

Programs of Study: Year 2 Joint Technical Report

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By the Programs of Study Joint Technical Working Group

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Programs of Study: Year 2 Joint Technical Report

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What Will Be the Impact of
Programs of Study? A
Preliminary Assessment
based on Similar Previous
Initiatives, State Plans for
Implementation, and Career
Development Theory

Mature Programs of
Study: A Longitudinal
Analysis

Programs of Study as a
State Policy Mandate: A
Longitudinal Study of
the South Carolina
Personal Pathways to
Success Initiative

Rigorous Tests of
Student Outcomes in
CTE Programs of Study

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Executive Summary

This is a progress report on three studies being conducted by the National Research Center for Career and Technical Education (NRCCTE) that examine the implementation and outcomes of Programs of Study (POS), which were required in the 2006 reauthorization of the federal legislation for career and technical education (CTE). The Carl D. Perkins Career and Technical Education Improvement Act of 2006 (otherwise known as Perkins IV) states that recipients of federal funds must offer at least one POS that includes coherent and rigorous content aligned with challenging academic standards and relevant career and technical content. This content must be delivered in a coordinated, nonduplicative progression of courses that align secondary education with postsecondary education and lead to an industry-recognized credential or certificate at the postsecondary level or an associate or baccalaureate degree. In addition, POS may include the opportunity for secondary students to participate in dual or concurrent enrollment programs or other ways to acquire postsecondary education credits.

In this joint report, we summarize the literature on previous initiatives that share many similarities with the components of POS, specifically Tech Prep, career pathways, and dual/concurrent enrollment. Most of the evidence on these predecessors of POS is mixed. Tech Prep was designed to directly link secondary and postsecondary education, but studies have not found that its participants are more likely to continue their education or earn postsecondary credentials. Career pathways are associated with higher grade point averages (GPAs) and less need for remediation at the postsecondary level, and dual enrollment gives its participants an advantage in total credits earned. As with Tech Prep, however, postsecondary degree attainment is low for both career pathway and dual enrollment participants.

We also summarize the evidence on the effects of participation in CTE on engagement in school, academic achievement, and transition to postsecondary education and employment. Most studies that have examined the relationship between CTE participation and high school graduation have found an association between the two, but the relationship is not straightforward. It is curvilinear: High school graduation is associated with taking neither too few nor too many CTE courses, but rather a ratio of about one CTE to every two academic courses. All studies found that CTE students score lower than college preparatory students on academic achievement tests, but there is evidence that enhancing instruction on the academics inherent in the CTE curriculum can improve student performance on such tests. The studies relating CTE course-taking to postsecondary enrollment have found that the more CTE courses students take, the lower their chances that they will continue their education.

We then describe three field-based research studies initiated by the NRCCTE that seek to examine POS from different perspectives. The first of these, referred to as the *Mature POS* study, identified eight sites that appeared to have had most of the components of POS, especially strong secondary-postsecondary articulation, well before these were legally required by Perkins IV. Site visits were made to each of these sites to gather information about the structure and development of their POS. From the information

gathered, three final sites were selected as most closely aligned with the legislative requirements; these three are being studied longitudinally to better understand the factors underlying their development and operation and the outcomes of their students.

The second study, referred to as the *Personal Pathways* study, is tracking the implementation and impact of the Education and Economic Development Act (EEDA), which was passed in South Carolina in 2005. EEDA establishes a statewide education reform policy that requires career-focused POS for all students across the high school curriculum. This project is tracking the implementation and impact of this policy in eight high schools that were selected to represent diversity in the degree of implementation as well as in size, location, demographics, and the level of school and community resources of the geographic areas they serve. Site visits have been conducted to each of these schools in order to develop baseline data on their respective implementation of the mandated reform policy. Other data on the selected high schools come from state student records that will track selected cohorts from middle school through high school and from questionnaires developed in cooperation with the study teams of the other two NRCCTE POS projects. The study will continue to follow the selected cohorts for three years.

The third study, referred to as the *Rigorous Tests* study, is examining POS in two large districts, each of which offers multiple POS. The first district uses a lottery to select students for its POS, which permitted the study team to construct a randomized control trial of the effects of participating. In the second district, the study team is conducting a quasi-experimental study that used propensity score matching to select students for a closely matched comparison group. In both districts, data are being collected on program implementation from student cohorts that will be followed from entry into the POS through the first year of postsecondary experience.

The published research on prior initiatives in CTE is not encouraging, but initial data collected for the three NRCCTE studies cause us to be cautiously optimistic about the potential for POS. At this early stage in each of the studies, we offer the following preliminary observations about the implementation of the four legally required core components of POS.

Core Component 1: Incorporate Secondary and Postsecondary Education Elements

Alignment of secondary and postsecondary instruction represents a major challenge for POS. At the sites visited, articulation of secondary and postsecondary courses was the exception, not the rule. Alignment requires secondary and postsecondary faculty to agree concerning the content most appropriate to be delivered at each level and the ways in which secondary students will demonstrate the acquisition of knowledge and skills sufficient to receive postsecondary credit. Many years of experience with the articulation agreements developed for Tech Prep consortia demonstrated that even after agreements were signed, students often did not receive postsecondary credit for content they studied at the secondary level.

Core Component 2: Include Coherent and Rigorous Content Aligned with Challenging Academic Standards and Relevant Career and Technical Content in a Coordinated, Non-Duplicative Progression of Courses

The integration of academic and technical content was not frequently observed in any study. It occurred most often in CTE courses that used project-based learning and rarely in academic courses that included students from several different occupational areas. Integration requires time for teachers of academic and technical courses to work together to identify the knowledge and skills appropriate for instruction in their respective classes, and district- and school-level administrators typically do not provide the common planning time needed to engage in this work. An added challenge is when academic courses are offered at the home high school and technical courses at a regional CTE center, resulting in the physical separation of academic and technical faculty. When integration occurs, it is often the result of the initiative of individual teachers, not a systematic school process. Project-based learning is by its nature inherently integrative, but in our observations, few teachers use it as their primary instructional method.

Core Component 3: May Include the Opportunity for Dual or Concurrent Enrollment Programs

Scheduling, costs, and teacher qualifications represent barriers to offering courses that award postsecondary credit at the high school level. It was noted in connection with Core Component 1 that high school students often do not receive the postsecondary credits they earn through articulation agreements. These are often referred to as “escrowed” credits, because they are not awarded until students meet defined criteria at the postsecondary level. High school students who earn “transcribed” postsecondary credits typically do so in courses in which they are also enrolled at the postsecondary level. Transcribed credit is much easier for colleges to document and for students to claim. The remaining challenge is ensuring that the credits are accepted at multiple postsecondary institutions.

Core Component 4: Lead to an Industry-Recognized Credential or Certificate at the Postsecondary Level, or an Associate or Baccalaureate Degree

Schools recognize the value of industry certification both in improving instruction and signaling that students have acquired a defined set of skills and knowledge. Programs that earn industry certification receive high-quality curriculum and professional development opportunities for their instructors. Earning certification requires that programs meet national standards with regard to facilities, equipment, and instructor qualifications. Some schools find it difficult to meet these standards, provide the time, and cover the expenses needed for professional development. Not all programs that have industry certification arrange for their students to take the assessments required for individual certificates.

Although we are optimistic, we recognize that successful POS require much hard work at the local level. It is fairly easy to design a POS that shows the academic and technical

courses to be taken at the secondary and postsecondary levels, but the real work lies in actually integrating and articulating these courses. This requires extensive interaction and negotiation. If such work is not done, however, the result will be POS that exist on paper but not in practice.

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The economic prospects of young people who do not continue their education after high school have been declining since the middle of the 1970s, but those prospects are especially dim today. Jobs paying a family-supporting wage increasingly require some postsecondary education. President Obama (2009) cited this fact when he announced the launch of the American Graduation Initiative as a means of strengthening the nation's community colleges and improving students' outcomes: "In an economy where jobs requiring at least an associate's degree are projected to grow twice as fast as jobs requiring no college experience, it's never been more essential to continue education and training after high school."

In addition to the failure of young people to enroll in postsecondary education after high school, a large proportion of youth do not complete high school. This has become a serious policy concern. Many experts agree that it will be a challenge to fill all of the skilled and semi-skilled positions that are needed to maintain our economy, much less to provide the innovation that will be necessary to address future challenges. In fact, the high school dropout problem has been called "a silent epidemic" (Bridgeland, Dilulio, & Morison, 2006), and high schools with especially high dropout rates have been dubbed "dropout factories" (Balfanz & Legters, 2004). Although in the past, dropout rates were hard to compare across districts or states, more recent means of reporting have resulted in more reliable information. One study estimated that 30% of students expected to graduate in 2003 did not complete high school (Greene & Winters, 2006).

A recent survey of high school noncompleters revealed that almost half of them (47%) claimed that their classes were boring (Bridgeland et al., 2006). The next most-chosen responses were that they had missed too much class or spent time with people who were not interested in school (43% and 42%, respectively), both of which are ultimately related to the most popular response, that school was uninteresting to them and their peers. Only 35% of the respondents claimed to have dropped out because they were failing. The personal and social costs of these dropouts are high in terms of lost wages and tax revenue. High school dropouts are also potential burdens on society because they are more likely than high school graduates to tap into the social welfare system, commit crimes, and have children who are at risk of dropping out (Alliance for Excellent Education, 2009; Levin, 2005).

The same survey of noncompleters (Bridgeland et al., 2006) asked what factors might have encouraged them to stay in school. Although some could not think of anything, others suggested improving classroom instruction to make what is taught more relevant to students' lives, as well as having smaller classes with more one-on-one instruction and individual feedback. Other studies have reported similar findings (e.g., Barton, 2005).

What is needed is a curricular structure that presents the high school curriculum in a way that is relevant to students and also meets current rigorous academic standards. Students moving through such a curriculum would be prepared to continue their education and training at the next level of their chosen pathway or major, be that through the attainment

of a certificate, an associate degree, or a baccalaureate degree. The field of career and technical education (CTE) provides a foundation upon which to build such a structure: CTE program areas are relevant to students' lives or at the very least offer the opportunity to apply learning in ways that have real-world consequences. CTE is career-based so its relevance is not just for students' enjoyment; it also serves to teach them about working with others and accomplishing specific goals. Anecdotal evidence suggests that CTE classes tend to be smaller than other classes, providing more one-on-one time for teachers and students. Historically, CTE courses have lacked the academic rigor that a successful curricular structure would require, but emergent new standards-based models of CTE programs require more of students academically. Developments in the federal Carl D. Perkins legislation funding CTE have helped CTE lead the way in creating greater articulation and alignment between secondary and postsecondary programs.

The 2006 reauthorization of the Perkins legislation, known as Perkins IV, included a requirement to develop programs of study (POS), which

- (1) incorporate secondary and postsecondary education elements;
- (2) include rigorous career and technical content aligned with challenging academic standards in a nonduplicative progression of courses;
- (3) optionally include dual enrollment programs or other ways to acquire postsecondary education credits, and
- (4) lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree (P.L. 109-270. Sec. 122[c][1]).

POS require high schools and colleges to cooperate to increase the numbers of high school students who continue to postsecondary education and receive an industry-recognized degree or certificate.

The National Research Center for Career and Technical Education (NRCCTE) is currently conducting three longitudinal field-based studies of POS, each of which takes a different approach to assessing the effectiveness of this educational reform policy initiative. This paper provides a review of the literature that helped inform the three field-based research projects by examining the best available evidence on related initiatives that preceded POS: Tech Prep, career pathways, and dual enrollment. The paper then briefly describes the three studies and presents a synthesis of their early observations from the field. Technical appendices to this paper more fully describe the methodology and sampling of the three studies.

The first study examines the working structure of programs in sites that already have most, if not all, of the characteristics of POS. We refer to this project as the *Mature POS* study, because it focuses on programs that had many of the characteristics of POS before they were mandated in Perkins IV. The second study, the *Personal Pathways* study,

tracks the implementation and outcomes of South Carolina's Education and Economic Development Act (EEDA) of 2005, legislation that changes how high schools assist young people to prepare for careers through a state-mandated focus reform efforts that require all public school students to enroll in career pathways that incorporate many, if not all, elements of POS. The third study, referred to as the *Rigorous Tests* study, is an experimental test of the effects of POS in four sites in two large school districts using both randomized controlled trial (RCT) and quasi-experimental designs.

The final section of this paper presents early observations from these three studies, organized according to the four core components of POS as defined by the legislation and outlined above. These early observations are based on no more than one year in the field from the respective study sites, including the site selection process. As such, we make no claims of causality at this time; however, these collective early observations have much to offer to states, districts, schools, and researchers interested in learning more about the development and implementation of POS and the factors that lead to struggles or success. Taken as a whole, these studies will increase the field's understanding of (a) the conditions that must be in place for the successful implementation of POS and (b) the effects that POS implementation has on student engagement, achievement, and the transition to and outcomes of postsecondary education.

Evolution of Programs of Study

The Forgotten Half, a report from the W. T. Grant Foundation Commission on Work, Family and Citizenship (1988), was instrumental in raising awareness of the decline in fortunes of young people entering the marketplace with only a high school diploma. During the 1990s, there were a number of policy responses to this decline, but the problem continues to this day (Berlin, 2007; Halperin, 1998). One of these responses was Tech Prep, which was included in the 1990 reauthorization of the Perkins legislation, known as Perkins II. Tech Prep had been proposed by Parnell in *The Neglected Majority* (1985), in which the majority he identified consisted of students in the middle two quartiles of academic ability who complete high school but rarely obtain four-year degrees. Tech Prep was designed to link the last two years of high school with two years of postsecondary education through articulation agreements allowing students to seamlessly transition from high school CTE to postsecondary occupational programs. The goal was to provide pathways to successful careers that did not require baccalaureate degrees. By the 1990s, it was clear that mid-level workers, or technicians, would be in high demand in the future. These careers did not require baccalaureate degrees, but they did require post-high school education, and they did offer the promise of strong, stable, middle-class jobs.

Other initiatives begun since the 1990s to address the need for students to finish high school with a planned next step include career pathways and dual/concurrent enrollment programs.¹ These three precursors to POS are examined in detail in this section, much of

¹ Career academies are a separate initiative that have influenced the development of POS, but they are not considered a precursor to POS because they do not *require* postsecondary elements. However, career

which is adapted from Chapter 2, “Precursors of Programs of Study,” in Lewis and Kosine (2008). For more details on the literature presented here, readers are referred to that review or to the original studies referenced.

Tech Prep

Tech Prep, an initiative in which high schools and community colleges form regional consortia with articulated (i.e., linked) CTE curricula, was first authorized to receive federal funding in 1990. According to the legislation, the components of Tech Prep were (1) a “2 + 2 design” in which the last two years of high school courses were designed to seamlessly transition into the first two years of postsecondary education, in both academic and technical subject matter, (2) articulation agreements, which aligned secondary and postsecondary technical course sequences so as to eliminate duplication and promote students entering community colleges at more advanced levels, (3) preparatory services such as recruiting and counseling, and (4) curriculum development, particularly academic and technical integration of curricula and applied academics. Later changes to the law allowed Tech Prep course sequences to start as early as ninth grade and to continue through to baccalaureate degrees.

Bragg and her colleagues (2002) followed students in eight selected Tech Prep consortia from high school to college and into employment between January 1998 and December 2001. To study the effects of participating in these consortia, a total of almost 4,600 students were selected using systematic random sampling for follow-up, with roughly equivalent numbers of Tech Prep participants and nonparticipants in each group.

Over 80% of the high school Tech Prep participants in six of the consortia attended two-year colleges, exceeding the enrollment of nonparticipants, but the differences were small, reaching statistical significance in only two sites. Although many students in both groups enrolled in college, few earned sufficient credits to obtain a certificate or degree. Most enrollees were required to take developmental, non-credit courses. Relatively few who enrolled in two-year colleges received degrees (associate of arts [AA], associate of science [AS], or associate of arts and science [AAS]) or certificates, regardless of Tech Prep status: The median percentage of students earning some credential was only 10% by three to four years after high school graduation.

Stone and Aliaga (2003) analyzed data from the National Longitudinal Survey of Youth 1997 (NLSY97) to determine the effects of Tech Prep on high school academic achievement. These data are based on a nationally representative sample, but they rely upon students’ self-reports of the courses they took and their grade point averages (GPA). Regression analyses found no significant relationship between Tech Prep participation and GPA.

The federally mandated evaluation of Tech Prep (Hershey, Silverberg, Owens, & Hulsey, 1998) had a formative rather than a summative focus, but also included case studies of 10

academies played an important role in the development of POS, and their outcomes are reviewed in this literature review.

consortia selected due to the quality of their programs. These case studies included follow-up interviews with 486 former Tech Prep students conducted approximately 18 months after high school graduation, but did not include a comparison group of similar non-Tech Prep participants. Enrollment in postsecondary education or other types of formal occupational preparation from these 10 consortia was 61%, but only 15% reported that their programs had awarded credits for the articulated courses they had taken in high school. Over one-third (37%) of those attending community colleges had not started programs leading to degrees but were instead taking developmental and general education courses.

The research on Tech Prep tended to show minimal effects partly because the studies were aggregates of many Tech Prep sites, each of which was implemented independently and may not have included the same components. The legislation was not overly prescriptive in terms of the relative emphasis placed on the components of Tech Prep, so as to allow for local innovation, but the disadvantage of this approach was that it was difficult to define exactly what Tech Prep was, because it was different things in different consortia. One of the conclusions of the evaluation was to more sharply define what constituted Tech Prep.

Career Pathways

As part of the recognition of the need to continue one's education beyond high school in order to prepare for a career in the labor market of the latter part of the 20th century, initiatives were designed to align high school preparation more closely with the needs of the labor force. Career clusters and career pathways emerged from these efforts. Career clusters organize related occupations by the types of products and services these occupations provide to society, such as manufacturing or health services. Career pathways provide guidance as to the knowledge and skills—both academic and technical—that must be acquired to prepare for the occupations at varying levels within these clusters. For example, pathways for physician and radiology technician exist within the health services cluster. Both require basic medical knowledge and a common core, but the pathways diverge as students focus in on their chosen occupations.

The College and Career Transitions Initiative (CCTI), a federally funded project administered by the League for Innovation in the Community College, worked with community colleges to encourage career pathways within career clusters. Its initial experiences in developing partnerships and enrolling students with 15 original college members were positive enough for CCTI to open its network to any community college in North America that wanted to adopt its goals and use its resources.

The original 15 CCTI colleges have provided yearly outcome data based on 1,124 students who participated in pathways, graduated from high school in the spring of 2004 through 2007, and enrolled in these colleges in the fall of the same years. The data do not include graduates who went on to other community or four-year colleges, or those who did not enroll in the fall following graduation. Warford, Beauman, and Kindall (2008) reported that 27% of these graduates enrolled in the 15 colleges in the same pathways

they studied in high school. By way of comparison, data from the Educational Longitudinal Study of 2002 (ELS; Bozick & Lauff, 2007) indicate that the enrollment rate directly from high school into any public two-year institution is 23%. Warford et al. also reported that remediation rates for students following CCTI pathways into the original 15 community colleges were 40% for mathematics and 27% for both English and reading. This mirrors the national rate of remediation required by students entering community college (Shults, 2000). Although the comparisons are less than precise, CCTI participants, either through self-selection or program effects, appear to be equally or slightly more successful in making the transition to postsecondary education without remediation than representative samples of all high school graduates.

Stone and Aliaga (2003) analyzed data from the National Longitudinal Survey of Youth 1997 to identify students who had participated in different types of CTE programs. Regression analyses found that (students' self-report of) enrollment in career pathways (referred to as *career majors* in the data) had a significant positive relationship with final, 12th-grade GPAs, and this relationship remained significant when measures of student characteristics, including their eighth-grade GPAs, were added to the equation.

Castellano and her colleagues (2007) studied three selected high schools that were engaged in career-based comprehensive school reform, one of which was a career pathways model. These students' experiences were compared to those of students in a similar comprehensive high school without career pathways. The pathways model did not improve graduation rates, but the pathway students who did graduate outperformed their counterparts on many measures of transition to postsecondary. More pathway students had post-high school plans than non-pathway students, and equal numbers were accepted to four-year universities. Pathway graduates who attended the community college in their area outperformed their comparison counterparts. For each academic subject, fewer pathway than non-pathway students were required to take remedial courses; 60% still needed remediation, however. More pathway students participated in Tech Prep than did their counterparts, and at the end of one year of college, pathway students had earned significantly more credits than the non-pathway students.

Another study (Lekes et al., 2007) identified exemplary transition initiatives and compared student outcomes with those of students who were not in career pathways. Pathway students were more likely than nonparticipants to have experienced the components recommended for pathways, such as contextualized learning, mentoring, and work-based learning. In most comparisons, however, such experiences were not associated with differences between pathway and non-pathway students in outcomes such as graduation, GPAs, or postsecondary enrollment. Pathway students had an advantage in postsecondary credits earned, in part because of the dual credit courses they took in high school. At one college offering an Information Technology/Computer Information Science pathway, this advantage appeared to increase students' chances of earning a certificate or degree: 21% in the pathway compared to 17% for the non-pathway students.

Although career clusters and pathways did not replace Tech Prep, they were seen in the field as "the next generation" of Tech Prep (Hull, 2004). In addition, as defined by the

national organization for career pathways, the National Career Pathways Network (NCPN), career pathways are a precursor to programs of study: “A career pathway is a coherent, articulated sequence of rigorous academic and career/technical courses, commencing in the ninth grade and leading to an associate degree, baccalaureate degree and beyond, an industry recognized certificate, and/or licensure. The career pathway is developed, implemented, and maintained in partnership among secondary and postsecondary education, business, and employers. Career pathways are available to all students, including adult learners, and lead to rewarding careers” (NCPN, n.d.). The similarity to the legislative requirements for POS, outlined at the beginning of this paper, is obvious.

Dual/Concurrent Enrollment

Dual or concurrent enrollment programs allow high school students to take college-level courses either at their high school or on a college campus. Originally, dual enrollment was targeted toward high-achieving students who looked for the added challenge of college coursework and the benefit of earning postsecondary credits while still in high school. As these opportunities have grown, they have come to be seen as a transition strategy that can help all students. Dual enrollment is available for both academic and CTE courses.

Waits, Setzer, and Lewis (2005) reported that during the 2002-2003 school year, 71% of public high schools offered courses in which students could simultaneously earn both high school and college credit. Almost all (92%) of these schools offered dual credit academic courses and half (51%) offered dual credit CTE courses. Although dual credit courses were available in a majority of high schools, students taking these courses represented only 8% of the total high school enrollment during the 2002-2003 school year (Lewis & Kosine, 2008). Students taking CTE courses made up 36% of all dual credit students or 3% of total high school enrollment.

One of the more rigorous attempts to estimate the effect of earning dual credits on secondary to postsecondary transition was conducted by the Community College Research Center with funding from the NRCCTE (Karp, Calcagno, Hughes, Jeong, & Bailey, 2007). Student records from Florida and from the City University of New York (CUNY) were analyzed. The data from Florida included 18,000 CTE students. Results suggested a number of advantages associated with earning dual credits while in high school. Logistic regressions yielded increased probabilities for dual credit students to (a) graduate from high school, (b) enroll in postsecondary education, and (c) persist to the second year.

Ordinary least squares (using the same independent variables as the logistic regressions) was used to estimate the effect of dual enrollment on the continuous variables GPA and total credits earned at the postsecondary level. These analyses yielded net increases associated with dual enrollment on both measures.

The CUNY data had far fewer student records: 2,303. But the CUNY data had the

advantage of standardized application procedures as well as curriculum and instruction monitored by the college. This coordination reduced the variability in dual enrollment experiences, thereby enhancing the fidelity of the intervention. These CTE graduates were 9.7% more likely to pursue a bachelor's degree, had a .13 higher GPA in their first semester in college, and earned 10.65 more credits 3.5 years after enrolling. Although several of the CUNY analyses did not reach statistical significance, the effects estimates were all in expected directions. If the number of student records had been as large as in Florida, many of these might have reached accepted levels of significance.

Kotamraju (2005) also analyzed state-level data to determine the relationship between participating in the Minnesota dual enrollment program and GPA at the postsecondary level. Kotamraju selected students who took dual enrollment courses during the 1999-2000 or 2000-2001 school years, graduated in the spring of 2001, and enrolled as full-time students in the same two-year colleges that had offered the courses in which they had taken their dual enrollment courses anytime between the fall of 2001 and the spring of 2004. When these students were identified, they were matched with similar students who had also graduated in 2001 and entered these two-year colleges during the same period. Matching was based on gender, ethnicity, and high school cumulative GPA. The final sample included 3,639 students, of whom 461 had taken dual enrollment courses. Dual enrollment students were classified into those who had taken only Liberal and General Study courses (45%), those who had taken only CTE courses (13%), and those who had taken both (43%). The restrictive criteria used by Kotamraju to define his sample resulted in students with similar characteristics who had similar exposure to postsecondary education but entered with or without having experienced dual enrollment.

During the three years of postsecondary experience that Kotamraju examined, students who had taken dual enrollment courses in high school had a cumulative mean GPA of 2.92 compared to 2.53 among those who had no dual enrollment. Students who took any CTE courses at the postsecondary level, had selected a CTE major, or had taken one CTE course were classified as *participants*; students who had completed one-third of the credits required by their programs were classified as *concentrators*; and students who had received certificates, diplomas, or AA or AAS degrees were classified as *completers*. A statistically significant difference in GPA was found for those classified as participants who had taken dual enrollment courses (2.55) compared with those who had not (1.88). Kotamraju concluded that the dual enrollment courses appeared to give students a head start on succeeding in college courses, but this effect declined as postsecondary exposure increased.

The Development of Programs of Study in Light of Its Precursors

As the Congress was preparing to reauthorize the Perkins legislation, evidence about the efficacy of Tech Prep was studied in order to provide greater guidance to the field and to call for increased accountability for student outcomes under the provisions of the law. However, the evidence was mixed at best. Tech Prep itself had been implemented in so many ways that it was not possible to reach strong conclusions about its efficacy. The Tech Prep evaluation was able to discern three main types of Tech Prep implementation,

two of which they determined were not robust enough or different enough from regular CTE programs to expect improvements in student outcomes. The third implementation type, however, was strongly endorsed by Hershey et al. (1998) as the one with the greatest chance to significantly affect student trajectories and fulfill the promise of Tech Prep: “Our five-year evaluation suggests that prospects for Tech-Prep to change educational pathways and success of students … will be enhanced if federal and state education agencies renew their emphasis on developing structured, focused *programs of study* with a strong career theme, meaningful integration between technical and academic curricula, and a close link between high school and postsecondary stages of the program” (p. 130). Again the similarity between this language and the final legislative language on POS is clear.

Similarly, the evidence on the effect of career pathways on student achievement and transition to postsecondary is not strong, but this is another diffuse effort that could be given more focus. As time goes by, more schools are adopting the career clusters and pathways notion, and better-designed studies can be undertaken to determine the efficacy of career pathways.

Fidelity of implementation is a key factor in evaluating any educational program. In the case of Tech Prep and career pathways, it became clear that more specific guidelines needed to be proposed so that fidelity of implementation could be agreed upon. For instance, although dual credit can sometimes be earned through Tech Prep, it is not a required component of Tech Prep, and in many cases the articulation agreement between institutions does not yield any postsecondary credit opportunities for participating students. In some cases, students do not understand the steps they must take in order to receive dual credit. In other cases, students decide not to attend the college with the articulation agreement. In still other cases, students decide to retake a course in college in order to consolidate learning. For many reasons, articulation was not as strong a link as dual enrollment has proven to be. Results from studies of dual enrollment are more promising than the articulation results of Tech Prep. For these reasons, POS include opportunities to earn postsecondary credits rather than simply recording the existence of an articulation agreement.

Another trend in education over the last 20 years has been the push for accountability. Federal legislation for vocational education (the previous label for CTE) has included mandated indicators of program outcomes since 1968. Perkins IV was the first reauthorization of this legislation since the No Child Left Behind (NCLB) Act of 2001 and linked many of its outcome indicators to NCLB. CTE students, like all students, have to meet their state’s rigorous academic standards in order to graduate. This was codified into Perkins by a new emphasis on “rigorous content aligned with challenging academic standards” (P.L. 109-270. Sec. 122[c][1][A][ii]). The adjectives *rigorous* and *challenging* do not appear in the prior Tech Prep language. Programs of study, then, can be seen as the Tech Prep analog for the NCLB era. In other words, the basic Tech Prep structure of a secondary-postsecondary connection is the same (although strengthened), the secondary component is now being evaluated using NCLB academic expectations, and there is a

requirement for technical skill assessments beyond mere course grades. This creates a more demanding high school experience than either Tech Prep or NCLB alone.

Federal legislation tends to mandate best practices as determined by what states and other entities are already doing. In this case, many districts were already upgrading CTE programs prior to the passage of Perkins IV in ways that in essence met the criteria for POS without calling them POS. Instead, they use terms such as *career academies*, which is perhaps more familiar to parents and students. By the time the Perkins IV legislation was passed, some states and localities were already implementing what would legally become known as POS.

In addition to incorporating recent trends in accountability for academic achievement, Perkins IV also represents federal endorsement of the reorientation that CTE has undergone in the past two decades. As described, the value of a high school diploma has declined over the last quarter-century. Shifts in the skills needed in the labor market now reward those with postsecondary training; the real, inflation-adjusted wages of those whose education ended with high school graduation have actually dropped.

Globalization, technological change, the associated loss of manufacturing jobs, and the decline of unions have contributed to this drop. *A Nation at Risk* (National Commission on Excellence in Education, 1983) linked America's economic prospects to the strength of our educational system, and this theme has been repeated in reports such as those from the American Diploma Project (2004) and the National Center on Education and the Economy (2007). The more recent incarnation of the Perkins legislation has incorporated the most promising practices in current high school education and required entities receiving Perkins funds to develop at least one POS.

Seen in this context, POS are not a new federal mandate imposed on the field. Instead, POS represent an expansion and endorsement of initiatives both within and outside of CTE that have existed for several years. Perennially popular but less academically rigorous than college preparatory tracks in high school, CTE historically has been directed toward students not interested in college. However, POS will infuse CTE with rigorous academics and seamless postsecondary connections, which have the potential to lead to improved outcomes for all high school students. In the next section, we review the evidence on whether participation in CTE contributes to the engagement, achievement, and transition to postsecondary education and employment of high school students. The following review of the literature on CTE serves as the backdrop for the current focus on POS, which promise to fortify the benefits of CTE.

Literature Review: Engagement, Achievement, and Transition

"Rigor, relevance, and relationships" (Daggett & Nussbaum, n.d.) have emerged as the defining elements of many efforts to improve education, such as the Early College High School Initiative supported by the Bill and Melinda Gates Foundation and other sponsors (American Institutes for Research & SRI International, 2005). Typically, one means of introducing relevance is by organizing instruction around a career focus (Kemple & Rock, 1996; Oakes & Saunders, 2008).

One example of such a reform with a career focus is career academies. This high school structure has existed since the 1970s, but the focus shifted in the late 1980s from a dropout prevention strategy to a high school reorganization model intended to prepare all students for both work and postsecondary education (Kemple & Snipes, 2000). Most career academies incorporate the elements of rigor, relevance, and relationships necessary for student success, including an academic curriculum linked or integrated with a career theme and a broad career focus with links to postsecondary education and business; these academies are also often housed as a school within a school, in which students stay with a group of teachers and a cohort of students in the same academy for a period of three or four years.

The evidence on the role of CTE and career academies on student engagement, achievement, and transition reviewed below is mixed but suggests that participation in CTE can (1) improve student engagement as measured by high school graduation, (2) influence achievement, and (3) facilitate the transition to employment.

Student Engagement

An example of curricular programming that is relevant to students, CTE has been proposed as a way to increase student engagement and reduce dropout rates (Castellano et al., 2007; Plank, 2001; Plank, DeLuca, & Estacion, 2005). Engagement is a precursor to student achievement in and completion of high school, which itself is a precursor to a successful transition to postsecondary education or work. Educators often guide or, as some critics claim, “track” students with poor grades and attendance into CTE courses in the hope that the relevance and hands-on nature of the classes will enhance engagement.

Plank (2001) used data from the National Education Longitudinal Study of 1988 (NELS:88) to determine if participation in CTE was associated with a reduced probability of dropping out. Plank measured CTE participation as a proportion or ratio of the high school experience: the ratio of CTE Carnegie credits to academic credits. He found that the relationship was not linear, but *U*-shaped, with higher dropout rates associated both with no or very few CTE credits and with high ratios of CTE to academic credits. The bottom of the curve, the point with the lowest probability of dropping out, was three Carnegie units of CTE to every four academic units. After this point, as the ratio of CTE to academic credits increased, the probability of dropping out also increased. This curvilinear relationship was found for all students and was especially true (i.e., the curve was more pronounced) for lower achieving youth. Plank concluded that a balanced combination of CTE and academic courses may reduce the risk of dropping out.

There were concerns, however, about the directionality of the association in Plank’s analysis. Staying in school provides more opportunities to take CTE courses, especially in the later grades. The relationship could be interpreted as, “staying in school causes students to take more CTE,” not the reverse. To address these concerns, Agodini and Deke (2004) also analyzed the NELS:88 data, but applied a different statistical method referred to as hazard models, which estimate the probabilities of an event’s occurring

over a period of time. The event of interest was withdrawal from high school and the period was from entering high school to the semester of withdrawal. Agodini and Deke did not use Plank's measure of CTE participation, the ratio of CTE to academic courses. Instead they defined students into five groups based on the number of CTE and academic courses for which they had received credit. These groups ranged from those similar to Plank's three-to-four ratio to those who took no CTE courses. The Agodini and Deke comparisons yielded no significant differences in the probability of dropping out between any of the CTE groups and the group with no CTE credits.

Plank et al. (2005) applied the Agodini and Deke statistical methods to a more recent data set, the National Longitudinal Study of Youth of 1997 (NLSY97). For these analyses, Plank et al. used hazard models but retained the Plank method of measuring CTE participation, the ratio of CTE to academic courses. These new analyses found the same curvilinear, *U*-shaped curve, but the point of inflection was 0.54 rather than 0.77. This translates into roughly one CTE credit earned for every two core academic credits. They found that this course-taking ratio was not significant for students who enter high school older than the typical age (i.e., overage for grade). In almost all cases, these older students had been retained at least one year in the elementary or middle grades and were at a higher risk of dropping out regardless of participation in CTE.

In a longitudinal study of student outcomes at high schools undertaking career-based comprehensive school reforms, Castellano et al. (2007) used a similar technique for their analysis of the CTE effect on dropout. This quasi-experimental study found that in each of the three comparisons, the odds of a student dropping out declined as the proportion of the high school experience invested in CTE courses increased, regardless of whether the student attended the intervention school or a comparison school.

Two random assignment studies have examined whether participation in career-focused education caused students to remain in high school: Crain et al. (1999), a study of 59 career magnet programs serving one urban area, and Kemple and Scott-Clayton (2004), a study of nine career academies in cities across the nation. Both studies compared the outcomes of students who were randomly selected to attend these programs to those of students who had applied but were not selected. Because these assignments were made randomly, any unmeasured characteristics that may have affected the outcomes of participation were randomly distributed in both groups. For the career magnet programs, being selected increased the chances of dropping out. For the career academies, admission had no significant overall effect, positive or negative, on graduation.

Methodological issues in these studies mitigate their conclusions somewhat. In the Crain et al. study (1999), only half of the students were admitted through a lottery; the other half were, in the words of the authors, "handpicked" (p. iii). But all students had to meet the programs' high standards, which tended to push out students who had been admitted through the lottery, many of whom were lower achievers.

There were also limitations in the career academies study (Kemple & Snipes, 2000). For example, only half of the students admitted attended for the full three or four years.

Fifteen percent of those admitted never enrolled, and an additional 30% enrolled but withdrew after completing, on average, less than half of the scheduled semesters. With such a large proportion of students having no or limited participation, the effects of the academies would have to have been quite powerful to cause the outcomes of all in the group to be significantly different than those in the non-academy group. Academy participation was not powerful enough to produce consistent differences in high school achievement or graduation, but as we shall discuss below, it did produce differences in earnings after high school.

Academic Achievement

Since its origins as a component of public education, advocates for CTE have claimed that it can add relevance to academics (Commission on National Aid to Vocational Education, 1914). Most studies have found, however, that taking CTE courses does not have a significant effect on academic achievement (Castellano et al., 2007; Kemple & Snipes, 2000; Stone, 2004). The Castellano study yielded mixed results across all sites and academic subjects, with no discernible patterns. Such weak effects are not unusual for a large-scale longitudinal study that aggregates individual results. The Stone study used national datasets as well as case study data to show that CTE reforms of the 1990s (i.e., Tech Prep, career pathways, career academies) have resulted in CTE students taking more math classes and higher level math classes than an academically comparable group of students. There was no evidence that these students' math performance had improved; however, most educators would agree that taking more math and more rigorous math are necessary conditions to improving academic performance.

Kemple and Snipes (2000) found that career academies increased the number of high school credits earned for students at high risk of dropping out compared to control group students. The academies did not increase the number of credits earned by students at low risk of dropping out compared to their counterparts in the control group. The authors hypothesized that having this kind of heterogeneous student grouping in a small learning community with learning supports might help explain why the academies improved high-risk student outcomes without decreasing low-risk student achievement.

A study that explicitly emphasized instruction in one academic area that is inherent in the CTE curriculum—mathematics—did find meaningful gains on tested performance (Stone, Alfeld, & Pearson, 2008). In a random assignment experiment, Stone et al. showed that students in math-enhanced CTE classes performed significantly better than control students on tests of math ability, without any negative impact on measures of technical skills achievement. The Stone et al. model described a promising direction for CTE, and one that has been demonstrated in a rigorous test to improve academic achievement in five different CTE program areas.

Student Transitions to Postsecondary Education and Work

Many young people start college in the first year or two following high school, but less than half successfully complete their postsecondary programs (Rosenbaum, 2001). The

NELS:88 data reported that 43.2% of students from the class of 1992 completed a degree eight years after graduating (U.S. Department of Education, National Center for Education Statistics, 2006, Table 306). This section reviews the evidence available on the transition to postsecondary education of high school CTE students.

DeLuca, Plank, and Estacion (2006) found from analyzing the NLSY97 data that as the level of CTE participation increased, the chances of enrolling in postsecondary education decreased. DeLuca et al. used the same measure of CTE participation, the ratio of CTE to academic courses, as was used in their 2005 study of the relationship between CTE credits and graduation. Controlling for relevant student factors (e.g., prior test scores, high school GPA, gender, race, socioeconomic status), their new analyses found that a ratio of more than one CTE course for every two academic courses decreased the probability of college enrollment. Students who earned more than half their high school credits in CTE had an almost 80% lower probability of attending college than those with smaller proportions of CTE to academic credits.² Lower ratios of CTE-to-academic courses, those in the range of .20 (1 CTE to 5 academic) to .50 (1 CTE to 2 academic), were associated with lower probabilities of entering four-year colleges. Ratios of .60 and above were associated with lower probabilities for both two and four-year colleges.

The most rigorous test of the effect of career courses on postsecondary enrollment is found in the career academies study reported by Kemple and Scott-Clayton (2004) and Kemple and Willner (2008). This study had the advantage of random assignment (i.e., a lottery) that determined who attended academies and who did not; a large proportion (45%) of those admitted did not enroll or attended less than half of the semesters that constituted a full program. Kemple and Willner analyzed follow-up data collected four and eight years after scheduled graduation. They confirmed the findings reported by Kemple and Scott-Clayton that academy assignment had no effect on postsecondary enrollment or completion. At the time of eight-year follow up, 50% of those admitted and excluded from the academies had obtained a postsecondary credential, and about 20% of both groups were still enrolled in postsecondary education of some type.

Although CTE participation contributes little to the transition to postsecondary education, most studies have found it does ease the transition to work. The final report of the most recent National Assessment of Vocational Education (NAVE; Silverberg, Warner, Fong, & Goodwin, 2004) summarized the available evidence and concluded that there is a consistent pattern that high school CTE has a positive effect on short- and medium-term earnings. A study not included in the NAVF synthesis (Bishop & Mane, 2004) analyzed the NELS:88 dataset and found higher earnings of 12% one year after high school and 8% eight years later for students who had taken several CTE courses.

Most of the studies on the effects of CTE share the same methodology for determining the effect of high school CTE on earnings. They are based on correlational analyses of

² Part of this relationship may be explained because some CTE program areas require intensive coursework at the secondary level but do not have required postsecondary connections, such as cosmetology, carpentry, culinary, or certified nurse assistant. Students in such programs may attend college but are also qualified to work directly after high school.

large datasets, which cannot provide the same kind of strong evidence of effectiveness as randomized controlled trials because they cannot control for unobserved variables that might create systematic differences between groups. Here again, the career academies study is the exception. Kemple and Willner's (2008) analyses of follow-up data collected four and eight years after scheduled graduation indicated that admission to career academies caused an 11% advantage in average earnings. The differences between the two groups did not decrease during the follow-up period. In a trend chart that depicts the average earnings for each month of the eight-year period, the gap between the academy and non-academy students is wider during the second four-year period than it was during the first (Kemple & Willner, 2008, Exhibit 2, p. 15).

Overall, more research is necessary on the effects of CTE on engagement, achievement, and transition. One problem with most previous studies is that they were conducted within a very different policy environment than the current one. Perkins IV requires specific elements to be present in POS—for instance, accountability for academic achievement—that change the essence of these programs.

Summary

The evidence reviewed here shows few strongly positive outcomes in studies on the initiatives that came before POS like Tech Prep. Comparisons between participants and similar nonparticipants typically found few statistically significant differences in student engagement, achievement, or transition, and those that were found were usually only a few percentage points. The evidence on the effectiveness of dual enrollment shows some positive effects, but here again, the differences are only a few percentage points and the analyses may not fully control for the self-selection of students into dual enrollment programs. This suggests that it may be a challenge for POS to improve student achievement and transition to postsecondary education. However, another finding was that increasing the focus of these interventions and the methodological quality of the studies conducted on them could lead to better results and better information.

POS are a natural evolution of prior efforts (e.g., career pathways, Tech Prep) aimed at improving students' educational and career outcomes. However, this most recent iteration promises to be more expansive and rigorous than prior initiatives. Despite a dearth of solid evidence so far supporting their efficacy, programs that meet POS requirements are growing across the nation. An example of an intervention that shares components with POS and which has grown tremendously in recent years is career academies: Almost 5,000 schools reported having at least one career academy, and many school districts, often in large urban areas, have included the career academy model as a major component of their high school reform or high school choice efforts (Brand, 2009). In fact, such programs are often oversubscribed and admissions lotteries have had to be instituted to manage student demand. Some states have adapted their career academies in order to meet the POS requirements. Clearly, career-based reforms have struck a chord across the country, and POS represent the most rigorous implementation of such reforms. POS hold the promise of increasing student engagement through career themes, which provide the relevance students want. POS incorporate rigor through the inclusion of state

academic standards, and they both assume transition to some form of postsecondary education and provide the sequences and supports to make that transition happen.

Whether the implementation of POS will produce the outcomes desired will be determined by research similar to that currently being conducted by the NRCCTE in three field-based studies of POS, to which we now turn.

Mature Programs of Study: A Longitudinal Analysis³

Background

The new legislative requirements have created a need for information on how best to plan and conduct POS. A review of state plans for the implementation of Perkins IV found that states planned to draw upon their experience with similar initiatives such as Tech Prep, career pathways, and dual enrollment (Lewis & Kosine, 2008). Because the idea and model for POS in the legislation evolved from CTE reform initiatives such as Tech Prep and career pathways, as described in the previous section of this paper, we recognized that many schools may already be engaged in activities that look very much like POS in spirit, if not in name. That is, POS may have begun with another name but have now been relabeled, if not also restructured, to better fit the new Perkins definition.

This NRCCTE research project on POS focuses on the identification and rich description of mature POS that can inform CTE policymakers and practitioners about how and why POS function at the local level. . We examine the processes and structures of “mature” sites that (a) have been in existence for several years and (b) have evidence of students moving from a secondary CTE program into a postsecondary CTE program in a nonduplicative sequence of courses, as mandated by Perkins IV. This project examines three mature POS sites longitudinally using a combination of research methods for studying complex social structures and relationships. We seek to explore POS from the ground up rather than imposing a top-down theoretical or policy lens.

Although POS as defined in the legislation contain four critical components that have existed in various forms in prior legislation, the current vision of POS makes cooperation between the secondary and postsecondary levels a critical necessity.⁴ Thus, rather than search for sites that incorporated all four components (which would be next to impossible given that the concept of POS was only recently introduced), the primary selection criteria for “mature” POS sites in this study was one particular component: several years’ worth of evidence that CTE students move from a high school CTE program *into and through* a postsecondary CTE program. We assumed that communication and coordination had to have taken place between secondary and postsecondary

³ See http://136.165.122.102/UserFiles/File/Tech_Reports/Mature_POS_Yr2_Technical_Report.pdf for the more detailed Year 2 Technical Report of the *Mature POS* project.

⁴ Findings from the National Assessment of Vocational Education (NAVE; U.S. Department of Education, Office of the Under Secretary, Policy and Program Studies Service, 2004) showed that the most challenging aspect of Tech Prep was communication and alignment between sending high schools and receiving colleges; few if any Tech Prep sites accomplished this successfully.

administration and faculty in order to create these successful programs. We wanted to learn about how this occurred in order to help the field better understand the critical elements and mechanisms of POS.

Sample and Method

Site selection. In order to identify mature sites, we relied on suggestions from CTE state directors, the Association for Career and Technical Education (ACTE), researchers, and others involved in POS-related CTE efforts (e.g., the League of Innovation's College and Career Transitions Initiative). Initial scouting visits were made to eight recommended sites; on these visits, we (a) sought evidence that they met our criteria for mature sites and (b) established relationships with relevant individuals in order to facilitate future visits should these sites be selected for the study. The method of identifying and narrowing a pool of potential sites included nominations from CTE leaders at the national and state levels in government, for-profit, and not-for-profit sectors; preliminary web searches; phone calls; and finally an in-person visit. We received almost 40 nominations of local sites and ended up with eight we selected to visit.⁵ In the initial screening (web and phone), we determined whether or not the site indeed had a secondary-to-postsecondary linkage. We did find many impressive secondary or postsecondary programs, but without a strong and demonstrable link between the two that provided a clear pathway to students, we did not consider these programs to be mature POS. .

Visits to each of eight sites that met our criteria consisted of informal interviews with the contact person at the site as well as other staff members at the secondary and postsecondary level (administrators, counselors, faculty) and advisory committee members from local businesses that the contact person felt were important to our understanding of how POS were developed. Interview questions addressed issues about the *structure* of the POS, including:

- course sequencing at both the secondary and postsecondary level, as well as articulation between the two;
- dual credit and dual enrollment opportunities;
- distance learning opportunities;
- the integration of academics into the CTE POS (both within and across courses);
- availability and structure of career guidance, including individual graduation plans; and
- opportunities for work-based learning (WBL).

We also asked the following questions about the *development* of the POS:

- when did the POS begin?
- who initiated the process? (Business? Someone at the school? Legislation?)

⁵ Several sites that were highly recommended and met all of our initial criteria declined our visit on the basis of limited time and resources for hosting researchers. For this reason and because of our own limited time and resources, we do not claim to have conducted an exhaustive search. However, what we do have is a range of approaches to implementation of POS at the local level that we hope will help policymakers and practitioners better understand how POS are being implemented across the country.

- who was involved/ at the table for the planning?
- how long did it take?
- what were the barriers and challenges?
- what facilitated it?
- what would you do differently if you were to do this again?
- what are your plans for ongoing improvement?

The answers to these questions helped us create initial case studies of these eight sites. From these, we developed a list of preliminary observations (combined with those of the other NRCCTE POS studies in the last section of this paper) and then selected three sites to continue in the longitudinal portion of the study, which will continue until 2015.

Although the findings presented in the current report stem from the visits to eight sites, future reports will focus only on the three continuing sites. We are aware that the sites that we selected to visit, and those we selected to include in the longitudinal study, may not necessarily be the most mature POS in the country. However, we believe that because of the progress they have made and the geographic and programmatic variation between and among them, they will make for interesting and informative case studies.

Summary

Our preliminary visits clearly showed that POS are not easy to implement locally, and that there are some common challenges facing sites. Many of those we visited had met and negotiated these challenges; others were still struggling. Struggles ranged from getting all of the relevant players (e.g., secondary, postsecondary, business/industry) in one room to arranging student schedules so they could take college courses without missing their high school classes. We hope through this study to identify which components of POS are critically important, which are not, and what might be missing. We understand that we may discover other key elements of POS along the way that may or may not map onto or align with the Perkins legislation. The discussion in our final study report will address how well POS in practice align with the Perkins IV elements; we will also address the pros and cons of close adherence to policy versus looser adaptations based on local needs and circumstances. This discussion may help sites still struggling with how to develop and sustain seamless links between secondary and postsecondary CTE programs; it may also inform policymakers as they craft the language for the next reauthorization of Perkins.

This study has important implications for the field. POS are a culmination of many years of attempts to invigorate, strengthen, and streamline CTE programming from the secondary to the postsecondary levels. An evidence base is needed to determine whether POS actually work and how they map onto the Perkins legislation. If successful, POS will not only engage youth but increase their academic performance and guide them through college completion with a degree or certificate that will help them obtain family-supporting work in promising careers. Policymakers, analysts, and practitioners can use this information to develop evidence-based academic and career preparation POS and transition practices, thus providing students with viable opportunities to not only plan for and engage in academic and career-related pursuits, but also to succeed.

A Longitudinal Study of the South Carolina Personal Pathways to Success Initiative⁶

Background

South Carolina's Personal Pathways to Success initiative, authorized under the 2005 Education and Economic Development Act (EEDA), is a state-mandated school reform model intended to improve student achievement and preparedness for postsecondary education and high-skill, high-wage jobs. EEDA is intended to work through a focus on career awareness and exploration at all school levels and the creation of locally relevant POS in high schools. The law contains nearly all of the basic requirements of Perkins IV plus additional elements intended to support and sustain the implementation of POS. These include the organization of high school curricula around at least three career clusters per school, an enhanced role for school counselors, and extra assistance for high-risk students. Further, the law mandates evidence-based high school reform, regional education centers charged with facilitating business-education partnerships, and greater articulation between secondary and postsecondary education.

This five-year study seeks to assess the effects of the EEDA legislation on the development of POS in South Carolina, as well as the effects of career pathways and POS on high school students' engagement, achievement, and transition to postsecondary education and/or employment. POS and career-focused education have shown promise in improving student achievement, engagement, and transition to postsecondary education and employment (Kemple & Snipes, 2000; Stone et al., 2008). However, the ways in which this type of education reform has been implemented have varied widely (Castellano, Harrison, & Schneider, 2007), leaving the question open as to the most effective means of implementing POS. This study examines the extent to which a statewide reform mandate like the EEDA facilitates the creation of quality POS in schools and whether these POS impact selected outcomes for South Carolina's secondary students and the schools they attend. This study also explores the influence of the availability of school and community resources and future employment opportunities — whether substantial or limited—on the development of POS and the outcomes of students enrolled in them.

To address the above, the study is structured around the following four research questions: (1) to what extent does South Carolina's EEDA policy facilitate the development of POS? (2) what impact does the level of available community resources have on the implementation of EEDA policy? (3) what impact does the implementation of EEDA policy have on (a) student high school outcomes and (b) student postsecondary employment and education/training outcomes? and (4) what impact do POS, as defined in Perkins IV, have on (a) student high school outcomes and (b) student postsecondary employment and education/training outcomes?

⁶ See http://136.165.122.102/UserFiles/File/Tech_Reports/Personal_Pathways_Yr2_Technical_Report.pdf for the more detailed Year 2 Technical Report of the *Personal Pathways* project.

Study Design

Because all high schools in South Carolina are operating under the same state law, it is not feasible to randomly assign schools to experimental and control groups. Rather, the study employs a quasi-experimental design with a mixed-methods, triangulated approach (Tashakkori & Teddlie, 2002), following three student cohorts from a sample of eight high schools from economically and culturally diverse regions of South Carolina over a five-year period. Two alternative methods provide a measure of control over competing influential factors: (1) a cohort design with non-equivalent groups and cyclical turnover (Cook & Campbell, 1979, as cited in Garson, 1998/2007) has been employed with data collection on the three cohorts chosen because of their varying exposure to treatment. Each school's Class of 2009 received very little to no exposure to the reforms. Each school's Class of 2011 is receiving moderate exposure. By contrast, each school's Class of 2014 is receiving the full effects of the reforms. Further, the Class of 2014 and Class of 2011 cohorts are being partitioned into subgroups based on the level of fidelity of implementation of EEDA policy at their schools (i.e., low and high implementation levels) and the level of school and community resources (i.e., low-to-moderate and high poverty). This sampling scheme provides for quasi-experimental control groups in each school, and for contrasts between both middle- and relatively-low SES contexts and between relatively strong and weak policy implementation levels.

Both quantitative and qualitative data are being collected from study participants, which will help to create a broader understanding of EEDA's impacts on schools, teachers, and students and the creation of POS. Quantitative data include student outcome data, such as grades and attendance, from three student cohorts and responses from surveys of students (both in-school and after graduation). Qualitative data include course catalogs and career-related materials, Individual Graduation Plans (IGPs), and perspectives gleaned from interviews and focus groups conducted with school principals, counselors, teachers, and students as well as community college deans and faculty.

To collect information on the extent to which POS are being implemented, the *Personal Pathways* study team is interviewing school personnel and students during visits to schools each year; surveying students while in school and after graduation; and analyzing school catalogs and career-related materials. Student cohort IGPs, which outline students' POS, courses taken, and any work-related learning experiences they have experienced, are also being analyzed.

To explore the influence of the availability of school and community resources on EEDA policy implementation and the development of POS, sample schools were selected to be equally divided into two resource-level clusters, based on the relative level of resources in the communities in which the schools' students live, as measured by levels of poverty, unemployment, and income per capita. The ways in which policy implementation and outcomes vary within and between schools from these two resource-level clusters will be examined.

To assess the impact of the policy on sample student outcomes, various types of data are being collected on the three student cohorts. The impact on student outcomes over the study period are being explored by examining achievement and behavioral data available in the state educational database, including attendance, disciplinary incidents, retention, dropout, grades, and test scores. This information is being supplemented with information gleaned from responses collected during on-site interviews with school personnel and students as well as from student surveys.

Data on students' transitions after leaving high school will be collected in follow-up surveys sent to two of the student cohorts (Class of 2009 and Class of 2011) one year after they leave high school. Student cohorts are being surveyed about their high school experience; whether having a POS has helped them with their postsecondary activities; whether they are employed or furthering their education; and whether their postsecondary activities are related to their high school POS.

Site Selection

The *Personal Pathways* study team sought to select a diverse group of schools from different regions of the state that varied on factors critical to our research questions. Sampling criteria were established for the following three factors: (1) community economic conditions and industries, (2) levels of school and community resources, and (3) initial levels of EEDA implementation. These sampling criteria were applied during a four-stage selection process that resulted in the selection of eight high schools from three of the state's Workforce Investment Areas (WIAs). Two of the WIAs have one dominant industry, manufacturing or leisure and hospitality, whereas the third has a more diverse industrial base, including government, financial activities, and education/health services. Income levels also vary across and within WIAs, with regional poverty rates ranging from 12% to almost 17%.

The final group of eight high schools was selected to be a diverse mix with varying levels of community resources. The majority of students from four of the schools come from low-to-moderate poverty communities, and the majority of students from the other four schools come from high poverty communities. Initial policy implementation levels were low at two schools, moderate at three schools, and high at three schools. In addition, the schools range in size from 500 to almost 2,000 students; serve urban, suburban and rural communities; have levels of minority enrollment that range from 10% to 95%; and in the years immediately preceding the study varied across student outcome measures. For example, across the eight high schools, 10th-grade high school exit exam passing rates ranged from 54% to 84%.

Summary

Although the study team will make more definitive statements at later stages of the study, preliminary observations from initial site visits suggest some interesting trends in policy implementation and point to potential influential support structures that may contribute to POS development. There was substantial variance in initial school response to the EEDA

career pathways model. Some schools immediately embraced the career pathways model introduced by the state policy. Other schools seemed overwhelmed by the policy demands, whereas others appeared to be waiting (and hoping) for the “trend to pass.” Building on existing CTE programs or whole-school reform models such as High Schools That Work facilitated early implementation of career pathways. Not surprisingly, access to a wide variety of resources facilitated policy implementation, such as having staff with prior knowledge of and experience with various policy areas or being located in a community with diverse local businesses willing to provide resources and educational opportunities for students. Several of the schools lacked some of the basic resources necessary to design and implement POS, and there appears to be little potential for this situation to change in the near future. This will definitely limit, if not curtail, long-term policy implementation at these schools. The new law also mandated fundamental changes in guidance personnel roles, shifting from a focus on testing and scheduling to career planning and POS development. Although seen as essential to EEDA policy and the evolution of quality POS, these shifts in roles are only slowly taking place at most sample schools. Whether counselors can break free of their traditional, bureaucratic roles may determine whether schools can fully implement this career development model and POS.

Rigorous Tests of Student Outcomes in CTE Programs of Study⁷

Background

This study seeks to measure the impact of POS on student academic and technical achievement as implemented under a variety of conditions in two different states using two methodologies. First, we are conducting a set of randomized controlled trials (RCTs; Shadish, Cook, & Campbell, 2002) in three sites in one large district. Second, we are using rigorous quasi-experimental methods in one site in another large district. Given the study’s two-stranded design, we will be able to separately report differential impacts, if any, for some groups or under some conditions. The results will show the degree to which POS have any impact on student academic and technical skill outcomes in relation to typical CTE programs and practices that exist in the control and comparison schools. In order to better understand student outcomes, we also seek to describe the context and practices that produced them through a qualitative study component that includes classroom observations, participant interviews, and student surveys.

We are examining the following measures of effectiveness of POS, as derived from Perkins IV: (a) academic achievement, (b) technical skills achievement, (c) high school completion, (d) placement in postsecondary education, work, or the military, (e) program participation and completion by nontraditional students, and (f) program participation and completion by students from special populations. Our research question asks, to what extent does participation in a POS lead to improved student outcomes as compared to outcomes of (1) a strand of control group students (who applied to be in the program but were not selected in a lottery process), or (2) a strand with a closely matched comparison group? More specifically, the study examines to what extent POS participation increases

⁷ See <http://136.165.122.102/UserFiles/File/Tech%20Reports/Rigorous%20Tests%20Tech%20Report.pdf> for the more detailed Year 1 Technical Report of the *Rigorous Tests* project.

student (a) academic achievement, (b) technical skills achievement, (c) high school completion, (d) participation in and completion of POS by nontraditional (e.g., female) students and other special populations of students (e) employability, and (f) completion of coursework leading to college credits.

Study Design

As shown by research in the physical sciences and medicine, effectiveness can best be determined through experiments with random assignment to treatment and control groups (Cook & Payne, 2002; Mosteller & Boruch, 2002). Our first choice in study design was an RCT. Aware of the difficulties of creating random assignment conditions in educational contexts, however, we undertook a rigorous quasi-experimental design in the case of one district that was unable to accommodate an RCT. In the end, we have a two-strand study: an experimental strand and a quasi-experimental strand.

Experiment. The first strand uses an RCT design with three simultaneous sites located in one district. In this district, the unit of randomization is the school. Background characteristics (including prior achievement) were collected on treatment and control groups to serve as covariates in later ANCOVA analyses as a way of minimizing the possibility that differences in outcomes reflect pre-existing differences in the groups.

Quasi-Experiment. The second strand of this study uses a quasi-experimental design. The sample for this strand consists of the 2008-2009 ninth-grade class attending the participating wall-to-wall academy high school and a comparison group that was identified by the district research office using propensity score matching.

Data Sources

All of our outcomes measures come from the districts' systems data and are of practical interest to schools; these measures capture those skills and content that POS are designed to address. We measure academic gains using systems data, including course grades and state test scores. Technical skills achievement is also being measured using systems data, including course grades and program assessments. We are also collecting work readiness assessments where these are available, as well as data on high school completion and dual credits earned. Student attendance and retention over the four years of high school are our primary measures of engagement. Our classroom observations and student surveys, part of the qualitative strand of the study, also contain some measures of, or questions related to, student engagement. Data on participation by nontraditional (e.g., female) students and other special populations (e.g., students with disabilities, special education students, economically disadvantaged students, and/or students with limited English proficiency) are being collected from Perkins reporting data.

Study Sites

Many districts have developed opportunities for students at all grade levels to receive innovative or themed instruction. These opportunities are often developed as a means of

integrating schools so that students who would otherwise attend relatively segregated schools might instead attend a magnet school attracting students from all over. In other cases, the goal may be to provide options outside the traditional high school experience—a response to the notion of the “shopping mall high school” (Powell, Farrar, & Cohen, 1985), in which high schools have been described as attempting to cater to such a wide variety of students that they were unable to respond adequately to the needs of most students. By providing schools of choice, students and teachers can be certain of the focus at any particular school. The districts participating in this study chose to develop POS for some or all of these reasons.

District 1. District 1 is located in a large city in a Western state. It serves 300,000 students, over 60% of whom self-identify as ethnic minorities. The impetus behind District 1’s magnet high schools and career-technical high schools (CTHS) was to improve student achievement, promote diversity, and create an awareness of career opportunities relative to the POS (and magnet themes). District 1’s CTE programs meet the requirements of POS and have proven to be popular enough that the district holds a lottery to select student applicants to their magnet high schools and CTHS. Three of these high schools are participating in the experimental strand of this study, but each differs from the others in structural ways—reflective of the diverse approaches to implementing POS employed by high schools across the country—that allow us to extend the generalizability of our findings beyond that of any one school. One school (Sioux⁸) has a long history of delivering CTE, another (Apache) has built a reputation of “academic distinction and technological excellence,” and the third (Navajo) was only recently opened. Each delivers POS differently: one through a project-based curriculum, another through an academic-technological focus, and the third through more traditional CTE infused with high-level academics.

District 2. District 2 is located in a large city in the Eastern United States. It serves almost 150,000 students, over 65% of whom self-identify as ethnic minorities. District 2 has multiple magnet programs across all grade spans. At the high school level, a number of schools (or programs within schools) offer magnets that are available to qualified students through a lottery. Cherokee Academy is a state-of-the-art high school featuring three integrated technology academies combining rigorous academics with strong, well-articulated POS in engineering, medical sciences and biotechnology, and information technology. District 2 is located in a state with secondary/postsecondary statewide articulation agreements, assuring students a seamless transition and the opportunity to earn college credit that can be applied to an associate degree or postsecondary certificate program. POS have a different developmental history in this district; our goal is to capture that variability and how it affects outcomes of interest.

Summary

In searching for appropriate sites, as well as in our first year of data collection in the four sites we eventually chose, we learned a great deal about POS and how they operate in some districts. POS (along with other high school choice programs) are popular enough

⁸ All school names are pseudonyms.

across the nation that many districts have had to develop a way to fairly allocate opportunities to participate. In some districts, new sections of popular programs are added; in others, applicants are rank ordered and offered admission in that order. In still others, lotteries are held.

We also learned that districts were already upgrading CTE programs prior to the passage of Perkins IV in ways that in essence, if not in name, met the criteria for POS. Neither of the districts in this study refers to these programs as POS. Instead, these districts' POS are known as *academies*, a term perhaps more familiar to parents and students. These POS were developed based on national best practices. CTE directors become aware of developments in their field through participation in conferences and other communications. Best practices then spread to districts just as they do to the federal level, where new mandates develop based on what states and localities find feasible and promising. As such, by the time the Perkins IV legislation was passed, states and localities were already implementing what later became known as POS.

Preliminary Observations of POS Across All Study Sites

In this section, we summarize preliminary observations derived from early data collected for the three NRCCTE projects, but each observation does not necessarily apply to all three studies. These observations were developed as part of the site selection and early site visit process for each project and are based on initial reviews of site data rather than systematic data analysis. The principal investigators for the three projects prepared summaries of their observations relative to the four components of POS specified in Perkins IV. Another NRCCTE researcher, not directly involved in the projects, reviewed the summaries and attempted to identify overarching themes from the separate studies. Consequently, what follows are labeled *early observations* rather than findings. As additional data are collected and analyzed, it may be necessary to modify what is stated below. The observations are organized by the four Perkins IV components with a final section relative to the overall implementation of POS.

Core Component 1: Incorporate Secondary and Postsecondary Education Elements

Cross-Site Summary. Alignment of secondary and postsecondary instruction represents a major challenge for POS. At the sites visited, articulation of secondary and postsecondary courses was the exception, not the rule. Alignment requires secondary and postsecondary faculty to agree concerning the content most appropriate to be delivered at each level and the ways in which secondary students will demonstrate the acquisition of knowledge and skills sufficient to receive postsecondary credit. Many years of experience with the articulation agreements developed for Tech Prep consortia demonstrated that even after agreements were signed, students often did not receive postsecondary credit for content they studied at the secondary level (Bragg et al., 2002; Hershey et al., 1998).

Site Observations. In both districts in the *Rigorous Tests* study, students can take certain CTE classes in high school, and if they pass with an A or a B, they can receive college credit for the course. Even if they take a class as a ninth-grader, during their junior or

senior years, they become eligible to apply for the credit, paying a small fee per course to receive their credits. These fees are very small compared to the hundreds in tuition and fees they might otherwise have paid at local postsecondary institutions. This program allows students to receive both high school and college credits, but students must apply while still attending high school. In addition, many of these credits are transferable to the state university system. We learned from teachers that the community college sends representatives to visit each eligible program to talk with students about the opportunity to earn transferable credits.

For some program areas in the *Rigorous Tests* study, secondary and postsecondary connections have been strengthened by the input of Joint Technical Skills Committees (JTSCs). The Culinary JTCS, for example, is composed of representatives from the school district, regional CTE centers, and the local community college along with members of the local restaurant and hotel and lodging associations and representatives from business and industry. This group supports the program in many ways including curriculum alignment and articulation between secondary and postsecondary, program planning, standard setting, and resource development.

In most of the sites visited as part of the *Mature POS* project, it was reported that the college was the first to reach out to the high schools to begin building common curriculum sequencing and articulation agreements. In fact, the three sites selected for the longitudinal study all had designated staff whose job it was to work with high schools on POS. At the three non-college sites visited in the initial search, connections with local community or technical colleges appeared to be either weak or nonexistent. These high schools seemed to be constructing their POS in something of a vacuum, though all identified potential postsecondary and career options and were knowledgeable about their state's efforts regarding POS. High schools may need guidance or resources to establish postsecondary links. In some cases, the high schools seemed reluctant to jump through all of the scheduling, cost, and teacher credentialing hoops that the college required in order to offer courses for college credit to high school students. The secondary-postsecondary linkage, including development of articulation agreements and non-duplicative curriculum sequencing, could be made stronger in these sites if a local college reached out more overtly, as was the case in five of the *Mature POS* sites, or if the state provided more technical assistance, guidance, and support.

The South Carolina EEDA policy mandates improvements in the articulation between school districts and higher education institutions to ensure that students can transition from high school directly into postsecondary education and to increase dual enrollment opportunities available to students. Currently, a statewide advisory council is reviewing all existing articulation agreements between school districts and South Carolina higher education institutions. The advisory council will make recommendations to improve rigor and equivalency in content across levels and recommend coursework that is acceptable statewide for dual enrollment. These efforts are still in the early stages, however, and may take some time to impact schools. Nevertheless, during initial visits, opportunities for earning dual credit were found to be available at all schools visited.

Core Component 2: Include Coherent and Rigorous Content Aligned with Challenging Academic Standards and Relevant Career and Technical Content in a Coordinated, Non-Duplicative Progression of Courses

Cross-Site Summary. The integration of academic and technical content was not frequently observed in any study. It occurred most often in CTE courses that used project-based learning and rarely in academic courses that included students from several different occupational areas. We observed many of the same challenges to integration that were reported in the volume edited by Grubb (1995) and a report by Johnson, Charner, and White (2003). Integration requires time for teachers of academic and technical courses to work together to identify knowledge and skills appropriate for instruction in their respective classes, and district- and school-level administrators typically do not provide the common planning time needed to engage in this work. An added challenge is when academic courses are offered at the home high school and technical courses at a regional CTE center, resulting in the physical separation of academic and technical faculty. When integration occurs, it is often the result of the initiative of individual teachers, not a systematic school process. Project-based learning is by its nature inherently integrative, but in our observations, few teachers use it as their primary instructional method.

Site Observations. Across the *Rigorous Tests* schools, much technical content is aligned with academics. However, curriculum integration remains a challenge at many schools because of staffing and scheduling issues. For instance, there are eight program areas at one school but not eight English teachers—thus each program area cannot have a dedicated English teacher. Even English teachers at a school where they are dedicated to a specific program area do not integrate content with the CTE teachers because they are not granted the time to work together. These teachers also noted that there are several pathways within each program area, and students from various CTE pathways are scheduled into the same English class. Several teachers reported doing curriculum integration work largely on their own, finding time infrequently, on an as-needed basis, to seek input from peers in other curricular areas, observe each other's classrooms, and offer each other critiques and feedback.

At one school, the principal found funds to support Thursday afternoon collaborative work between teachers in various programmatic groups. As the principal described it, a science or math or Spanish teacher in one part of his facility can connect with other teachers in culinary, alternative fuels, or hospitality and determine how their academic content might relate to technical concepts and give students something to connect to. In this school, academic chairs do not drive the curriculum; CTE program leaders do.

The South Carolina EEDA policy requires that all students take rigorous academic core courses, regardless of their career pathway, and that all core academic and CTE courses meet state academic standards and incorporate career-related content and experiential learning opportunities. These changes regarding career-related content and experiential learning were to be made to curriculum in all high schools in a minimum of three career clusters by the beginning of the 2007-2008 school year. By the time of our initial visits to

schools during the second semester of the following school year (2008-2009), few teachers interviewed—whether core academic or CTE—described this required depth of integration of CTE and academic content. Teachers who did describe integration efforts were much more likely to be CTE than core academic teachers. A number of CTE teachers reported integration of academic content into their courses and cross-disciplinary cooperation and shared projects. For example, one health sciences teacher told us that to be successful in the health sciences, students need to have a good academic grounding, so this teacher works across departments to make sure students are prepared. This includes co-teaching sections and working on a joint student project with a chemistry teacher.

There were also a few core academic teachers at several *Personal Pathways* schools who spoke of integrating career-related content into their courses. One math teacher described using a student learning interest inventory to decide what real-world examples to use in class. Based on student interests, this past spring, she gave examples for calculus in engineering, computers, motion problems, and finances. She also organizes an Advanced Placement (AP) calculus night each year to show students interested in math the possibilities for careers. Guest speakers this past year included math faculty and the head of the Engineering department from a local university and employees from a local manufacturing company.

The *Mature POS* study did not find much alignment between CTE and academic courses, and curriculum integration within either type of course was even rarer in most of the sites visited. Two of the technical high schools had made efforts to offer complementary academics with their CTE courses. In the rest of the sites, although many of the POS listed academic courses on paper, it was not clear that rigorous or even relevant academics were actually being taught to students in the POS. Rather, academic courses were a parallel but separate sequence. It is very difficult to align academic course content (e.g., English) with more than one industry or career area (e.g., culinary, welding, health) at a time, and many academic teachers had students from multiple POS in their classes. It was easier for the CTE teachers to include academic content in their courses; and although we saw some of this, it was not happening in a systematic way (i.e., with curriculum mapping).

A contrast to the prevailing situation was seen in a few classes that use project-based learning. At a *Rigorous Tests* school, for example, a pre-engineering teacher described a project he assigns to his freshman students. He chooses a 10-year time span (e.g., 1750-1760). Students find an inventor or invention from that era, research the invention, and write a two-page report about it. They then build a model of the invention. The model is not meant to function but must be built to scale. Students then present it to the class. One computer science teacher, building on his extensive business background, runs his classroom much like a software development company. To complete a whole-class, multi-week video game project, students function as a team, occupying a variety of roles like programmer/coder, debugger, graphic designer, audio technician, and librarian/archivist. Students in this program also serve as each other's teachers, producing screen capture videos of their programming techniques that are featured on the teacher's website and played in class. These observations were made in a school where the faculty

had received intensive professional development in project-based learning before the school was opened, with follow-up sessions offered the next summer to the new cohort of teachers. The school is supported in this activity by the superintendent’s office, which helped fund the purchase of the professional development materials.

These examples illustrate that it is easier for CTE teachers to include academics in their classes than it is for academic teachers to make their content relevant to students who are from several different occupational areas. An implication of this observation is that the emphasis in integration should be on ensuring that CTE teachers have the skills to identify opportunities for academic enhancement inherent in their curricula and the knowledge and confidence to teach the academic content they identify.

Core Component 3: May Include the Opportunity for Dual or Concurrent Enrollment Programs

Cross-Site Summary. Scheduling, costs, and teacher qualifications represent barriers to offering courses that award postsecondary credit at the high school level. The Education Commission of the States (Vandal, 2009) summarized research demonstrating that high school students often do not receive the postsecondary credits they earn through articulation agreements. These are often referred to as “escrowed” credits, because they are not awarded until students meet defined criteria at the postsecondary level. High school students who earn “transcribed” postsecondary credits typically do so in courses in which they are also enrolled at the postsecondary level. Transcribed credit is much easier for colleges to document and for students to claim. The remaining challenge is ensuring that the credits are accepted at multiple postsecondary institutions.

Site Observations. Budget issues were acknowledged at all *Rigorous Tests* schools as constraining dual credit options. One initiative provided funding for a community college instructor to come to the high school and teach a college-level course for which students received dual credit. Student feedback indicated that they would prefer going to the college campus in order to get the college experience. The POS high school set up a cohort to travel back and forth to the college, but the funding to support that service ran out. Although the program continues, it is now back at the high school.

The *Mature POS* project noted that many logistics had to be worked out in order to create connections between secondary and postsecondary institutions. If a dual credit course is offered at the college, both semester and daily schedules must be aligned between the institutions to allow students to leave their high schools for part of the day without missing any of their other classes. Colleges were often trying to develop arrangements with multiple high schools, all of which were operating on different schedules. In some cases, the school districts or the college needed to provide transportation; in others, the students drove themselves to campus.

When a dual credit course is offered at the high school, either the college instructor needs to travel to one or more high schools to teach it, or the high school teacher needs to have proper credentials, either by showing relevant documents or by enrolling in college

courses to receive a degree. Because many high school CTE teachers have industry experience in lieu of a bachelor's degree, this was sometimes a hurdle. In addition, compensation arose as a contentious issue in cases in which (a) the college instructor had to go out to the high schools as part of his or her work day, and (b) the high school teachers were not further compensated by the college for the extra work involved in teaching a college-level course. At both of the technical high schools visited that are co-located with a technical college, the courses offered to high school students for college credit are taught at the colleges because they are so close. The other technical high school was located within the vicinity of many different colleges, but did not have a unique relationship with any of them. The courses available for college credit at this school are taught at the high school and articulated with a variety of area colleges.

We rarely encountered a seamless procedure for students to receive credit for their articulated courses once they enrolled in the partner college. In two sites, high school students were required to enroll as college students in order to take the dual credit courses; these students were considered college students and high school students at the same time. In this way, their course credits went directly onto their college transcripts and appeared when they enrolled full-time at the college. However, in most cases, the college did not have a system of recording which high school students had passed the articulated course and were eligible for the credit. This was true even in sites where the program faculty at both levels had very good working relationships. It seemed to be an issue that instructors expected that the registrar or some other college administrative office would handle and was therefore beyond the control of individual programs. However, the colleges claimed that their data systems were not set up to flag incoming students who were eligible for credit (even though colleges routinely flag AP credits). In a few sites, it was incumbent upon the students to obtain, keep, and present a piece of paper from their high school to the college in order to claim the articulated credit. Not surprisingly, many students failed to do this and ended up re-taking the same course at the college at full price. Due to budget cutbacks at one site, one of the articulated credit sequences was halved so that high school students only received half the credits for a college course; therefore, they needed to retake the full course at the college level anyway. The sites varied in whether or not the articulated or dual credits earned would be accepted by other colleges in the state; clearly, the credits are more valuable to the student when this is the case.

The *Mature POS* study found that the question of who would pay the tuition for dual-enrolled students was a barrier that some of the sites had worked out and with which others were still wrestling. In most sites, the college covered the cost of the tuition and received more state funding for their increased enrollments; the high school or the students paid only for required books. In one site, the principal told us that the state could not decide how to pay for dual credit, which was why they did not offer it. The school in question did have articulation agreements with a few colleges for a handful of its courses; these colleges had agreed that students who passed certain courses could place out of the first year of their college programs, much like AP courses. However, dual enrollment/dual credit was not being actively pursued in that state. In another state, both the college and the high school were claiming the student and receiving state funds; there

was concern at the state level that this controversial practice represented “double dipping.”

In other *Mature POS* sites, even when tremendous efforts had been made and opportunities were clearly there, students did not always benefit. This was either because of logistical issues in the secondary-postsecondary arrangement (such as when a college had no way of knowing which students had taken the course in high school and were eligible for credit, and/or the students did not remember to claim their credits once they enrolled in the college) or because of students’ own choices. That is, some students did not want to forgo classes or activities at their high school (when the course was offered only on the college campus) or preferred to “make an easy A” by not taking the more rigorous college-level course. Although many of the students in our focus groups told us they were taking a dual credit course because it was “free college,” or “more fun than high school,” half or fewer of students who met eligibility requirements in the sites visited took available courses for college credit while in high school.

At the time of initial site visits, all of the *Personal Pathways* schools had some college credit options available to students through dual enrollment and/or dual credit. The range of options varied widely across schools and regions of the state.

Core Component 4: Lead to an Industry-Recognized Credential or Certificate at the Postsecondary Level, or an Associate or Baccalaureate Degree

Cross-Site Summary. Schools recognize the value of industry certification both in improving instruction and signaling that students have acquired a defined set of skills and knowledge. Programs that earn industry certification receive high-quality curriculum and professional development opportunities for their instructors. Earning certification requires that programs meet national standards with regard to facilities, equipment, and qualifications of instructors. Some schools find it difficult to meet these standards and to provide the time and cover the expenses for professional development. Not all programs that have industry certification arrange for their students to take the assessments required for individual certificates.

Site Observations. The signaling power of industry certifications and credentials are evident to all of the schools in the *Rigorous Tests* study and almost all in the *Mature POS* study. Some nationally recognized programs (e.g., ASE [Automotive Service Excellence], Comptia A+, and Cisco), were mentioned by study participants as offering the highest assurance of academic and technical rigor and standards-based career preparation. Furthermore, many of these programs offer curriculum materials and professional development, which are seen as a substantial incentive because the teacher or school does not have to do this work. Nevertheless, the time, personnel, and monetary commitments required to establish and maintain such programs are also often cited.

One school in the *Rigorous Tests* project is considering American Culinary Foundation certification for its culinary program. Until that is attained, its students may acquire ServSafe certifications, an industry-recognized portable food and alcohol safety

certifications that covers recipients for three years. Juniors or seniors may earn this certificate and carry it into jobs and/or postsecondary education. This district also uses ProStart, a secondary-level career development program in culinary arts and foodservice management, which is driven by industry needs and standards and incorporates classroom curriculum, work experiences, and opportunities for students to participate in local and national competitions. Additionally, because this school's restaurant is open to the public, it is inspected by the local health department; students must demonstrate proper sanitation, food safety, and professional dress standards to earn a health card, which is also portable to work or postsecondary education.

Only some of the sites in the *Mature POS* study facilitated the opportunity for their students to receive industry-recognized credentials via technical skill assessments in high school. In some areas like child care, there are specified hours of work-based learning among the requirements for certification or licensure. Many students who begin CTE coursework during their junior year are unable to log all of their hours prior to graduating from high school and continue working full-time after graduation rather than enrolling in college. If these students attend college full-time, they miss out on the window of opportunity to earn more hours toward licensure and risk losing the ones they have already built up while in high school. Automotive technology students, in contrast, can earn two ASE certifications while in high school that are applicable toward their Master certification, and auto dealerships often pay for their employees to earn an associate's degree and manufacturer-specific certifications.

Implementing Programs of Study

In this section, we move from the components of POS mandated in Perkins IV to some general observations about conditions that appear to facilitate or hamper POS implementation, including guidance and counseling, business-industry partnerships, and prior involvement in initiatives similar to POS. We conclude with some final thoughts about the potential of POS.

Guidance and Counseling. We found that guidance and counseling play a key role in POS. When career planning is simply added to the primary responsibilities of counselors (e.g., scheduling, testing, facilitating college applications), they do not have the time to work with students to thoroughly explore career options. However, when counselors' involvement in career planning is mandated and their responsibilities are reorganized by reform policies, as is happening in South Carolina, POS become more central and students become better prepared to choose them. At some sites, schools are experimenting with giving some counseling responsibilities to teachers.

In the *Rigorous Tests* project, college and career advising happen largely at the program level at one of the district's schools. Several teachers stated that school counselors serve largely academic planning needs (i.e., filling out four-year graduation plans) and are not connected—or experienced—in the programmatic areas that faculty are. Faculty are thus accustomed and expected to do both informal and formal advising, including counseling students about the best postsecondary programs to consider in their respective fields,

providing advice on professional standards, and mentoring students in their job searches. One principal noted that, although his academic counselors are strong, “real guidance happens in the programs.” A culinary teacher at the same school described how classroom content in her program is enriched by exposure to real-world career opportunities, including industry tours and guest speakers drawn from the region’s rich restaurant and hospitality resources. Such experiences have been coupled with an emphasis on soft skills, manners, professionalism, and service that will benefit students in many contexts, whether they choose to pursue careers in the culinary field or not.

One of the *Rigorous Tests* high schools incorporates a ninth-grade course that helps orient students and also introduces them to the soft skills and career planning instruction that will be provided at the school. In this class, students create their four-year plans, which lay out the courses they will take during high school, and explore state- and district-hosted websites offering career and postsecondary education planning tools and interest inventories. One of the teachers of this course told us that she allows students to visit their counselor during the class period, as well as having counselors come and speak to the entire class, because scheduling issues often make it difficult for students to find a time to meet with counselors. The cultivation of standards of professional dress and business manners is also a component of this course, the culmination of which is a ninth-grade luncheon at which the students dress in their business attire and are served by upperclassmen. The principal of this school stressed the importance of the demonstration of such soft skills to their overall culture and curriculum. Half-joking, he used the term “indoctrination” to describe the process by which the school’s values of academic and technical excellence, team-building, and professionalism are established and reinforced. Rules and customs at this school uphold a culture of shared responsibility and pride that feels familial and time-honored. School-wide activities celebrate and reward students and staff for their successes. The principal and several teachers mentioned award ceremonies, class luncheons, and (culinary-produced) brownie-and-ice-cream school treat days.

Every POS high school participating in the *Rigorous Tests* study, across two districts and two states, requires its students to have a plan encompassing their four years of high school, outlining which courses they will take. Completing such a plan shows students and their parents what high school requirements and postsecondary training and education are necessary to reach their anticipated career goals.

The *Mature POS* study observed that most sites did not provide regular guidance to students about POS in high school. In one technical high school, however, POS-focused career guidance was emphasized. In fact, the entire school was structured around students’ career exploration and development, which meant that the guidance and curriculum included related planning activities, particularly in the freshman year. These included interest/aptitude tests, a rotation of two weeks in each of seven career areas, and course-planning meetings with parents culminating in an official “decide activity” in which the student would select a career area and map out a course plan and goals for the next four years.

Career guidance for students was much less well-developed in the other *Mature POS* sites. In some high schools, career exploration websites (such as ACT's Explore test or Kuder's Career Planning System) or other online tools were offered but not required. When we spoke with guidance counselors, the majority were more focused on testing, scheduling, and college applications than on helping students choose a POS. Some counselors were not even familiar with the term *program of study* and were unaware of and/or not involved in the course sequencing work that had been done between CTE teachers at the high school and the local college. That is, CTE programs were barely on the radar for many guidance counselors at the high schools we visited.

In the *Personal Pathways* study, South Carolina state law requires guidance counselors to play a major role in EEDA policy implementation by spearheading career awareness, exploration, preparation, and guidance efforts at all school levels, particularly in high schools. The intent of state policy is to shift the major focus of guidance counselors from testing and scheduling courses to assisting students with identifying their career interests and helping them to plan their courses and future work and education around these interests. Schools are required to reduce their student-to-guidance personnel ratio to 300-to-1 or lower. To help with this, the state has provided some funding for career specialists to assist with the career planning and development duties and help lower student-to-guidance personnel ratios. Whether or not counselors can break free of their traditional, often bureaucratic, roles may be a key factor in whether a school can fully implement this career development model and POS.

Some schools visited in the *Personal Pathways* study were very creative in reorganizing their guidance staff to try to accommodate these new expectations and responsibilities, whereas others struggled to address the new requirements. At no school, however, did we find a complete change in roles for guidance personnel after this second year of policy implementation in high schools. Several counselors indicated that they had taken a greater role in career planning due to implementation of the state policy. Others noted no significant changes in their job duties over the past several years. Many guidance counselors expressed a desire to do more career counseling if only they could find the time away from the demands of testing and scheduling. Many counselors spoke of being "overwhelmed" by everything expected of them and that, rather than replacing the old responsibilities, the new ones required by the state policy were being "piled on top" of the old ones.

Business-Industry Partnerships. Consistent with the benefits of industry certification, we generally found that schools with strong business-industry partnerships had better developed POS. Active community involvement benefits POS in many ways. Advisory committees ensure that the curriculum, facilities, and equipment are aligned with industry standards and local workforce needs. Business and industry partners promote programs in the community by encouraging financial support and hiring of students. Partners also provide opportunities for work-based learning through internships and cooperative placements.

Unfortunately, strong business-industry partners are not universally available. In the *Personal Pathways* study, for example, some sites were located in communities with diverse local businesses that were willing to partner with the school and provide a variety of resources, such as guest speakers, internships, and other work-based learning experiences for students, but others lacked local businesses that could provide such support. One sample school was in such a remote rural location that there was no cellular phone service available in the immediate school area and a long drive was necessary to reach communities offering diverse types of employment. The best jobs and opportunities for job shadowing or internships were at least 20 miles from the school. Although access to a career center is available, it may be difficult for this school to garner sufficient resources and partnership options to develop a significant number of POS for students.

Even though they lacked some resources, the rural areas visited for the *Mature POS* study typically displayed much better relationships across agencies, offices, and institutions than those in larger or more urban areas. More importantly, it appeared that these close ties—in which everyone in the community knew one another and wore multiple hats—help facilitate progress in developing and maintaining the POS. In the larger sites, the quality of the relationships was less personal and more bureaucratic; the multiple layers and a lack of frequent, direct communication were often barriers to getting things done, despite the greater availability of resources. In fact, the necessity of having to do things with limited resources actually seemed to bring the smaller communities together in a spirit of cooperation and efficiency that facilitated the development of POS.

Involvement in Similar Initiatives. As would be expected, schools that have been involved in implementing career clusters/pathways appear to be more advanced in implementing POS. This was found across sites. The POS in the *Rigorous Tests* study were specifically designed using career clusters. Some of the schools visited for the *Mature POS* study had adopted career pathways that had been developed by the College and Career Transitions Initiative (Warford et al., 2008). In some of the sites visited for the *Mature POS* project, the staff had been involved in state POS planning committees. In some cases, it was because of the advanced state of progress on POS locally that the staff had been asked to participate on state committees. In other cases, it was the other way around: Because staff had been on state committees, they had momentum and brought back a vision to their local site about what POS should look like.

The *Personal Pathways* study noted that a systematic approach to high school reform, such as High Schools That Work (HSTW), also contributes to implementation of POS. In South Carolina, state policy requires all high schools to implement whole-school reform either through HSTW or a similar model. All of the sample schools are implementing HSTW, with a range in years of implementation from one to five or more as of spring 2009. During preliminary school visits, we noticed that there appeared to be a relationship between HSTW implementation and the level of acceptance and implementation of the state policy. Schools already actively engaged in HSTW often had a head start on POS implementation. The higher the level of HSTW implementation and the longer the school had been implementing the model, the higher the level of state policy implementation appeared to be. As would be expected given the nature of the

HSTW model, many schools found elements of HSTW to be highly compatible with different facets of the state policy. One principal told us that a key reason for electing to implement HSTW was that it would help make a “seamless transition with EEDA.”

It is worth noting that in terms of both staff time and fiscal resources, a state policy as comprehensive as EEDA is expensive to implement. In many ways, this policy is an unfunded mandate and the fact that its implementation coincides with a major recession has made it even more challenging for schools. It requires major resources to reorganize curriculum and hire enough staff to meet state mandates, and only a portion is provided by the state. For example, the law mandates lower student-to-guidance personnel ratios, and districts are hard-pressed to hire additional school counselors and/or career specialists (or any other personnel) in the midst of freezes and even cuts to a range of other positions. This has become particularly difficult with repeated state budget cuts to education. Staff in all of the schools visited, whether they were located in high- or low-poverty areas, mentioned struggling to carry out the policy without being able to hire more staff. Even the school with the most staff and district resources to implement the policy was struggling. Any state desiring to successfully implement such an ambitious state mandate would be well advised to consider the feasibility of implementing an ambitious, high-cost reform in the absence of sufficient financial support for schools within existing economic realities.

Conclusions

Our review of the relevant literature combined with the preliminary observations presented here cause us to be cautiously optimistic about the potential of POS. We concede that as implemented, previous initiatives have had limited success in facilitating the transition to postsecondary education. If, however, the core components are fully implemented, POS may accomplish what their precursors did not. Secondary-postsecondary articulation must link instruction at the two levels to eliminate duplication and develop methods to ensure that students who earn postsecondary credits while still in high school actually receive these credits. POS must also deliver rigorous academic and technical content in a manner that is appropriate to the learning styles and interests of students who choose to participate in POS. The average CTE student does not have the academic proficiency of the average college preparatory student (Silverberg et al., 2004). Vocational education, the previous label for CTE, was introduced into the high school curriculum in large measure to provide an option for students who were bored and frustrated in academic classes. For most of the 20th century, CTE served these students, sometimes well, sometimes poorly.

Now more is being asked of CTE. Preparation for entry-level employment following high school is no longer sufficient. CTE must now prepare its students for success in postsecondary education—including the academic demands of the postsecondary level. Most specifically, CTE students must be able to pass the diagnostic testing that determines whether they may enter postsecondary occupational classes or must struggle with the developmental courses that stand between them and the programs they want (Bailey, Jeong, & Cho, 2008). In an even broader context, as is being attempted in South

Carolina, the POS model could serve all students, regardless of their chosen postsecondary endeavors. As we see it, POS will succeed primarily to the degree that they succeed in teaching rigorous academic *and* technical content. In South Carolina, all students, regardless of their POS, take the same high level of core academic courses; the goal is for POS-like pathways to be developed in traditional CTE areas as well as other more traditionally core academic areas. Success will be determined largely by the degree to which CTE or core academic teachers can make academics relevant by demonstrating their use in occupational contexts. The Math-in-CTE study (Stone, Alfeld, Pearson, Lewis, & Jensen, 2006) has demonstrated that this approach can work. The challenge lies in making such an approach part of every POS.

If POS truly articulate secondary and postsecondary instruction, teach rigorous academic and technical skills, and provide opportunities to earn postsecondary credits, they should become attractive to a wider range of students, which appears to help all participants (Kemple & Snipes, 2000). Career-focused classes will not be perceived as suitable only for those who cannot succeed in the college preparatory curriculum. The legislation on POS is currently being expanded by a set of guidelines developed by OVAE, with substantial input from the field, to help educators develop strong POS. These guidelines include supporting components such as counseling, supportive policies, technical assistance, and professional development. We believe that if POS are implemented with all of the legislated and supporting components, this particular reform effort has considerable potential to increase students' engagement, achievement, and transition to postsecondary education and successful careers.

Having stated our optimism about POS, we must counter it with our primary concern about their implementation. The potential we see in POS will not be reached if they are simply created on paper. Many states are providing guidance to local agencies in the form of POS templates. However, the *Mature POS* study observed that there seems to be a disconnect between how many POS models (on paper) have been developed and how many POS (in practice) are actually up and running. We believe this is because an "on paper" POS is something that is relatively easy to prepare to meet an accountability requirement—that is, it is a top-down approach. By contrast, "in practice" POS need to be developed through a lengthy, complicated, local process of building partnerships, making decisions, and negotiating compromises—a bottom-up approach. Sometimes, the two are developed in tandem, but often they are not.

To illustrate, the model developed by the League for Innovation for the College and Career Transitions Initiative (CCTI), funded a few years ago by OVAE, or some adaptation of it, is the most ubiquitous form of "on paper" POS. This document depicts what is offered in the POS and how it fits into a course sequence. This is often what the local school district shows to the approving body (usually at the state level) and what passes for a POS, but it does not mean that either horizontal (academic/CTE) or vertical (secondary/postsecondary) integration has actually taken place—just that it has been arranged on paper.

More specifically, the CCTI model is basically a grid for each POS, with columns for each grade level and rows for each course. It lays out which courses are recommended for students to take over the four years of high school. The grid might have the name of the POS and the associated career cluster at the top of the page, with local college and university programs and possible careers available at the bottom. The majority of the page, however, is taken up by the grid in which the CTE courses for the POS are listed across a row labeled *electives* and relevant, required courses for the particular grade level are listed across the rows for math, science, language arts, and social studies.

In other words, the academic courses shown for the POS sequence are not necessarily aligned or integrated with the CTE courses. However, such POS on paper are often approved. Our recommendation is that a better alternative would be for POS to be documented on paper during or after the POS is actually hammered out between all involved parties rather than before. Documentation of newly created aligned curriculum, teacher credentials for dual credit courses, articulation agreements, course schedules, and bus schedules should be required to be submitted with the POS document for state approval. If paper precedes practice, there is a risk that the process will cease before the real work has started.

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