools in order to have a unified schedule district-wide.

Senior Projects

Since 1994, some high schools have required seniors to complete a project in which they shadow a business mentor for 20 hours a year and create a project to be presented for their mentors' evaluation. Most students find their own mentors. CCS plans to expand this activity to all seniors.

Transitions

CCS is working on facilitating students' transition into ninth grade and into post-secondary education, particularly to CTCC. These efforts include developing a uniform high school schedule, providing more support for ninth graders, and shifting more challenging coursework into the later grades.

Tech Prep Curriculum Reform

The primary curricular change has been the reorganization of the high school courses of study into college prep and CTP. This change has been the basis for incorporating applied and integrated courses, articulated programs of study with the community college, and developing work-based learning experiences.

During the reorganization in 1994, the general track was eliminated and the CTP courses of study were created, as prescribed by new state education policy. Since then, CTP has developed into courses of study for 11 career pathways. All students who complete the requirements of either college prep or CTP will be prepared for college admission; students in both tracks are required to take algebra I. The primary difference is that college prep students are required to take foreign language courses while CTP students are required to take four sequenced technical courses. The CTP career pathways offer several youth apprenticeship program options to be articulated to community college degree programs.

Table 3

Minimum High School Graduation, College Tech Prep and University Requirements in Core Academic Subjects

Course	College Prep	State University Admissions Requirements	State Scholars Program	College Tech Prep (CTP
English	4 courses	4 courses emphasizing grammar, composition and literature	4 courses	4 courses
math	3 courses including Algebra I	3 courses including Algebra I and II, and Geometry	3 courses including Algebra I, Geometry and Algebra II (or Advanced Math)	3 courses from Algebra I, Geometry, Algebra II, Technical Math I and II
science	Biology Physical Science Lab Science	3 courses including Biology, Physical Science and 1 lab course	Biology, Chemistry, and Physics or other advanced science	Biology Physical Science Lab Science
social studies	U.S. History World Studies/ World History	2 courses, including U.S. History (but the district requires 3)	Government/ Economics; U.S. History, one World Studies course	U.S. History World Studies/ World History
foreign language	not required	2 courses in one language is recommended	2 levels of one language	recommended but not required
health/physical education	1 Health/PE	1 course required by the district	1 course	1 Health/PE
computer skills	students must demonstrate proficiency through state testing	students must demonstrate proficiency through state testing	students must demonstrate proficiency through state testing	Students must demonstrate proficiency through state testing
technical courses	not required	not required	not required	4 sequenced technical courses
electives	8 electives	7 electives	2 additional courses from the core subjects above. Must have a B or better average	5 electives
Total credits	22	22	22	22

Source: High school course catalog (graduation requirements for the classes of 2000-2003)

Note: Two of the high schools require 6 more credits for graduation because of block scheduling, but all are in electives.

In its program description for CTP, the district emphasizes that students are prepared to complete both college prep and CTP. It refers to transitioning to a two- or four-year college program, but stresses more the need for high technical skills for the changing labor market. The course planning guide outlines recommended academic and technical courses for 10 career pathways, and describes related postsecondary career opportunities. The 10 pathways are agricultural and natural resources technologies, biological and chemical technologies, business technologies, commercial and artistic production technologies, construction technologies, engineering technologies, health sciences technologies, industrial technologies, public service technologies, and transport systems technologies. Each pathway outlines recommended academic courses that meet the graduation requirements but are tailored to the technical specialization (e.g. physics as science course for construction technologies, but human anatomy and physiology for the public services technologies). CTP students are not tracked into specific Tech Prep courses and can enroll in advanced placement (AP) or other academic courses, depending upon their prior academic performance.

Within the 10 career pathways are 11 possible youth apprenticeship programs, which are articulated to CTCC. CTCC produced in 1999 as part of the consortium's work, a career paths booklet for students that outlines the high school and community college courses of study for each of the 11 career paths. These are:

- automotive technology,
- banking and financial services,
- chemical and process manufacturing,
- construction technology,
- culinary arts,
- electrical/electronics technology,

- heavy equipment,
- transport technology,
- HVAC,
- information technology,
- metals manufacturing, and
- public service.

The high school youth apprenticeship experience is optional. At CTCC, 19 programs require a co-operative (co-op) experience, while 20 programs offer it as an option, and others offer it for career exploration opportunities.

The district's technical courses are listed in the common course catalog and are available at some high schools as well as the Weaver Educational Center, where all students are eligible to attend. Although some courses are articulated to CTCC, they are not indicated as such in the high school course catalog. Course requirements differ somewhat across the high schools because of differences in block scheduling and regular scheduling (28 and 22 unit requirements, respectively). High school courses and community college courses are now fairly standardized by the state, through a common course description and numbering system.

CCS and CTCC, through Tech Prep, STWOA and other funds, have pursued five types of curriculum reforms:

- applied academic courses,
- integrated curriculum,
- item banks,

- up-to-date skill standards for vocational-technical course upgrades and program development, and
- the HSTW model and related curriculum approaches.

Each of the curriculum reforms is described below.

Applied Academic Courses

The school district initially tried to implement applied academic courses as part of Tech Prep, but later shifted its emphasis to integrated curriculum. In school year 1995-96, the district implemented several applied academic courses, including AIT applied communications curriculum for each high school, CORD's Technical Math I and II (for seven high schools), and CORD's applied biology/chemistry for 10 high schools. The district later added the applied course, Principles of Technology. Teachers were trained in the use of these courses.

Over time, the district found that the applied academics course label was problematic, because of the difficulty in having the state recognize these as comparable to other academic courses for college admissions. As a result, the district shifted to infusing applications into regular academic courses, rather than offering freestanding applied academics courses with two exceptions. First, the district is continuing to offer Principles of Technology. Second, the district is adopting a CORD applied algebra course. These applied academics courses are not limited to CTP students and CTP students do not have separate academic courses.

Integrated Curriculum and Item Banks

The school district has worked extensively on developing applied instructional units to be used across the courses and curriculum, to facilitate curriculum integration. This has been supported by on-going professional development on curriculum integration and the use of a computerized instructional management system (IMS). To this end, CCS purchased an IMS in 1994 for 13 technical and academic courses (based on the state's course of study objectives). The IMS was used to assist academic teachers in designing integrated lesson plans that applied academic skills to related technical courses. The district also made use of state training on how to use integrated item banks to produce integrated teaching materials, such as lesson plans and worksheets.

The district started in 1994 with seven pilot high schools and a core academic and vocational teaching staff who were trained as trainers of integrated curriculum, even before the district purchased its computerized system. During the following school year, the pilot high school teams prepared to train other faculty members, which they did the subsequent school year, when CCS and CTCC received a federal grant to implement CTP systemwide. In 1995, CCS obtained additional software, integrated lessons, and provided IMS software and test bank training for teacher teams from the other seven high schools. Similar training on the IMS was provided to teacher teams from elementary and middle schools. To obtain more item banks, CCS recruited other school districts to use these as part of their CTP programs and arranged a group purchase for all high school courses. With respect to the 13 technical and academic courses, the district required teachers to develop first one and then two integrated lesson plans and to add lesson plans and test items to the item bank annually, as part of the teachers' contractual professional development. These were referred to as "crosswalks" and teachers drew on these items in developing end-of-course tests. These item banks were similar to the state assessments in vocational-technical education, because they helped to stipulate what was to be covered in courses.

Vocational Curriculum and Employability Skills

For over 10 years, the state has produced a competency-based system that defines units of instruction, core competencies and objectives for each unit, time to be spent on each unit, and the integrated academic skills, for all technical courses. In addition, the state developed guides for programs of study and support services in seven major career areas (agricultural, business, family and consumer sciences, health occupations, marketing, technology and trade, and industrial), as well as career development. The guides outline course content, establish standardized course numbers, and describe recommended enrollment and hours of instruction. CCS uses these guides to define technical courses.

As part of creating CTP career pathways and youth apprenticeship programs, CCS and CTCC developed new courses and revamped existing technical courses to support articulated programs of study. Various national standards or the DACUM process were used to develop appropriate course content and instruction, along with input from 11 business and industry councils. CCS and CTCC also used DACUM to analyze general employability skills. As a result of this effort, a manual, *Educating the Workforce*, was developed as a guide for curriculum integration in academic and technical courses.

High Schools That Work

High Schools That Work (HSTW) is a reform model of the Southern Regional Education Board (SREB) to improve the organization and content of high schools' general and vocational education programs of study. The model incorporates high academic skill development, upgrades vocational-technical courses of study, and stresses key organizational and administrative conditions to accelerate student achievement. It builds upon and extends the Tech Prep model as a parallel pathway to college prep and encourages the development of integrated curriculum, extensive career and educational guidance, and challenging academic courses as well as a vocational major. The model relies on evaluation information to improve curriculum, instruction, school organization, and management.

CCS adopted the HSTW model and began with one pilot high school in 1995. CCS has since expanded to 10 of the 14 high schools and the Vocational Education Center, finding that this model supports its CTP programs of study and curriculum integration efforts, and has helped teachers focus on increasing accountability. Initial evaluation experiences have been quite positive, despite the cost of $6000 per school and the need to have all staff support its adoption.

Core Curriculum of the Community College

CTCC is an open admissions community college, admitting anyone who has earned a high school diploma, GED, or equivalent. For admission to a baccalaureate-oriented or career-oriented curriculum students must meet minimum performance standards. Like CCS, CTCC has worked to establish articulation agreements for its courses of study and develop integrated technical and academic courses.

Academic Requirements

The community college requires that students develop core academic competencies as defined by the regional accreditation association. These competencies are in computer literacy, mathematics, oral communication, reading, research, and writing. All associate degree graduates must demonstrate proficiency in these areas and meet specific course requirements as outlined the degree programs. The expectation is that these skills will be taught in courses that are college-wide requirements and as part of the general education core. It is also expected that they will be taught or reinforced in several courses across the curriculum, as well as in core course requirements. As shown in Table 4, there are 18 credits of general education course requirements: three communications courses, one natural science or math course, one social/behavioral science course, and one humanities or fine arts course. For the AAS degree, there are only six credits of general education course requirements (one communications and one of the other three types of core courses).

Table 4

Minimum Credit Requirements for Various Degree Programs

Curriculum Areas	AAS Degree Requirements	AA Degree Requirements
communications	1 course	3 courses
science	1 additional core course	1 course math or science
math		
social/behavioral science		1 course
humanities/fine arts		1 course
computer skill	demonstrate computer literacy	--
Total	6 credits	18 credits

Source: CTCC Course Catalog

To be eligible to enroll in two-year associate degree programs, applicants must be high school graduates or have earned a GED or equivalent. All degree, diploma, and some certificate applicants must take CTCC's placement test in English grammar and writing skills, reading, and mathematics as part of the admissions and course placement process. Some programs and courses have additional math, computer and foreign language test requirements. Other programs also have special requirements about student aptitude and placement test scores, as outlined in the courses of study. CTCC has a guided studies program for academic skill improvement in reading, English, and math, which may be taken prior to or concurrent with courses in the program of study (depending on the program). These courses include basic language skills, developmental grammar and composition, math, ratio and proportion, algebra, geometry, reading skills, comprehension, vocabulary, and study skills.

Prior to graduation with an AAS degree, students must demonstrate math and computer competency in selected courses (MAT 110 or 115 and CIS 110) in some programs. Students must have a cumulative 2.0 GPA or better to graduate.

Vocational Education

The community college offers over 80 different career-oriented courses of study. Each program area and degree program has its own course requirements. None of the program areas were identified in the college course catalog as part of the CTP specifically. The recently produced Career Paths for Students 1999-2000 booklet, however, presents the high school and community college courses of study together by 11 career paths, clarifying the articulated course sequences, work-based learning, and the relationship between the secondary and postsecondary programs of study.

CTCC's efforts to upgrade its vocational curriculum have overlapped with CCS's efforts particularly for technical courses and programs of study as they relate to the youth apprenticeship programs. In developing these programs, the two institutions worked together to review the national standards most relevant for each program area and revised the respective programs of study as needed. In addition, CTCC has been upgrading its other technical programs, using national standards or DACUM.

CTCC developed a manual for integrating academic, technical, and employability skills into curriculum programs in 1997 and 1998. It has built on a state curriculum improvement effort to integrate vocational-technical and academic curriculum and develop course sequences. The state is also conducting a series of community college-level curriculum improvement projects in three to five program areas bi-annually.

Articulation Agreements and the Vocational Curriculum

The state strongly encourages articulation between secondary schools and community colleges as part of its workforce development efforts. In the state's Master Plan for Workforce Development Education, there is a discussion of secondary and postsecondary education coordination to improve articulation for time-shortened programs and advanced skills programs, as well as for CTP. To that end, the state is currently developing a statewide articulation agreement for secondary schools and community colleges. As a result, CTCC and CCS have postponed articulation development work, while awaiting the state's plan.

Concurrent Enrollment

As part of K-14 system building efforts generally and in support of CTP specifically, the community college and school district strengthened concurrent enrollment options to offer more advanced technical courses to high school students, and help students earn college credit while in high school. Concurrent enrollment is a state-approved process to encourage high school to community college articulation and increase student postsecondary education participation rates. The state's Huskins Bill allows the community college to enhance the high school curriculum by offering courses that are not otherwise available at high schools. Students do not pay college tuition and the schools purchase the requisite textbooks. In the 1997-98 school year, the college has about 60 students each quarter in concurrent enrollment, but expects to see this increase significantly.

These technical courses were once listed in the high school course catalog as a dual enrollment option with CTCC, with an explanation that students would earn both high school and community college credit once a course was successfully completed. They were not listed in the 1999-2000 course catalog, because they were no longer offered. Instead, students learned about dual credit options primarily from vocational-technical teachers.

At present, some articulation agreements exist between CTCC and CCS within some program areas for specific courses. In addition, as the consortium developed youth apprenticeship programs, both CCS and CTCC revamped curriculum and instruction using national standards, state course guidelines, DACUM, and other processes. In doing this, they aligned courses and developed articulation agreements, although some have been more well defined and communicated than others. At the time students in this study were in high school, few articulation agreements existed. Even during the 1998-99 school year, few articulation agreements were finalized. According to one school district person, articulation agreements were put into place in the following areas:

- metals processing,
- early childhood development,
- office technology,
- chemical processing, and
- culinary arts.

More recently, CTCC and CCS had three other program-related articulation agreements under development, in: (a) automotive repair to articulate with the community college's two corporate sponsored programs, using the ASE certification guidelines; (b) information technology to develop courses of study at both CCS and CTCC; (c) for the electrical, HVAC, and carpentry programs, using the *Wheels of Learning* competency-based curriculum. The youth apprenticeship programs appear to be the basis for the articulation agreements, rather than the general CTP career pathways and courses of study. Under the existing articulation agreements, CTCC accepts for college credit all completed high school coursework. This can be as much as 24 credits, depending upon the articulation agreement and course of study. CTCC's new booklet on articulated studies identifies the advanced standing credit (community college credit) that students can earn when they complete the high school portion of the career path program of study.

Existing articulation agreements have not been well defined in any high school course catalog or apprenticeship materials. As a result, it appeared from our interviews of high school and community college students, that high school students had learned about college credit earning options by word of mouth from vocational teachers. As a result, advanced standing credit was underused by high school students. Many educational officials thought that few students took advantage of the existing articulation agreements, because they either changed majors once they enrolled in the community college or retook the same courses once they enrolled there. Nonetheless, the new Career Paths for Students booklet ties together the academic and technical courses for each career path, which should greatly facilitate students' program articulation between secondary and postsecondary education.

Several factors may have hindered the formation and use of articulation agreements: the different course schedules (changed recently by the state for all community colleges to use a semester rather than quarter system), the delays the two systems experienced as they changed programs of study and courses to meet national standards, the resource inequities because the high schools could not offer the same level of training as expected for the college-level courses, and the lack of an organizational process to bring the two systems together specifically to develop articulation agreements.

Work-Based Learning

The school district and community college both offer several work-based learning (WBL) experiences and jointly have developed several articulated youth apprenticeship programs. The WBL experiences and related courses of study are strongly supported by 11 business councils of the CC partnership. These 11 councils are for automotive technology, banking and financial services, chemical and process manufacturing, construction technology, culinary arts, electrical/electronics technology, heavy equipment and transport technology, HVAC, information technology, metals manufacturing, and public service.

In the high school course catalog, the district describes several WBL experiences that students are encouraged to try, including job shadowing (one half- to one-day experience), internship, co-op, and apprenticeship. The community college requires co-op for 19 programs, and as an option for many other programs.

Co-op Education

There is a high school co-operative education program, generally made available to students who are interested in the technical career fields, but are not interested in the youth apprenticeship programs. According to the high school course registration catalog, co-op is available in accounting, business management, computing, network administration, marketing, marketing management, strategic marketing, travel, tourism and recreation marketing, small business/entrepreneurship, and fashion merchandising. To participate, students must have at least a 2.0 GPA and no more than 10 absences the prior school year.

CTCC offers cooperative education experiences for students as part of its programs of study. Typically, students work an average of 25 hours per week for 160 hours in all, earning almost $10 per hour, on average. Students earn course credit while applying classroom instruction to their work experience.

Internships

The high school course catalog identifies several courses that could include internships as a recommended WBL experience, usually offered as an alternative to an apprenticeship. Internships are offered in network administration, early childhood education, automotive technology, collision repair, technology, and drafting (engineering and architecture).

Youth Apprenticeship

A priority of the consortium has been to develop broadly available and articulated youth apprenticeship programs. The metals manufacturing industry and a local high school in 1994-95 created a pilot youth apprenticeship program. This program was followed by another pilot program started the following year by Dow Corning Corporation, a local high school, a CTCC representative, and district officials. Dow Corning provided a grant to create a technology lab and the program started with 15 students. Dow Corning has since been active in encouraging other similar businesses to help sponsor the apprenticeship program and has raised funds to support the program.

Based on the success of these two pilot programs, CCS and CTCC encouraged other industries to come forward and develop similar programs. The community college and school district used these as a schematic model that they promoted to industry groups, encouraging them to contribute the paid work experience and scholarship funds. Industry groups were also asked to upgrade labs at the high schools, provide input on upgrading courses of study at CTCC and CCS, and recruit other businesses.

By the 1996-97 school year, there were four youth apprenticeship programs in metals manufacturing, chemical processing technology, electrical trades, and banking and finance. The prototype for this model requires advanced academic coursework, industry-driven technical curriculum linked to work-based learning experiences, articulation to CTCC courses of study, and industry-sponsored scholarships to CTCC. For the 1997-98 school year, additional youth apprenticeship programs were planned for automotive technology, HVAC, and medium/heavy vehicle technology.

Currently, there are 11 youth apprenticeship programs incorporated into CTP. Each is based on the same core components of two years of technical coursework in high school followed by a two-year AAS program at a community college (often with a scholarship), combined with paid work experience with a sponsoring business (see Table 5). Each apprenticeship is registered with the state Department of Labor with specific standards and minimum qualifications outlined for a 2+2 program. Each student signs an agreement that outlines the minimum standards to enroll, the nature of the work, the classroom instruction, wages, and supervision. Students can earn course credit and are paid for their school-year work experience (which averages four hours daily, three days a week) and are paid for summer employment.

Several youth apprenticeship programs were started in 1995-96, including a banking and finance youth apprenticeship program started with a financial services company. Later, youth apprenticeship programs were started in automotive technology, HVAC, heavy equipment and transport technology, construction, culinary arts and hospitality, and information technology; others, such as communication and furniture, are still being planned. The high school course registration catalog lists several youth apprenticeship programs as part of the course offerings. These include business administration, banking and financial services, network administration, technology, medical careers, family and consumer sciences, horticulture/landscaping, chemical processing, automotive technology, collision repair technology, heavy equipment and transport technology, air conditioning technology, construction technology, masonry, electrical trades, electronics, metals manufacturing technologies, and drafting (engineering and architecture). The high school catalog does not list any prerequisites for the youth apprenticeship programs, but the program marketing materials do. The program marketing materials and the Career Paths for Students booklet both outline the recommended high school courses for each youth apprenticeship program.

Student Demographics, Experiences, and Preliminary Outcomes

The section that follows summarizes the findings for three cohorts of high school graduates for 1996, 1997, and 1998. The results present the demographic and educational characteristics, math and vocational course-taking patterns, high school employment experiences, and transition patterns to postsecondary education and work. The results compare the experiences of three groups of graduates—Tech Prep, non-Tech Prep, and youth apprentice—for whom survey and school and college performance information could be compiled.

Tech Prep and non-Tech Prep students selected for this study graduated from six of the fourteen high schools in the consortium. (Refer to Appendix A for further details on site and student sample selection procedures for this site.) The six purposively chosen high schools were the first to implement Tech Prep during the initial planning years of 1993 and 1994; the remaining high schools followed in subsequent years. Consequently, all high school graduates (n=373) who had completed the four-year high school course sequence of College Tech Prep (CTP) in 1996-98were included in the analysis. These students were the first to complete the CTP curriculum, which stressed the integration and completion of higher level academic and technical courses and the provision of multiple educational and career options. To be counted as a CTP completer and therefore included in this study, students must have completed four years of English, three years of math at the Algebra 1 level or above, three years of science, and four sequential credits (the equivalent of two years) of vocational-technical education by the time they graduated from high school. Students identified for this analysis were flagged by the local school district's institutional research office based on an audit of high school transcripts. In so doing, the analysis identified bona fide CTP completers in the Tech Prep graduate group.

The youth apprenticeship program had more restricted eligibility than CTP, with different admission requirements for each program. As with Tech Prep graduates, all youth apprentice graduates were included in the analysis, especially since this group was quite small (n=39). It is important to note that students who engaged in the youth apprenticeship program were more readily identified with that program than CTP, partly because of the selective admission requirement and special program features. At a minimum, the youth apprenticeship programs required a 2.0 GPA and good attendance. To be counted as a youth apprentice high school completer (graduate), students in youth apprenticeship programs must have completed the CTP course plan requirements as well as the specific apprenticeship program requirements.

Once the Tech Prep (i.e., CTP) and youth apprentice groups were identified, a comparable sample of non-Tech Prep graduates was selected at random from the same high schools using the same upper and lower limits as the Tech Prep group, ensuring a comparable distribution on class rank percentile at high school graduation. (Refer to the methodology section.) Results reported later in this section show that the youth apprentice group had a significantly higher class rank percentile and cumulative grade point average (GPA) than the Tech Prep and non-Tech Prep groups. Since the youth apprentice group was quite small requiring that we take the entire population, it was not possible to control for GPA or class ranking in the selection process. This information should be considered when examining the subsequent discussion of student outcomes.

Demographics and Personal Characteristics

The majority of the 1996-98 high school graduates were White and non-Hispanic (see Table 5). While slightly more than half the high school graduates were female, youth apprentices were more likely to be male (67% vs. 54% overall), and this result was statistically significant ($\chi^2 = 7.36$, $df = 2$, $p = .025$). Most students were single and two-thirds, regardless of program designation, still lived with their parents, one to three years after high school graduation. The graduates reported wide differences in family income, but the averages differed little among the three groups.

There were program-related differences in whether the graduates' fathers had only a high school diploma, some college, or a college degree ($\chi^2 = 16.28$, $df = 2$, $p = .04$). Tech Prep graduates were more likely to have fathers who had only a high school diploma or less (51% vs. 41% for the other two groups), while non-Tech Prep graduates were most likely to have fathers who had earned a college degree or more (34% vs. 21% of Tech Prep graduates and 14% of youth apprenticeship graduates). The three groups differed little, however, on their mothers' educational attainment.

Table 5

Percentage Distribution on Selected Demographics

by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**				**Tech Prep Youth Apprenticeship**		
	Total Grad. n=173	1996 Grad. n=34	1997 Grad. n=61	1998 Grad. n=78	Total Grad. n=138	1996 Grad. n=34	1997 Grad. n=57	1998 Grad. n=47	Total Grad. n=23	96/97 Grad. n=10	1998 Grad. n=13
Gender											
Male	44.0	52.6	39.7	41.9	46.9	43.4	50.4	45.9	66.7	76.2	55.6
Female	56.0	47.4	60.3	58.1	53.1	56.6	49.6	54.1	33.3	23.8	44.4
Race/Ethnicity											
White, non-Hispanic	53.0	61.8	49.2	52.0	56.0	60.6	57.4	50.0	56.5	40.0	69.2
Black, non-Hispanic	36.9	29.4	33.9	42.7	34.6	39.4	31.5	34.8	43.5	60.0	30.8
Hispanic	1.2	0.0	3.4	0.0	3.7	0.0	3.7	6.5	0.0	0.0	0.0
Asian/Pacific Islander	4.2	2.9	5.1	4.0	3.7	0.0	5.6	4.3	0.0	0.0	0.0
Am. Indian/Alaskan Native	1.2	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	3.6	5.9	5.1	1.3	2.3	0.0	1.9	4.3	0.0	0.0	0.0
Marital status											
Single	91.8	79.4	91.7	97.4	93.5	88.2	91.2	100.0	82.6	60.0	100.0
Single with children	3.5	11.8	1.7	1.3	2.2	2.9	3.5	0.0	8.7	20.0	0.0
Married	3.5	8.8	3.3	1.3	1.4	0.0	3.5	0.0	4.3	10.0	0.0
Married with children	1.2	0.0	3.3	0.0	2.9	8.8	1.8	0.0	4.3	10.0	0.0
Father's education level											
Less than HS graduate	14.1	19.4	13.0	12.7	13.1	12.5	9.4	17.8	13.6	0.0	23.1
High school graduate	36.5	41.9	27.8	40.8	27.7	25.0	32.1	24.4	27.3	22.2	30.8
Some college, no degree	16.7	6.5	24.1	15.5	16.2	28.1	13.2	11.1	31.8	55.6	15.4

Table 5 (cont.)

Two-year associate's degree	12.2	16.1	11.1	11.3	9.2	6.3	9.4	11.1	13.6	0.0	23.1
Four-year bachelor's degree	16.0	12.9	14.8	18.3	17.7	6.3	22.6	20.0	9.1	11.1	7.7
Graduate degree	4.5	3.2	9.3	1.4	16.2	21.9	13.2	15.6	4.5	11.1	0.0
Mother's education level											
Less than HS graduate	7.4	6.1	10.5	5.5	7.4	9.1	3.6	10.6	8.7	0.0	15.4
High school graduate	38.0	42.4	40.4	34.2	36.0	27.3	41.1	36.2	43.5	40.0	46.2
Some college, no degree	20.9	9.1	21.1	26.0	17.6	12.1	26.8	10.6	21.7	20.0	23.1
Two-year associate's degree	12.9	15.2	7.0	16.4	9.6	15.2	8.9	6.4	17.4	20.0	15.4
Four-year bachelor's degree	19.0	24.2	21.1	15.1	19.9	30.3	8.9	25.5	4.3	10.0	0.0
Graduate degree	1.8	3.0	0.0	2.7	9.6	6.1	10.7	10.6	4.3	10.0	0.0
Family income											
$14,999 or less	11.4	14.8	8.0	12.7	6.1	6.7	6.1	5.7	0.0	0.0	0.0
$15,000 – $29,999	19.7	11.1	18.0	25.5	11.4	6.7	18.4	5.7	20.0	33.3	9.1
$30,000 – $44,999	18.9	14.8	22.0	18.2	19.3	16.7	20.4	20.0	15.0	22.2	9.1
$45,000 – $59,999	22.7	25.9	28.0	16.4	25.4	33.3	24.5	20.0	30.0	22.2	36.4
$60,000 – $74,999	11.4	11.1	8.0	14.5	20.2	20.0	16.3	25.7	25.0	22.2	27.3
$75,000 – $89,999	7.6	7.4	12.0	3.6	4.4	3.3	4.1	5.7	5.0	0.0	9.1
$90,000 or more	8.3	14.8	4.0	9.1	13.2	13.3	10.2	17.1	5.0	0.0	9.1
Present residence											
Live with my parent(s)	68.8	57.6	70.7	72.5	68.3	63.0	62.5	79.1	68.2	50.0	83.3
Live alone	5.6	9.1	5.2	4.3	6.3	3.7	8.9	4.7	9.1	20.0	0.0
Live with spouse or significant other	8.1	15.2	8.6	4.3	9.5	11.1	12.5	4.7	13.6	20.0	8.3
Live with a friend or roommate	17.5	18.2	15.5	18.8	15.9	22.2	16.1	11.6	9.1	10.0	8.3

Source: Education-To-Careers Follow-up Survey (n=334) for all items except gender, which came from the Tech Prep High School Transcript File (n = 723)

Note: Details may not sum to 100 due to rounding.

Educational Characteristics

As mentioned at the start of this section, youth apprentices had higher GPAs (3.0 or higher for 36% of youth apprentices) compared to the Tech Prep and non-Tech Prep groups (22% of Tech Prep and 19% of non-Tech Prep had GPAs at 3.0 or higher) (F = 3.59, df = 2, p = .03) (see Table 6). Furthermore, youth apprentices were the least likely to have GPAs under 2.0 (compared to 2.6% of Tech Prep vs. 7% of non-Tech Prep), but this finding is not surprising since youth apprentices must have achieved a 2.0 GPA to be eligible for the program. A similar pattern existed with class rank percentile (F = 3.12, df = 2, p = .05), with more youth apprentices in the upper half of the class ranking than the other two groups (74% vs. 55%, respectively). Even so, most graduates from all three groups were middle majority (26^{th} to 75^{th} percentile) or higher in their high school graduation classes, with few represented at or below the 25^{th} percentile.

Looking at whether graduates took the ACT and SAT tests as an indication of their interest in attending four-year college, results show the majority of all three groups took the ACT, but not the SAT. Overall, there was no difference between the three groups on this variable.

From survey results, we also learned that youth apprentices were more likely than the other two groups to perceive that their high school learning was extremely useful (22% vs. 10% and 5% respectively), and these results were statistically significant (F = 5.17, df = 2, p = .006). Non-Tech Prep graduates were more likely to perceive their high school learning as only somewhat or not at all useful (32%) compared to only about 20% of the other two groups.

Table 6

Percentage Distribution on Selected Educational Characteristics and Attitudes by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep				Tech Prep Youth Apprenticeship		
	Total Grad. n=373	1996 Grad. n=97	1997 Grad. n=116	1998 Grad. n=160	Total Grad. n=311	1996 Grad. n=99	1997 Grad. n=127	1998 Grad. n=85	Total Grad. n=39	96/97 Grad. n=21	1998 Grad. n=18
Class rank percentile at HS graduation											
1 – 25%	9.9	8.2	6.4	13.5	8.3	8.2	6.6	11.3	0.0	0.0	0.0
26 – 50%	34.8	44.3	39.1	25.8	36.3	40.8	36.1	31.3	25.6	33.3	16.7
51 – 75%	35.4	29.9	34.5	39.4	34.7	31.6	36.1	36.3	51.3	42.9	61.1
76 – 100%	19.9	17.5	20.0	21.3	20.7	19.4	21.3	21.3	23.1	23.8	22.2
Cumulative GPA at HS graduation											
1.01 – 1.50	1.3	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.51 – 2.00	7.0	6.2	1.7	11.3	7.7	7.1	1.6	17.6	2.6	4.8	0.0
2.01 – 2.50	34.0	38.1	35.3	30.6	37.0	43.4	37.0	29.4	25.6	23.8	27.8
2.51 – 3.00	35.7	37.1	37.9	33.1	36.3	32.3	41.7	32.9	35.9	42.9	27.8
3.01 – 3.50	17.2	12.4	20.7	17.5	16.4	14.1	17.3	17.6	30.8	19.0	44.4
3.51 – 4.00	4.8	6.2	4.3	4.4	2.6	3.0	2.4	2.4	5.1	9.5	0.0
Took ACT											
Yes	67.6	62.9	73.3	66.3	71.4	72.7	74.0	65.9	64.1	61.9	66.7
No/Unknown	32.4	37.1	26.7	33.8	28.6	27.3	26.0	34.1	35.9	38.1	33.3
Took SAT											
Yes	9.4	14.4	5.2	9.4	12.5	14.1	11.0	12.9	12.8	14.3	11.1
No/Unknown	90.6	85.6	94.8	90.6	87.5	85.9	89.0	87.1	87.2	85.7	88.9

Table 6 (cont.)

Utility of high school learning											
Extremely useful	10.4	8.8	11.5	10.3	5.1	2.9	5.3	6.4	21.7	10.0	30.8
Very useful	31.8	23.5	37.7	30.8	32.6	23.5	40.4	29.8	34.8	30.0	38.5
Fairly useful	37.0	32.4	31.1	43.6	30.4	26.5	24.6	40.4	34.8	40.0	30.8
Somewhat useful	20.8	35.3	19.7	15.4	29.7	44.1	28.1	21.3	8.7	20.0	0.0
Not at all useful	0.0	0.0	0.0	0.0	2.2	2.9	1.8	2.1	0.0	0.0	0.0

Source: Tech Prep High School Transcript File for all items except utility of high school learning, which came from the Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Math and Vocational Course-Taking Patterns

The majority of all three types of graduates had completed seven or more semesters of math courses in high school and almost all had completed at least five to six semesters of math courses (see Table 7). Within the Tech Prep group, the 1998 graduate cohort showed a higher level of math course-taking than the 1996 cohort (58% of the 1998 cohort took 7 or more math semesters compared to 54% of the 1996 cohort), and this result was statistically significant ($F = 3.30$, $df = 2$, $p = .04$). (See Appendix E for examples of math course titles corresponding to the categories discussed here.)

For the majority (59-63%) of graduates, Algebra I or Geometry was the lowest math course taken in high school, while almost all members of the three groups completed Algebra II or advanced math as their highest math course. However, Tech Prep and youth apprentice graduates were even more likely than non-Tech Prep to have completed higher level math. Almost 90% of Tech Prep and youth apprentice graduates had completed Algebra 2 or advanced math, compared to 77.5% of the non-Tech Prep graduates ($F = 6.86$, $df = 2$, $p = .001$). Of the three groups, youth apprentices were the most likely of the three groups to complete advanced math (56% vs. 50-47%, respectively). Further, about half the graduates from all three groups completed at least one honors math course. Youth apprentices were more likely to have completed at least one applied math course (31% vs. 22-23%, respectively), but there was no significant difference between the groups on this variable.

Table 7

Percentage Distribution on High School Math Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep				Tech Prep Youth Apprenticeship		
	Total Grad. n=373	1996 Grad. n=97	1997 Grad. n=116	1998 Grad. n=160	Total Grad. n=311	1996 Grad. n=99	1997 Grad. n=127	1998 Grad. n=85	Total Grad. n=39	96/97 Grad. n=21	1998 Grad. n=18
Total math courses by semester:											
None	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 – 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 – 4	0.3	0.0	0.9	0.0	2.9	1.0	3.1	4.7	0.0	0.0	0.0
5 – 6	41.6	46.4	37.1	41.9	43.4	43.4	44.1	42.4	41.0	42.9	38.9
7 – 8	53.6	53.6	56.0	51.9	49.5	52.5	48.0	48.2	56.4	57.1	55.6
9 or more	4.6	0.0	6.0	6.3	4.2	3.0	4.7	4.7	2.6	0.0	5.6
Lowest math course											
Basic math	0.5	1.0	0.9	0.0	1.6	0.0	0.8	4.7	0.0	0.0	0.0
General math	0.0	0.0	0.0	0.0	1.6	1.0	1.6	2.4	0.0	0.0	0.0
Applied math	22.0	18.6	19.0	26.3	21.5	21.2	19.7	24.7	30.8	33.3	27.8
Pre-Algebra	14.2	12.4	17.2	13.1	16.1	12.1	19.7	15.3	7.7	4.8	11.1
Algebra 1	34.3	43.3	37.1	26.9	30.6	37.4	29.9	23.6	33.4	28.5	38.9
Geometry	29.0	24.7	25.9	33.7	28.3	27.3	28.3	29.4	28.2	33.3	22.3
Algebra 2	0.0	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.0
Highest math course											
Basic math	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.2	0.0	0.0	0.0
General math	0.0	0.0	0.0	0.0	0.6	0.0	0.8	1.2	0.0	0.0	0.0
Applied math	0.0	0.0	0.0	0.0	1.3	1.0	1.6	1.2	0.0	0.0	0.0
Pre-Algebra	1.1	2.1	0.0	1.3	6.1	4.0	5.5	9.4	0.0	0.0	0.0

Table 7 (cont.)

Algebra 1	0.0	0.0	0.0	0.0	1.0	1.0	0.8	1.2	0.0	0.0	0.0
Geometry	9.4	12.4	1.7	13.1	13.2	13.1	10.2	17.6	12.8	9.5	16.7
Algebra 2	39.1	40.2	51.8	29.4	30.5	28.3	39.4	20.0	30.8	33.3	27.8
Advanced math	50.4	45.3	46.5	56.3	47.0	52.5	41.7	48.3	56.4	57.1	55.6
Total applied math by semester:											
None	77.7	81.4	80.2	73.8	76.8	77.8	78.7	72.9	69.2	66.7	72.2
1 – 2	22.3	18.6	19.8	26.3	23.2	22.2	21.3	27.1	30.8	33.3	27.8
3 – 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 – 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total honors math by semester:											
None	56.0	46.4	48.3	67.5	54.0	44.4	52.0	68.2	53.8	47.6	61.1
1 – 2	19.6	12.4	34.5	13.1	17.0	11.1	24.4	12.9	28.2	33.3	22.2
3 – 4	14.2	28.9	9.5	8.8	16.1	30.3	12.6	4.7	5.1	0.0	11.1
5 – 6	5.1	8.2	2.6	5.0	5.8	6.1	4.7	7.1	0.0	0.0	0.0
7 – 8	5.1	4.1	5.2	5.6	7.1	8.1	6.3	7.1	12.8	19.0	5.6

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding.

Vocational Course-Taking

Vocational course-taking patterns varied widely among the three groups of graduates, both in specialization and levels (see Table 8), referring to the SST coding typology where taking the first course in a sequence is represented by Level 1, taking the second course in a sequence is represented by Level 2, and taking a specialty course is represented by Level 3. (Appendix F provides further identification of Level 1, 2 and 3 vocational courses.)

Enrollment in vocational specialty areas reflected the available career pathways for College Tech Prep (CTP) and the youth apprenticeship programs at the time these three cohorts were in high school. For example, 74% of the youth apprentices took precision production courses (reflecting the metals youth apprenticeship program) and 59% had at least one business course (reflecting the business and finance youth apprenticeship program). Differences identified among the three groups as to whether they participated in particular vocational specialty areas follow:

- A higher percentage of Tech Prep than non-Tech Prep and youth apprentice graduates took business courses ($\chi^2 = 22.26$, $df = 2$, $p = .000$);

- A higher percentage of Tech Prep than non-Tech Prep graduates and youth apprentices took health courses ($\chi^2 = 16.0$, $df = 2$, $p = .000$);

- A higher percentage of youth apprentices took precision production courses (e.g., electronics, mechanical drawing, welding) than the other two groups, and a higher percentage of Tech Prep graduates took these courses than non-Tech Prep graduates ($\chi^2 = 98.22$, $df = 2$, $p = .000$);

- A higher percentage of youth apprentice than Tech Prep graduates and non-Tech Prep graduates took general labor market courses (e.g., typewriting, industrial arts, work experience, career exploration) ($\chi^2 = 7.38$, $df = 2$, $p = .025$);

- A higher percentage of youth apprentices than Tech Prep and non-Tech Prep enrolled in specific labor market courses (e.g., co-op training, apprenticeship) (χ^2 = 6.46, df = 2, *p* = .04); and

- A higher percentage of Tech Prep than non-Tech Prep graduates and youth apprentices took marketing courses (χ^2 = 23.85, *df* = 1, *p* = .000).

Within several vocational specialty areas, significant differences emerged among the three groups on the levels of courses taken. Table 8 also shows sequential course-taking in all vocational areas, with participation in a minimum of one course in each level representing the most advanced sequential course-taking in vocational education. It is important to note, however, that high schools do not always offer three levels in all vocational specialty areas and/or the number of higher level courses may be extremely limited. To be considered a sequential course-taker, students could have taken a semester of vocational courses at Level 1 and Level 2, Level 1 and Level 3, or a minimum of one at each level. Given this caveat, major results for the Tech Prep, non-Tech Prep, and youth apprentice groups on sequential vocational course-taking follow:

- More Tech Prep graduates and youth apprentices were engaged in sequential course-taking in business than non-Tech Prep graduates (χ^2 = 64.46, *df* = 2, *p* = .000);

- More Tech Prep graduates than non-Tech Prep graduates and youth apprentices were engaged in sequential course-taking in health (χ^2 = 59.14, df = 6, p = .000);

- More youth apprentice graduates than Tech Prep and non-Tech Prep graduates were engaged in sequential course-taking in precision production, and Tech Prep graduates were more engaged in these courses than non-Tech Prep (χ^2 = 67.60, df = 4, p = .000);

- More Tech Prep graduates were engaged in sequential course-taking in marketing than non-Tech Prep and youth apprentice graduates (χ^2 = 29.98, df = 4, p = .000).

Table 8

Percentage Distribution on Vocational-Technical Education Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep				Tech Prep Youth Apprenticeship		
	Total Grad. n=373	1996 Grad. n=97	1997 Grad. n=116	1998 Grad. n=160	Total Grad. n=311	1996 Grad. n=99	1997 Grad. n=127	1998 Grad. n=85	Total Grad. n=39	96/97 Grad. n=21	1998 Grad. n=18
Course-taking in vocational area:											
Business	77.7	69.1	85.3	77.5	62.1	62.6	62.2	61.2	59.0	66.7	50.0
None	22.3	30.9	14.7	22.5	37.9	37.4	37.8	38.8	41.0	33.3	50.0
Agriculture	0.5	0.0	0.9	0.6	0.6	0.0	0.8	1.2	0.0	0.0	0.0
None	99.5	100.0	99.1	99.4	99.4	100.0	99.2	98.8	100.0	100.0	100.0
Consumer/Family Studies	29.5	18.6	33.6	33.1	27.7	21.2	27.6	35.3	12.8	4.8	22.2
None	70.5	81.4	66.4	66.9	72.3	78.8	72.4	64.7	87.2	95.2	77.8
Health	22.3	18.6	18.1	27.5	13.2	14.1	14.2	10.6	2.6	4.8	0.0
None	77.7	81.4	81.9	72.5	86.8	85.9	85.8	89.4	97.4	95.2	100.0
Construction	9.4	13.4	5.2	10.0	7.1	5.1	7.1	9.4	17.9	19.0	16.7
None	90.6	86.6	94.8	90.0	92.9	94.9	92.9	90.6	82.1	81.0	83.3
Technical/communications	16.6	21.6	17.2	13.1	16.4	17.2	17.3	14.1	20.5	33.3	5.6
None	83.4	78.4	82.8	86.9	83.6	82.8	82.7	85.9	79.5	66.7	94.4
Precision production	24.7	23.7	23.3	26.3	9.0	9.1	10.2	7.1	74.4	81.0	66.7
None	75.3	76.3	76.7	73.8	91.0	90.9	89.8	92.9	25.6	19.0	33.3
Mechanics/repairers	5.6	6.2	1.7	8.1	3.2	2.0	3.1	4.7	5.1	0.0	11.1
None	94.4	93.8	98.3	91.9	96.8	98.0	96.9	95.3	94.9	100.0	88.9
Marketing	20.1	15.5	22.4	21.3	8.4	8.1	7.1	10.6	2.6	4.8	0.0
None	79.9	84.5	77.6	78.8	91.6	91.9	92.9	89.4	97.4	95.2	100.0
Special labor market	4.0	4.1	5.2	3.1	4.2	6.1	2.4	4.7	12.8	23.8	0.0
None	96.0	95.9	94.8	96.9	95.8	93.9	97.6	95.3	87.2	76.2	100.0

Table 8 (cont.)

General labor market	14.2	14.4	6.9	19.4	10.6	6.1	15.0	9.4	25.6	23.8	27.8
None	85.8	85.6	93.1	80.6	89.4	93.9	85.0	90.6	74.4	76.2	72.2
Business											
None	22.3	30.9	14.7	22.5	37.9	37.4	37.8	38.8	41.0	33.3	50.0
Only level 1	4.0	4.1	2.6	5.0	3.9	5.1	3.1	3.5	2.6	4.8	0.0
Only level 1 and 2	1.1	1.0	0.9	1.3	00	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	18.5	15.5	25.9	15.0	20.9	16.2	19.7	28.2	17.9	28.6	5.6
Minimum 1 in each level	24.4	24.7	26.7	22.5	3.5	5.1	1.6	4.7	17.9	4.8	33.3
Other	20.7	23.7	29.3	33.8	33.8	36.3	37.8	24.7	20.5	28.6	11.1
Agriculture											
None	99.5	100.0	99.1	99.4	99.4	100.0	99.2	98.8	100.0	100.0	100.0
Only level 1	0.3	0.0	0.0	0.6	0.6	0.0	0.8	1.2	0.0	0.0	0.0
Only level 1 and 2	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Consumer/Family Studies											
None	70.5	81.4	66.4	66.9	72.3	78.8	72.4	64.7	87.2	95.2	77.8
Only level 1	14.7	9.3	18.1	15.6	12.5	10.1	11.8	16.5	7.7	0.0	16.7
Only level 1 and 2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.2	0.0	0.0	0.0
Only level 1 and 3	8.0	7.2	9.5	7.5	9.0	5.1	12.6	8.2	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	6.7	2.1	6.0	10.0	5.8	6.0	3.2	9.4	5.0	4.8	5.5
Health											
None	77.7	81.4	81.9	72.5	86.8	85.9	85.8	89.4	97.4	95.2	100.0
Only level 1	1.6	0.0	0.9	3.1	5.5	4.0	6.3	5.9	0.0	0.0	0.0
Only level 1 and 2	17.4	11.3	15.5	22.5	2.3	2.0	3.1	1.2	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.8	2.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	2.5	5.2	.9	1.9	5.5	8.0	4.7	3.5	2.6	4.8	0.0

Workforce

Table 8 (cont.)

Construction											
None	90.6	86.6	94.8	90.0	92.9	94.9	92.9	90.6	82.1	81.0	83.3
Only level 1	6.7	11.3	1.7	7.5	6.1	5.1	5.5	8.2	15.4	19.0	11.1
Only level 1 and 2	1.6	2.1	3.4	0.0	1.0	0.0	1.6	1.2	2.6	0.0	5.6
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	1.1	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Technical/communications											
None	83.4	78.4	82.8	86.9	83.6	82.8	82.7	85.9	79.5	66.7	94.4
Only level 1	12.9	16.5	15.5	8.8	15.4	16.2	17.3	11.8	15.4	28.6	0.0
Only level 1 and 2	2.7	2.1	0.9	4.4	0.3	1.0	0.0	0.0	5.1	4.8	5.6
Only level 1 and 3	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	.8	2.0	.8	0.0	.6	0.0	0.0	2.3	0.0	0.0	0.0
Precision production											
None	75.3	76.3	76.7	73.8	91.0	90.9	89.8	92.9	25.6	19.0	33.3
Only level 1	13.1	11.3	8.6	17.5	8.0	9.1	7.9	7.1	5.1	9.5	0.0
Only level 1 and 2	11.3	12.4	14.7	8.1	1.0	0.0	2.4	0.0	33.3	38.1	27.8
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	.3	0.0	0.0	.6	0.0	0.0	0.0	0.0	35.9	33.4	38.9
Mechanics/repairers											
None	94.4	93.8	98.3	91.9	96.8	98.0	96.9	95.3	94.9	100.0	88.9
Only level 1	0.8	0.0	0.0	1.9	0.3	0.0	0.8	0.0	0.0	0.0	0.0
Only level 1 and 2	1.1	1.0	0.0	1.9	1.0	0.0	0.0	3.5	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	3.7	5.2	1.7	4.4	1.9	2.0	2.3	1.2	5.1	0.0	11.1

Table 8 (cont.)

Marketing											
None	79.9	84.5	77.6	78.8	91.6	91.9	92.9	89.4	97.4	95.2	100.0
Only level 1	5.4	5.2	3.4	6.9	4.5	6.1	2.4	5.9	2.6	4.8	0.0
Only level 1 and 2	12.3	9.3	16.4	11.3	2.3	1.0	3.1	2.4	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	2.4	1.1	2.6	3.1	1.6	1.0	1.6	2.4	0.0	0.0	0.0
Specific labor market											
None	96.0	95.9	94.8	96.9	95.8	93.9	97.6	95.3	87.2	76.2	100.0
Only level 1	0.0	0.0	0.0	0.0	1.0	1.0	0.0	2.4	0.0	0.0	0.0
Only level 1 and 2	0.0	0.0	0.0	0.0	1.0	0.0	1.6	1.2	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	4.0	4.1	5.2	3.1	2.3	5.1	.8	1.2	12.8	23.8	0.0
General labor market											
None	85.8	85.6	93.1	80.6	89.4	93.9	85.0	90.6	74.4	76.2	72.2
Only level 1	14.2	14.4	6.9	19.4	10.6	6.1	15.0	9.4	25.6	23.8	27.8
Only level 1 and 2	0.0	0.0	0.0	0.0	1.0	0.0	1.6	1.2	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding. The "other" category includes course combinations other than those specified, and this category was not included in significance testing. Between group differences were computed on the total groups, but not cohorts by year due to small cell sizes.

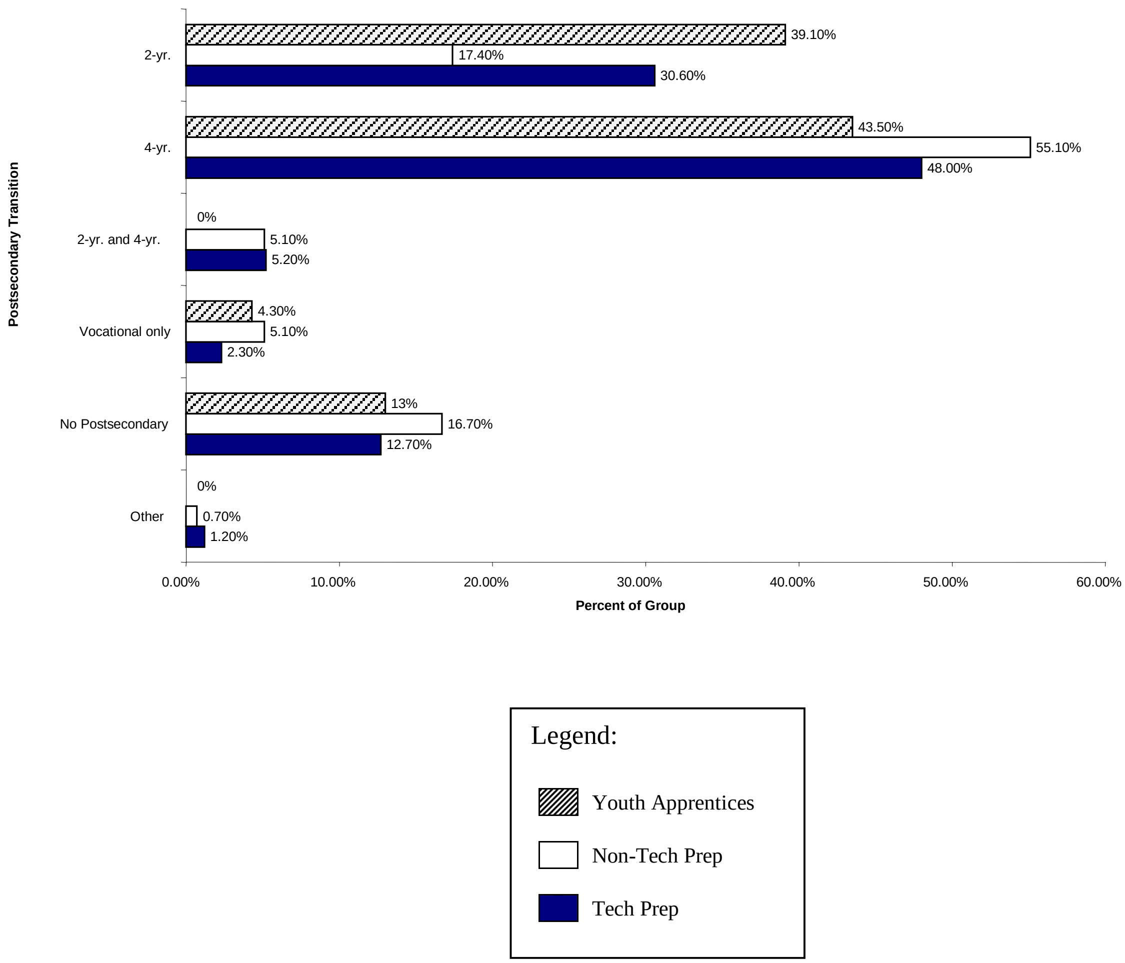
Transition to Postsecondary Education

Based on transcripts and follow-up survey results, it appears that the vast majority of high school graduates in all three groups went to postsecondary education of some type after high school graduation. Based on transcripts obtained from the community college, only a small percentage of any of the three groups continued their postsecondary education at Central Technical Community College (CTCC), the main two-year college in the Workforce Consortium. CTCC transcripts showed that only 19% of the graduates had matriculated to the community college overall, with youth apprentices (23%) slightly more likely to matriculate than the Tech Prep (19%) and non-Tech Prep groups (18%).

Looking at follow-up survey results, we captured a slightly larger group of graduates who matriculated to two-year colleges with 39% of the youth apprentice, 31% of the Tech Prep, and 17% of the non-Tech Prep graduates reporting going to two-year college only (see Figure 3). About another 5% of the Tech Prep and non-Tech Prep groups reporting attending both two- and four-year colleges after high school graduation. Since graduates of this consortium had other two-year college programs fairly accessible to them, they could have continued to the two-year level, but outside the particular community college that leads the Workforce Consortium and provided transcripts for this analysis. However, the highest percentage of students in all three groups had matriculated to four-year colleges, with non-Tech Prep group matriculating at the highest rate (55%) compared to 48% Tech Prep and 44% youth apprentice. From 13% to 17% of graduates in all three groups had not gone to postsecondary education at all within one to three years after high school graduation.

Figure 3

Transition to Postsecondary Education by Tech Prep Status



Work Experience During and After High School

Most graduates were employed during high school, including all youth apprentice graduates, and the differences between the youth apprentice and other graduates was statistically significant ($\chi^2 = 7.04$, $df = 2$, $p = .03$) (see Table 9). Youth apprentice graduates also earned more while working in high school, as is the nature of their work-based learning. Seventy-four percent of the youth apprentice graduates earned $6 or more per hour, in contrast to 57% of the Tech Prep graduates and 33% of the non-Tech Prep graduates. Whereas youth apprentice graduates were more likely than the other two groups to have worked and earned more when working, they averaged fewer working hours during a typical week in high school: 30% worked more than 20 hours weekly in contrast to 46% of the Tech Prep graduates and 39% of the non-Tech Prep graduates.

Table 9

Percentage Distribution in Employment Experiences During High School by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep				Tech Prep Youth Apprenticeship		
	Total Grad. n=173	1996 Grad. n=34	1997 Grad. n=61	1998 Grad. n=78	Total Grad. n=138	1996 Grad. n=34	1997 Grad. n=57	1998 Grad. n=47	Total Grad. n=23	96/97 Grad. n=10	1998 Grad. n=13
Employed during high school											
No	11.1	15.2	13.1	7.8	18.1	20.6	17.5	17.0	0.0	0.0	0.0
Yes	88.9	84.8	86.9	92.2	81.9	79.4	82.5	83.0	100.0	100.0	100.0
Estimated hourly wages in last job held before high school graduation											
Zero – unpaid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Less than $5.25/hr	9.9	21.4	7.5	7.0	10.7	14.8	13.0	5.1	4.3	10.0	0.0
$5.26 – $6.00/hr	42.8	42.9	47.2	39.4	56.3	59.3	52.2	59.0	21.7	30.0	15.4
$6.01 – $7.00/hr	30.9	17.9	34.0	33.8	19.6	11.1	19.6	25.6	60.9	50.0	69.2
$7.01 – $8.00/hr	8.6	14.3	7.5	7.0	8.0	3.7	10.9	7.7	13.0	10.0	15.4
More than $8.00/hr	7.9	3.6	3.8	12.7	5.4	11.1	4.3	2.6	0.0	0.0	0.0
Total hours worked during typical week in high school											
Less than 5 hours	0.7	0.0	1.9	0.0	0.9	3.7	0.0	0.0	0.0	0.0	0.0
6 – 10 hours	11.2	7.1	7.5	15.5	15.9	18.5	10.6	20.5	4.3	10.0	0.0
11 – 20 hours	42.8	53.6	35.8	43.7	44.2	51.9	48.9	33.3	65.2	50.0	76.9
21 – 30 hours	37.5	28.6	49.1	32.4	31.9	25.9	34.0	33.3	21.7	30.0	15.4
31 – 40 hours	7.2	10.7	5.7	7.0	7.1	0.0	6.4	12.8	8.7	10.0	7.7
More than 40 hours	0.7	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Work After High School

Almost all the graduates worked after high school graduation, with youth apprentice graduates having the fewest number of different jobs after graduation compared to Tech Prep and non-Tech Prep graduates (61% vs. 33% and 30% respectively) (see Table 10). Most graduates were holding only one job at the time of the study, although less than half were working part-time. Non-Tech Prep graduates were least likely of the three groups to be working full-time (33% vs. 46% and 44% respectively), and most likely not to be working (15% vs. 10% and 13%).

Most graduates were earning more than $6 per hour in their current primary job. Tech Prep graduates were somewhat more likely than the other two groups to be earning $8 or more per hour (39% of Tech Prep graduates vs. 30% of non-Tech Prep and 35% of youth apprentice graduates). The 1996 Tech Prep cohort earned higher wages than the 1997 Tech Prep cohort and this group, in turn, earned higher wages then the 1998 Tech Prep cohort ($F = 4.90$, $df = 2$, $p = .01$). A similar finding was evident for the 1998 non-Tech Prep cohort compared to the 1998 non-Tech Prep cohort ($F = 4.94$, $df = 2$, $p = .01$). A similar finding was evident among the youth apprentice cohort, but it was not statistically significant, probably because of the small group size. When looking at the change in wages from high school employment to the current primary job, similar patterns emerged with comparable statistical results for cohorts within the three groups.

Some differences existed in the types of current jobs held. Youth apprentice and Tech Prep graduates were somewhat more likely to have semi-skilled or skilled jobs than were the non-Tech Prep graduates (50% and 46% vs. 35% respectively), but these results were not statistically significant. The vast majority of both groups hoped to obtain a professional job some day, and most were very or extremely confident that they would reach their career goals. Looking at their present employment, however, most graduates were at least fairly satisfied with their current primary job.

Table 10

Percentage Distribution on Post-High School Employment

by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**				**Tech Prep Youth Apprenticeship**		
	Total Grad. n=173	1996 Grad. n=34	1997 Grad. n=61	1998 Grad. n=78	Total Grad. n=138	1996 Grad. n=34	1997 Grad. n=57	1998 Grad. n=47	Total Grad. n=23	96/97 Grad. n=10	1998 Grad. n=13
Number of jobs since HS											
1 – 2	32.6	24.2	23.0	43.6	30.4	29.4	25.5	37.0	60.9	40.0	76.9
3 – 4	37.2	27.3	45.9	34.6	32.6	20.6	34.5	39.1	13.0	20.0	7.7
5 – 6	16.3	18.2	24.6	9.0	20.7	26.5	25.5	10.9	21.7	30.0	15.4
7 – 8	4.7	15.2	3.3	1.3	9.6	20.6	7.3	4.3	4.3	10.0	0.0
9 or more	4.7	15.2	1.6	2.6	3.7	2.9	7.3	0.0	0.0	0.0	0.0
None	4.7	0.0	1.6	9.0	3.0	0.0	0.0	8.7	0.0	0.0	0.0
Number of jobs held currently											
0	9.9	3.0	10.2	12.9	15.2	17.6	12.0	17.1	13.0	30.0	0.0
1	74.7	75.8	74.6	74.3	69.6	61.8	72.0	73.2	73.9	50.0	92.3
2	13.6	18.2	13.6	11.4	12.8	20.6	10.0	9.8	13.0	20.0	7.7
3 or more	1.9	3.0	1.7	1.4	2.4	0.0	6.0	0.0	0.0	0.0	0.0
Current employment status											
Full-time (35 hours or more per week)	46.3	60.6	51.7	35.2	32.6	27.3	38.2	29.3	43.5	50.0	38.5
Part-time (less than 35 hours per week)	42.7	36.4	36.7	50.7	47.3	48.5	43.6	51.2	47.8	30.0	61.5
Unemployed seeking Employment	4.9	3.0	6.7	4.2	7.8	0.0	9.1	12.2	4.3	10.0	0.0
Unemployed not seeking Employment	6.1	0.0	5.0	9.9	8.5	15.2	7.3	4.9	4.3	10.0	0.0
Military full-time	0.0	0.0	0.0	0.0	3.9	9.1	1.8	2.4	0.0	0.0	0.0

Table 10 (cont.)

Months worked in current primary job											
Less than 6 months	23.8	25.0	24.5	22.4	35.2	17.9	37.8	46.9	30.0	28.6	30.8
6 – 12 months	37.1	34.4	35.8	39.7	34.3	32.1	33.3	37.5	35.0	28.6	23.1
13 – 24 months	16.8	15.6	22.6	12.1	13.3	28.6	8.9	6.3	35.0	14.3	46.2
25 – 36 months	11.2	9.4	7.5	15.5	7.6	10.7	8.9	3.1	10.0	28.6	0.0
36 months or more	11.2	15.6	9.4	10.3	9.5	10.7	11.1	6.3	0.0	0.0	0.0
Wages per hour, current primary job											
Zero	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
$5.25 or less	2.8	0.0	1.9	5.2	1.9	3.6	2.2	0.0	0.0	0.0	0.0
$5.26 – $6.00	9.9	3.2	9.6	13.8	15.2	14.3	13.3	18.8	0.0	0.0	0.0
$6.01 – $7.00	24.8	29.0	13.5	32.8	31.4	14.3	24.4	56.3	35.0	28.6	38.5
$7.01 – $8.00	22.7	25.8	26.9	17.2	19.0	21.4	24.4	9.4	30.0	14.3	38.5
$8.01 – $9.00	14.9	6.5	17.3	17.2	14.3	17.9	15.6	9.4	15.0	28.6	7.7
$9.01 – $10.00	8.5	9.7	11.5	5.2	7.6	7.1	11.1	3.1	10.0	14.3	7.7
$10.01 – $11.00	5.7	9.7	3.8	5.2	4.8	7.1	4.4	3.1	5.0	0.0	7.7
More than $11.00	9.9	16.1	13.4	3.4	3.8	7.2	4.4	0.0	5.0	14.3	0.0
I don't know	0.7	0.0	1.9	0.0	1.9	7.1	0.0	0.0	0.0	0.0	0.0
Change in wages per hour from HS to present											
-$1.00	6.1	0.0	8.0	7.3	4.0	8.0	2.3	3.1	0.0	0.0	0.0
0	23.7	7.7	16.0	38.2	34.0	20.0	39.5	37.5	25.0	14.3	30.8
+$1.00	20.6	23.1	18.0	21.8	28.0	24.0	23.3	37.5	45.0	28.6	53.8
+$2.00	22.1	30.8	20.0	20.0	15.0	12.0	14.0	18.8	10.0	28.6	0.0
+$3.00	10.7	11.5	16.0	5.5	8.0	16.0	7.0	3.1	5.0	0.0	7.7
+$4.00	5.3	3.8	8.0	3.6	2.0	4.0	2.3	0.0	5.0	0.0	7.7
+$5.00 or more	11.5	23.0	14.0	3.6	9.0	16.0	11.6	0.0	10.0	28.6	0.0

Table 10 (cont.)

Type of current primary job											
Entry level/unskilled	52.1	48.5	45.3	60.3	62.9	39.3	62.2	84.4	50.0	42.9	53.8
Semi-skilled	32.6	39.4	32.1	29.3	28.6	46.4	31.1	9.4	30.0	28.6	30.8
Skilled or technical	13.2	9.1	22.6	6.9	6.7	10.7	6.7	3.1	20.0	28.6	15.4
Professional	2.1	3.0	0.0	3.4	1.9	3.6	0.0	3.1	0.0	0.0	0.0
Type of primary job desired											
Entry level/unskilled	0.0	0.0	0.0	0.0	3.8	2.9	3.6	4.5	4.3	10.0	0.0
Semi-skilled	4.6	11.8	1.6	3.8	6.0	8.8	5.5	4.5	0.0	0.0	0.0
Skilled or technical	22.5	26.5	27.9	16.7	18.8	11.8	23.6	18.2	13.0	20.0	7.7
Professional	72.8	61.8	70.5	79.5	71.4	76.5	67.3	72.7	82.6	70.0	92.3
Satisfaction with primary job											
Extremely satisfied	20.7	12.1	30.2	16.9	18.1	14.3	22.2	15.6	10.0	0.0	15.4
Very satisfied	24.8	24.2	26.4	23.7	25.7	39.3	20.0	21.9	30.0	28.6	30.8
Fairly satisfied	37.2	45.5	32.1	37.3	34.3	28.6	37.8	34.4	50.0	57.1	46.2
Somewhat satisfied	9.7	15.2	3.8	11.9	18.1	17.9	13.3	25.0	10.0	14.3	7.7
Not at all satisfied	7.6	3.0	7.5	10.2	3.8	0.0	6.7	3.1	0.0	0.0	0.0
Confidence in reaching career goals											
Extremely confident	49.7	47.1	45.9	53.8	50.7	47.1	58.2	44.4	52.2	70.0	38.5
Very confident	32.4	29.4	42.6	25.6	30.6	29.4	18.2	46.7	39.1	20.0	53.8
Fairly confident	13.3	14.7	9.8	15.4	12.7	17.6	14.5	6.7	4.3	0.0	7.7
Somewhat confident	3.5	2.9	1.6	5.1	3.7	2.9	5.5	2.2	4.3	10.0	0.0
Not at all confident	1.2	5.9	0.0	0.0	2.2	2.9	3.6	0.0	0.0	0.0	0.0

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Summary

The Workforce Consortium has made systemic school reform, K-14 system-building, and extensive work-based learning the center pieces of its Tech Prep and STWOA initiatives. The consortium has built extensively on the state's early priority for a College Tech Prep (CTP) course of study, supplemented with a solid commitment from local business and industry to the youth apprenticeship model. CCS and CTCC, both individually and collectively, have worked over the past six years to revamp vocational-technical education with a significant youth apprenticeship component, establish technical skill-based employment as viable career options, and combine high academic achievement and thoughtful career planning for students.

The county's K-14 workforce development system for youth combines many of the recommended strategies of Tech Prep and STWOA. This shared system established career pathway courses of study in the high school, created articulated career pathways between the secondary schools and community colleges with youth apprenticeship opportunities, supported extensive integrated and applied curriculum development, established an extensive career development process for students K-14, and greatly upgraded vocational-technical education through upgraded labs and equipment, standards-driven curriculum, and broad based business and industry oversight and advisement. The school district's adoption of the High Schools That Work (HSTW) model helped to reinforce its own goals to foster higher academic achievement for all students while strengthening and extending vocational education options. The shared commitment of the school district and community college to using national standards and the DACUM process has guided program development, upgrading, and articulation in several vocational-technical specialty areas.

The approach to Tech Prep implementation used by the school district and community college has been systemic in nature, combining inquiry, extensive professional development, and a phased-in implementation process, particularly among the high schools. The two educational systems and other council members established a series of joint study groups, some for just the high school staff (on the use of the item banks, for example), some for both the community college and school district staff (on work-based learning), and still others combining community college, school district, and business and industry (on each career pathway). These study groups investigated the reform strategies, identified standards and models, and proposed strategies to be used in the schools throughout the county. These study groups also helped to sort out the local implementation challenges and supported local adoption of the various reform strategies.

The strong and committed leadership of the community college president, the school district superintendent, and business and industry enabled the formation of a partnership that has been crucial to establishing shared goals. Through this collaboration, the partners have been able to continually expand strategies to improve the skill level and quality of the county's entry-level workforce and provide youth with multiple career and educational options. While the school district and community college have encountered some implementation challenges, they have continued to look for opportunities to incorporate complementary strategies by adding new career development strategies K-14, expanding career pathways and youth apprenticeship options, and improving programs of study, marketing materials, and curriculum.

The CTP program of study and broader K-14 workforce development system are still under development, reflecting a long-range commitment. Both the school system and the community college, as well as the other partners, are continuing to enhance and expand the various elements, including extending career development activities, expanding into new career pathways, upgrading the vocational-technical courses of study, and integrating academic and technical instruction. Often, however, these efforts have been focused within each institution and less attention has been directed to the students' transition between the school system and community college. The community college's publication of courses of study for 11 career paths helps to clarify the 2+2 sequence. More guidance and clarification are needed, however, to facilitate students' planning for 2+2 courses of study (for all 10 career pathways, not just the 11 career paths of the youth apprenticeship programs).

The evidence of early participants' experiences in the newly revamped Tech Prep system and youth apprenticeship options is promising. The high school and community college experiences of 1996-1998 graduates reflect the early stages of CTP and youth apprenticeship when the school district was beginning to encourage education and career planning, distinguish the CTP courses of study, and offer limited youth apprenticeship options. The more extensive applied and integrated curriculum, career development and planning, related guidance activities, and other efforts were being developed and implemented during these years. As a result, only some of the graduates (although increasingly over the three cohorts) experienced these developments. Given this background, results show that the youth apprentice graduates were more likely than other graduates to believe that their high school education was useful. Both Tech Prep and youth apprentice graduates were more likely than their non-Tech Prep counterparts to be enrolled in vocational-technical education, and to be taking sequential vocational courses in such areas as business, marketing, health, and precision production (e.g., electronics, drafting, machine shop). Though difficult to know for sure, after high school, Tech Prep and youth apprentice graduates appeared to be more likely to be working in jobs that required specialized skills that they would have learned in vocational education courses during high school as compared to non-Tech Prep graduates. All three groups were equally likely to have taken advanced math courses while in high school, with a very high percentage (approximately 50% or more) having completed courses such as Trigonometry and Calculus. Given this preparation it is not surprising that the vast majority of graduates in all three groups enrolled in postsecondary education at a two-year or four-year college, with less than 17% of any of the groups choosing to not go to college (at least within one to three years after high school graduation.)

Local leaders of the Workforce Consortium plan to continue their efforts to implement the CTP model and youth apprentice programs, and to enhance enrollments in these programs in the future. Efforts to create a unified (block) school district schedule are being planned for implementation over the next one to two years, which should help reduce logistical problems in coordinating students' schedules between schools and the vocational center. Plans to clarify and publicize 2+2 articulated curriculum offered by the school district and CTCC are also being carried out at present, with marketing efforts increasing in the future. Finally, local leaders plan to continue to work to find ways to reconcile differences between local reform strategies and the state's new accountability system to ensure that the local CTP and STWOA initiatives will continue to flourish. Consortium leaders plan to continue to help teachers and administrators understand how to integrate several new reform initiatives with CTP and STWOA, so that they are more complementary as time goes on.

PACIFIC TECH PREP CONSORTIUM

Donna E. Dare and Carolyn J. Dornsife

Community Context

The Pacific Tech Prep Consortium (Pacific Consortium) is located in a highly diverse area in the western United States. While the consortium as a whole is predominantly suburban, pockets of the county where the consortium is located could be described as urban. Currently, the county's population is just over 700,000 and covers an area of 553 square miles, with the fifth highest population density and the fourth highest per capita income in the state. While in the early 1980s the northern region of the county had less than 20% minority population, by 1994 this part of the county reported nearly 60% minority population, with large proportions of Hispanic, Filipino, and other Asian populations. The southern region of the county is also highly diverse, while the mid-county tends toward a higher proportion of White residents.

The Pacific Consortium is comprised of one large community college district, which includes three community colleges, five school districts that include 20 high schools total (19 of which are engaged in Tech Prep), and a countywide regional occupational program (ROP). While the three community colleges (North County Community College, Mid-County Community College, and South County Community College) operated in the early years of Tech Prep implementation as three separate consortia, these colleges agreed in 1996-97 to begin operating as a single unit as the Pacific Tech Prep Consortium. The three colleges honor articulation agreements across the community college district, although each college maintains its focus on particular Tech Prep programs of study. North County Community College emphasizes business and accounting, fashion merchandising, hospitality, and automotive technology; Mid-County Community College places its main focus on broadcast/multimedia, business and accounting, CAD, electronic, and computer repair/network technology; and South County Community College concentrates its articulation agreements in early childhood education, business and accounting, fashion design, technology, and travel. Five high schools from the consortium, all suburban, were selected to participate in this study.

Like the different regions of the county, the high schools in the Pacific Consortium vary widely. While one mid-county high school is described as a “restructured” school, most of the mid-county schools are quite traditional, with large numbers of students enrolled in college prep courses. In high schools in the northern and southern parts of the county, restructuring associated with Tech Prep and other related reforms seems more predominant. In North County, the academy model has served some schools effectively, and these academies have implemented some strategies typically associated with Tech Prep, such as the use of integrated and applied curriculum. At one high school, a career academy in information technology was first established in 1995-96, and other academies have been added since then.

Articulation agreements, along with curriculum reform and changes in guidance and counseling, have served as a catalyst for change in many county high schools. According to local administrative personnel, Tech Prep has been widely accepted at some high school sites and somewhat less accepted at the mid-county school sites, where strong emphasis on students pursuing professional jobs and four-year degrees is prevalent.

High schools served by the consortium are highly diverse in terms of ethnicity, socio-economic status, first-generation college status, and geography. Annual reports prepared by the schools in this study indicate that school populations for the high schools range from between 1,300 and 1,800 students. In 1995, students in one high school in the northern part of the consortium were 94% people of color, 50% foreign-born, 75% from bilingual households, and 35% Limited English Proficient (LEP). According to the project director for the Pacific Consortium, this demographic shift has been a significant factor in the implementation of Tech Prep. For the 1998 school year, ethnicity is reported in Table 1.

Table 1

Enrollment in High Schools during 1998

High School Code	**Total Enroll-ment**	White	African American	Latino/ Hispanic	Asian	Filipino	Arab	Native American
801	1,550	49.3%	3.7%	15.0%	27.5% (3%)	3.9%	NA	0.5%
802	1,320	66.8%	1.2%	17.0%	12.1% (1.2%)	2.4%	NA	0.6%
803	NA	NA	NA	NA	NA	NA	NA	NA
804	1,469	26.2%	3.0%	22.0%	12.6% (2.9%)	35.9%	NA	0.3%
805	1.780	7.1%	5.1%	21.7%	22.0%	39.7%	3.0%	0.3%

Source: High school annual reports

Note: NA means Not Available. Percentage of Pacific Islanders is shown in parentheses under Asian percentage.

Mid-county high schools in this consortium report dropout rates below the district's already low average of 1.2%, compared to the county rate of 2.03% and the state rate of 3.3%. Dropout rates for other high schools in the consortium were not available. The race/ethnicity of students enrolled in the five high schools selected for our study varied widely from only 7% White in High School 805 to 67% White in High School 802. However, sizeable Latino/Hispanic and Asian populations were represented in the schools, and nearly 40% of the students in two high schools were Filipino. Few students in any of the schools were African American, Arab or Native American. Though demographics were not available for the county as a whole, much of the area is increasingly shifting to a minority population. School enrollments show a similarly diverse population of students attending the high schools participating in our study.

The community college district for this consortium, consisting of three community colleges, serves approximately 32,000 students. In all three of these colleges, students can earn either AA or AS degrees with the latter degree considered the technical degree. All three community colleges indicate that they lead the charge for educational entities in the region to be responsive to local labor market needs and local educational reforms.

Economic and Political Context

Over the past hundred years, the area has seen tremendous growth in industry, agriculture, dairy farming, and the nursery business. In the last 50 years, the region has seen increased populations, decreased agriculture and farming, and increased light industry and transportation. A recent citizens' report indicated that the unemployment rate is 2.7% and the same report stated that median family income is quite high, averaging $64,400 per year. The consortium is located in a region of the country that hosts a wide range of companies that specialize in computer technology and biotechnology industries and whose growth and expansion have flourished during recent times. Nonetheless, like the educational context of the region, the economic context is also highly diverse and varies widely from one area to the next.

While the incredibly rich, diverse mix of cultures and ethnic groups in this region is somewhat of a west-coast phenomenon, it is a driving force in educational and economic development for the region. Another driving force is the high cost of living in the area. According to a local administrator, self-sufficiency wage in the county for a family of three is $45,800, or approximately $22 per hour.

North and south, the county is comprised of a series of separate cities and population areas, with no one major population center. North county closely identifies with a major city in the region, and jobs are primarily middle-income and blue-collar. Employers in north county include a large international airport, a fast growing bio-tech industry, and some light-industry companies. Mid-county tends to be middle-class to affluent, bedroom communities with a small business focus. South county is a mix of very low-income communities and very affluent communities with very high tech industry. Otherwise, industry in mid-county and south county is minimal. The more coastal side of the county consists of bedroom communities with the predominant industry being agriculture.

Administrators for the consortium indicate that educational efforts are labor-market driven and that career pathways have been identified through collaborative efforts in the county that include the School-to-Work (referred to as [STC]) partnership committees, the Private Industry Council, and other education and economic development entities. Due to growth and shifts in types of occupations, educational entities are attempting to expand education for high technology industries in the county. To that end, expansion efforts are focused on Tech Prep programs of study in information technology, multimedia studies, business and accounting, and allied health.

Tech Prep Implementation

Official implementation of Tech Prep, supported by federal funding, began in 1992-93 for the three separately funded consortia. While most of the key components of any Tech Prep initiative were in place at least to some extent across all schools in the consortium, the Tech Prep initiative for this site has been defined primarily by articulation agreements for vocational classes. In fact, Tech Prep students are identified through their completion of articulated vocational courses. However, as stated by the North County Tech Prep coordinator, “that isn’t all there is…. There is a lot going on, and its just not all at once. It’s slow, and it is unique at each school.”

Since implementation of School-To-Career (STC) in the county beginning in 1997-98, there has been a deliberate attempt to align the goals and activities of Tech Prep with those of the state’s STC initiative. In a recent grant proposal, the STC partnership was described as “a key component of the Pacific Tech Prep Consortium.” Also according to this recent grant proposal, “members of the Tech Prep consortium are active partners in the STC plan, and are essential to the success of the effort.”

Like Tech Prep, STC includes an emphasis on ensuring that career pathways are available to eleventh and twelfth grade students across the county. In fact, according to the 1998-99 Tech Prep grant application, restructuring high schools into eight career pathways based on extensive economic development and labor market analyses is a major goal of STC for the county. Recent efforts in developing career pathways extend the initial efforts of Tech Prep which focused on developing articulated courses in a variety of occupational and technical programs. The two initiatives—Tech Prep and STC—are now working in conjunction to expand courses and articulation agreements that will continue to support the seamless transition of students to any of the community colleges in the county.

To date, although career pathways have not been highly structured as sequences of courses, related courses have been available to students as articulated courses that are part of the consortium's 2+2 or 2+2+2 Tech Prep programs. Personnel at all levels of the consortium continue to be engaged in the development and expansion of these career pathways in new areas and in the development of supportive curriculum.

Tech Prep Goals and Definitions

According to the 1998 Tech Prep grant application, the objectives of Tech Prep are in alignment with the STC initiative. These Tech Prep objectives include:

- Strengthening relationships between education providers and STC activities;
- Continuing to develop curricula that integrate academic and vocational competencies, work-based learning experiences, and SCANS skills;
- Continuing to enhance professional development;
- Providing support services for students; and
- Increasing industry involvement in Tech Prep.

In addition to mutually shared objectives, Tech Prep and STC also share similar or related goals. Table 2 provides a correlation of stated goals for each initiative. Perhaps because of its longevity compared to the STC initiative, some of the goals of Tech Prep are more measurable (e.g., increased number of students in postsecondary education, increased number and quality of articulation agreements, increased number of work-based learning opportunities). While the Tech Prep goals focus on a similar range of experiences as STC, the goals of STC seem to make a more deliberate attempt to address rigorous academic standards. Career guidance and parental involvement is also somewhat more evident than in the Tech Prep goals. However, interviews with personnel associated with Tech Prep revealed that they do not regard the initiatives as conflicting but rather as congruent. Particularly in the mid-county high schools, high school administrators indicated STC has been more readily embraced by parents and academic faculty because it is perceived as somewhat less vocational in nature.

Table 2

Comparison of Stated Goals for Tech Prep and STC

Tech Prep	STC
Increasing the number of students in postsecondary institutions	--
Increasing access to high-skill/high wage careers	--
Using more effective teaching strategies	All students will have opportunities to demonstrate academic skill competencies meeting rigorous state standards in academic disciplines to earn a Certificate of Academic Mastery.
Increasing the number and quality of articulation agreements	All schools will be organized in career paths in the eleventh and twelfth grades.
Increasing the number of work-based learning opportunities for high school and college Tech Prep students	All graduates will have successfully completed a work-based learning experience and will have opportunities to demonstrate skill competencies to earn a Certificate of Skill Mastery.
Increasing the integration of academic and vocational education courses	All academic curriculum will meet new rigorous state standards; academic and vocational curriculum will be integrated; and all career paths will have 2+2(+2) articulation.
Increasing the number of faculty who address SCANS skills in their curriculum	--
Engaging business and industry in more meaningful participation in educational opportunities for students	All local partners will be active, contributing members of the on-going partnership.
--	All students entering eleventh grade will have completed career assessments and chosen a labor-market growth career path.
--	All parents/significant adults will be involved in their child's career path choice and progress.

Sources: 1998 Tech Prep Grant Application Abstract and STC Partnership Abstract (1998)

Although a number of school reforms such as Tech Prep, service learning, and STC have compelled schools in the state to embrace change, many high schools in this consortium, particularly mid-county and south-county schools, remain focused on academic preparation of students for entrance into universities. In terms of Tech Prep, the consortium describes itself as a 2+2 or 2+2+2 model, but the community of parents places a great deal of emphasis on attainment of a four-year university degree.

As stated above, schools across the consortium associate articulation with Tech Prep and more or less define the initiative by articulation agreements with the three local community colleges. In High Schools 801, 802, and 803 students are identified as Tech Prep students more or less after the fact. If they complete a high school course that articulates with a community college course in a technical area, they are given a Tech Prep certificate, which enables them to obtain college credit for the course after they complete six hours of college credit at any of the three community colleges in the county. High schools 804 and 805 focus more on recruitment and placement of students into technical studies and are somewhat more visible in their implementation of Tech Prep. In addition, as stated by the guidance counselor at High School 802, "the students really self-select for the [articulated] classes. They hear about the class from a friend and decide they want to take it."

Due to this focus on vocational course articulation, the awarding of Tech Prep certificates according to secondary vocational course completion, and identifying students based on this process, this consortium relies heavily on vocational course taking as a distinguishing feature of the Tech Prep program. Other components of Tech Prep support the vocational articulation process, including integrated and applied curriculum, career guidance, and professional development of teachers and counselors. Because of extensive reliance on vocational education, the consortium's approach could be considered a vocational Tech Prep approach (Hershey, Silverberg, Owens, & Hulsey, 1998), in that the linchpin of the local initiative is vocational course-taking.

A variation on the student selection process occurs at High School 805, where the teachers are quite active. The school site Tech Prep coordinator indicated that "The teachers identify who the Tech Prep students are because what we have done is articulate our classroom instruction with the course of study offered at North County College, through advisory meetings throughout the year." Students in the Pacific Consortium are increasingly receiving information from their counselors about career pathways, as indicated in the marketing and student recruitment and the guidance and counseling sections below.

In some ways, distinctions in the target population served by the two initiatives (Tech Prep and STC) may be a matter of semantics. Whereas Tech Prep targets students in the middle majority (25^{th} to 75^{th} percentiles), faculty involved in teaching articulated vocational courses at the high schools indicated that their courses, because they are elective and have always been open to a broader range of students, include both the lower and upper quartiles as well as the middle majority. Interviews with students in some of these elective classes validated that students with very diverse academic and career goals do, in fact, participate in the same elective courses.

In this consortium, there is no attempt to label students as STC or Tech Prep. Schools have made deliberate attempts to include students of different ability levels in both Tech Prep and STC. Throughout the history of this consortium, at-risk and special education students have participated in Tech Prep educational opportunities. Efforts have been made with special education departments to ensure that special population students were included in Tech Prep, and ESL students were encouraged to participate in academies. Interpreters were provided at Tech Prep outreach meetings, and translations of materials were offered to students and parents. Mid-county schools also reported efforts in working with LEP students and students interested in nontraditional careers. Because of the inclusive nature of STC and its goal of serving all students, similar efforts remain part of this initiative as well. Figure 1 provides an overview of various definitions used by the consortium.

Figure 1

Snapshot of the Local Tech Prep Approach

Primary Goal: To move students toward high-skill, high-wage careers

Tech Prep Student: A student who has completed an articulated course that is part of a Tech Prep program of study

Tech Prep Course of Study: A sequence of related courses within a specific technical area

Primary Articulation Approach:
- 2+2 approach using articulated vocational courses associated with career pathways
- Dual credit, advanced placement

Predominant Tech Prep Approach:
- Vocational Tech Prep
- Career academies

Sources: Interviews with site personnel

Based on the Tech Prep student identification process used by this consortium, the number of students identified as Tech Prep graduates during the years of 1995, 1996, and 1997 is quite limited in the five schools included in our study (see Table 3). Reflected in this table is a modest growth in Tech Prep participation from 1995 to 1996, then a leveling off of enrollment for 1997. For all three years, less than 10% of the graduates of the five high schools participated in Tech Prep.

Table 3

Number of Graduates and Tech Prep Participants by High School

High School Code	Number of Graduates			Number of Graduates Participating in Tech Prep		
	1995	1996	1997	1995	1996	1997
801	347	268	251	18	17	22
802	291	290	282	28	22	24
803	261	292	254	15	17	32
804	363	349	328	10	11	12
805	264	344	298	5	51	29
Total	1,526	1,543	1,413	76	118	119

Source: Official NCRVE worksheet for determining TP/STW population

Governance and Funding

The structure of the Pacific Consortium reflects its educational constituents, including one large community college district, with three community colleges; five school districts; and a countywide regional occupational program (ROP). The STW initiative, known in this state as School-to-Career (STC), involves many of the same partners and follows the guidelines of the federal legislation. The structure of the STC partnership consists of:

- 1 governing board, consisting of 29 members;
- 1 steering committee, consisting of 15 members; and
- 6 subcommittees associated with the following: a) career pathways; b) career guidance; c) work-based learning/connecting activities; d) performance, evaluation and finance; e) marketing and outreach; and f) professional development.

The STC initiative project includes partnering with local employers and employer organizations, labor organizations, educator representatives, community-based organizations, local government agencies, state agencies/programs, postsecondary institutions/programs, student and parent groups, and local education agencies/districts. While many of these same partners (i.e., local employers and employer organizations; postsecondary institutions/programs; and local education agencies/districts) have been key players in the local Tech Prep initiative, the structure of these partnerships has been made somewhat more formal in the past two years under the auspices of STC. In this local consortium, Tech Prep and STC have made a commitment to use their resources to continue to promote both initiatives, with as little duplication of services as possible.

The overall coordination of the combined consortium is directed by a countywide coordinator of Tech Prep, who is also the assistant chancellor of research and technology at the Mid-County Community College District, with coordination of Tech Prep only a portion of his assigned duties. As consortium coordinator, he is engaged in a wide variety of economic development activities for the county. He is assisted by a Tech Prep project consultant, who works on research and evaluation issues, assists with curriculum development efforts, and facilitates business outreach activities. The coordinator also maintains a relationship with the countywide STC partnership and hosts partnership meetings.

In addition to the consortium coordinator, North County and South County colleges also have their own Tech Prep project director who work with the local secondary school district partners. At the local level, these project directors also work directly with business advisory councils that oversee occupational program activities across the consortium. The regional occupational program (ROP) director also serves the district schools and coordinates Tech Prep efforts through a variety of off-campus educational programs. Added in 1994-95, high school site coordinators were responsible for getting buy-in at the local school and district levels, and they meet every other week with their respective project directors. As indicated by the North County Tech Prep director, these site coordinators are responsible for planning events, although the directors often conduct the meetings. She stated, “What we try to do is identify the teacher who is most apt to make a difference and bring them on board.”

Each college and its high school district is served by an articulation council. This council is composed of administrative and faculty representatives as well as business representatives from all consortium partners. Currently, these councils oversee the following programs of study available at the colleges as indicated:

- North County Community College – business and accounting, fashion merchandising, hospitality, automotive technology;
- Mid-County Community College – broadcast/multimedia, business and accounting, CAD, electronics, computer repair/network technology; and
- South County Community College – early childhood education, business and accounting, fashion design, technology, and travel.

Originally the articulation councils met every two to three months, but currently meet only once or twice each year. Curriculum Integration Committees (CICs), who report to the articulation councils, also are scheduled to meet at least twice a year. CICs, comprised of secondary and postsecondary faculty members from relevant disciplines develop articulation agreements, identify course clusters including applied academics, and design new courses, when needed.

In addition to this structure for local governance, an entity charged with coordination of the Tech Prep initiative at the state level was also established in 1993 at one of the state universities. This entity, or statewide consortium, has assisted local consortia by producing instructional and marketing materials for high school students, by providing leadership for Tech Prep and by offering professional development opportunities for Tech Prep project directors across the state.

Funding

Throughout most of the history of the Tech Prep initiative in the state, funding has been allocated based on numbers of students within a consortium and has been disbursed through the community colleges. Between 1993 and 1998 each of the three community college consortia were allocated primarily federal funds by the state ranging from $70,000 to $110,000 per year. Funding for the three community colleges in 1998-99 was $99,930, or a total of $299,790 for the entire combined consortium.

Table 4

Amount of Funding for Each Community College by Year

Year	Federal Tech Prep Funds	Additional Federal Funds	Local Funds	Total Funds
1992-93	$30,000	--	$12,842	$42,842
1993-94	$77,625	$20,000	$34,560	$112,185
1994-95	$108,000	--	--	$108,000
1995-96	$88,700	--	--	$88,700
1996-97	$71,590	--	--	$71,590*
1997-98	$69,400	--	--	$69,400
1998-99	$99,930	--	--	$99,930

Source: Final progress reports for local consortium
Note: *North County Community College reported $71,590; South County Community College reported $72,000

In recent years, local high schools have also been afforded opportunities to apply to the colleges for funds to purchase equipment and materials and to access other Tech Prep resources. However, as reported by one high school principal, Tech Prep funding that trickled down to the individual high school level in this consortium has been relatively small—with a few thousand dollars going to various high schools within a consortium.

To accomplish the objectives of Tech Prep, the consortium coordinator expressed concern for ensuring that resources for the Tech Prep and STC initiatives not be duplicated but appropriately shared. Specifically, professional development activities were developed to reach faculty engaged in either effort. Tech Prep and STC personnel were attempting to enhance work-based learning opportunities for a larger number of students, particularly since STC had a full-time industry liaison who was hired for the purpose of placing students in work settings. While Tech Prep had attempted to establish and maintain strong business and industry connections, school personnel were anticipating stronger alliances with business and industry through the increased efforts of STC. The STC initiative had already served to expand visibility of career-related educational opportunities, which included Tech Prep, for students throughout the county and had supported the development of marketing materials for career pathways.

Early Tech Prep funding provided resources to conduct initial leadership efforts, such as organizing the consortium, establishing a Tech Prep leadership council, and supplementing business advisory council activities and related committee/council activities in occupational areas. From 1991-93, the focus of the Tech Prep initiative was on developing articulation agreements for several curriculum areas, and Tech Prep funds were used to purchase CORD materials (initially applied math and science materials, principles of technology, and, more recently, applied communications).

According to annual reports prepared by the three community colleges, the bulk of the funding had been spent on administrative salaries and curriculum development. Professional development was funded at between $1,000 and $10,000 each year, with higher levels aimed at professional development and evaluation at North County Community

College than at the other community colleges in the district. Higher levels of funding were aimed at curriculum development at Mid-County Community College.

In recent years, funding was allocated at the local level to develop curriculum in career pathways. Funding was directed toward restructuring high schools into eight career pathways (specified in the core curriculum). The most recent grant application for the combined consortium indicated that $121,097 (42% of the entire consortium budget) was dedicated to curriculum development as follows:

- $15,200 for faculty time for curriculum integration at the three community colleges and partnering high schools,
- $71,810 for faculty time for curriculum development in career pathways,
- $13,500 for development of workshops for faculty related to curriculum development,
- $2,000 for faculty time for curriculum workshops,
- $18,587 for materials for curriculum development, and
- $21,455 for equipment purchases.

According to the same Tech Prep grant application, work plans and budgets for the local STC initiative indicated that funds were used for more faculty participation on the subcommittees to increase articulation, expand work-based learning opportunities, and increase the integration of curriculum.

Barriers to Implementation

Implementation of Tech Prep at this site has met with varied levels of success. As one school principal put it, “anything that smacks of vocational education in this area is just not popular with parents.” As a result, implementation of key components such as applied academics and integrated courses and the specific identification of students as part of Tech Prep has been uneven across the schools. High Schools 801, 802, and 803 have been more low-key in their implementation in comparison to the more intensive efforts at High Schools 804 and 805.

In contrast, according to the North County Tech Prep project director, demographic changes during the past 15 to 20 years have had a significant impact on the implementation of vocational and technical education in district high schools. While Tech Prep is more widely accepted in these schools, Tech Prep students are still identified in the same way, namely, through completion of articulated courses.

Other barriers identified during interviews with administrators, faculty, and students included the local economy, parent perceptions of the value of a four-year degree, and more traditional approaches to curriculum and scheduling. One mid-county high school principal stated that, by 1994, support for Tech Prep had not been apparent in the district's high schools because of low funding, perceptions of threats to their accustomed practice, and lack of personnel and structural changes needed to sustain a bona fide Tech Prep effort. Although perceptions of Tech Prep at other high schools were more positive, one teacher in a mid-county high school who is a strong proponent of Tech Prep went so far as to say that, at his high school, Tech Prep is "a paper joke," referring to the Tech Prep certificates as the primary evidence that Tech Prep had been implemented.

Sustaining business and industry involvement also remains a challenge for this consortium. Minutes from articulation council meetings as early as 1992 indicated that, although business and industry members were included in the articulation councils, actual participation was minimal. One suggestion that was adopted by the councils was changing meeting times to late afternoon in order to make the meetings more convenient for business representatives. Another strategy to increase input was to revise meeting schedules to accommodate joint meetings for advisory committees, curriculum integration committees, and articulation committees and to define more clearly the role of business and industry. For example, some of these early meetings of the joint committees included engaging business representatives in looking at program titles and courses in office administration programs in light of current job titles and descriptions actually available at local businesses.

Key Components

This section provides an overview of the consortium's non-curricular approaches to marketing and student recruitment, guidance and counseling, professional development, program evaluation and student outcomes assessment, and business and industry partnerships with education.

Marketing and Student Recruitment

At the early stages of implementation the responsibility for marketing Tech Prep rested primarily on the shoulders of the project directors and consisted primarily of presentations to local stakeholders, including administrators, faculty, counselors, parents, students, and business and industry representatives. Many of these early marketing efforts were directed at educational personnel to obtain greater buy-in from teachers. Early efforts also targeted parents as key stakeholders. Strategies for marketing Tech Prep included distributing written marketing materials and brochures at various meetings, including parents' nights, college nights, and other meetings at high schools and colleges. A parents' night at the high school in South County resulted in over 150 parents and students attending. Parents' night at this high school continued through its first year (1994-95) and expanded to include local school boards, other school faculty, and business partners.

According to North County Community College's Tech Prep project director, there has always been a need to work with teachers to market Tech Prep and recruit students. This project director saw it necessary to focus on getting the word to more teachers, as they would become supportive of and engage in the initiative if and when they became knowledgeable. Similarly, teachers and administrative faculty at mid-county high schools recognized that teacher support was critical. Administrators perceived that the success of Tech Prep was dependent on teacher buy-in. In addition, North Country Community College sent someone from its counseling office to the high schools to talk to the students about articulation and transition opportunities.

In 1994, site coordinators also recommended to the articulation council of North County that field trips should be planned to bring high school students to the community colleges to make them aware of Tech Prep programs of study. Field trips were scheduled by program area, and the first student field trips to North County Community College were planned for March, 1995. Reports indicated that the field trips were probably one of the most effective recruitment tools for enrolling students from across the consortium into Tech Prep programs of study at the three community colleges. These field trips continued for increasing numbers of students each year. As the North Country Tech Prep coordinator explained, these field trips enabled students to learn about what Tech Prep could do for them. North County hosted two field trips each year for students interested in business administration and automotive technology, and approximately 50-60 students participated in each field trip. Career days hosted at Mid-County Community College since 1995-96 have also served a similar purpose of recruiting students into occupational programs.

In 1995-96, a marketing brochure was developed for use district-wide. A 1995-96 report for North County Community College indicated that marketing and outreach had helped to recruit students into nontraditional careers. During that year, females earned college credit in automotive technology, and 30 of 69 students in the technology academy were female. Male students in the Tech Prep business program increased 23%. There was also a 20% increase in at-risk and ESL students earning college credit in North County high schools. Mid-County Community College reported similar progress in marketing programs to nontraditional students. The 1995-96 progress report for Mid-County indicated that the Computer Aided Design (CAD) program had an increase of 20% during that academic year.

According to administrative staff at one mid-county high school, Tech Prep was particularly useful in helping students to focus. They indicated that Tech Prep was being marketed as a way for community college-bound students to “get on track.”

Guidance and Counseling

Counselor involvement has been a major issue since 1993. In fact, at that time the topic was brought before the articulation council to discuss ideas about implementing guidelines for counselors to work with students, parents, and industry so that more students graduating from high school would be better prepared to enter the job market, a training program, or college. In response, an orientation meeting was held for counselors from across the county in November 1993 to provide a basic understanding of the Tech Prep concept and accomplishments to date in the county's initiative. Countywide articulation agreements were presented, and the process of receiving articulated credit was explained to the counselors.

Professional development helped counselors understand Tech Prep and encouraged students to enroll in articulated programs. For example, in 1996 the consortium offered a workshop on the process that had been developed for posting credits for students earning certificates in articulated courses and on the value of these courses for students.

At the mid-county high schools, the guidance and counseling staff also used the Job-O assessment at the freshman level, along with other assessments such as the Armed Services Vocational Aptitude Battery (ASVAB), the Interest Determination, Exploration and Assessment System (IDEAS), and a modified Self-Directed Search (SDS). These assessments were used at various points throughout students' high school careers. (Job-O, ASVAB, IDEAS, SDS, and Career Decision Making [CDM] are career interest inventories used as assessment instruments in many schools across the nation for assisting students in identifying their career interests and aptitudes.)

When asked how he recruited students, one high school counselor indicated that he often advised students that "it is good to take one of those occupational courses" as an elective course of study. In terms of how students were selected for specific programs or courses, he indicated that "counselors are the ones selling the programs." High School 802 where this counselor worked also housed a career center that offered the following career-related resources:

- Guidance Information System (GIS) computer;
- Applications and an interactive CD-ROM program with information on colleges and universities;
- Interest inventories (Job-O, CDM, IDEAS, and SDS);
- Scholarship and financial aid information and application forms;
- Video Career Library;
- Trade and technical school, military service, and Regional Occupational Program (ROP) information;
- SAT prep workshop information; and
- Part-time job placement information.

At mid-county high schools, students and parents were given information about all courses of study by no later than the sophomore year, and they determined a four-year plan by that time as well. At High School 801, a sophomore counseling function was conducted in the evenings for one week during the spring, and students and parents met with counseling staff and teachers to select a career cluster. All sophomores and their parents were invited to participate.

Professional Development of Faculty, Counselors, and Administrators

A recent grant application prepared by the consortium's coordinator indicated that secondary and postsecondary faculty had worked together since initial Tech Prep implementation. However, academic faculty involvement was limited, at least at some mid-county high schools. In addition, as stated by the principal from High School 804, another problem was that teachers in this area are highly mobile. Many had attended workshops on a voluntary basis and then left the school to go to another district.

In the early years of Tech Prep implementation, professional development consisted primarily of training offered to project directors. Since then project directors have been charged with local dissemination of information. Thus, the first few years focused on establishing an organizational structure, including policies and procedures for implementing Tech Prep, and increasing the scope of implementation. As a result, early professional development meant providing broad-based information to administrators and faculty throughout the region.

These efforts were supplemented by ongoing workshops on the use of integrated and applied curriculum. For instance, in 1992, the project directors at all three community colleges worked with area high schools to introduce academic faculty to Tech Prep. The directors also encouraged attendance at applied academics orientation workshops, sponsored by the state and CORD in Waco, Texas. The first faculty to attend were primarily in math and science, with communications faculty participating later. Continued professional development opportunities in applied and integrated academics were funded by all three colleges, and resources were dedicated to providing release time for teachers. By 1994, summer stipends were provided for teacher training. In 1995, project directors and members from Tech Prep committees agreed that professional development efforts were still needed to focus on marketing Tech Prep to teachers across the consortium. Plans were made in 1995 to continue to use staff development and in-service days to provide information on Tech Prep to teachers.

Other professional development activities included faculty in workshops offered by the state's Office of Gender Equity. Training in gender equity has supported efforts in encouraging nontraditional students to participate in Tech Prep. South County Community College reported in 1994-95 that its faculty were involved in the state Tech Prep conference, follow-up workshops, more training in applied communications, CORD training in principles of technology, and Internet training offered by the county. According to a 1995-96 final performance report, numerous high school teachers were involved in training for teaching applied math, ABC science, applied communications, applied math II, and applied physics, i.e., principles of technology.

In 1995-96 the consortium provided two workshops designed to increase the integration of SCANS skills into the curriculum and to encourage college instructors to incorporate applied academics. Tech Prep funds also supported teachers' visits to other campuses and their collaborative efforts in developing career academies, integrated science curriculum, and applied communications curriculum. Mid-County Community College indicated that the integration workshops were intended to provide awareness for postsecondary faculty regarding integrated curriculum at the secondary level. In January 1997, math teachers from the high schools attended a workshop at Mid-County to connect community college math courses with secondary math courses and to work together on articulation of math courses. Reports for 1997-98 also indicated that postsecondary faculty were continuing to expand their focus on integration of academic and vocational education, to collaborate on expansion of articulation agreements and existing Tech Prep programs, and to develop curriculum to reflect workplace needs. Also, teachers spent a full day at local businesses and industries to help them understand the perspective of local employers as to needed skills and competencies for future employees.

Counselor workshops provided ongoing opportunities to encourage counselors to recruit students into Tech Prep and to help them adjust to the combined focus of Tech Prep and STC. Recent workshops for administrators, teachers, and counselors emphasized the development and implementation of career pathways at area high schools. In 1996-97, ROP staff also participated in a two-day training session on SCANS and then incorporated these skills into their programs. More recent professional development related to Tech Prep has consisted of workshops on project-based learning, and the colleges have sponsored workshops providing information on Tech Prep.

Most recently, in spring 1999, a new opportunity to apply for a mini-grant from the consortium was offered to teachers. As described by the Tech Prep director at North-County Community College, the mini-grants were particularly for high school teachers who were interested in developing integrated curriculum. Finally, some schools in the Pacific Consortium participated in a teacher preparation project funded and directed by personnel working at a local university. This project enabled teachers to develop more hands-on approaches to integration of careers in their curriculum and to develop the use of portfolios. In a recent interview, the consortium director for North County indicated, "The entire district is working on a new focus on what an educated student from that district must know upon graduation. All of their teachers are also working on designing curriculum rubrics."

Program Evaluation and Student Outcomes Assessment

North County Community College distributed evaluation forms to faculty members who attended the applied academics orientation workshop in spring 1993. Also, in 1993, the consortium completed its first survey for the national Tech Prep evaluation. This survey was also used to prepare a progress report for the state. Student intake forms used for identifying Tech Prep students at the community colleges were developed for use across all three colleges in fall 1994. According to grant applications for 1994-95, Tech Prep consortia in the state were responsible for initiating data collection procedures for the state's vocational education data system.

While no local evaluation or outcomes assessment procedures were in place during the first years of the Tech Prep initiative, some of the articulation agreements provided an indication of student outcomes (e.g., tracking enrollments into postsecondary education), in the form of tests administered at the end of the articulated course. Students in these courses were required to pass the assessment before a Tech Prep certificate could be awarded. Although there was debate on the issue of the use of end-of-course tests, several programs fought to maintain these tests to evaluate student outcomes, at least on a single course basis. Some of these tests are still in place, while others have been dropped.

In fall 1994 and winter 1995, North County Community College conducted the first phase of a follow-up study for the purposes of identifying Tech Prep students. Five high schools in the region, two of which are included in the NCRVE study, were included in the report. This reporting process was in compliance with the evaluation project that was piloted in 1993-94 and implemented in 1994-95. Student records formed the basis of the report and served as the first step in building a database of Tech Prep students. According to a report from the follow-up study, a student record was defined as "information provided by students when they completed Student Education and Career Interest Forms." The evaluation was conducted by an external evaluator and was funded by the state's community college office in cooperation with the state's department of education. The 1994-95 Tech Prep grant application for North County Community College also indicated that they participated in two additional statewide evaluation projects.

One very recent outcomes assessment effort for North County schools is Project 2000. A planning panel for this project is using SCANS competencies as the basis for its development of graduation standards and subject area performance objectives. In addition, in 1997 the articulation council discussed engaging a management and planning group to conduct a pilot system for Tech Prep follow-up. The project would track students from high school to college, but not rely on social security numbers. No further information was available on the status of this pilot system.

The 1997-98 progress reports for both Mid-County and North County Community College described evaluation information provided by the state's Community College Management Information System. These reports indicated levels of retention and achievement for Tech Prep students by program. However, the figures reported by the state's management information system were questioned and deemed potentially inaccurate by the consortium's project directors. Local reports prepared by all schools in the consortium indicated higher levels of participation in Tech Prep. The 1995-96, 1996-97, and 1997-98 reports for Mid-County indicated the following number of secondary <u>and</u> postsecondary Tech Prep students for each year respectively, approximately 300, 315, and 420. According to those same reports, 251 high school seniors received Tech Prep certificates for articulated courses in 1996-97 and 277 in 1997-98.

While they do not report the data source, the South County Community College 1996-97 final performance report indicated that students enrolled in their Tech Prep programs were more successful in completing high school than students who did not enroll. Persistence rates at the community college were higher for Tech Prep than other students in business, early childhood education, travel careers, and fashion design.

In addition, North County Community College concluded from a 1997-98 survey that "many programs owe their existence to Tech Prep," since articulation agreements encouraged students to participate. According to a summary report, "Students like the idea of earning college credit while in high school and high school teachers feel that the agreements validate their course content."

A more recent survey of the mid-county high school classes of 1994 and 1996 was conducted by an external evaluator to determine what worked for students and what areas of Tech Prep implementation remained unanswered for school improvement. Results were limited to only 375 of 1,665 (23%) graduates and the number of these who had participated in Tech Prep was probably small. Findings from this survey that bear potential relevance to the NCRVE study include that there were gaps in the high school educational experience. Fifty-three percent of the graduates indicated that their schools did not do very well or did poorly in helping them to gain marketable skills. They did not feel prepared for the college expectations they encountered, and they also indicated a need for instruction in real world practical things, including money management, shop courses, computer instruction, and public speaking and presentation skills. When asked what classes graduates thought they should have taken in high school, knowing what they know now, the respondents indicated that, in addition to other schedule changes, over 40% thought they should have taken more business, math, and science.

Educational and Business/Industry Partnerships

Early attempts at partnership and collaboration also included attempts to recruit more business and industries to be engaged in Tech Prep. More recent involvement of business and industry still includes participation on advisory councils and curriculum committees and hosting teachers' visits to industries. In 1997-98, for example, two high school districts in mid-county spent a full day visiting local businesses and industries and discussing the academic and vocational needs of students as perceived by business and industry.

Earlier in 1993, the North County project director indicated that business and industry representatives participated in advisory committees but also contributed to Tech Prep by providing guest speakers in classes, opportunities for field trips, and part-time employment of students whereby they could earn work study credit and/or cooperative education units at the community college. Other businesses donated cars, equipment, and expertise for the automotive program at the community college. One company also assisted with developing marketing materials. During the 1993-94 academic year, participation of business increased through the involvement of an area council committed to equipping students in the area, particularly those in disadvantaged neighborhoods, to be better prepared to enter the work force.

Later meetings of the articulation council at North County Community College indicated that, by 1995, attempts were made to solidify an infrastructure of entities in the county who were affiliated with Tech Prep. These attempts included working with local businesses and industries to continue to support business involvement in Tech Prep throughout the county. The effort to establish and maintain a strong infrastructure was an important step in moving the Tech Prep initiative forward in terms of its melding with STC and also in terms of the most efficient and effective administration of governance and funding. These ongoing attempts to provide an infrastructure have been reported by Mid-County in final performance reports since 1996-97.

A strong partnership was established at North County Community College with two Japanese automobile makers and the automotive program. Representatives of these companies, along with other businesses, continued to participate actively in advisory committees and the development of curriculum and programs for jobs in the automotive industry. In the southern region of the county, 12 businesses were involved with the business (career) academies in one of the high school districts served by South County Community College. Twenty businesses are also involved with the ROP program to provide internships and community learning experiences for secondary students and adults in travel careers, business, and early childhood education. The college reported in 1995-96 and 1996-97 that job shadowing, mentoring, and summer jobs for juniors and seniors enrolled in the academies were also provided. The same reports indicated that 144 employers were involved in supervising college students in cooperative education provided through South County Community College, 60% of whom were enrolled in business and 30% in travel careers, fashion design, and early childhood education.

While some partnerships with business and industry currently exist for all three community colleges and their feeder high schools included in the study, these partnerships remained fairly traditional and minimal (i.e., providing input on various committees and providing resources and equipment) until the more recent thrust of the STC partnership. More recent efforts, including those of area temporary agencies and other employers across the region, are being directed toward developing more work-based learning opportunities for students. Currently, a major airline, a large hospital, and a major bank in the county are engaged in developing business and health pathways and are active and contributing members of advisory committees.

Tech Prep Curriculum Reform

The Pacific Tech Prep Consortium's approach to Tech Prep and STC curriculum reform is presented in this section.

Core Curriculum and High School Graduation Requirements

The core academic curriculum, consisting of math, science, and English or language arts courses, offered in selected high schools in the Pacific Consortium, is presented in this section.

Math Curriculum

All five high schools in our study required that their students complete a minimum of two years of mathematics to graduate. All high schools offered a mathematics curriculum ranging in the level of difficulty from basic to advanced, including courses that fulfill college and university requirements. In all schools, freshmen were placed into the first math course based on the recommendation of their eighth grade teacher. Based on the student's performance in the ninth grade class, they moved on in the math curriculum. Tables 5-7 show the mathematics course sequences offered at High Schools 803, 804, and 805, to provide an overview of the course options and levels of difficulty, but also the different opportunities available to students in each high school.

In studying Table 5, one notices a large disparity in the levels of math classes that can be taken by entering students. Whereas a student can begin ninth grade with the lowest level math class (Math 1-2), students can also opt to take the highest level math class (Trigonometry/Math Analysis) based on their previous achievements and the recommendation of eighth grade teachers. While this math curriculum is not common to all high schools in the Pacific Consortium, this challenging curriculum is offered at two of the five high schools (High Schools 801 and 803).

Table 5

Mathematics Course Sequences (High School 803)

	Grade Level			
Levels of Math Sequences	9	10	11	12
1	Math 1-2 Algebra 1-2	Math A 1-2	Math B 1-2	Geometry 1-2
2	Math A 1-2 Geometry 1-2	Math B 1-2 Geometry 1-2 Advance Standing	Algebra 3-4	Trigonometry/ Math Analysis
3	Geometry 1-2 Advanced Standing	Algebra 3-4	Trigonometry/ Math Analysis	Advanced Math Applications
4	Algebra 3-4	Trigonometry/ Math Analysis	Advanced Mathematical Applications	Calculus AP 1-2
5	Trigonometry/ Math Analysis	Trigonometry/ Math Analysis	Calculus AP 1-2	

Source: High School 803 Course Catalog

Table 6

Mathematics Course Sequences (High School 804)

	Grade Level			
Levels of Math Sequences	9	10	11	12
1	General Math Algebra .5A	Competency Math Math A	Algebra 1	Algebra 2
2	Math A Algebra 1	Algebra .5B Geometry	Algebra 2	Algebra 2 (Honors)
3	Geometry	Algebra 2	Algebra 2 (Honors)	Pre-Calculus
4	Algebra 2	Honors Geometry Algebra 2 Honors	Pre-Calculus	AP Calculus
5	Honors Geometry	Pre-Calculus	Pre-Calculus	Advanced Placement Calculus AB

Source: High School 804 Course Catalog

Table 7

Mathematics Course Sequences (High School 805)

	Grade Level			
Levels of Math Sequences	9	10	11	12
1	Math A	Math B	Algebra 1A-1B	Algebra 3-4
2	Algebra 1A-1B	Algebra 1-2	Algebra 2A-2B Geometry 1-2	Algebra 3-4
3	Algebra 1-2 Geometry 1-2	Algebra 2A-2B	Algebra 3-4	Statistics
4		Algebra 3-4	Statistics	Statistics Math Analysis
5			Math Analysis	Calculus Advanced Placement

Source: High School 805 Course Catalog

In addition, math courses are continually being revised and developed to meet the needs of all students, including those needing higher level mathematics and those of average or remedial performance levels. Across the schools there has been an effort to make the math curriculum relate more closely to practical applications. As a result, some courses involve the use of manipulatives and cooperative learning.

Science Curriculum

All five high schools required their students to take two years of science for graduation. Some high schools such as High School 802 specified that students needed to take one year of physical science and one year of life science. In addition, students were encouraged to take more than two years of science in order to benefit from the full four-year science curriculum. Classes ranged in levels of difficulty, starting from basic introductory to more advanced courses for those students interested in pursuing study in the sciences at a higher level. All science courses had a laboratory focus in order to balance theoretical aspects with more practical ones. The goal in designing such science classes was to introduce the students to both the content and process of science. Table 8 shows the science courses offered by High School 802, a typical science curriculum of consortium schools.

Table 8

Science Course Sequences (High School 802)

	Grade Level			
Levels of Science Sequences	9	10	11	12
1	Physical Science Life Science 1, 2	Physical Science Life Science 1, 2	Physical Science Life Science 1, 2	Physical Science Life Science 1, 2
2	Conceptual Physics	Chemistry 1, 2	Chemistry 1, 2 Physics 1, 2	Chemistry 1, 2 Physics 1, 2
3	Biology 1, 2	Biology 1,2	Physics 3, 4 AP Biology 3, 4 AP	Physics 3, 4 AP Biology 3, 4 AP

Source: High School 802 Course Catalog

English/Language Arts Curriculum

Four years of high school English were required by high schools in the study. At High Schools 801 and 802, the English program placed students into either college prep English, English 1CP through 8CP, or Honors English, English 1H through 8AP (Honors or Advanced Placement). Placement was determined by teacher recommendation, achievement, testing, and student willingness to work at accelerated levels. Students needed an A grade to be recommended for placement in honors courses, and they must have maintained at least a B- to remain in the honors program. According to the course catalogs, these placements were not permanent or exclusive. At the end of each semester a student's progress was evaluated and changes could be made.

High School 801 also required students to complete a summer reading requirement for both college prep and honors courses. Students were provided with summer reading lists in the spring of each year. Incoming ninth graders also received a list of books from their eighth grade language arts teachers. For the year 1999-2000, ninth and eleventh grade courses were also integrated with Modern World History and United States History, respectively.

The mid-county area is comprised primarily of working middle class to upper middle class families, and the high schools emphasize university/college prep coursework. According to school personnel, parents in this region expect their children to attend four-year colleges and universities, and curriculum is structured with this goal in mind. In fact, a principal from High School 802 indicated that more academic course requirements, as well as other requirements for graduation will be added. The principal explained, "We have just decided to add more academic subjects and also add some electives so that students will take industrial technology, fine arts, and voc. ed., whereas before they didn't have to take those electives." A guidance counselor and business instructor at High School 803 commented that, over the last two years, "graduation requirements have just mushroomed," including an extra year of math, another year of social science, and another year of English. They also indicated that, as result of the increased requirements, students opted to take the academic courses first before elective ones.

High school students confirmed these higher expectations and indicated that their schedules were virtually decided for them, since they were encouraged and expected to take courses to enable them to apply to four-year colleges and universities, both within and outside of the state. As several teachers indicated during our interviews, the curriculum and schedules at the high school level were "driven by the state university system." Students' schedules were dictated largely by the structure of courses required to satisfy the A-F system of admission requirements for the state university system. These A-F university credit requirements include:

A. U.S. history/government and world history (two years);

B. English (four years college prep);

C. Math (four years college prep);

D. Lab science/science (two years college prep required; three years recommended);

E. Foreign language and drama/art/music (two years required; three years recommended); and

F. Electives (55 credits – one year course = 10 credits).

In 1998, recommended electives were restructured to include fine arts, foreign languages, computers, and vocational education.

To satisfy state university system entrance requirements, students were encouraged to take technical courses that would satisfy the elective option (see Table 9). Although it was intended to be a college prep program, at least in the initial phase of implementation, Tech Prep did not satisfy the demands of high schools in this consortium for preparing students for direct entrance into four-year universities. In recent years, a number of changes have taken place through collaborative efforts with the community colleges, including an increased number of college classes offered on high school campuses.

Table 9

Minimum High School Graduation Requirements and Community College and University Entrance Requirements

Subject Area	Minimum High School Graduation Requirements	Community College Recommended Entrance Requirements	University Entrance Requirements
English	4 Yrs. (HS 801, 803) 3 Yrs. (HS 802, 805) 3.5 Yrs. (HS 804)	4 Yrs. (3 Yrs. if minimum competencies are passed)	4 Yrs. College Prep English
Math	2 Yrs. (all HS)	3 Yrs. (2 Yrs. if minimum competencies are passed)	4 Yrs. College Prep Math

Science	1 Yr. Biological Science 1 Yr. Physical Science (all HS)	2 Yrs.	2 Yrs. College Prep; 3 Yrs. recommended (univ. system) 1 Yr. College Prep (state univ. system)

Table 9 (cont.)

History	3 Yrs. (all HS)	3 Yrs.	2 Yrs. (univ. system) 1 Yr. (state univ. system)
Foreign Language and/or Fine or Performing Arts	1 Yr. (HS 801, 802, 803, 804) 2 Yrs. (HS 805)	2 Yrs.	2 Yrs. Foreign Language (state univ. system); 3 Yrs. recommended (univ. system) 1 Yr. Fine or Performing Arts (state univ. system)
Physical Education	3 Yrs. (HS 801, 802, 803) 2 Yrs. (HS 804, 805)	2 Yrs.	Not required
Health and Safety Education	1 Semester (all HS)		Not required
Electives	55 Credits (1 semester course = 5 credits) (HS 801, 802, 803) 60 credits (HS 804, 805)	45 credits (65 credits may be chosen if both English and math competencies are passed) Vocational Ed. 1 Yr.	2 Yrs. College Prep (univ. system) 3 Yrs. College Prep (state univ. system)

Source: Community college and high school catalogs

As indicated during interviews, the perception of some students, administrators, and faculty in the Pacific Consortium is that high school graduates go directly to four-year universities, but many graduates also attend community colleges. While high school administrators in the mid-county high schools reported that 40% to 50% of the students go straight to four-year universities, they had not followed up on students who had been out of high school for several years to determine the actual transition outcomes of their graduates.

Applied Academics Courses

According to milestones prepared by the project director at South County Community College, CORD instructional materials in math, English, and physics through the Principles of Technology course were sent to all consortia statewide in 1993. However, adoption of applied curriculum was slow and these materials were not widely distributed to individual high schools in the early years. By 1993-94, the articulation councils of the Pacific Consortium had begun to focus on using funds to purchase curriculum materials and equipment to implement CORD's math and science curricula (particularly Principles of Technology).

At the same time, one significant barrier to implementing the applied science curriculum at all schools was the fact that the Principles of Technology class was originally not accepted by the state university system; however, by 1994 the name of the course had been changed to Principles of Physics, and the university system had agreed that the course would satisfy entrance requirements. Adoption of Principles of Physics increased after that decision.

In 1995-96, all six high schools affiliated with the Mid-County Community College offered Principles of Physics. In addition, CORD math was integrated into the math curricula at four high schools. A 1996-97 report for the North County Community College indicated that the applied English and math materials were used in the new Fundamentals of Technology (career) academy and these materials were attributed with having significant impact on the success of the program during its first year. Communications 2000 materials were purchased from Southwest Publishing Company using Tech Prep funds and these materials were used as the foundation for revising curriculum in High School 804. These materials were also piloted in other mid-county high schools in fall 1997. English curriculum for two of the district's high schools were revamped to focus on youth and workplace needs, while integrating literature throughout the curriculum. (Table 10 shows the applied academics courses offered by high schools in the study.)

Table 10

Applied Academics Courses at Consortium High Schools

High School	Applied Academic Courses
801	Computer Applications 1-2 Computer Applications 3-4 Applied Physics 1-2 Advanced Math Application

802	Applied Physics 1-2 Computer Applications 1 Computer Applications 2 Accounting 1-2 (which is part of the TP articulation program the district has with the community colleges, p.15)

Table 10 (cont.)

803	Business Math 1-2 Computer Applications 1-2 Computer Applications 3-4 Advanced Math Applications 1-2 Integrated Science 1-2 Integrated Science 3-4
804	Business Math Business Skills Business Computer Applications Office Technology Consumer Mathematics Integrated Science 1 Integrated Science 2
805	Business Calculations Consumer Math

Source: High School Course Catalogs

Tech Prep and the Curriculum of the Community College

Tables 11, 12, and 13 provide an overview of the various requirements for degree programs at the three community colleges included in the study. The tables specifically focus on the requirements for math and English to provide a general idea of the expectations in pursuing an associate degree.

Table 11

Minimum Credit Requirements for Degree Programs

at Mid-County Community College

Curriculum Area	AA Degree	AS Degree
Math/Quantitative Reasoning	a. Appropriate scores on ACT math, SAT math, or MCCC math placement tests. b. Completion of an elementary algebra with grade of C or higher. c. Completion with grade of C or higher of an intermediate algebra or higher math course in HS within four years prior to receiving degree. d. Completion of any one of the following courses with a grade of C or higher: Accounting 121 Business 115 Computer and information services Chemistry Earth Systems Economics Electronics Psychology	Same requirements as for AA degree.
English	a. Completion of English 100 with a grade of C or higher. b. Completion of one of the following courses with a grade of C or higher: ENG 800 or 825 c. Placement in READING 420 based on the reading placement tests.	Same requirements as for AA degree.

Source: Mid-County Community College Course Catalog

Table 12

Minimum Credit Requirements for Degree Programs

at North County Community College

Curriculum Area	**AA Degree**	**AS Degree**
Mathematics	A minimum score of 21 on the Community College District's Math Test #2 or minimum score of 27 on SCAT or completion of elementary algebra with a grade of C or better.	Same requirements as for AA degree.
English	<u>Reading</u> a. Eligibility for Read 420. b. Satisfactory completion of Eng 100. c. Satisfactory completion of Read 802. <u>Writing</u> a. Eligibility for Eng 100 based on placement test results. b. Satisfactory completion of Eng 800.	Same requirements as for AA degree.

Source: North County Community College Course Catalog

Table 13

Minimum Credit Requirements for Degree Programs

at South County Community College

Curriculum Area	**AA Degree**	**AS Degree**
Mathematics	a. Satisfactory completion of Math 110 or equivalent. b. Satisfactory completion of any course having at least Math 110 as a prerequisite. c. Satisfactory score on approved math placement test.	Same requirements as for AA degree.
English	<u>Reading</u> a. Eligibility for Eng 100 or 105. b. Satisfactory completion of Eng 100. c. Grade of C or better in Eng 400 or 800. d. Eligibility for 100 or 105.	Same requirements as for AA degree.

Source: South County Community College Catalog

Articulation Agreements and the Vocational Curriculum

The Tech Prep initiative is defined primarily by its articulation agreements, so it is important to understand this consortium's approach to articulation. As one administrator put it, the awarding of the Tech Prep certificate for completing a course in a Tech Prep program area is "when kids get it about Tech Prep." This certificate and the procedure for awarding it defines the Tech Prep student in this consortium.

To date, the consortium offers the articulated programs listed below, outlining the Tech Prep program offerings for the entire consortium. Whereas articulation agreements are not in place for all high schools in the consortium, a number are. Table 14 shows articulated programs offered by community colleges in the consortium, a number of area high school districts and the ROP. Table 15 provides a list of articulated courses by high school.

Table 14

Articulated Vocational Programs by Community College

Community College	Articulated Vocational Program
North County Community College[a]	Automotive Technology (county wide agreement) Business and Accounting Business and Computer Sciences Fashion Merchandising Hospitality Medical Transcription
Mid-County Community College[b]	Business and Accounting Electronics Multimedia Studies Broadcast Arts
South County Community College[c]	Accounting Business/Office Technology Early Childhood Education Fashion Design Travel Careers Art/Business (Multimedia) Computer Repair Technician Information Technology

Source: High school and community college course catalogs

Note: a. Articulation agreements in these six programs include 19 specific course agreements.
b. Articulation agreements with 10 high schools in four high school districts.
c. Articulation agreements with several high school districts in the county, the ROP, and a community-based job training program.

Table 15

Articulated Credit Courses by High School

Pacific Consortium Technical Programs	HS 801	HS 802	HS 803	HS 804	HS 805
Business/ Office Technology	Sales and Merchandising 1 & 2	Sales and Merchandising	Business Math 1-2	Business Math Business Computer Applications Notetaking, Shorthand Office Tech-nology	Business Calculations Personal Finance
Fashion Design	Fashion and Careers in Fashion	Fashion Careers	Fashion Design and Merchandising	Clothing 1-3	
Travel/ Tourism/ Hospitality			Cooking from Scratch Gourmet Foods	Foods 1-3	
Early Child-hood Education		School Service Program	Child Dev. 1-2		
Accounting	Accounting 1-2	Accounting 1-2		Accounting 1-5	Accounting 1-2 Computerized Accounting
Computer Applications	Computer Apps 1-2 and 3-4	Computer Apps 1-2 Keyboarding	Computers 1-2 Computer Apps 1-4	Keyboarding/ Word Proc-essing 1-3 Web Page Design	Computer Concepts Computer Programming Computer Links Keyboarding Job Technology
Industrial Technology	Applied Physics 1-2 Automotive Technology Electronics 1-2 and 3-4		Applied Physics Auto Technology Beginning Industrial Tech Intro. to Technology Metals Technology Woods Technology	Auto Mechan-ics 1-5 Electronics Graphics/ Advanced Graphics Mechanical Drafting 1-5 Metals/ Advanced Metals Small Engine Technology Woods	

Source: High School Course Catalogs

Each of the three community colleges in the consortium has developed articulation agreements on a course-by-course basis with each of the high schools in the area and the ROP. Some agreements developed by the colleges articulated courses offered at several area high schools across the county. The North County Tech Prep director described the process as follows:

> Once a year, at the college, instructors in auto and business get together with the high school teachers. We have an annual curriculum integration committee in business once a year. We do the same thing in auto, once a year. In auto, every institution that has an auto program meets once a year, so that's quite big. For the business meeting, we usually try to get a representative from each campus, as well as each area. For example, the Tech Prep site coordinator for High School 804, who is also a computer coordinator for the school, attends, and the person that comes from [another district] high school is from accounting. So we try to make sure that each discipline and campus is represented.

As indicated above, in 1992, articulation councils for each consortium were developed through the use of Tech Prep funds made available through the state's community college system. As outlined in the governance and funding section of this report, these articulation councils have served as the oversight bodies within each consortium. In that role, they have been responsible for much of the implementation of Tech Prep related to articulated curriculum. They have reviewed all curriculum adaptations and revisions, as well as all articulation agreements. According to articulation council meeting minutes for North County in 1992, business participation in early meetings was low, but efforts were made to increase business/industry participation.

In the first year (1992), the articulation councils for all three colleges attempted to utilize the input of existing advisory committees, supplemented by additional business representatives on the articulation councils. Academic faculty were also included in advisory committee meetings, where appropriate. These council activities were also supplemented by the work of the various curriculum integration committees (CICs), which were working groups of expert faculty in specific subject areas who were given release time to refine curriculum and integrate applied academics and develop new curriculum using course clusters. Various stakeholders (students, alumni, parents, counselors, employer representatives) were also invited to participate in the CICs. During that first year, the articulation councils were charged with the task of developing a format for the articulation agreements. In ensuing years, articulation agreements were developed for each college in the consortium.

By 1993-94, an intake form had been developed for use by the community colleges to identify Tech Prep students. While the articulation agreements had been put into place during the previous year, the implementation procedures had not been fully developed since the agreements were to be in effect district-wide and not all schools had the resources or curriculum to implement the agreements. By fall 1994, procedures for implementing the articulation agreements had been put in writing and were disseminated to participating schools so that students could be identified as Tech Prep when they entered the community college, allowing them to obtain credit for articulated courses. Efforts at providing a seamless transition for students throughout the county have served as a model for other consortia in the state, and staff from these consortia have provided technical assistance in developing this process through conferences and workshops since it was successfully implemented in 1994-95. According to a 1995-96 progress report from Mid-County, the perceived benefits of this seamless system were:

- Students could receive the same services at any of the three community colleges in the geographic region they chose to attend;
- The community college could identify a Tech Prep student immediately when they matriculated;
- The student could receive college credit for high school courses on their transcripts when they met the articulation requirements and not have to complete additional documentation; and
- Students could continue to receive the same supportive services they received in high school.

Refinements to this seamless articulation system are ongoing for the entire consortium. It is important to note, as stated by the North County Tech Prep coordinator who used business administration as an example, the articulated vocational courses are electives. The coordinator explained, “We try to stress to all the teachers and everyone we talk to that all students who come here in Tech Prep should be thinking of majoring in business administration. And in that scenario a lot of the classes they have articulated will not count towards that major but will count as electives.”

Emerging Curriculum Reform and Career Pathways

As part of Tech Prep, many efforts have been directed toward ongoing curriculum development. Much of this effort has been conducted under the auspices of the CICs. These committees, comprised of faculty members from all segments of the consortium, have worked in collaboration with other advisory committees and have reported to the articulation councils for each community college. The CICs involve industry/labor representatives, students, and counselors in the curriculum development effort. Once Tech Prep programs of study were established, the programs as well as the courses that comprised the curriculum were subject to ongoing revision by the curriculum committees. Meetings of the committees were held regularly to review and revise curriculum.

In terms of competencies, a Mid-County Community College final performance report for the 1997-98 academic year indicated that academic and vocational competencies were identified by faculty involved in Tech Prep when they developed courses. These competencies were modified with input from the advisory committees and faculty review. High school staff developed academic competencies; community college staff reviewed all courses and programs, since they were required to meet at least once a year with their advisory committees. SCANS skills and competencies were also embedded in vocational courses at the colleges when they are developed, and academic faculty were encouraged to address these skills and competencies as well.

As stated above, in recent years funding was directed toward developing curriculum in the eight career pathways. The selected pathways are:

- arts, media, and communication;
- health and human services;
- transportation;
- hospitality, tourism, and recreation;
- computer information systems and business systems;
- retail, wholesale, international trade, and marketing;
- industrial technology, construction, and engineering; and
- environmental and natural resources.

A current goal of the consortium is to increase the use of these (or a variation of these) career pathways and have all high school students identify a pathway by no later than the sophomore year, with participation in courses that comprise the pathway to begin in eleventh grade. Various changes have occurred in curriculum over time to bring about the opportunity to create career pathways, and the schools in the different parts of the county have become involved, particularly in the last two to three years.

In 1992-93 the first countywide curriculum committee was established for fashion design, and a travel careers committee was also established with a high school academy in a nearby community. Currently, a number of curriculum committees continue to serve as primary sources for ongoing curriculum development. Articulation council minutes from 1996 indicated that 20 high school teachers from North County high schools met to present a plan for a high school core curriculum that would prepare students for community college. Career pathways in biotechnology, multimedia, allied health, and telecommunications were reported as being in the planning stages at that time. It was also recommended that high school students should take at least basic algebra and biology to provide a foundation for a smooth transition to the college level.

In an attempt to support curriculum development at High School 804, computers were upgraded and added during the 1997-98 school year. The Tech Prep consortium played a role in gaining administrative support for needed changes in computer labs. These upgrades also supported articulation efforts in the business program.

At High School 801, students could choose a career major, from the following clusters: recreation, environment, and health; engineering and technology; arts, communication, and entertainment; computers, marketing, and business; and human, social, and governmental services. Career pathways at High School 803 are similar: engineering and industrial technology; arts, communications, and humanities; business management and information systems; and health science and human services.

High School 802 offers business and computer-aided design (CAD) courses that articulate with Tech Prep programs in the community colleges. The district of which this high school is a part has recently put over $200,000 of local funds into these programs, and some schools in the district upgraded their auto shops as well. (Table 16 provides an overview of how vocational programs have aligned with selected career pathways in the Pacific Consortium.)

Table 16

Vocational Program Areas by Career Pathways

Career Pathway	Vocational Program Area
Recreation, Environment, and Health	Adaptive Physical Education Health Education
Engineering and Technology	Architectural Design Automotive technology Electronics Drafting Vocational Auto Mechanics
Arts, Communication, and Entertainment	Art Ceramics Musical Theater Commercial Art, Design and Illustration Photography Digital Communications

Table 16 (cont.)

Computers, Marketing, and Business	Computer Applications Accounting Multimedia Technology Computerized Accounting Computer Programming Finance Business Computer Applications
Human, Social, and Government Services	School/Community Service Sales and Merchandising Sociology Government Health and Safety

Source: High School Course Catalogs

One of the most recent career programs to be developed at mid-county high schools is in allied health. During 1996-97, math, science, English, social science, and vocational faculty met several times during the year to identify programs and courses to be articulated. Articulation agreements were signed for the program to begin in 1997-98. During 1997-98, the college developed a new multimedia/web design program that included 15 courses and articulated with the business program, since a basic computer course as a prerequisite for the program. Keyboarding, computer processing, and spreadsheet courses also satisfied prerequisite requirements for the program.

In the northern part of the county, as the emphasis on sequencing of curriculum and career pathways continued, two career academies were established at area high schools in 1995-96. At High School 805, an academy was developed in information technology and an academy was developed in hospitality, tourism, and business administration at a high school not included in this study. Another academy was implemented in fall 1996 at High School 805, a Fundamentals of Technology Academy. The science department at a third high school was also developing an allied health careers pathway. Sixty-nine students in High School 805's information technology academy earned college credits through North County Community College during its first year of existence in 1995-96. The college reported that students earning college credits through articulation agreements rose 162% over the previous year. All academies focused on integration of academic and vocational curriculum.

Likewise, the development of two business technology academies and a Tech Prep high school in the southern part of the county had a significant impact on curriculum development for that region. According to final performance reports, all schools in the South County consortium focused on integration, use of applied academics curriculum, and career pathways. In 1994-95, major effort was devoted to developing an accounting and finance pathway and the following year a family and human services pathway.

Integrated Academic and Vocational Curriculum

In 1993, at North County Community College, a committee on applied academics and curriculum integration began working to develop applied and integrated course work that would support the implementation of Tech Prep at area high schools. By 1993-94, high schools in North County were using CORD applied math materials. All site coordinators were engaged in identifying faculty who would be interested in using applied academics as a means of integration, and the county office of education agreed to assist in the effort by supplying workshops. Twenty-eight faculty from the North County high school district schools attended the Applied Academics Orientation Workshop sponsored by the consortia in the county in February, 1993. Math and science faculty expressed interest in applied Train-the-Trainer workshops to be held later that year.

By 1994-95, there were indications of an increased level of interest from English, math, and science faculty in area high schools, and some schools in the consortium were implementing sections of integrated and applied courses. In this consortium where applied communications materials from AIT had been piloted, English faculty were resistant "because the English framework for secondary education is literature based." It was suggested, instead, that these applied communications materials be integrated into the regular curriculum rather than used as stand-alone materials.

Much of the curriculum reform at high schools in the southern part of the county was in association with the development of business technology career academies at area high schools. Two of the career academies included an integrated economics course that focused on entrepreneurship. Attempts were also made to incorporate alternative, authentic assessment tools such as portfolios, projects, and written scenarios. In addition, at High School 805, the principal commented on the fact that the school was considered the technology hub for the district. He stated, "We have over 250 computers and three computer labs with equipment because of a couple of dynamite science teachers who were really interested in technology, and they pretty much spearheaded this effort." As a result, this high school became the district's leader in technology. The principal went on to say that the emphasis on technology in the business department was the result of receiving some grant money to start a personal computer (PC) lab:

> One of the budgets around 1995-96 gave us a great infusion of money that was completely earmarked for technology. The district gave us $250,000 based on our goal for '98. At that point we started to expand dramatically in technology. In business and in other areas we began to write for PC grants that got us some more mini-labs, and we have used Carl Perkins money to improve the lab.

Most of the early efforts at integration in this consortium consisted of efforts to incorporate applied materials into courses. By the end of 1994, some of the focus on applied curriculum (i.e., CORD materials) had shifted to a focus on integration of academic and vocational education through attempts to bring faculty from different disciplines and sites together to encourage addressing academic and vocational skills in courses in various disciplines.

A 1994-95 final performance report from South County indicated that entrepreneurship was included in both economics and business technology classes at two of the high school academies in the South County consortium. In these classes students planned, developed, and ran their own business using business technology. Academic teachers tried different approaches to integration and application of curriculum, especially labs and hands-on learning. Team teaching was employed and teachers met throughout the school year to plan integration activities.

In 1995, in addition to the consortium's new emphasis on integration, an emphasis on use of applied academics and integration of postsecondary curriculum (rather than just secondary curriculum) gained strength. These later efforts began to emphasize the integration of SCANS skills and industry standards into the curriculum. In 1995-96, High

School 803, a restructured school, reported that they had developed a program in which industrial technology, math, and science departments worked together on various projects, including an energy audit conducted by the region's gas and electric company. Like North County Community College, Mid-County Community College began emphasizing integration of curriculum by 1995-96, and this emphasis included the integration of SCANS competencies and industry standards.

South County Community College also reported in 1996-97 that a math instructor and a fashion design instructor developed instructional materials for infusing math skills into a pattern design class. A business technology instructor and an economics instructor infused SCANS competencies into homework assignments that required the use of computers and the Internet. At that same time, one high school in South County developed and implemented integrated science, applied bio/chemistry, applied communities modules to be infused into English courses, Community Chemistry, and Principles of Technology. The same report also indicated that the high schools in the area used an integrated approach to teaching math, English, and social studies and that economics continued to be taught through entrepreneurship during the senior year.

Looking toward the future, both High School 803 and 805 had experienced a large turnover in teaching personnel. For instance, at High School 803, one of the business teachers commented that approximately 60% of the current teaching staff had been at the school less than four years. The instructor went on to say that teaching of integrated courses involved a lot of energy and many of the new instructors did not feel they had enough time for such curriculum development efforts. The teacher commented that new teachers rarely stayed more than three years and the job was very demanding. He stated, "The new way is a different way of teaching. It's more student focused, less lecture focused, less teacher focused, which takes a lot more energy."

Work-Based Learning

Work-based learning (WBL) is not well developed at the high school level in this consortium. At suburban high schools, work experience in conjunction with school course work is almost nonexistent. An exception is in the area of cooperative education, which still dominates WBL opportunities in this consortium. A 1997-98 progress report for North County Community College indicated that many programs offered cooperative education.

Opportunities for WBL occur through co-op courses and fairly limited experiences. For example, at High School 801, a work experience course is offered for school credit, providing 18 lessons on general workplace skills as well as exposure to one or various work sites. The course description in High School 801's course directory for 1999-2000 indicated that students who were already employed in a part-time job at an established business could earn one credit toward graduation for every 36 hours of work, up to a maximum of 10 credits per semester. Students could elect to be released from one or two periods per day but they had to attend one hour of required weekly instruction. The course description at other high schools was similar. There was little job shadowing at the schools, although reports indicated that job shadowing was available in some areas through the ROP.

In addition to the work experience course offered at the mid-county high schools, this district also offered a district program for students where they could learn about various aspects of the business world. A community retail training center offered courses in sales and merchandising, providing courses in a variety of job skills and for a minimum of 10 hours per week (paid) or 6 hours per week on an assignment (non-paid). Unlike the work experience course, students in the sales and merchandising courses did not have to be employed to participate. Classroom instruction took place at the training center two afternoons per week.

In 1996, one high school in the mid-county region implemented a course titled Career Choices in Business. In this course, students were provided the opportunity to participate in a six-week unpaid work experience at a local company. By design, the majority of the students were Tech Prep students.

The 1998-99 grant application for the consortium and the 1997-98 Mid-County final performance report indicated there had been increased attention to WBL in recent years, due, in part, to STC implementation. According to the application, the number of students participating in WBL experiences during the 1997-98 school year had risen to 25% of the Tech Prep students, compared to about 10% of the general population of students. The consortium anticipated an increase in the number of work-based learning opportunities as result of the STC Partnership's hiring of a full-time industry liaison whose job was to find WBL opportunities for students.

Student Demographics, Experiences, and Preliminary Outcomes

The following section provides a summary of preliminary outcomes for a sample of 1995, 1996, and 1997 high school graduates in the Pacific Consortium. This section includes preliminary results relative to demographic and educational characteristics; math and vocational course-taking patterns; and transition to postsecondary education, with a focus on the community colleges within the consortium. We also provide information on employment during and after high school. Students are classified as either Tech Prep or non-Tech Prep for this analysis.

Sample selection for this consortium entailed the acquisition of lists of all Tech Prep participants who completed high school in 1995, 1996, and 1997 in five high schools in the consortium, all located in the northern or central region of the county. Schools selected for the study had been involved in Tech Prep implementation since the early 1990s and were representative of the overall implementation strategies used by high schools in this consortium. All students who had participated in Tech Prep and graduated in 1995-97 were selected for the study (n = 313) since the population of Tech Prep participants approximated the desired sample size of 300. To create the sample, the lists of students were obtained from consortium and school officials, based on community college database records showing students who had participated in and later requested Tech Prep credits. (See Appendix A for further details on sampling decisions for this site.) Once the Tech Prep sample was identified, a similar sample of non-Tech Prep graduates was selected at random from the same high schools using the same upper and lower limits on class rank percentile as the Tech Prep group, ensuring a comparable distribution on class rank at high school graduation. A total of 310 non-Tech Prep graduates were selected as the comparison group for this study. (Note that frequency distributions for the two groups are shown in Table 18, providing comparable results on class rank percentile and cumulative grade point average.)

To understand who the Tech Prep graduates are for this consortium, it is important to understand the particular local approach to Tech Prep implementation. Tech Prep in this consortium focused primarily on articulation agreements for vocational classes offered at the high schools. Tech Prep students were identified by their completion of articulated vocational courses, and they received Tech Prep certificates as proof of their involvement. When students matriculated from high school to community college, their Tech Prep certificates provided verification that they had accomplished college-level work in a secondary-level vocational (Tech Prep) course. Tech Prep participants were also encouraged to enroll in higher level academics but mostly traditional courses, since applied academics courses were not provided in most of the schools, to ensure that students would be eligible for four-year college/university admission in moderately selective to the most elite higher education institutions in the state. Besides articulated vocational curriculum, which was clearly the defining characteristic of Tech Prep in this consortium, career pathways were emerging in recent years, partly to help align Tech Prep courses and newer curriculum with the STW initiative. Professional development of faculty and counselors was another important element, along with changes in guidance and counseling to assist all students with educational and career decisions.

Demographics and Personal Characteristics

Graduates in both the Tech Prep and non-Tech Prep groups had similar demographics and personal characteristics. While gender was relatively evenly split for both groups, the percentage of males in Tech Prep increased slightly with each cohort, from 44% in 1995 to 59% in 1997. Both groups were comprised of over 30% White non-Hispanics, approximately 36% Asian/Pacific Islanders, and less than 30% from other race/ethnic groups. A higher percentage of Tech Prep than non-Tech Prep graduates (19% and 13%, respectively) were of Hispanic origin.

The vast majority of graduates from both groups were single and approximately 70% were still living at home. Family income during high school was widely distributed, but a sizeable proportion of both groups of graduates came from families having fairly high incomes. Approximately 30% of non-Tech Prep graduates reported a family income of $75,000 or more, compared to nearly 20% of the Tech Prep group, but no statistical difference was found between the two groups on income.

The only significant difference in demographic and personal characteristics was in the father's education level (t = 2.03, df = 225, p = .04), with Tech Prep graduates' fathers having completed less education than their non-Tech Prep counterparts. For Tech Prep graduates, 23% indicated their fathers had completed four-year bachelor's degrees (31% bachelor's plus graduate), compared to 34% of non-Tech Prep graduates' fathers with bachelor's degrees (50% bachelor's plus graduate). The mothers of non-Tech Prep graduates were also more highly educated than the mothers of the Tech Prep group, but the difference between the two groups was not significant.

Table 17

Percentage Distribution on Selected Demographics by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=116	1995 Grad. n=26	1996 Grad. n=37	1997 Grad. n=53	Total Grad. n=113	1995 Grad. n=31	1996 Grad. n=40	1997 Grad. n=42
Gender								
Male	52.5	43.9	51.4	58.9	49.5	46.2	50.5	50.5
Female	47.5	56.1	48.6	41.1	50.5	53.8	49.5	49.5
Race/Ethnicity								
White, non-Hispanic	34.9	29.2	34.3	37.3	37.4	30.0	42.1	38.5
Asian/Pacific Islander	35.8	25.0	42.8	35.3	35.5	30.0	34.2	41.0
Hispanic	19.3	29.2	14.3	19.6	13.1	16.7	5.3	17.9
Other	10.1	16.7	8.6	7.8	11.2	20.0	13.2	2.6
Black, non-Hispanic	0.0	0.0	0.0	0.0	2.8	3.3	5.3	0.0

Table 17 (cont.)

Marital status								
Single	94.8	96.2	94.6	94.3	92.0	87.1	97.5	90.2
Single with children	2.6	0.0	5.4	1.9	3.6	3.2	2.5	4.9
Married	1.7	0.0	0.0	3.8	0.9	3.2	0.0	0.0
Married with children	0.9	3.8	0.0	0.0	3.6	6.5	0.0	4.9
Father's education level								
Less than high school graduate	9.6	7.7	8.1	11.5	8.0	0.0	7.5	14.6
High school graduate	20.0	23.1	18.9	19.2	13.4	22.6	7.5	12.2
Some college, no degree	23.5	26.9	24.3	21.2	17.9	16.1	12.5	24.4
Two-year associate's degree	9.6	15.4	10.8	5.8	6.3	9.7	7.5	2.4
Four-year bachelor's degree	22.6	15.4	27.0	23.1	33.9	25.8	50.0	24.4
Graduate degree	9.6	3.8	8.1	13.5	16.1	22.6	10.0	17.1
I don't know	5.2	7.7	2.7	5.8	4.5	3.2	5.0	4.9
Mother's education level								
Less than high school graduate	12.1	15.4	10.8	11.3	5.5	0.0	10.0	5.3
High school graduate	20.7	30.8	16.2	18.9	19.3	29.0	10.0	21.1
Some college, no degree	24.1	15.4	24.3	28.3	21.1	16.1	32.5	13.2
Two-year associate's degree	13.8	15.4	13.5	13.2	13.8	6.5	10.0	23.7
Four-year bachelor's degree	20.7	15.4	27.0	18.9	30.3	38.7	27.5	26.3
Graduate degree	5.2	3.8	2.7	7.5	10.1	9.7	10.0	10.5
I don't know	3.4	3.8	5.4	1.9	0.0	0.0	0.0	0.0
Family income								
$14,999 or less	6.1	0.0	10.8	5.7	4.5	6.7	2.5	5.0
$15,000 – $29,999	11.3	12.0	13.5	9.4	6.4	3.3	10.0	5.0
$30,000 – $44,999	14.8	12.0	13.5	17.0	11.8	13.3	12.5	10.0
$45,000 – $59,999	12.2	16.0	13.5	9.4	13.6	13.3	17.5	10.0
$60,000 – $74,999	13.0	4.0	18.9	13.2	10.0	13.3	5.0	12.5
$75,000 – $89,999	6.1	8.0	2.7	7.5	8.2	10.0	10.0	5.0
$90,000 or more	12.2	16.0	8.1	13.2	20.9	26.7	17.5	20.0
I don't know	24.3	32.0	18.9	24.5	24.5	13.3	25.0	32.5
Present residence								
Live with my parent(s)	70.7	57.7	70.3	77.4	69.6	74.2	75.0	61.0
Live alone	2.6	3.8	5.4	0.0	2.7	3.2	2.5	2.4
Live with spouse or significant other	6.0	15.4	2.7	3.8	4.5	6.5	0.0	7.3
Live with friend or roommate	14.7	19.2	16.2	11.3	17.0	12.9	17.5	19.5
Other	6.0	3.8	5.4	7.5	6.3	3.2	5.0	9.8

Source: Education-To-Careers Follow-up Survey (n = 229) for all items except gender, which come from Tech Prep high school transcript file (n = 620)

Note: Details may not sum to 100 due to rounding.

Educational Characteristics

Overall, the graduates in both groups fell into all four quartiles of class rank percentile, with 33% of both groups in the upper quartile, 53% within the two quartiles associated with the "middle majority," and 14% in the lower quartile. Approximately half of the graduates had obtained a GPA of 3.01 or higher (B average or higher), and slightly under half (46%) had obtained a GPA of 2.01 to 3.00 (C to B average). Because of the sampling procedure, no significant differences were found in high school academic performance between the Tech Prep and non-Tech Prep groups or among the cohorts within the Tech Prep and non-Tech Prep groups.

When asked about their perceptions of high school, the majority of non-Tech Prep graduates felt their high school education was either very useful or fairly useful. While non-Tech Prep graduates' responses were balanced between those two responses, more Tech Prep graduates felt their high school education was only fairly useful, and fewer felt it was very useful. Again, there were no significant differences in the responses between groups.

Table 18

Percentage Distribution on Selected Educational Characteristics and Attitudes by Tech Prep Status and Year of High School Graduation

	Tech Prep				**Non-Tech Prep**			
	Total Grad. n=314	1995 Grad. n=76	1996 Grad. n=118	1997 Grad. n=120	Total Grad. n=306	1995 Grad. n=75	1996 Grad. n=115	1997 Grad. n=116
Class rank percentile at HS graduation								
1 – 25%	14.0	9.2	18.6	12.5	13.8	9.5	17.4	12.9
26 – 50%	24.8	28.9	22.0	25.0	25.2	31.1	21.7	25.0
51 – 75%	27.7	30.3	28.0	25.8	27.5	27.0	28.7	26.7
76 – 100%	33.4	31.6	31.4	36.7	33.4	32.4	32.2	35.3
Cumulative GPA at HS graduation								
Less than 1.00	0.3	0.0	0.8	0.0	0.0	0.0	0.0	0.0
1.01 – 1.50	0.3	1.3	0.0	0.0	0.3	1.4	0.0	0.0
1.51 – 2.00	3.5	2.6	5.1	2.5	3.3	2.7	4.3	2.6
2.01 – 2.50	20.1	19.7	23.7	16.7	20.0	18.9	24.3	16.4
2.51 – 3.00	26.1	38.2	16.1	28.3	25.6	37.8	15.7	27.6
3.01 – 3.50	28.0	27.6	28.0	28.3	28.9	28.4	27.8	30.2
3.51 – 4.00	21.7	10.5	26.3	24.2	22.0	10.8	27.8	23.3

Table 18 (cont.)

Utility of high school learning								
Extremely useful	8.7	3.8	8.3	11.3	9.8	10.0	10.0	9.5
Very useful	26.1	23.1	33.3	22.6	33.0	23.3	40.0	33.3
Fairly useful	44.3	53.8	41.7	41.5	31.3	26.7	27.5	38.1
Somewhat useful	18.3	19.2	13.9	20.8	22.3	30.0	22.5	16.7
Not at all useful	2.6	0.0	2.8	3.8	3.6	10.0	0.0	2.4

Source: Tech Prep High School Transcript File for all items except utility of high school learning, which came from the Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Math and Vocational Course-Taking Patterns

The majority of graduates in both groups (86% of Tech Prep and 76% of non-Tech Prep) took from five to eight semesters of math courses in high school. This pattern indicates that most students took more than the required number of math courses required for high school graduation (two years, as indicated in Table 9 above). The higher number of math classes may also reflect the strong emphasis of the high schools on encouraging students to pursue college degrees, since university entrance requirements include four years of college prep math and community colleges also specify entrance requirements including three years of math.

A fairly large percentage of graduates (37% of the Tech Prep and 33% of the non-Tech Prep) began their high school sequence with Algebra 1. (See Appendix E for examples of math course titles corresponding to the categories presented in Table 19.) The most noticeable difference among the cohorts was the drop between 1995 and 1996 in the percentage whose math sequences began with Algebra 1, but even these differences were not significant. There was very little difference between the groups or among the cohorts within groups in the highest level of math taken. The majority of both groups completed the high school math sequence with Algebra 2 (approximately 25%) or advanced math (about 40%).

The number of graduates taking applied math was small (less than 6%) and comparable for both groups. (Recall that applied math course offerings were somewhat limited and only available at four of the five high schools in the sample. Applied course offerings more typically included computer applications and applied science courses, which are not included in this analysis.) Slightly more graduates from both groups (between 15-20%) were enrolled in honors math. (Recall that only High School 804 indicated that honors math classes were offered, namely Algebra 2 Honors and Honors Geometry).

Table 19

Percentage Distribution on High School Math Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=314	1995 Grad. n=76	1996 Grad. n=118	1997 Grad. n=120	Total Grad. n=306	1995 Grad. n=75	1996 Grad. n=115	1997 Grad. n=116
Total math courses by semester:								
None	0.0	0.0	0.0	0.0	0.7	0.0	0.9	0.9
1 – 2	1.3	2.6	1.7	0.0	2.3	2.7	2.6	1.7
3 – 4	6.7	9.2	8.5	3.3	8.5	9.3	7.8	8.6
5 – 6	41.1	40.8	39.0	43.3	33.0	36.0	30.4	33.6
7 – 8	44.6	39.5	47.5	45.0	45.8	45.3	50.4	41.4
9 or more	6.4	7.9	3.4	8.3	9.8	6.7	7.8	13.8
Lowest math course								
Basic math	2.0	1.3	1.6	2.5	3.3	5.4	2.7	2.6
General math	34.4	27.6	41.5	31.7	38.5	33.3	38.6	41.7
Applied math	0.3	0.0	0.0	0.8	0.3	0.0	0.0	0.9
Pre-Algebra	11.1	5.3	15.3	10.8	10.5	0.0	17.5	10.4
Algebra 1	37.3	55.3	25.4	37.5	32.5	50.7	24.9	27.8
Geometry	15.0	10.5	16.1	16.7	14.5	10.7	15.8	15.7
AP Geometry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Algebra 2/AP Algebra	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.9
Highest math course								
Basic math	0.3	0.0	0.8	0.0	0.3	1.3	0.0	0.0
General math	0.6	2.6	0.0	0.0	6.2	8.0	2.7	8.7
Geometry	18.8	21.1	19.5	16.7	13.5	14.7	8.8	16.5
Pre-Algebra	6.4	3.9	10.2	4.2	3.9	2.7	6.1	2.6
Algebra 1	6.0	6.6	6.8	5.0	8.6	6.7	11.4	7.0
Algebra 2	25.8	28.9	24.6	25.0	23.0	29.3	20.2	21.7
Advanced math	40.1	36.9	37.3	45.0	42.1	36.0	45.6	42.6
Total applied math by semester:								
None	95.5	100.0	93.2	95.0	93.8	97.3	90.4	94.8
1 – 2	3.8	0.0	6.8	3.3	3.6	2.7	6.1	1.7
3 – 4	0.6	0.0	0.0	1.7	2.3	0.0	3.5	2.6
5 – 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 – 8	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.9

Table 19 (cont.)

Total honors/AP math by semester:								
None	84.1	92.1	84.7	78.3	82.4	90.7	79.1	80.2
1 – 2	11.5	3.9	11.9	15.8	13.1	4.0	16.5	15.5
3 – 4	4.5	3.9	3.4	5.8	4.2	5.3	3.5	4.3
5 – 6	0.0	0.0	0.0	0.0	0.3	0.0	0.9	0.0

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding.

Vocational Course-Taking

Most Tech Prep and non-Tech Prep graduates took at least one vocational-technical course during high school. Business courses were taken most frequently, with smaller percentages of graduates in either group taking consumer and family studies and precision production (e.g., electronics, graphic arts, welding). Few graduates took technical/communications (e.g., telecommunications), marketing, specific labor market (e.g. industrial arts, career guidance), or general labor market (e.g. co-op) courses, although the percentage of both groups taking specific labor market courses increased from less than 10% among 1995 graduates to well over 20% among 1997 graduates. Areas where Tech Prep and non-Tech Prep graduates exhibited different levels of participation in vocational education follow:

- A higher percentage of Tech Prep than non-Tech Prep graduates took business courses ($\chi^2 = 44.49$, $df = 1$, $p = .000$);
- A higher percentage of Tech Prep than non-Tech Prep graduates took mechanics/repairer courses ($\chi^2 = 13.67$, $df = 1$, $p = .000$); and
- A higher percentage of Tech Prep than non-Tech Prep graduates took precision production courses ($\chi^2 = 9.00$, $df = 1$, $p = .003$).

Significant differences were noted between the Tech Prep and non-Tech Prep groups in the levels of courses taken within several SST coding categories: first in a sequence being Level 1, second in a sequence meaning Level 2, and third being a specialty course and labeled Level 3. (Further information on vocational categories and SST codes is provided in Appendix F.) However, it is important to note that high schools do not always offer three levels in all vocational specialty areas or the number of higher level courses may be extremely limited. Therefore, individuals labeled sequential course takers could have completed two semesters of vocational education. Given this information, results for sequential course-taking for the two groups follows:

- More Tech Prep than non-Tech Prep were sequential course-takers in business (χ^2 = 69.60, *df* = 4, *p* = .003).
- More Tech Prep than non-Tech Prep graduates were sequential course-takers in the precision production area (χ^2 = 16.67, *df* = 4, *p* = .002).
- More Tech Prep than non-Tech Prep graduates were sequential course-takers in the mechanics/repairers area (χ^2=18.86, p=.000).

Table 20

Percentage Distribution on Vocational-Technical Education Courses by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=314	1995 Grad. n=76	1996 Grad. n=118	1997 Grad. n=120	Total Grad. n=306	1995 Grad. n=75	1996 Grad. n=115	1997 Grad. n=116
Course-taking in vocational area:								
Business	85.4	85.5	88.1	82.5	61.8	54.7	67.0	61.2
None	14.6	14.5	11.9	17.5	38.2	45.3	33.0	38.8
Consumer/Family Studies	33.8	36.8	29.7	35.8	29.4	28.0	24.3	35.3
None	66.2	63.2	70.3	64.2	70.6	72.0	75.7	64.7
Technical/Communications	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.9
None	100.0	100.0	100.0	100.0	99.7	100.0	100.0	99.1
Precision Production	31.5	36.8	28.0	31.7	20.9	22.7	22.6	18.1
None	68.5	63.2	72.0	68.3	79.1	77.3	77.4	81.9
Mechanics/Repairers	21.3	10.5	21.2	28.3	10.5	8.0	13.0	9.5
None	78.7	89.5	78.8	71.7	89.5	92.0	87.0	90.5
Marketing	1.9	5.3	0.0	1.7	1.6	2.7	1.7	0.9
None	98.1	94.7	100.0	98.3	98.4	97.3	98.3	99.1

Table 20 (cont.)

Specific labor markets	20.1	5.3	28.0	21.7	20.9	9.3	23.5	25.9
None	79.9	94.7	72.0	78.3	79.1	90.7	76.5	74.1
General labor markets	18.5	26.3	16.9	15.0	14.7	14.7	12.2	17.2
None	81.5	73.7	83.1	85.0	85.3	85.3	87.8	82.8
Business								
None	14.6	14.5	11.9	17.5	38.2	45.3	33.0	38.8
Only level 1	63.1	55.3	74.6	56.7	56.2	49.3	63.5	53.4
Only level 1 and 2	20.7	30.3	11.0	24.2	3.9	5.3	1.7	5.2
Only level 1 and 3	0.3	0.0	0.8	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.6	0.0	1.7	0.0	1.0	0.0	1.7	0.9
Other	.7	0.0	0.0	1.7	.7	0.0	0.0	1.7
Consumer/Family Studies								
None	66.2	63.2	70.3	64.2	70.6	72.0	75.7	64.7
Only level 1	15.9	15.8	13.6	18.3	12.4	6.7	11.3	17.2
Only level 1 and 2	3.5	6.6	2.5	2.5	1.0	0.0	0.9	1.7
Only level 1 and 3	3.5	6.6	1.7	3.3	3.6	5.3	0.9	5.2
Minimum 1 in each level	2.5	3.9	1.7	2.5	1.3	0.0	3.5	0.0
Other	8.3	3.9	10.2	9.1	11.1	16.0	7.8	11.2
Technical/Communications								
None	100.0	100.0	100.0	100.0	99.7	100.0	100.0	99.1
Only level 1	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.9
Only level 1 and 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Precision production								
None	68.5	63.2	72.0	68.3	79.1	77.3	77.4	89.1
Only level 1	5.7	2.6	7.6	5.8	6.9	6.7	9.6	4.3
Only level 1 and 2	9.6	19.7	6.8	5.8	4.9	6.7	7.0	1.7
Only level 1 and 3	0.0	0.0	0.0	0.0	0.7	1.3	0.0	0.9
Minimum 1 in each level	3.8	2.6	0.8	7.5	0.3	0.0	0.0	0.9
Other	12.4	11.8	12.7	12.5	8.2	8.0	6.1	10.3
Mechanics/repairers								
None	78.7	89.5	78.8	71.7	89.5	92.0	87.0	90.5
Only level 1	7.6	2.6	11.0	7.5	6.5	5.3	7.8	6.0
Only level 1 and 2	13.1	7.9	9.3	20.0	3.6	1.3	5.2	3.4
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	.6	0.0	.9	.8	.4	1.3	0.0	0.0

Table 20 (cont.)

Marketing								
None	98.1	94.7	100.0	98.3	98.4	97.3	98.3	99.1
Only level 1	0.3	1.3	0.0	0.0	0.3	1.3	0.0	0.0
Only level 1 and 2	1.3	2.6	0.0	1.7	0.0	0.0	0.0	0.0
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	.3	1.4	0.0	0.0	1.3	1.4	1.7	.9
Specific labor markets								
None	79.9	94.7	72.0	78.3	79.1	90.7	76.5	74.1
Only level 1	12.1	0.0	18.6	13.3	13.7	2.7	16.5	18.1
Only level 1 and 2	1.0	0.0	2.5	0.0	1.3	2.7	0.9	0.9
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	7.0	5.3	6.8	8.4	5.9	4.0	6.1	6.9
General labor markets								
None								
Only level 1								
Only level 1 and 2								
Only level 1 and 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum 1 in each level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other								

Source: Tech Prep High School Transcript File

Note: Details may not sum to 100 due to rounding. The "other" category includes course combinations other than those specified, and this category was not included in significance testing. Between group differences were computed on the total groups, but not cohorts by year due to small cell sizes.

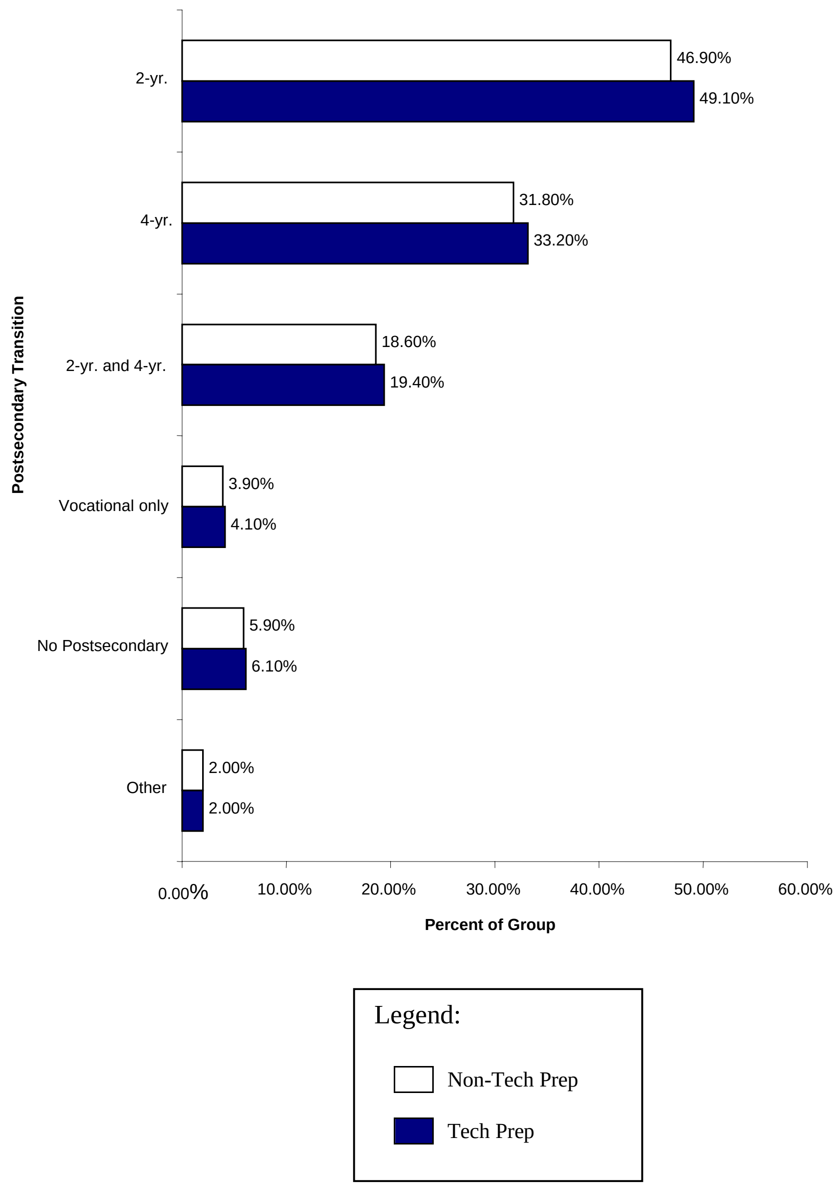
Transition to Postsecondary Education

Of the entire sample of high school graduates from the Pacific Consortium, 45% had continued their postsecondary education at one of the three colleges in the community college district. Of the high school graduates for whom we received transcripts because they had matriculated to the community-college level, 46% attended Mid-County Community College, 28% attended North Community College, and 26% attended some combination of all three colleges in the district. Since no high schools from South County were included in the study, few students attended only South County Community College, although several attended a combination of colleges that included this particular college.

Based on the follow-up survey results, very little difference in the transition pattern of Tech Prep and non-Tech Prep graduates emerged (see Figure 2). In fact, the transition to postsecondary education and work was nearly identical, with just under 50% of the graduates reporting that they had pursued a two-year college, with about another 30% going to a four-year college, and yet another 20% combining two- and four-year college. Only about 6% of each group reported going to work and not to postsecondary education, indicating nearly all had pursued some form of postsecondary education as detailed above.

Figure 2

Transition to Postsecondary Education by Tech Prep Status



Work Experience During and After High School

There were no differences between the two groups on work experience during high school. Approximately three-fourths of the graduates in both groups indicated that they held jobs at some time during high school (see Table 21). For both groups, the majority of the respondents to the survey also indicated they worked between 11 and 30 hours per week in their last high school job. Two-thirds of Tech Prep graduates indicated they made between $5.26 and $7.00 per hour in their last high school job. Wages for non-Tech Prep graduates were distributed more evenly than for the Tech Prep group. Fewer Tech Prep than non-Tech Prep graduates reported earning wages over $8.00 per hour during high school; however, there was no significant difference between the groups on wages.

Table 21

Percentage Distribution in Employment Experiences During High School by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=116	1995 Grad. n=26	1996 Grad. n=37	1997 Grad. n=53	Total Grad. n=113	1995 Grad. n=31	1996 Grad. n=40	1997 Grad. n=42
Employed during high school								
No	23.7	15.4	22.2	28.8	30.4	25.8	40.0	24.4
Yes	76.3	84.6	77.8	71.2	69.6	74.2	60.0	75.6
Estimated hourly wages in last job held before high school graduation								
Zero – unpaid	2.3	0.0	0.0	5.4	3.8	4.3	8.3	0.0
Less than $5.25/hr.	10.5	9.1	18.5	5.4	21.5	17.4	25.0	21.9
$5.26 to $6.00/hr.	37.2	45.5	48.1	24.3	20.3	13.0	20.8	25.0
$6.01 to $7.00/hr.	30.2	31.8	22.2	35.1	20.3	26.1	12.5	21.9
$7.01 to $8.00/hr.	11.6	9.1	7.4	16.2	12.7	13.0	20.8	6.3
More than $8.00/hr.	8.1	4.5	3.7	13.5	21.5	26.1	12.5	25.0
Total hours worked during typical week in high school								
Less than 5 hours	3.4	0.0	3.6	5.4	3.8	0.0	4.2	6.3
6 – 10 hours	11.5	4.5	17.9	10.8	15.2	21.7	8.3	15.6
11 – 20 hours	56.3	63.6	53.6	54.1	44.3	47.8	37.5	46.9
21 – 30 hours	21.8	27.3	21.4	18.9	29.1	26.1	37.5	25.0
31 – 40 hours	4.6	4.5	0.0	8.1	7.6	4.3	12.5	6.3
More than 40 hours	2.3	0.0	3.6	2.7	0.0	0.0	0.0	0.0

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Work After High School

After leaving high school, graduates in the Pacific Consortium held a number of jobs, but the majority held only one job at the time they completed the follow-up survey one to three years after high school graduation (see Table 22). Approximately half of both groups worked part-time (less than 35 hours per week), and slightly less than one-third of both groups reported working full-time. Most graduates held their current primary job less than twelve months, although the percentage of non-Tech Prep graduates who held jobs less than six months (41%) was higher than the percentage of Tech Prep students (27%). Slightly more Tech Prep than non-Tech Prep graduates held their primary jobs more than 36 months.

Wages for graduates in both groups were distributed over a wide range of earnings categories, with the largest percentage of Tech Prep graduates (18%) earning $7.01 to $8.00 per hour and the largest percentage of non-Tech Prep graduates (21%) earning $6.01 to $7.00. However, as in high school earnings, more non-Tech Prep (19%) than Tech Prep students (8%) reported earning wages above $13.00 per hour. A significant difference was found among the non-Tech Prep cohorts in the change in wages earned per hour from high school to post-high school ($F = 5.07$, $df = 2$, $p = .01$).

As part of the follow-up survey, graduates were also asked to identify the types of jobs they held at the present time. A majority of both groups held entry level/unskilled jobs, although the vast majority ultimately desired to obtain professional jobs. The majority of both groups were fairly satisfied, very satisfied, or extremely satisfied with their current jobs. Almost all graduates in both groups felt confident about reaching their career goals.

Table 22

Percentage Distribution of Post-High School Employment by Tech Prep Status and Year of High School Graduation

	Tech Prep				Non-Tech Prep			
	Total Grad. n=116	1995 Grad. n=26	1996 Grad. n=37	1997 Grad. n=53	Total Grad. n=113	1995 Grad. n=31	1996 Grad. n=40	1997 Grad. n=42
Number of jobs since HS								
1 – 2	29.3	7.7	43.2	30.2	23.9	9.7	22.5	35.7
3 – 4	23.3	30.8	13.5	26.4	28.3	22.6	40.0	21.4
5 – 6	20.7	19.2	21.6	20.8	23.0	35.5	17.5	19.0
7 – 8	9.5	15.4	5.4	9.4	8.8	6.5	7.5	11.9
9 or more	10.3	26.9	10.8	1.9	10.6	22.6	7.5	4.8
None	6.9	0.0	5.4	11.3	5.3	3.2	5.0	7.1
Number of jobs held currently								
0	17.0	15.4	20.0	15.6	20.2	13.8	22.2	23.1
1	70.8	50.0	74.3	80.0	72.1	79.3	72.2	66.7
2	11.3	34.6	5.7	2.2	6.7	6.9	2.8	10.3
3 or more	0.9	0.0	0.0	2.2	1.0	0.0	2.8	0.0
Current employment status								
Full-time (35 hours or more per week)	31.5	38.5	25.7	31.9	29.9	36.7	31.6	23.1
Part-time (less than 35 hours per week)	47.2	46.2	51.4	44.7	47.7	46.7	47.4	48.7
Unemployed seeking employment	7.4	7.7	2.9	10.6	9.3	6.7	2.6	17.9
Unemployed not seeking employment	9.3	3.8	14.3	8.5	11.2	10.0	15.8	7.7
Military full-time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	4.6	3.8	5.7	4.3	1.9	0.0	2.6	2.6
Months worked in current primary job								
Less than 6 months	26.7	14.3	22.2	36.8	41.2	40.0	43.3	40.0
6 – 12 months	25.6	33.3	22.2	23.7	15.3	8.0	20.0	16.7
13 – 24 months	20.9	23.8	14.8	23.7	27.1	32.0	16.7	33.3
25 – 36 months	9.3	4.8	11.1	10.5	9.4	12.0	13.3	3.3
36 months or more	17.4	23.8	29.6	5.3	7.1	8.0	6.7	6.7
Wages per hour, current primary job								
zero	3.5	4.8	3.8	2.6	4.7	4.0	9.7	0.0
$5.25 or less	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
$5.26 – $6.00	8.2	9.5	7.7	7.9	5.8	0.0	6.5	10.0
$6.01 – $7.00	8.2	14.3	7.7	5.3	20.9	12.0	19.4	30.0

Table 22 (cont.)

$7.01 – $8.00	17.6	9.5	19.2	21.1	10.5	12.0	3.2	16.7
$8.01 – $9.00	15.3	4.8	23.1	15.8	5.8	4.0	9.7	3.3
$9.01 – $10.00	11.8	9.5	3.8	18.4	12.8	16.0	12.9	10.0
$10.01 – $11.00	9.4	4.8	11.5	10.5	8.1	8.0	3.2	13.3
$11.01 – $12.00	14.1	14.3	15.4	13.2	7.0	4.0	12.9	3.3
$12.01 – $13.00	2.4	9.5	0.0	0.0	4.7	8.0	3.2	3.3
More than $13.00	8.2	19.0	7.7	2.6	18.6	28.0	19.4	10.0
I don't know	1.2	0.0	0.0	2.6	1.2	4.0	0.0	0.0
Change in wages per hour from HS to present								
-$1.00	20.3	20.0	23.1	18.2	22.4	14.3	21.7	28.1
0	8.9	15.0	3.8	9.1	3.9	4.8	0.0	6.3
+$1.00	6.3	0.0	11.5	6.1	11.8	4.8	4.3	21.9
+$2.00	16.5	10.0	19.2	18.2	11.8	14.3	13.0	9.4
+$3.00	15.2	10.0	15.4	18.2	7.9	9.5	0.0	12.5
+$4.00	10.1	0.0	7.7	18.2	11.8	14.3	17.4	6.3
+$5.00 or more	22.8	45.0	19.2	12.1	30.3	38.1	43.4	15.6
Type of current primary job								
Entry level/unskilled	51.2	47.6	48.1	55.3	51.2	44.0	45.2	63.3
Semi-skilled	32.6	33.3	29.6	34.2	27.9	28.0	32.3	23.3
Skilled or technical	14.0	19.0	22.2	5.3	16.3	16.0	22.6	10.0
Professional	2.3	0.0	0.0	5.3	4.7	12.0	0.0	3.3
Type of primary job desired								
Entry level/unskilled	1.7	7.7	0.0	0.0	4.4	6.5	2.5	4.8
Semi-skilled	6.0	3.8	8.1	5.7	5.3	3.2	2.5	9.5
Skilled or technical	16.4	7.7	18.9	18.9	9.7	9.7	15.0	4.8
Professional	75.9	80.8	73.0	75.5	80.5	80.6	80.0	81.0
Satisfaction with primary job								
Extremely satisfied	13.1	19.0	7.7	13.5	18.8	28.0	22.6	6.9
Very satisfied	29.8	28.6	26.9	32.4	23.5	24.0	32.3	13.8
Fairly satisfied	39.3	33.3	50.0	35.1	27.1	12.0	22.6	44.8
Somewhat satisfied	9.5	14.3	3.8	10.8	18.8	24.0	12.9	20.7
Not at all satisfied	8.3	4.8	11.5	8.1	11.8	12.0	9.7	13.8
Confidence in reaching career goals								
Extremely confident	44.0	50.0	48.6	37.7	38.9	45.2	47.5	26.2
Very confident	31.9	30.8	29.7	34.0	40.7	29.0	37.5	52.4
Fairly confident	18.1	19.2	13.5	20.8	12.4	19.4	10.0	9.5
Somewhat confident	4.3	0.0	5.4	5.7	8.0	6.5	5.0	11.9
Not at all confident	1.7	0.0	2.7	1.9	0.0	0.0	0.0	0.0

Source: Education-To-Careers Follow-up Survey

Note: Details may not sum to 100 due to rounding.

Summary

Tech Prep implementation began in 1992-93 for separately funded consortia associated with each of three community colleges in the county. However, in 1996-97 the three consortia joined together into one to form the Pacific Consortium. Since the beginning, Tech Prep has focused primarily on articulation agreements for vocational classes, making this consortium's efforts indicative of the "vocational tech prep" approach described by Hershey, Silverberg, Owens and Hulsey (1998, p. 5). Tech Prep students were identified by their completion of articulated vocational courses, and they received Tech Prep certificates as proof of their involvement. When students matriculated from high school to community college, their Tech Prep certificates acted as a sort of "proof of purchase," indicating to the college that the student had mastered the skills and knowledge offered in a secondary-level vocational (Tech Prep) course.

Since implementation of School-To-Careers (STC) beginning in 1997-98, there has been a deliberate attempt to align the goals and activities of Tech Prep with those of STC. Similar to Tech Prep, STC has included an emphasis on ensuring that career pathways were available to eleventh- and twelfth-grade students. According to the 1998-99 Tech Prep grant application, restructuring high schools into eight career pathways was a major goal of STC. In fact, Tech Prep and STC worked together to bolster vocational articulation via the development of career pathways to support the seamless transition of students to any of the three community colleges in the county. The two initiatives shared common objectives in that they both emphasized strengthening relationships between education providers and STC; continuing to integrate academic and vocational competencies, work-based learning (WBL) experiences, and SCANS skills; continuing to enhance professional development; providing support services for students; and increasing industry involvement in Tech Prep.

Without doubt, articulation agreements were a key ingredient in the formula for Tech Prep in this consortium. Articulation agreements plus the adoption of applied academics courses and later career pathways constituted much of the emphasis of the 2+2 core curriculum change efforts over the years. Professional development and changes in guidance and counseling served as catalysts for change in many county high schools. According to local administrative personnel, Tech Prep has been widely accepted at some high school sites, particularly those in north and south county districts, and somewhat less accepted at the mid-county schools, where strong emphasis on students pursuing professional jobs and four-year degrees was prevalent.

Initially, implementation of Tech Prep occurred through the use of articulation councils that met every two to three months. More recently, when much of the articulated curriculum has been put into place, these councils have met only once or twice each year. Curriculum integration committees, which report to the articulation councils, also met at least twice a year to develop, review, and update curriculum. These CIC committees were comprised of secondary and postsecondary faculty from relevant vocational and academic disciplines.

Leadership of the Pacific Consortium was assumed by a countywide coordinator of Tech Prep, who also served as the assistant chancellor of research and technology for the mid-county community college district, with responsibility for several funded programs, including Tech Prep. His assistant acts as a Tech Prep project consultant, working on research and evaluation issues, assisting with curriculum development efforts, and facilitating business outreach activities. In addition to the consortium coordinator, all three colleges also have hired their own part-time Tech Prep project directors who work with the local secondary district partners. At the local level, these project directors have worked directly with business advisory councils to oversee occupational program activities across the consortium. The regional occupational program (ROP) director has also served the district schools and coordinated Tech Prep efforts through a variety of off-campus educational programs. At the school-building level, high school site coordinators have been responsible for planning Tech Prep and coordinating happenings in their schools with the countywide effort. Each college and its high school district have been served by an articulation council composed of administrative and faculty representatives as well as business representatives from all consortium partners.

Barriers to implementation of Tech Prep have been evident in this consortium. Because Tech Prep has been tied so closely to the declining image of vocational education, the initiative has had a hard time attracting teachers and students who affiliate more closely with college prep curricula. Consequently, applied academics courses have had difficulty attracting students and the specific identification of students as part of Tech Prep has been problematic. This concern has been most evident in mid-county high schools rather than in high schools where a more highly diverse population of students is enrolled. Modifying traditional curricula has been a problem as well, especially with limited funding and a lack of knowledgeable personnel. Structural changes to school schedules have been slow to evolve. Finally, sustaining business and industry involvement has been a challenge, but strategies to heighten involvement have been implemented, including changing meeting times to late afternoons and engaging business representatives in curriculum development efforts.

Results for Tech Prep graduates of 1995-1997 were associated primarily with participation in articulated vocational courses, plus a limited selection of applied academics courses. More recent efforts to modify curriculum around career pathways were only in the planning stages when the students in this study were completing high school and transitioning to college or work, so results associated with this reform concept cannot be determined. Even so, results suggest the majority of students in both groups took a substantial amount of math during high school, with about 20% completing at least Algebra 2 and another 40% completing at least one advanced math course (e.g., Trigonometry or Calculus). Tech Prep and non-Tech Prep graduates alike were moving to the advanced mathematics level of the high school curriculum. With respect to vocational education, almost all graduates participated in some vocational education; however, Tech Prep graduates took more. A higher percentage of Tech Prep graduates took vocational courses in the areas of business, precision production, and mechanics/repairers than their non-Tech Prep counterparts. Tech Prep graduates were also more likely to be taking a series of vocational courses than the non-Tech Prep group. Although career pathways were not in place at the time these students were attending high school, the Tech Prep graduates were involved in courses that aligned with these pathways, including the computer information systems and business systems pathway and the industrial technology, construction, and engineering pathway. Each of these pathways provided matriculation opportunities to two-year colleges in the area and some students were taking advantage of them. In terms of transition to postsecondary education and work, Tech Prep and non-Tech Prep graduates were very similar, with the vast majority proceeding to two- or four-year college (or a combination of the two). Few students proceeded into the workplace without participating in college of some kind.

While this consortium has faced a number of barriers in implementing Tech Prep, its efforts to join Tech Prep and STC into new career pathways were encouraging, providing the opportunity to expand Tech Prep beyond the articulation of vocational courses. In this region where the economy has flourished and high tech jobs have increased at a staggering rate, a continuing challenge will be to move the local Tech Prep initiative beyond the vocational Tech Prep model to a more comprehensive and systemic approach. Making this change will require a significant reorientation of high school, community college and university personnel. More importantly and more difficult, the change will require reeducating the community at large about the purpose of Tech Prep and its potential contributions to improving K-16 education while simultaneously meeting workforce demands.

CONCLUDING OBSERVATIONS

The primary intent of this study was to provide a detailed description of the evolution of Tech Prep implementation in eight local consortia and better understand the emerging relationships between implementation and students' educational experiences and outcomes. Since the scope of the study was extensive and further analysis remains, these concluding observations are not intended to be comprehensive but represent concerns that stand out for the authors as factors that deserve further review and debate with respect to policy, practice, and research.

The Complex Relationships between Tech Prep and School-To-Work (STW)

Although some divergent goals were evident between Tech Prep and STW, in most communities local leaders coordinated these efforts closely. In fact, the two initiatives were merged into one entity in a few communities (particularly those in rural areas), with Tech Prep and STW leadership being one and the same. Consortia operating youth apprenticeship programs provided a good example of how fully integrated the Tech Prep and STW initiatives could become. In these areas, the school-based component that originated with Tech Prep was blended with work-based learning encouraged by STW. This high level of integration was a positive sign that the limited resources associated with both reforms could be coordinated to create a more systemic approach. Even so, some local leaders (particularly those in urban areas) felt uneasy about the relationship between Tech Prep and STW, perceiving unclear boundaries and duplication of effort. Even in regions where Tech Prep and STW were integrated extensively, local leaders worried about how similar or distinctive the two initiatives should be, especially with the pending sunset of STWOA. As local communities move forward, it is important to examine the relationship between Tech Prep and STW. Where Tech Prep has benefited from integration with STW, will it suffer when STW funds diminish? Will activities started with STW be sustained through local Tech Prep initiatives? How will Tech Prep students' experiences and outcomes be impacted by future changes in STW? These questions deserve careful examination, since the continued evolution of Tech Prep may be influenced by changes in local STW systems or similar initiatives that evolve in the future.

Student Enrollments in Tech Prep

The majority of consortia defined students as participants in Tech Prep in the last two years of high school, though some began to recruit as early as Grade 8. Parnell (1985) and others who followed his prescription targeted neglected majority or middle majority students for Tech Prep, but enrollment did not always reflect this specification. Even though at least 50% of the Tech Prep participants were between the 25th and 75th percentile on class rank at high school graduation, some consortia also targeted upper quartile students. In fact, the more highly rigorous the secondary curriculum, the more it attracted top students. For example, the two consortia designating curricula as College Tech Prep (the Sunland and Workforce Consortia) attracted far more students from the top quartile than those offering Tech Prep as a more general, untargeted approach, such as the Central State and Northwest Consortia. Regardless of the fact that the definition of a Tech Prep student varied across the sites, Tech Prep enrollments grew, but to varying degrees. In consortia providing three years of enrollment data, the percentage increase ranged from a high of approximately 250% in the Southern and Sunland Consortia to from 60% to 80% in the Northwest, Workforce, and Pacific Consortia. Moreover, Tech Prep enrollment as a percentage of total high school enrollment varied from only 7% in the Pacific Consortium to almost 35% in Sunland, and an average of 15% for the remaining sites (based on enrollment figures from six consortia over either two or three years).

There are many reasons for enrollment increases, including the fact that Tech Prep implementation was deepening and the initiatives were maturing over the 1990s. As more vocational-technical areas were designated as part of Tech Prep, as more teachers were trained, as more guidance mechanisms were developed, and as more students were informed and recruited, Tech Prep enrollments grew. Especially when STW came along with an emphasis on all students, enrollment growth was evident as the potential target audience expanded. In addition, most consortia offered an increasing array of technology-based programs that attracted students who might not have participated in traditional vocational subjects. Career pathways were implemented in all of the consortia in the mid- to late-1990s, and these pathways precipitated new options leading to college. Finally, consortia that linked Tech Prep to college scholarships had success in recruiting more students and encouraging them to further their studies at the postsecondary level. The River Valley Consortium's efforts were particularly impressive at encouraging students to transition to the local community college. Students in the Workforce, Central State, and Sunland Consortia were also enthusiastic about the financial support that Tech Prep scholarships had provided. When interviewed, students readily attributed the availability of scholarships to solidifying their commitment to Tech Prep, particularly at the postsecondary level. Further research is needed to examine enrollment patterns and the particular policies and practices that encourage and support diverse learners' participation in Tech Prep in secondary education but particularly the postsecondary level. Reliable estimates of Tech Prep enrollment at the postsecondary level are difficult to ascertain, but knowledge of student participation in the entire curriculum is essential to determining the success of Tech Prep. Questions also remain regarding student participation in new vocational-technical specialties, and further research should be done to assess the impact of support services, including scholarships, on student transitions from high school to college and/or work.

Local Governance Structures

Governance structures have developed incrementally to accommodate the expansion of Tech Prep. At the foundational level, administrative policies and organizational structures were already in place in secondary and postsecondary institutions, providing a framework for Tech Prep, both supporting its evolution and also constraining it. Traditional approaches to administration, curriculum, scheduling, and teaching sometimes impeded the adoption of changes endorsed by Tech Prep. (See "Raising the Bar" below for further discussion of this issue.) Often operating out of a consortium office housed at the postsecondary level, Tech Prep leaders had minimal control over secondary school finances, personnel, and other related policies that needed to be changed. Partly to enhance their authority, Tech Prep leaders organized a menage of school coordinators, committees, councils, and boards whose central purpose was to legitimize and focus implementation efforts at the secondary level. Because of their importance to establishing Tech Prep, most funds were spent on implementation at the secondary level, leaving few resources for postsecondary efforts. Though other factors contribute, an imbalance in distribution of resources between the secondary and postsecondary levels explains, at least in part, why limited activity took place at the postsecondary level relative to Tech Prep. (Consortium administration, facilitation of secondary curriculum reform, and professional development were the major foci of the postsecondary institutions engaged in this study, with far less emphasis on curriculum reform.)

In addition to more limited change in postsecondary institutions, leveraging change at the secondary level was a role played by business and industry. To some extent, the ongoing expansion of Tech Prep reflected the success of local leaders at eliciting business participation in the local implementation process. In fact, employers were highly visible in the majority of consortia studied. For example, the involvement of the Workforce Consortium in Tech Prep and later STW was precipitated by business and industry's plea for school reform. Building Tech Prep and later STW through a partnership between business and education resulted in the evolution of a governance structure over time, first through the combined chambers of commerce in the region and later through industry councils. Without question, the governance and administrative functions that underpin Tech Prep have an influence on implementation and its eventual impact on students; however, very little research has been done to examine these relationships. In addition, the complex roles that business and industry can play as an advocate for, stakeholder in, and/or beneficiary of Tech Prep are relatively unknown. Much more needs to be done to uncover effective ways to leverage change at all levels, particularly related to the complex roles played by business and industry.

Tech Prep and Academic Standards: Raising the Bar

Tech Prep has evolved and changed during the 1990s. As the decade proceeded, an important goal of Tech Prep was to become a legitimate part of the broader educational reform agenda, increasingly dedicated to raising academic standards. Whereas the goal of raising academic expectations for all students is essential, it is important to point out that the playing field shifted for Tech Prep. Consortia that built their programs emphasizing workforce development and technical employment found themselves making adjustments to keep abreast with new state and federal priorities dedicated almost exclusively to academic standards. Local leaders who had focused Tech Prep on the middle majority questioned how best to enable these students to meet increasingly higher academic standards at the same time they were engaged in more demanding technical preparation, often including work-based learning. With the realities of limited scheduling options in most high schools, many leaders were perplexed about how to conceptualize Tech Prep in ways that would deliver advanced (and also integrated) academic and vocational-technical course work. Without question, they were dedicated to making this change but unsure about what to do about the segregated academic and vocational tracks that still dictated high school curriculum. To make such a dramatic change, policies had to be modified in the overall educational system and these decisions usually went well beyond the authority of Tech Prep coordinators. Even with the best political savvy, Tech Prep leaders could influence but not change policies that were not within their span of control. For many educators working to implement Tech Prep, this dilemma represented a continual frustration. Moreover, having seen the purpose of Tech Prep shift throughout the 1990s, they looked to the future and wondered whether the goals that mattered today would still be a priority tomorrow.

Certainly, having seen Tech Prep increasingly linked to higher academic standards, it is important to know how Tech Prep participants perform and whether they are indeed better prepared in the core academics than their non-Tech Prep counterparts? It is also important to know how Tech Prep contributes to the employability of graduates, particularly in technical fields that are growing in importance. Further, it is essential to know the demographic and educational characteristics of students who participate in these programs to better understand who is benefiting and who is being left behind. In our future analysis, we hope to address many of these critical questions, but we urge other researchers and policy analysts to launch studies that can provide needed answers.

The Critical Role of Professional Development

Professional development has proved to be an increasingly prominent component of Tech Prep. Over the years, the number and type of professional development opportunities provided by consortia have increased, along with the number and type of constituents participating. In its first year or two, as few as ten personnel from an entire consortium might have been engaged in professional development, and these were mostly secondary vocational-technical faculty. However, in recent years more than 400 participants have engaged in professional development on a regular basis in some consortia studied. These participants included a much more diverse group of participants than earlier days, including academic and vocational-technical faculty (secondary and postsecondary), as well as parents, business and industry representatives, community leaders, and students. Over time, as Tech Prep shifted from the awareness and planning stages to full-scale implementation, professional development was used to support its evolution. First, it was used to help sell and inform about Tech Prep, but later it was used to provide necessary information to develop core curriculum and provide integrated and applied instruction. Still later the focus turned to work-based learning.

Faculty became involved in Tech Prep for many reasons, but early conferences and workshops provided them with the rationale for Tech Prep and instruction on how to use applied curriculum materials. Consortia that purchased software, integrated item banks, equipment, and curriculum packages engaged faculty in training to use these resources. In the mid-1990s, consortia reported less training on off-the-shelf materials and more efforts focusing on more complex models of academic and vocational integration (e.g., team teaching, paired courses, career academies, learning communities), contextual learning, and curriculum development. In fact, curriculum integration became a pervasive focus of professional development throughout all consortia studied. More recently and sometimes in conjunction with STW, several consortia began to implement or expand professional development for faculty in business and industry. Used extensively in a few consortia, this approach was attributed with having a very positive impact on changing faculty attitudes about Tech Prep. Professional development involving employers also helped to improve career guidance as more counselors participated in training that provided up-to-date information about careers and the workplace. No doubt, over time Tech Prep has benefited from the active involvement of many stakeholders who became engaged through professional development activities. Recognizing this trend, it remains extremely difficult to determine the precise impact professional development has had on Tech Prep implementation. Understanding the relationship between professional development and implementation is vitally important to future educational reform. Determining the relationships between professional development and student outcomes is even more tenuous but vitally important because of their implication for initiating and sustaining change over the long term.

Tech Prep and Curriculum Reform

A number of promising developments were apparent in the evolution of Tech Prep curriculum, particularly articulated and integrated curriculum and work-based learning. First, articulation agreements provided the foundation for curriculum reform associated with Tech Prep throughout the 1990s; however, consortia struggled to entice students to access the articulated credits they accumulated in high school. Although mechanisms for monitoring articulated credits among college entrants were not well developed, anecdotal evidence suggested many students failed to capitalize on the college credits they acquired in their secondary Tech Prep programs. Without institutional support and concerted effort, students were either unaware or unwilling to access credits, providing a source of frustration for Tech Prep advocates. Clearly, more attention needs to be paid to making this fundamental element of Tech Prep more attractive to students. Still, the articulation process has other benefits that should not be overlooked. Through articulation, educators from the secondary and postsecondary levels were able to communicate about content and standards and create structured sequences of courses, providing a logical curricular progression from the secondary to postsecondary level. Also, the articulation process facilitated the continuous review of courses and the adaptation of existing content to new academic and occupational standards. Increasingly career pathways were used to organize curriculum, and their usage had a positive impact on curriculum, helping to broaden vocational-technical education and integrate it more fully with core academics. Some consortia developed career pathways in response to state directives, but others adopted them on their own, learning about them from state personnel or professional organizations. Though the language for career pathways varied from site to site, the most predominant foci were: agricultural science/technology and natural resources/sciences; arts, communications, and media technologies; business and management systems/technologies; health and health sciences technologies; human and public service technologies; industrial and engineering technologies; and transportation systems technologies.

Another aspect of curriculum that was evolving and expanding was work-based learning, though this strategy varied greatly from site to site according to geographic location and the type of work sites available. Nonetheless, in some instances rural schools had developed more sophisticated and extensive work-based learning options than urban schools where the range of work sites seemed unlimited. Even within consortia, work-based learning opportunities varied, with some schools showing more interest in developing alternative learning strategies than others, usually depending upon the support of the local school administration. Based on this study, the work-based learning component appeared strong in half of the consortia studied. Sites that offered the highest quality programs provided a variety of opportunities and integrated them carefully with school-based learning. The two consortia that had the most sophisticated work-based learning options were located in regions where manufacturing was prolific but undergoing dramatic change. In both of these consortia, youth apprenticeships had been developed through sustained partnerships between the schools and local businesses, with community colleges playing a pivotal role in facilitating and sustaining these initiatives.

Finally, with respect to curriculum, we would be remiss if we did not mention the continuing struggle with implementation of academic and vocational education apparent in these consortia. Inasmuch as the local Tech Prep leaders had committed to systemic reform, their challenge was not so much in integrating academic and vocational education as striking a new balance between the two. With so much pressure on schools to raise academic standards, school administrators and faculty were reluctant to steer away from traditional academic courses. While they supported the idea of Tech Prep and its core curriculum of academic and vocational education, their ongoing challenge was in finding ways to implement it successfully. With some consortia getting a slow start with Tech Prep because of its close affiliation with applied academics, several local leaders were hesitant to recommend untested curriculum strategies. Rather, they were much more likely to encourage faculty to stick with standard academic content but teach it in more interesting and engaging ways, using real-world problems and applications. Consequently, the consortia were increasingly emphasizing contextual teaching and learning, project-based instruction, and other applied teaching techniques, rather than applied courses. Still, knowing what curriculum to offer and how to teach it remains a continuing struggle for Tech Prep consortia. Knowing which approaches make a difference in students' learning and outcomes is the critical question of nearly every educational reform, and Tech Prep is no exception. Much more research and evaluation is needed to determine the impact of Tech Prep on student learning, particularly at the secondary level.

Transition to College and Work

A primary goal of Tech Prep is to assist more students to transition to college having completed rigorous academic and vocational-technical courses in high school. By examining transition rates, we begin to get an idea of the extent to which Tech Prep is meeting this goal. And, indeed, this study revealed that a high percentage of Tech Prep participants continued on to postsecondary education of some type after high school graduation. Across all eight sites, at least 70% of the Tech Prep participants had continued their education at the postsecondary level after high school graduation. In fact, transition to college was extremely high in five of the eight consortia, with over 85% of the Tech Prep graduates reporting that they had continued on to two- and/or four-year college. In most sites, Tech Prep participants enrolled in two-year college at a higher rate than their non-Tech Prep peers. Also, although preliminary, the Tech Prep model employed by consortia did appear to influence students' transition behaviors, with College Tech Prep graduates more likely to pursue four-year college than graduates of other Tech

Prep models, such as the vocational Tech Prep approach. However, a wide range of factors can influence students' transition decisions, including the personal characteristics of students, the geographic location of the consortium, the availability of postsecondary institutions, and so forth. Without more rigorous analysis, it is difficult to know how Tech Prep students' secondary educational experiences may have influenced their decisions about college and work. Further analysis using the data set obtained through this study, supplemented with additional longitudinal data collection, is necessary to determine the extent to which students' initial transition decisions relate to college readiness (i.e., entry into college without remediation), persistence, and college completion. Answering this question is also important to determining the long-term economic benefits associated with student participation in Tech Prep. As more Tech Prep consortia engage students in a secondary-to-postsecondary progression, opportunities for research on student transition behaviors increase. Researchers concerned about student transition are urged to examine these issues, with the ultimate goal of improving Tech Prep and related educational policy and practice at all levels.

REFERENCES

Adelman, C. (1995*). The new college course map and transcript files: Changes in course-taking and achievement, 1972-1993.* Washington, DC: U.S. Department of Education.

Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment.* Washington, DC: U.S. Department of Education.

Apple, M. (1995). The politics of a national curriculum. In P. W. Cookson, Jr. and B. Schneider (Eds.), *Transforming schools* (pp. 345-370). New York, NY: Garland.

Boesel, D., & Fredland, E. (1999). *College for all?* Washington, DC: National Library of Education, Office of Educational Research and Improvement, U.S. Department of Education.

Boesel, D., & McFarland, L. (1994). *Final report to Congress, volume 1, summary and recommendations.* Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Boesel, D., Rahn, M. L., & Deich, S. (1994, July). *Final report to Congress, volume III, program improvement: Education reform.* Washington, DC: U. S. Department of Education, Office of Educational Research and Improvement.

Borman, K., & Schneider, B. (Eds.). (1998). *The adolescent years: Social influences and educational challenges.* Chicago, IL: National Society for the Study of Education.

Bragg, D. (Ed.). (1992, December). *Implementing tech prep: A guide to planning a quality initiative* (MDS-241). Berkeley, CA: National Center for Research in Vocational Education, University of California at Berkeley.

Bragg, D., Layton, J., & Hammons, F. (1994, October). *Tech prep implementation in the United States: Promising trends and lingering challenges* (MDS-714). Berkeley, CA: National Center for Research in Vocational Education, University of California at Berkeley.

Bragg, D. (1995). Linking high schools to postsecondary institutions: The role of tech prep. In W. N. Grubb (Ed.), *Educating through occupations in American high schools* (pp. 191-211). New York, NY: Teachers College Press.

Bragg, D., Puckett, P., Reger, W., Thomas, S., Ortman, J., & Dornsife, C. (1997, December). *Tech prep/school-to-work partnerships: More trends and challenges* (MDS-1078). Berkeley, CA: National Center for Research in Vocational Education, University of California at Berkeley.

Brown, J. M., Pucel, D., Twohig, C., Semler, S., & Kuchinke, K. P. (1998). Minnesota's Tech Prep Outcome Evaluation Model. *Journal of Industrial Teacher Education, 35*(3). 44-66.

Creswell, J. (1995). *Research design: Qualitative and quantitative approaches.* Beverly Hills, CA: Sage.

Dillman, D. (1978). *Mail and telephone surveys: The total design method*. New York, NY: Wiley.

Dornsife, C. (1992). *Beyond articulation*. Berkeley, CA: National Center for Research in Vocational Education, University of California, Berkeley.

Fuhrman, S. H. (Ed.). (1993). *Designing coherent education policy: Improving the system.* San Francisco, CA: Jossey-Bass.

Gardner, H. (1991). *The unschooled mind: How children think and how schools should teach.* New York, NY: Basic Books.

Gifford, A., Hoachlander, E. G., & Tuma, J. (1989). *The Secondary School Taxonomy Final Report*. Berkeley, CA: MPR Associates.

Halperin, S. (Ed.). (1998). *The forgotten half revisited: American youth and young families, 1988-2008.* Washington, DC: American Youth Policy Forum, Inc.

Hamilton, S. (1990). *Apprenticeship for adulthood*. New York, CA: The Free Press.

Haimson, J., Hershey, A., & Silverberg, M. (1999, February). *Expanding options for students: Report to Congress on the national evaluation of school-to-work implementation.* Princeton, NJ: Mathematica Policy Research, Inc.

Hammons, F. (1999). *Florida tech prep evaluation*. Miami, FL: Institute for Workforce Competitiveness, Florida International University.

Hershey, A., Silverberg, M., & Owens, T. (1995). *Diverse forms of tech-prep: Implementation approaches in ten local consortia.* Washington, DC: U.S. Department of Education.

Hershey, A., Silverberg, M., Owens, T., & Hulsey, L. (1998). *Focus for the future: The final report of the national Tech Prep evaluation.* Princeton, NJ: Mathematica Policy Research, Inc.

Horn, L. (1998). *Stopouts or stayouts? Undergraduates who leave college in their first year*. Washington, DC: National Center for Educational Statistics.

Horn, L., Berktold, J., & Malizio, A. (1998, May). *Profile of undergraduates in U.S. Postsecondary education institutions: 1995-96.* Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

Hull, D., & Grevelle, J. (1998). *Tech prep: The next generation.* Waco, TX: Center for Occupational Research and Development.

Kirst, M. W. (1998). *Improving and aligning K-16 standards, admissions, and freshman placement policies.* Stanford, CA: National Center for Postsecondary Improvement, Stanford University.

Layton, J., & Bragg, D. (1992). Initiation of tech prep by the fifty states. In D. D. Bragg, (Ed.), *Implementing tech prep: A guide to planning a quality initiative* (MDS-241) (pp. 4-1 to 4-18). Berkeley, CA: National Center for Research in Vocational Education, University of California at Berkeley.

Lewis, L., & Farris, E. (1997). *Remedial education at higher education institutions in Fall 1995.* Washington, DC: National Center for Education Statistics.

McDonnell, L. M., & Elmore, R. F. (1987, Summer). Getting the job done: Alternative policy instruments. *Educational evaluation and policy analysis, 9*(2), 133-152.

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform.* Washington, DC: Author.

Olsen, L. (1997). *The school-to-work revolution.* Reading, MA: Addison-Wesley.

Orr, M. T. (1998). Integrating secondary schools and community colleges through school to work transition and educational reform. *Journal of Vocational Education Research*, *23*(2), 6-25.

Parnell, D. (1985). *The neglected majority*. Washington, DC: Community College Press.

Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students.* San Francisco, CA: Jossey-Bass.

Patton, M. (1996). *Qualitative evaluation methods*. Beverly Hills, CA: Sage.

Patton, M. (1997). *Utilization-focused evaluation*. Beverly Hills, CA: Sage.

Phillippe, K. A. (1997). *National profile of community colleges: Trends & statistics 1997-98.* Washington, DC: Community College Press.

Resnick, L. B., & Wirt, J. G. (Eds.). (1996). *Linking school and work: Roles for standards and assessment.* San Francisco, CA: Jossey-Bass.

Schneider, B., & Stevenson, D. (1999). *The ambitious generation.* New Haven, CT: Yale University Press.

Secretary's Commission on Achieving Necessary Skills (SCANS). (1991). What work requires of schools: A SCANS report for America 2000. Washington, DC: U.S. Department of Labor.

Silverberg, M. (1996a). *The continuing development of local tech-prep initiatives.* Washington, DC: U.S. Department of Education.

Silverberg, M. (1996b). *Building school-to-work systems on a tech prep foundation: The status of school-to-work features in tech-prep initiatives.* Washington, DC: U.S. Department of Education.

Sizer, T. R. (1984). *Horace's compromise: The dilemma of the American high school.* Boston, MA: Houghton Mifflin.

Stern, D., Stone, J. R., Hopkins, C., McMillion, M., & Cagampang, H. (1994, March). *Quality of work experience as perceived by two-year college students in co-op and non-co-op jobs.* (MDS-761). Berkeley, CA: National Center for Research in Vocational Education, University of California at Berkeley.

Tyack, D, & Cuban, L. (1995). *Tinkering toward utopia: A century of public school reform.* Cambridge, MA: Harvard University Press.

United States Department of Education. (1998). *Digest of Education Statistics, 1997*. Washington, DC: Author.

Urquiola, M., Stern, D., Horn, I., Dornsife, C., Chi, B., Williams, L., Merritt, D., Hughes, K., & Bailey, T. (1997, November). *School to work, college and career: A review of policy, practice, and results 1993-1997.* Berkeley, CA: National Center for Research in Vocational Education, University of California at Berkeley.

Weiss, C. (1998). *Evaluation, 2nd edition*. Upper Saddle River, NJ: Prentice Hall.

William T. Grant Foundation. (1988, November). *The forgotten half: Pathways to success for America's youth and young families.* Washington, DC: Author.

Wilson, B. L., & Rossman, G. B. (1993). *Mandating academic excellence: High school responses to state curriculum reform.* New York, NY: Teachers College Press.

Zemsky, R., Shapiro, D., Iannozzi, M., Cappelli, P., & Bailey, T. (1998). *The transition from initial education to working life in the United States of America.* Stanford, CA: National Center for Postsecondary Improvement, Stanford University.

APPENDIX A
SAMPLING DETAILS

Site and Institutional Selection

In the winter of 1998, we met with the leaders of the initial six consortia involved in the study to devise a sampling plan to ensure a representative group of schools. (Later, when two new consortia were added, similar meetings were conducted with local leaders to develop sampling plans for these sites.) Criteria that guided the selection of consortia were also used to select schools within consortia. (Refer to the methods section for further discussion of consortium selection criteria.) However, three items were added to the selection criteria to ensure that the schools chosen for the study were consistent with the research goals. First, the selected schools needed to have students participating in Tech Prep during the academic years being investigated (1993-94 through 1997-98). Second, the sample of schools was to be representative of the approach the entire consortium was using for Tech Prep implementation, including the focus, breadth, and depth of implementation. We did not want consortia to choose only their most advanced Tech Prep schools, but rather a representative group of schools that was implementing Tech Prep at the time. Third, leaders of the individual schools needed to be willing to participate and be responsive to providing access to data needed for this study. Table 1 shows the number of secondary and postsecondary schools and student samples for each consortium. (Minor variations in sample sizes are evident in this report because of the timing of the data collection and analysis relative to the report writing for each site, which began in June and July of 1999.)

Once the schools were selected, a sample of high school graduates was selected from each school following the procedure outlined in the methods section of this report (see Table 1). The worksheet used to guide sampling groups of Tech Prep and non-Tech Prep high school graduates within each consortium is shown in Table 2.

Table 1

NCRVE Tech Prep/STW Transcript and Survey Responses

	Central State	River Valley	Southern	Sunland	Northwest	Metro-politan	Workforce Develop-ment	Pacific	Total
Number of High Schools	10	14	6	15	3	2	6	5	61
Number of Secondary Area Vocational Centers	1	2	1	3	0	0	1	0	8
Number of Two-Year Colleges or Four-Year Colleges	1	1	1	2	1	1	1	3	11
Tech Prep Students	258	200	295	298	263	317	373	313	2317
Non-Tech Prep Students	263	211	291	297	269	326	311	310	2278
Youth Apprentices	37	0	0	0	0	0	39	0	76
Total Sample	558	411	586	595	532	643	723	623	4671
High School Transcripts	549 (98%)	291 (71%)	586 (100%)	595 (100%)	504 (95%)	610 (95%)	723 (100%)	622 (99%)	4480 (92%)
College Transcripts	241 (43%)	158 (39%)	310 (52%)	296 (50%)	320 (60%)	116 (18%)	146 (20%)	281 (45%)	1868 (38%)
Total Number of Surveys Received	347 (62%)	201 (49%)	256 (44%)	286 (48%)	236 (44%)	282 (44%)	369 (51%)	245 (39%)	2224 (48%)

Note: College transcripts were sought from the lead college(s) for all students in the study and obtained for any student who had matriculated to the institution(s). Other college transcripts were not obtained for this analysis, due to resource limitations.

Table 2

Official Worksheet for Determining NCRVE TP/STW Study Population and Sample[1]

Consortium:____

	School:__________		School:__________		School:__________		School:__________		All Schools in the Consortium	
Graduation Years	TP graduates	HS graduates	TP graduates	HS graduates	TP graduates	HS graduates	TP graduates	HS graduates	Total TP Grads	Total HS Grads
1995										
1996										
1997										
Total										

Directions:

1. In the top row, insert the names of all secondary schools that are considered official members of your local TP consortium at the present time.
2. For each official secondary school, indicate the total number of students in the graduating class of 1995, 1996, and 1997 that fit your local consortium's definition of a Tech Prep student. If no students fit the definition of a Tech Prep student/graduate in a particular year, indicate zero (0).
3. Also for each official secondary school, indicate the total number of students who graduated in the spring of 1995, 1996, and 1997.
4. In the last column of the grid, add up the number of TP graduates and HS graduates from all secondary schools to provide a total count of TP graduates and HS graduates for the local consortium for each graduation year: 1995, 1996, and 1997.
5. In the last row of the grid, add up the number of TP graduates and HS graduates for 1995, 1996, and 1997 to provide a total count of TP graduates and HS graduates for each secondary school.

[1] Duplicate this sheet and provide data on all schools considered official members of your local TP consortium.

Detailed Site-by-Site Sample Selection Decisions

Though the same guidelines were used for student sampling, variation in local circumstances created the need to devise specific sampling plans for all consortia studied. A brief description of each site selection plan for schools and graduates follows.

Central State

The Central State site was selected to participate in the study due to its rural, mid-west location and its recognized emphasis on work-based learning (WBL) as a key component of Tech Prep. Utilizing the state's definition, the Central State Consortium defined a Tech Prep student as one who had made a conscious decision to follow a clearly defined sequence of courses to prepare for employment in a Tech Prep occupation. Besides the general Tech Prep student, youth apprentices were identified as a distinct group within Tech Prep because of their WBL experiences. General Tech Prep students were typically identified by school counselors because of their stated intent to participate in Tech Prep, their completion of an Individual Career Plan (ICP) specifying courses and career objectives linked to a Tech Prep program of study, and their participation in technical courses. Utilizing the NCRVE worksheet, we identified a sample of Tech Prep students from 10 high schools that were actively engaged in Tech Prep implementation. (Recall there were actually 12 high schools in the county, but only 10 were actively engaged in Tech Prep implementation.) Within these 10 high schools, a total of 258 Tech Prep and a comparison group of 263 non-Tech Prep graduates were selected. A subgroup of 37 youth apprentice graduates was also identified as part of the analysis. An additional secondary school was included in the study, an area vocational center, because of its prominence in the Tech Prep approach in this region. However, since the student population of this area center is comprised of other high schools' students, it is not treated as a distinct entity. See Table 3 for a summary of total high school graduates, total Tech Prep graduates, and the Tech Prep sample for this site and all others included in the study.

Table 3

Total High School Graduates, Tech Prep Graduates, and Student Sample by Site

Consortia Graduation Years of Sample	Total High School Graduates	Number and Percent Tech Prep Graduates of Total HS Graduates	Sample Size as Number and Percent of Tech Prep Graduates
Central State (1996 & 1997)	1805	370 (20%)	258 (70%)
River Valley (1996 & 1997)	NA	NA (NA%)	200 (NA%)
Southern (1995-1997)	2763	954 (34%)	295 (31%)
Sunland (1995-97)	17,614	1839 (10%)	298 (16%)
Northwest (1995-97)	2902	530 (18%)	263 (50%)
Metropolitan (1995-97)	NA	NA (NA%)	317 (NA%)
Workforce (1996-98)	3184	408 (13%)	373 (91%)
Pacific (1995-97)	4482	313 (7%)	313 (100%)

Note: NA means Not Available.

River Valley

The River Valley Consortium was selected because it represented the 2+2 Tech Prep associate degree model and was based extensively on the approach to Tech Prep advocated by the state. It is also located in a mid-west state that is highly industrial and characterized by urban, suburban, and rural communities. The River Valley Consortium identifies a Tech Prep student as one who is enrolled in a sanctioned Tech Prep program, beginning in grade 11 and continuing through the associate degree in the occupational and employability competency delivery system. Thus far the Tech Prep program has been small and somewhat selective; students are nominated for the program by school personnel based on specific selection criteria (e.g., pass of ninth-grade state proficiency test, successful completion of Algebra I). In this consortium, 67 high schools make up the entire consortium, but the student sample was selected from two career centers (with 28 total feeder high schools) and also from one large comprehensive high school. These secondary institutions were chosen because they were the most active, and they enrolled a fairly sizeable number of Tech Prep students in the consortium. Within the two career centers, the sample was further confined to 14 feeder high schools with at least 10 Tech Prep students to reduce the burden on local personnel in collecting transcripts from so many different high schools. For the schools having 10 or more Tech Prep students, all students were included in the sample. A total of 200 Tech Prep graduates was included in the sample and 211 non-Tech Prep graduates were randomly selected (see Table 3).

Southern

The Southern Consortium was selected to be part of the study because of its location in a southern state and also because of its rural location. The site had a well developed vocational articulation process and also a highly established set of definitions for identifying Tech Prep programs and students, aligning local definitions closely with state policies and guidelines. The Southern Consortium defined a Tech Prep student as one who had signed an intent to follow an approved Tech Prep high school plan of study leading to postsecondary education and training and who had enrolled in a coherent sequence of academic and technical courses appropriate to that plan. A sample of six high schools was selected purposively from 18 (17 public, 1 private) to ensure a balance of school size and type. Specifically, four small, rural schools from across the large geographic region were selected, as well as two large high schools located in the town at the center of the consortium. The selected high schools were thought to provide features typical of Tech Prep/STW implementation in this consortium, and they included diverse student populations. In total, 295 Tech Prep graduates were chosen randomly to participate in the study, and 291 non-Tech Prep graduates were selected as the comparison group (see Table 3). About one-half of the graduates associated with each group came from the small, rural schools, and the other half came from the two larger schools.

Sunland

The Sunland Consortium was chosen to participate due to its large urban composition in a southern state. When selecting this consortium, it was described by state officials as gaining a relatively late start with Tech Prep in comparison to other consortia who first received planning grants in the same year, but its commitment to Tech Prep, especially through its local leadership and careful execution of evaluation for program improvement, had facilitated advancements in the mid-1990s. Following the definition of Tech Prep provided by the state, the Sunland Consortium defined a Tech Prep student as any student who was at grade level by the junior year, who had completed at least one technical course in an articulated study, and two courses each of English, science, mathematics at level II or III prior to graduation. Students were identified as Tech Prep once they signed a Course of Study Agreement at the end of their eighth grade year. Using this definition, a total of 298 Tech Prep graduates was selected from all 15 (out of 18) high schools that had implemented Tech Prep in this consortium throughout the 1990s. This site selected 297 non-Tech Prep graduates for the comparison group (see Table 3).

Northwest

Among the eight consortia selected for this study, the Northwest Consortium was the first to implement Tech Prep and receive recognition for its programs, starting prior to passage of the federal Tech Prep Education Act. Besides its long-standing commitment to Tech Prep implementation, relying heavily on vocational articulation, this site brought a predominantly suburban environment into the study. The Northwest Consortium identified Tech Prep students based on a state and locally-adopted definition that specified that students explicitly select Tech Prep and earn a minimum of two credits in professional-technical courses between their junior and senior year. We randomly selected 263 Tech Prep graduates, representing 50% of the Tech Prep graduates from three of the seven high schools in the consortium. We also randomly selected 269 non-Tech Prep graduates to comprise the comparison group (see Table 3). The high schools were chosen because they were the only three that had identified Tech Prep students and supplied baseline records on these students to the regional educational system, based on the state/local definition. All three of these high schools had been engaged in Tech Prep implementation in a serious manner; two had been identified as leaders of innovative practices related to Tech Prep and STW on a state and national basis.

Metropolitan

The Metropolitan Consortium was selected for this study because of its large urban location, diverse student population, and emphasis on an integrated Tech Prep approach, developed at least in part through its association with the NCRVE Urban Schools Network. The Metropolitan Consortium defined a Tech Prep student as any junior or senior enrolled in Tech Prep math and Tech Prep English courses. We randomly selected 317 Tech Prep graduates from two of 15 high schools in this consortium. In addition, a random sample of 326 non-Tech Prep graduates was selected for the comparison group (see Table 3). The high schools selected for the study were the two that had the longest period of time to implement Tech Prep with the largest enrollments of students characterized as the neglected majority. One other high school having implemented Tech Prep for an equal amount of time was considered for the study, but eliminated because its school population was more highly selective, primarily college prep, and not particularly indicative of the overall student population served by schools in this consortium.

Workforce Development

The Workforce Consortium was chosen to be a part of this study because of the breadth of types of schools in the consortium, i.e., urban, rural, and suburban. In addition, this consortium's well-respected youth apprentice program was tightly linked to the Tech Prep initiative and had been functioning long enough to be considered a mature aspect of the program. The consortium's southeastern United States location was another contributing factor in its selection. The Workforce Consortium targeted all students to be a part of Tech Prep because local leaders believed that all students needed both the strong academic foundation and the technical skills to be successful in today's work world. Students enrolled in Tech Prep were also to be engaged in college prep, as technical courses taken during high school fulfilled electives for the college prep program of study. Following an audit to ensure that students were truly college Tech Prep completers (as high school graduates), we selected 373 Tech Prep graduates to participate in the study. All 1996 and 1997 Tech Prep graduates were selected from the first six high schools to implement Tech Prep in this consortium. In addition, approximately 50% of the 1998

Tech Prep graduates were selected from these same high schools, and a sub-group of 39 youth apprentices was identified from the 1997 and 1998 graduating classes. A comparison group of 311 non-Tech Prep graduates was selected for the analysis (see Table 3).

Pacific

The Pacific Consortium was selected because of its diverse suburban and urban communities in a high tech, high labor market area outside a major metropolitan city on the west coast. The Pacific Consortium identified a Tech Prep student simply as one who had completed an articulated vocational course. That is, if a student completed a high school course that articulated with a community college course in a technical area, the student then received a Tech Prep certificate. The Tech Prep certificate enabled a student to receive college credit for a course upon completion of six credit hours at any one of the three community colleges in the consortium. Given this definition, 313 Tech Prep graduates (i.e., all of the Tech Prep graduates for 1995, 1996, and 1997) were selected from five high schools in the consortium (see Table 3). These high schools were located in the northern and central parts of the consortium to provide variation in student demographics and school type within the study. (Note that a high school selected from the southern region of the consortium gave serious consideration to participating in the study but ultimately declined our invitation due to concerns about excessive burden on administrative personnel.) A total of 310 non-Tech Prep graduates was randomly selected as well.

Education To Careers Follow-Up Survey

Conducted by

National Center for Research in Vocational Education

University of Illinois at Urbana-Champaign
Champaign, Illinois

University of California at Berkeley
Berkeley, California

Supported by

The Office of Vocational and Adult Education
U.S. Department of Education

Part One

High School Experiences

This set of questions asks about the education and jobs you may have had during high school.

1. How satisfied are you with the education you received during high school? *(Circle the one best response.)*

   1 Extremely satisfied
   2 Very satisfied
   3 Fairly satisfied
   4 Somewhat satisfied
   5 Not at all satisfied

2. How useful was what you learned in high school to what you've done since high school graduation? *(Circle the one best response.)*

   1 Extremely useful
   2 Very useful
   3 Fairly useful
   4 Somewhat useful
   5 Not at all useful

3. While you were enrolled in high school, did you ever hold a job?

   1 no **SKIP TO QUESTION 6 ON PAGE 2**
   2 yes CONTINUE TO QUESTION 4

4. Please estimate the amount of money you made per hour in the last job you held before high school graduation. If you held more than one job, choose the job where you worked the most hours. *(Circle the one best response.)*

   1 Zero…. My job was unpaid
   2 Less than $5.25 per hour
   3 $5.26 to $6.00 per hour
   4 $6.01 to $7.00 per hour
   5 $7.01 to $8.00 per hour
   6 More than $8.00 per hour
   7 I don't know

5. In the last job you held before high school graduation, how many total hours did you work during a typical week? *(Circle the one best response.)*

   1 Less than 5 hours
   2 6-10 hours
   3 11-20 hours
   4 21-30 hours
   5 31-40 hours
   6 More than 40 hours

6. Sometimes high schools arrange special opportunities for students to learn about careers. Which of the following experiences did you participate in while enrolled in high school? *(Circle all that apply.)*

   1 **Job shadowing –** where students spend time following workers in a work site
   2 **Internship** – where students work for an employer to learn about a particular occupation or industry
   3 **Cooperative education (Co-op) –** where students work in a job for which they get school credit
   4 **Tech Prep –** where students participate in academic and vocational classes that have a clear career focus that links high school and two-year college
   5 **Youth apprenticeship –** where students participate in a guided worksite learning experience that is closely associated with their classes in high school and two-year college
   6 **School-sponsored enterprise/business –** where students operate a business or provide services as part of an enterprise sponsored by a school and often located on school property
   7 **Career Academy** – where groups of students and teachers stay together for some of their classes in high school, students take classes in an occupational area and have jobs related to this occupation
   8 **Community service and service learning –** where students do volunteer work in the community that may or may not be related to their career interests
   9 **I did not participate** in any of the above experiences while in high school

7. Since graduating from high school have you ever enrolled in any college or university? *(Circle the one best response.)*

   1 no **SKIP TO QUESTION 20 ON PAGE 5**
   2 yes CONTINUE TO QUESTION 8

Part Two

College Experiences

This set of questions asks about the schools, colleges and universities that you have attended since high school graduation.

8. Since graduating from high school, which of the following types of colleges or universities have you attended? *(Circle all that apply.)*

   1 Two-year community or junior college
   2 Vocational, technical, trade or business school
   3 Four-year college or university
   4 Other - *Specify*____

9. List the name of each college/university that you have attended, the location of the college/university by city and state, and the dates you started and ended enrollment. *(If necessary, list additional colleges/universities on a separate sheet and return it with this survey.)*

College/University Name	City/State	Dates started and ended
EXAMPLE: Lincoln College	*Lincoln, Illinois*	*Sept. 1, 1996 – May 15, 1998*

10. How soon after high school graduation did you first enroll in a college/university? *(Circle the one best response.)*

    1 Within six months of high school graduation

    2 Six months to one year after high school graduation

    3 More than one year after high school graduation

11. Of the following categories of college majors, which one most closely matches your chosen program of study? *(Circle the one best response.)*

    1 **Agriculture** (agricultural business, natural resources, animal science, horticulture, farm management)

    2 **Allied health** (medical, dental, occupational or physical therapy, nursing, radiology, veterinary science)

    3 **Business and information technology** (accounting, banking, computer programming, information processing, secretarial, general management, marketing, real estate, travel agent)

    4 **Human services** (teacher, teacher assistant, child care, fashion design, hotel management, chef)

    5 **Humanities, Fine arts and Communications** (art, drama, English, music, foreign languages, journalism, television/radio, commercial art)

    6 **Industrial/engineering technology** (construction, machining, electronics, automotive, manufacturing)

    7 **Public service** (law and law enforcement, legal assistant, firefighting, social worker, armed services)

    8 **Science and mathematics** (biology, chemistry, math, physics, engineering, computer science)

    9 **Social and behavioral sciences** (economics, history, psychology, sociology)

    10 **Other** - *Specify*____

    11 **I am undecided about my college major**

12. Over all the time you have enrolled in college, have you usually been a full time or part time student? *(Circle the one best response.)*

    1 Full time (more than 12 credit hours per term/semester)

    2 Part time (less than 12 credit hours per term/semester)

13. How much of your college program (as identified in Question 11 above) have you already completed? *(Circle the one best response.)*

    1 Less than one-fourth

    2 About one-fourth

    3 About half

    4 About three-fourths

    5 More than three-fourths

    6 I have completed my entire college program

14. Which of the following college credentials are you seeking right now? *(Circle the one best response.)*

    1 A certificate or license requiring less than a two-year degree

    2 An associate of applied science degree in an occupational-technical field

    3 A transfer associate of science or arts degree designed for continuation at a four-year college

    4 A bachelor's degree

    5 Other – *Specify*____

    6 I am no longer seeking a college credential

15. Since high school graduation, which college credentials have you already received? *(Circle all that apply.)*
    1 A certificate or license requiring less than a two-year degree
    2 An associate of applied science degree in an occupational-technical field
    3 A transfer associate of science or arts degree designed for continuation at a four-year college
    4 A bachelor's degree
    5 Other – *Specify*____
    6 I have not completed any college credential since high school graduation

16. Sometimes colleges arrange special opportunities for students to learn about careers. Which of the following experiences did you participate in while enrolled in college? *(Circle all that apply.)*
    1 **Job shadowing –** where students spend time following workers in a work site
    2 **Internship –** where students work for an employer to learn about a particular occupation or industry
    3 **Cooperative education (Co-op)** – where students work in a job for which they get school credit
    4 **Tech Prep –** where students participate in academic and vocational classes that have a clear career focus that links high school and two-year college
    5 **Youth apprenticeship** – where students participate in a guided worksite learning experience that is closely associated with their classes in high school and two-year college
    6 **School-sponsored enterprise/business –** where students operate a business or provide services as part of an enterprise sponsored by a school and often located on school property
    7 **Community service and service learning** – where students do volunteer work in the community that may or may not be related to their career interests
    8 **Clinical or practicum experience –** where students engage in work to help them prepare for a certificate or license in health care, education, law, or other professional-technical fields
    9 **Learning communities –** where groups of students and teachers stay together for some of their classes in college, students take classes in an occupational area and have jobs related to this occupation
    10 **I did not participate** in any of the above experiences while in college

17. How important are the things you have learned in college to your career goals?
    1 Extremely important
    2 Very important
    3 Fairly important
    4 Somewhat important
    5 Not at all important

18. If it were up to you, how far would you go in school?
    1 A certificate or license requiring less than a two-year degree
    2 An associate of applied science degree in an occupational-technical field
    3 A transfer associate of science or arts degree designed for continuation at a four-year college
    4 A bachelor's degree
    5 A graduate or advanced degree such as Master's, Doctorate or M.D.
    6 Other **–** *Specify*____

19. How confident do you feel that you will reach your ultimate educational goal?
    1 Extremely confident
    2 Very confident
    3 Fairly confident
    4 Somewhat confident
    5 Not at all confident

Part Three

Employment after High School

This set of questions asks about the jobs that you have had since you graduated from high school.

20. Please indicate the number of jobs that you have had since graduating from high school. *(Circle the one best response.)*
    1 1 job
    2 2 jobs
    3 3 jobs
    4 4 jobs
    5 5 jobs or more
    6 I have not had any jobs since high school graduation. **SKIP TO QUESTION 27 ON PAGE 6**

21. What is your employment status at the present time? *(Circle the one best response.)*
    1 Employed full-time (35 or more hours per week)
    2 Employed part-time (less than 35 hours per week)
    3 Unemployed, but actively seeking employment
    4 Unemployed and not seeking employment
    5 Serving in the military full-time
    6 Other - *Specify*____

22. Sometimes people have more than one job. How many jobs do you hold at the present time?
    1 0 jobs **SKIP TO QUESTION 27 ON PAGE 6**
    2 1 job
    3 2 jobs
    4 3 jobs or more

23. Thinking of your primary job as the job that takes up the largest amount of time you spend working each week, how many months have you worked in <u>your primary job</u>? *(Circle the one best response.)*
    1 Less than 6 months
    2 6 to 12 months
    3 13 to 24 months
    4 25 to 36 months
    5 36 months or more

24. Please estimate the amount of money that you make per hour in <u>your primary job</u>. *(Circle the one best response.)*
    1 Zero…. My primary job is unpaid
    2 Less than $5.25 per hour
    3 $5.26 to $6.00 per hour
    4 $6.01 to $7.00 per hour
    5 $7.01 to $8.00 per hour
    6 $8.01 to $9.00 per hour
    7 $9.01 to $10.00 per hour
    8 $10.01 to $11.00 per hour
    9 $11.01 to $12.00 per hour
    10 $12.01 to $13.00 per hour
    11 More than $13.00 per hour
    12 I don’t know

25. Which of the following best describes the type of job you have as your primary job? *(Circle the one best response.)*

1 **Entry level or unskilled job** – minimal training is required and little orientation is provided by employers. Hiring is usually not very competitive.
2 **Semi-skilled job** – usually requires 6 months to 1 year of specific training, college education or equivalent skills and experiences prior to being hired. Hiring is usually competitive.
3 **Skilled or technical job –** usually requires 1 year to 2 years of specific training or college education prior to being hired. Hiring is usually very competitive.
4 **Professional job** - usually requires 2 to 4 years or more of specific training. College degrees and/or state professional licensure or certification are often required. Hiring is usually extremely competitive.

26. How satisfied are you with your primary job? *(Circle the one best response.)*

1 Extremely satisfied
2 Very satisfied
3 Fairly satisfied
4 Somewhat satisfied
5 Not at all satisfied

27. Which of the following best describes the type of job you would ultimately like to get? *(Circle the one best response.)*

1 **Entry level or unskilled job** – minimal training is required and little orientation is provided by employers. Hiring is usually not very competitive.
2 **Semi-skilled job –** usually requires 6 months to 1 year of specific training or equivalent skills, college education and experiences. Hiring is usually competitive.
3 **Skilled or technical job** – usually requires 1 year to 2 years of specific training or college education prior to being hired. Hiring is usually very competitive.
4 **Professional job** - usually requires 2 to 4 years or more of specific training. College degrees or state professional licensure or certification are often required. Hiring is usually extremely competitive.

28. How confident do you feel that you will reach your ultimate career goal? *(Circle the one best response.)*

1 Extremely confident
2 Very confident
3 Fairly confident
4 Somewhat confident
5 Not at all confident

Part Four

Just a few more questions about you . . .

29. What is your gender?

1 Male
2 Female

30. Are you of Hispanic origin or descent?

1 no
2 yes

31. What is your racial/ethnic background? *(Circle the one best response.)*

1 White
2 Black or African American
3 Asian or Pacific Islander
4 American Indian or Alaska Native
5 Other – *Specify*____

32. What is your current marital status? *(Circle the one best response.)*

1 Single
2 Single with children
3 Married
4 Married with children

33. How much education have your parent(s) or guardian(s) completed? *(Circle the one best response for each parent/guardian who you consider to have had the most influence on your life.)*

My father, stepfather or male guardian has completed: *(Circle one response.)*	**My mother, stepmother or female guardian has completed:** *(Circle one response.)*
1 Less than high school graduation	1 Less than high school graduation
2 High school graduation	2 High school graduation
3 Some college but no degree	3 Some college but no degree
4 Two-year Associate degree	4 Two-year Associate degree
5 Four-year Bachelor's degree	5 Four-year Bachelor's degree
6 Graduate degree such as Master's, Doctorate or M.D.	6 Graduate degree such as Master's, Doctorate or M.D.
7 I don't know	7 I don't know

34. What was your approximate total annual family income while you were in high school and living with your parent(s)/ guardian(s)? *(Circle the one best response.)*

1 $14,999 or less
2 $15,000-$29,999
3 $30,000-$44,999
4 $45,000-$59,999
5 $60,000-$74,999
6 $75,000-$89,999
7 $90,000 or more
8 I don't know

35. At the time you finished high school, did your parent(s)/guardian(s) own or pay a mortgage for their home? *(Circle the one best response.)*

1 no
2 yes
3 I don't know

36. Where do you reside at the present time? *(Circle the one best response.)*

1 I live with my parent(s)/guardian(s)
2 I live alone
3 I live with a spouse or significant other
4 I live with a friend or roommate
5 Other – *Specify*____

PLEASE RETURN THIS QUESTIONNAIRE IN THE POSTAGE-PAID ENVELOPE PROVIDED.

WE THANK YOU FOR PARTICIPATING IN THIS STUDY.

APPENDIX C
SURVEY PROCEDURES

The plan for distribution of the Education To Careers follow-up survey was based on Dillman (1978). The plan called for the survey to be mailed out in three waves, along with letters signed by the project director from UIUC and a local site liaison (usually each consortium's Tech Prep coordinator), with contact information for both. Surveys for each site were printed on different colored paper in order to make analysis and filing more efficient. Ultimately, a decision was made to conduct additional data collection, including a telephone follow-up and a fourth wave. The procedure for survey administration is summarized in this section.

Database Development

Once a sample was determined for each consortium, an electronic database of Tech Prep and non-Tech Prep graduates was compiled with the assistance of local consortium officials. The database included each student's full name, last known mailing address, school identification number, phone number, gender, high school at time of graduation, career center (if applicable), and year of graduation. Four sites added class rank information. Since the student information was frequently obtained from dated high school records, we updated our database when information received from community college transcripts appeared to be more current. As was expected, all data fields were not always complete. In fact, data such as phone numbers were sometimes missing in large numbers for particular consortia. In these cases, we worked with local consortium personnel to obtain missing information, and were sometimes successful. The database compiled for each site was converted and imported into a Filemaker Pro 3.0. To this database were added additional data fields, used by researchers to track and record specific kinds of information related to the distribution of the survey. These fields included a student code, whether or not a high school transcript and a community college transcript were received, and whether or not and when a survey was received. These fields were crucial to all subsequent sorting and manipulation of survey respondent information.

The students in the sample in each consortium were coded with a nine-digit code. For each site, the first number denoted the consortium (1-8), the second number (5, 6, 7, or 8) denoted the year of graduation, 1995-1998, and the third number (1, 2, or 3) denoted whether a student was a Tech Prep graduate (1), a non-Tech Prep graduate (2), or a youth apprentice graduate (3), with the youth apprentice option only present in two of the eight sites. The next three numbers in the code were the unique ordinal number given to each student. The final three numbers were the high school code. The high school code was composed of the consortium number and two ordinal numbers. Thus, the student code number indicated the student's consortium, date of graduation, Tech Prep status, and high school. As an example, if the fiftieth Tech Prep graduate in the first consortium's database graduated in 1996 from High School 101, the code for that student was 116050101. This code number appeared with the student's name in the Filemaker Pro database, on the mailing label when surveys were mailed out, and in the Excel files containing the names of non-respondents. These codes were also used on all transcripts and for all data entry on transcripts.

Survey and Follow-Up Procedures

Survey mailings were conducted for the first six consortia during the summer and fall of 1998. When two additional sites were added in late 1998, survey administration was scheduled for winter and spring 1999 for these consortia. A monetary incentive was provided in the form of a random drawing for a $100 check for one respondent in each consortium. Respondents were given a specific time (at least six weeks) to return their survey to be included in this drawing. In addition to the incentive, some consortia provided additional support for the survey process, within their own locations. For example, the Central States Consortium hired a community college student to call non-respondents and encourage their participation in the survey. (This student did not actually conduct the survey, only encourage response.) In addition, the Central States Consortium and two others distributed surveys to students enrolled in community college classes. While these attempts to boost response rate were apparently helpful in the Central States Consortium, they did not seem to have a dramatic impact in other locations. Determining the exact impact of local contributions to survey administration was, of course, not possible, though there is no evidence local encouragement impeded the research in any way. In fact, in the Central States Consortium, local involvement did seem to produce encouraging results.

In another attempt to increase the survey response rate, in February, 1999, CPR (Consumer Professional Research, a Chicago-based marketing research consulting firm) was contracted to contact non-respondents. Database files were forwarded to CPR to provide contact information for non-respondents from the first four sites where mail surveys had already been completed. CPR staff were trained by UIUC staff to conduct the survey by telephone and to enter the survey responses in a data file that had been created to merge with survey response files held at UIUC. Initially, CPR was provided with contact information for four consortia in February, then two more consortia were added in March, and finally the two final consortia were included in June and July to ensure that adequate telephone follow-up had occurred for all consortia.

In spring, 1999, the NCRVE researchers entered into negotiations with EMS, a telephone marketing firm also based in the Chicago area, to obtain the most current addresses and phone numbers possible. An Excel spreadsheet containing the total number of non-respondents up to that time was forwarded to CPR, and together with EMS, the database was updated using U.S. Postal Service records, along with the telephone survey process. These current addresses were also used in a fourth mailing of the follow-up survey in June-July, 1999. This mailing included a slightly condensed version of the original survey where a few questions deemed less pertinent were deleted and the survey was printed in an 8.5 by 5.5 inch format. This mailing was addressed to the student and parents/guardians and included a separate letter to parents/guardians in belief that many graduates had left their parental homes for school, work, marriage, etc. In these cases, parents could open the mailing and forward or at least encourage the student to complete the survey. As an incentive, students were asked to fill in a certificate that asked for their current address and phone number, and they received a check for $10 in return.

For the entire study, the total number of survey responses received was 2,224 out of 4,671, constituting a 48% overall response rate. Response rate varied from a high of

62% in the Central State Consortium to a low of 39% in the Pacific Consortium. For additional specifications on the survey administration by site, see Table 1.

Table 1

Survey Administration by Site

Site (Total Sample)	Initial Survey Mailings (Cumulative Response Rate)	Follow-up Phone Calls (Cumulative Response Rate)	Fourth Follow-up Mailing (Cumulative Response Rate)	Follow-up Phone Calls (Cumulative Response Rate)	Total Response Rate by Site
Central States (N=558)	June-August 1998 (45%)	March 1999 (54%)	June-July 1999 (60%)	June-July 1999 (62%)	62%
River Valley (N=411)	September-December 1998 (32%)	March 1999 (39%)	June-July 1999 (45%)	June-July 1999 (49%)	49%
Southern (N=586)	December 1998-February 1999 (28%)	March-April 1999 (28%)	June-July 1999 (38%)	June-July 1999 (44%)	44%
Sunland (N=595)	August-October 1998 (30%)	March 1999 (35%)	June-July 1999 (42%)	June-July 1999 (48%)	48%
Northwest (N=532)	October-December 1998 (24%)	March 1999 (33%)	June-July 1999 (40%)	June-July 1999 (44%)	44%
Metropolitan (N=643)	August-October 1998 (30%)	March 1999 (36%)	June-July 1999 (40%)	June-July 1999 (44%)	44%
Workforce (N=723)	March-May 1999 (36%)	--	June-July 1999 (45%)	June-July 1999 (51%)	51%
Pacific (N=623)	April-May 1999 (24%)	--	June-July 1999 (35%)	June-July 1999 (39%)	39%

Note: Response rates are based on survey returns as of August 1, 1999.

APPENDIX D
HIGH SCHOOL TRANSCRIPT ANALYSIS
PROCESSING AND CODING PROCEDURES

Obtaining High-School Records

Securing Course Catalogs

We requested course descriptive information for the years under investigation—1995, 1996, 1997. By level of priority, types of sources were as follows:

- a school-level catalog providing course titles and descriptions;
- a district-level catalog, if it indicated which courses were offered at participating high schools;
- a course list by department that included general descriptions of course offerings;
- a school-level course list without descriptions; and
- a district-level course list without descriptions.

Individual high school course catalogs were received for all but one consortium. For this consortium, the complete list of high school courses was returned to the site, and the Tech Prep coordinator for the site assigned codes to all courses utilizing our prescribed coding procedures (see below for more detail on coding procedures).

Acquiring Transcripts

Safeguards were built into the research procedures for the transcript study to ensure that students' rights to privacy were not violated in any way. To initiate this process, research procedures were submitted to the Institutional Research Board (IRB) at the University of Illinois at Urbana-Champaign (UIUC) to obtain approval of our proposed procedures to honor these rights. Once these procedures were approved, we began obtaining transcripts for students from all schools represented in the study. To obtain transcripts, we provided all sites with a coded list of names of students from each school who were included in the sample. Schools then pulled the transcripts for each student, removed all personal identifiers from the transcripts provided by the schools, coded each transcript with the student's code number, and forwarded the transcripts to NCRVE for data entry and analysis. Once the transcripts were provided by the school, student information was then identified only by the NCRVE-generated identification number (see Appendix C for details on coding).

Once transcripts from the sites were received, they were reviewed for accuracy and completeness. Any illegible or missing transcripts were requested from the site. After a complete set of transcripts was received for a site by the University of Illinois at Urbana-Champaign (UIUC) and preliminary coding was completed, a copy of the entire set of transcripts was forwarded to the University of California at Berkeley (UC-B) for further processing.

Processing High School Transcripts

The transcript processing for this study included the following steps:

- Transcript data were entered by F.Y.I. (a California-based firm specializing in data management),
- Courses were coded using a standardized classification system, and
- Quality control procedures were performed.

Entering Transcript Data into Computer Files

Transcript data entry began in June, 1998, as transcripts were received from the first consortium's schools. Data entry personnel employed at FYI entered transcript data using a computerized data entry system. The system displayed a number of labeled blank fields, and the data entry clerks filled in the fields. Each entry was checked to verify that it was within an allowed range, and the data entry system warned the clerk when a problem occurred.

The data entry clerks were instructed to enter the transcript items listed in Table 1 on the transcript format checklist. The items on the checklist were selected by the project directors and reflected the outcome measures targeted for the study. The quality of high school transcripts varied from school to school; hence, not all the measures listed in Table 1 were available on all transcripts for all consortia. After transcripts were processed by FYI, all attempts were made to find alternative sources for the information; and, where available, these data were entered into the master data file from other sources, either by FYI or UIUC personnel.

Table 1

Final Measures for High School Transcript Analysis

Transcript Items
1. NCRVE code
2. Student's SSN
3. Student's ID number (from school, district, etc.)
4. Student's birthdate
5. Student's race/ethnicity
6. Student's gender
7. Student's LEP status
8. Date student entered school
9. Date student graduated from school
10. Class rank (twelfth grade only) - out of total number of students
11. Cumulative GPA (after completed twelfth grade)

Table 1 (cont.)

12. Absences (by how school records them): a. by year b. by semester/quarter c. cumulative d. by hours e. by days
13. For a single course: a. course name (to indicate level of course, e.g., honors) b. course code c. number of credits awarded d. length of course (semester, quarter) e. year a course was taken f. grade received g. location, if *not* taught at this school (e.g. area vocational center, community college)
14. Total number of credits received
15. Type of diploma awarded (e.g., Regents, standard, honors, etc.)
16. Standardized test scores (SAT, ACT)

Coding Transcripts

Course coding is the process of associating a course title with a classification code number. The process involved selecting a course title, description, and accompanying code number from a standardized classification system that most closely matched the course title and description in a high school course catalog. In keeping with the methodology used in several nationwide, large-scale transcript studies, we used the Secondary School Taxonomy (SST), as a standard for classifying and coding all courses appearing on high school transcripts. These studies include the 1994 High School Transcript Study (HSTS) conducted for the National Center for Statistics by Westat, Inc. (NCES 97-262) and the comparative study of credits earned for 1994, 1990, 1987, and 1982 high school graduates also conducted by Westat, Inc. (NCES 97-260). The SST was developed as a uniform framework for organizing the high school curriculum and classifying transcript data (Gifford, Hoachlander, & Tuma, 1989). It was first developed for use with the High School and Beyond 1980 Sophomore Cohort Transcript study and has since been used in the 1994 High School Transcript Study (HSTS) and the on-going national evaluation of School-to-Work initiatives (Haimson, 1998).

For this study, each course taken by students in our sample was entered into the FYI transcript data file for each consortium. Once FYI had completed their data entry, we prepared an alphabetized list of all courses taken by students along with a complete list of the courses by code numbers, including the school code where each course was taken. At that point, we used course catalogs to identify the correct codes from the SST codes. To determine the appropriate codes for each course, we reviewed all course catalogs for the schools in the consortium and matched the described courses as closely as possible to an available SST code. When we had questions concerning coding of particular courses or course descriptions were unclear, we forwarded our questions to the local site for additional input and clarification. Corrections were made to the master data file for each site by UIUC personnel before data analysis began. In a very few instances where an appropriate SST code was not available, a code that would logically fall within the numerical sequences of related SST codes was generated to indicate the level and nature of the course. After SST codes were identified for academic and vocational courses, we entered the codes into the master data file for each consortium. These files were identified as the Tech Prep High School Transcript File and the Tech Prep Community College Transcript File.

Ensuring the Accuracy of Transcript Data

Each stage of the process described above included measures to ensure both the accuracy and consistency of the data. Training was provided for FYI staff to be sure that all data entry was consistent, and we remained in contact with FYI throughout the data entry process to provide feedback and answer specific questions. Spot checks of data entry were conducted throughout the data-entry process and after all data had been entered. During data entry, all questions to be resolved were noted by FYI and forwarded to our staff for resolution. NCRVE personnel who were assigned to particular sites were also asked to audit data files to be sure they accurately reflected student transcripts.

APPENDIX E

MATH COURSES BY CATEGORY, SECONDARY SCHOOL TAXONOMY (SST) CODE, AND REPRESENTATIVE COURSE TITLES

Math Category	SST Code	Typical Course Title
Basic Math **(SST Levels 1 & 2)**	27.0601	Mathematics, Basic 1 Arithmetic Review Competency Mathematics Mathematics Lab Mathematics, Essentials Mathematics, Remedial
	27.0104	Mathematics 8, Accelerated
	27.0602	Development Math 2 Math Fundamentals 2 Mathematics, Basic 2 Remedial Math 10 Remedial Math 2
	27.0603	Development Math 3 Math Fundamentals 3 Mathematics, Basic 3 Remedial Math 11 Remedial Math 3
	27.0604	Mathematics, Basic 4 Mathematics, Basic 4 Remedial Math 12
General Math **(SST Levels 3 & 4)**	27.0100	Mathematics, Other General
	27.0106	Mathematics 1, General Computational Skills 1 Mathematics 1, Applied
	27.0113	Mathematics Tutoring
	27.0107	Mathematics 2, General Computational Skills 2 Mathematics 1, Applied
Applied Math **(SST Level 5)**	11.0121	Computer Mathematics 1 Computer Problem Solving Mathematics and Computing
	11.0122	Computer Mathematics 2

NOTE: The categories provided in this table present the specific application of SST math codes to the math course sequences that are found in the sites investigated. The math categories reported here are also consistent with the sequencing of math curriculum found throughout the preponderance of high schools in the United States. The categories are also reflective of extensive review of the literature on high school mathematics curriculum and student course-taking behavior. The categories for high school mathematics courses were empirically derived by examining high school transcripts and course descriptions from the selected consortia, applying the SST codes to those courses, and assigning levels based on course content. Some variation across sites is of course possible due to differing content. In addition, note that SST codes are not always linear - a higher number can be a lower level course, for example.

Applied Math (SST Level 5) (cont.)	27.0110	Mathematics, Vocational Mathematics for Employment Work Experience Mathematics
	27.0111	Technical Mathematics
	27.0114	Consumer Mathematics Mathematics Survival Skills
	27.0300	Applied Mathematics, Other
Pre-Algebra (SST Level 6)	27.0401	Algebra, Basic Algebra Skills Algebra, Introduction Algebra, Practical Algebra, Principles Pre-Algebra
	27.0402	Algebra 1, Part 1
	27.0403	Algebra 1, Part 2
Algebra 1 (SST Level 7 & 8)	27.0404	Algebra 1 Algebra, Elementary
	27.0421	Mathematics 1, Unified
	27.0417	Algebra, Honors Matrix Linear
Geometry (SST Level 9 & 10)	27.0406	Geometry, Plane
	27.0407	Geometry, Solid
	27.0408	Geometry
	27.0409	Geometry, Informal Geometric Design Geometry, Intuitive Geometry, Occupational Geometry, Physical Geometry, Practical
	27.0422	Mathematics 2, Unified
	27.0412	Geometry, Advanced Analytic Geometry
Algebra 2 (SST Level 11 & 12)	27.0405	Algebra 2 Algebra, Intermediate
	27.0423	Mathematics 3, Unified
	27.0410	Algebra 3 Algebra, Advanced Algebra, College Mathematics, Advanced

Advanced Math (SST Levels 13 & 14)	27.0411	Trigonometry
	27.0413	Trigonometry and Solid Geometry
	27.0415	Algebra and Analytic Geometry
	27.0416	Mathematical Analysis Analysis, Elementary Analysis, Introductory Elementary Functions Limits and Functions Mathematical Analysis Pre-Calculus
	27.0500	Statistics, Other
	27.0511	Statistics
	27.0531	Probability and Statistics
	27.0419	Calculus
	27.0420	Mathematics, Advanced Placement Honors Calculus, Advanced Placement

APPENDIX F

VOCATIONAL-TECHNICAL COURSES BY CATEGORY, LEVEL, SECONDARY SCHOOL TAXONOMY (SST) CODE, TYPICAL COURSE TITLE

Voc. Course Categories	Levels	SST Codes	Typical Course Title
1.0 Agriculture	Level 1	01.0111	agriculture business
		01.0211	agriculture mechanics, general
		01.0312	agriculture technology
		01.0611	horticulture
	Level 2	01.0171	agriculture cooperative
		01.0212	agriculture mechanics 2
		01.0213	agriculture mechanics 3
		01.0214	agriculture mechanics 4
		01.0313	agriculture technology 2
		01.0632	landscaping, advanced
		02.0212	animal sciences 2
	Level 3	01.0100	agriculture business and management, other
		01.0181	agriculture, independent study
		01.0221	welding, agricultural
		01.0621	floriculture and gardening
2.0 Business 2.1 Business and Management	Level 1	06.0111	business introduction
		06.0121	business law
	Level 2	07.0251	banking
			financial careers cooperative education
	Level 3	06.0411	business organization and management
		06.1800	small business management and ownership, other
		06.9900	business and management, other
2.2 Business Support	Level 1	07.0121	accounting 1
		07.0151	recordkeeping, clerical
		07.0161	office machines
		07.0311	business computer concepts
		07.0331	business computer programming 1
		07.0351	data entry operator
		07.0641	word processing 1
		07.0731	clerk typist 1

Note: The categories in this table present the specific application of SST vocational codes to the vocational-technical courses that are found in the sites investigated. The categories for high school vocational courses were empirically derived by examining high school transcripts and course descriptions from the selected consortia, applying the SST codes to those courses, and assigning levels based on course content. Some variation across the sites is of course possible due to differing content.

	Level 2	07.0122 07.0322 07.0642 07.0643 07.0732 07.0733 07.0741	accounting 2 business data processing 2 word processing 2 word processing 3, advanced applications clerk typist 2 business careers 3 office occupations work experience
	Level 3	06.0200 07.0300 07.0341 07.0351 07.0361 07.0371	accounting, other business data processing and related programs, other keypunch operator data entry operator keyboarding peripheral computer operator
3.0 Consumer and Family Studies	Level 1	20.0113 20.0122 20.0133 20.0141 20.0183	comprehensive consumer and homemaking, home economics 1 child development 1 clothing construction economics, personal foods preparation, basic
	Level 2	20.0116 20.0123 20.0184 20.0187	comprehensive consumer and homemaking, home economics 4 child development 2 foods 2 international foods
	Level 3	20.0117 20.0171 20.0173	adult roles and functions family sociology parent education
4.0 Health	Level 1	17.0111 17.0511 17.0551	dental assistant 1, dental office assistant health occupations 1 medical assisting
	Level 2	17.0112 17.0521	dental assistant 2 health occupations 2, medical lab 3 & 4
	Level 3	17.0211 17.0221 17.0591 17.0621	CPR and first aid, emergency medical technician EKG technician health occupations, independent study nursing, practical
5.0 Marketing and Distribution	Level 1	08.0711 08.0911	marketing and distribution 1, merchandising 1, retailing and merchandising 1 orientation to hospitality careers
	Level 2	08.0722	distributive education 2, cooperative
	Level 3	08.1100 08.1111	transportation and travel marketing, other tourism services

6.0 Occupational Home Economics and Services	Level 1	12.0511	general services occupations 1
		20.0211	child care services
		20.0411	food service training 1, restaurant occupations 1, culinary arts 1
		20.0511	home furnishings
		20.0513	interior design occupations
	Level 2	12.0412	cosmetology 2
		20.0261	child care co-op ed. I
		20.0312	clothings occupations 2
	Level 3	20.0126	current issues in child development
		20.0371	fashion and fabric coordination
		20.0413	restaurant management
		20.0521	floral design
7.0 Trade and Industrial 7.1 Construction Trades	Level 1	21.0113	electricity 1
		46.0211	carpentry 1
		46.0411	building construction 1
		46.0511	plumbing 1
	Level 2	21.0114	electricity 2
		46.0212	carpentry 2
		46.0213	carpentry 3
		46.0412	building construction 2
	Level 3	46.0121	tile setting and plastering
		46.0131	concrete technician
7.2 Mechanics and Repairers	Level 1	47.0131	appliance repair 1
		47.0211	air conditioning, refrigeration & heating
		47.0511	energy and transportation 1
		47.0611	mechanics trades, small engine repair 1, motorcycle repair, small gas engines
		47.0621	auto mechanics 1, auto repair, auto engines
		47.0631	auto body 1, auto body repair
		47.0641	auto service 1, auto maintenance
	Level 2	47.0212	air conditioning, refrigeration, and heating, advanced 2
		47.0622	auto mechanics 2
		47.0623	auto mechanics 3
		47.0632	auto body 2
		47.0633	auto body 3
	Level 3	47.0151	business machine repair
		47.0321	diesel mechanics
		47.0400	miscellaneous mechanics and repairs, other (safety)
7.3 Precision Production	Level 1	21.0115	electronics, basic
		48.0111	mechanical drawing 1
		48.0121	architecture drawing 1
		48.0221	graphic arts 1
		48.0521	welding 1
		48.0711	woodworking 1
		48.0731	cabinetmaking 1

	Level 2	21.0116 21.0118 21.0122 48.0112 48.0113 48.0132 48.0222 48.0512 48.0522 48.0523 48.0712	electronics 2 electronics 4 machine shop 2 drafting 2, mechanical drawing 2 drafting 3 engineering graphics 2 graphic arts 2 metal 2 welding 2 welding 3 woodworking 2
	Level 3	15.0431 21.0126 48.0700 50.0811	computer assisted design (CAD) industrial arts research woodworking, other computer graphic art (adv. CAD)
7.4 Transportation and Material Moving	Level 1	49.0111 49.0411	aerospace for today, aeronautics 1 introduction to transportation industry (land, sea, air)
	Level 2	49.0112	aeronautics 2
	Level 3	49.0121 49.0211	aviation technology forklift operator
8.0 Technical and communications	Level 1	10.0111 10.0171 10.0151 11.0211 11.0311 15.0611 17.0321	world of communications telecommunications 1, television production 1 cinematography, filming & staging computer programming 1 data processing, computer concepts, data systems industrial production technology, manufacturing process technology I chemical technology I
	Level 2	11.0312 11.0212 11.0313 15.0612	data processing 2 computer programming. 2 data processing, advanced manufacturing process technology II
	Level 3	09.0700 10.0121 10.0181	radio communications media production, audio visuals cable television
9.0 General Labor Market Preparation	Area 1 Level 1 (typewriting I)	07.0711	typewriting 1
	Area 2 Level 2 (intro industrial)	21.0103 21.0104 21.0107	industrial crafts 1, IA orientation industrial arts 2 industry and technology

	Area 3 Level 3 (work experience career exploration)	32.0102 32.0103 32.0104 51.0104	college and career planning, career preparation, guidance career exploration, career development, employability skills, career education, vocations, intro. work experience, job entry drop out prevention
	Area 4 Level 4 (general labor market skills)	06.0511 07.0171 07.0172	business economics business math 1 business math 2
10.0 Specific Labor Market, Unidentified Subject	Level 2 (second or later course in sequence)	32.0106 32.0107 32.0121 51.0101	cooperative education I, co-op training, diversified (vo-tech) co-op education 2 off-campus vo tech, work experience (general), OJT apprenticeships, JTPA ROC
11.0 Personal, Other Curriculum	Level 1 (general skills)	07.0153 32.0100 32.0200 32.0221 33.0111 33.0151	Personal finance basic skills (other, ESL) basic skills, other (“life skills”) test taking, general lab assistant, teacher assistant community service