IMPROVING THE QUALITY OF CAREER AND TECHNICAL ALTERNATIVE TEACHER PREPARATION:

An Induction Model of Professional Development and Support

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Executive Summary

Secondary career and technical education (CTE) is a field in transition. It is moving from a primary focus on preparing students for entry-level employment to preparing them for continuing education and professional development as well as employment. The rapid pace of change in technology and the global economy has created a demand for workers who are able to learn and adapt, and CTE must prepare its students to meet these demands. Greater emphasis is being placed on assessment to improve accountability and to verify that students have acquired the skills to undertake these challenges. These higher expectations come at a time when more students are taking CTE courses and fewer CTE teachers are graduating from undergraduate teacher education programs. The field has responded by recruiting more teachers from business and industry, but those who enter teaching in this way usually have had little pedagogical professional development. Neither these teachers nor many of their colleagues who enter the profession through a traditional teacher education program are prepared to use technical skills to help students gain higher levels of competence.

The National Research Center for Career and Technical Education (NRCCTE) responded to these developments with a number of projects. Two of the projects address professional development models for improving the skills of secondary CTE teachers. The Southern Regional Education Board (SREB) developed and tested an induction model for alternatively certified teachers; that is, those who have not completed a traditional teacher education program.

There is a complexity of challenges concerning the development of CTE teachers. One of the most important challenges is the need to build a high-quality teaching force. The new demands and responsibilities on CTE teachers range from integrating grade-level literacy and numeracy to support increased student achievement to designing intellectually challenging projects and real-world problems that will engage an increasingly diverse population of learners. Alternative routes to CTE teacher licensure, embraced for nearly 100 years as a viable way of transitioning those with highly valued industry experience into the teaching profession, are one strategy for meeting the demand for more and better CTE teachers. Although an increasing percentage of teachers are entering the teaching profession through alternative routes, the requirements for these pathways vary greatly, and a debate continues to rage as to whether alternatively certified teachers are less or equally effective as traditionally prepared teachers in impacting student achievement.

In partnership with the NRCCTE, SREB developed an induction model for new CTE teachers pursuing an alternative route to certification that increases their career commitment, competency and self-efficacy. The model is designed to build the capacity of beginning CTE teachers to offer instruction that is intellectually demanding and standards-focused and thus more likely to improve CTE students' academic achievement. The model also builds CTE teachers' capacity to design instruction that is actively engaging using strategies like project-based learning and cooperative learning. Students who are actively engaged intellectually and emotionally in their high school courses are more likely to stay in school and graduate on time and less likely to need developmental (remedial) courses at the postsecondary level.

The induction model includes 196 hours of professional development delivered through a 10-day summer institute prior to the first year of teaching; three, two-day workshops during the first year; and a second 10-day summer institute at the conclusion of the first year. In addition, the model includes the support of coaching from the professional development instructor, on-site guidance from a mentor and administrator, and participation in an electronic community of practice. An iterative development process is being used to design the model.

This report presents the three phases of Year 3, Year 4 and Year 5 field test findings. In the first phase, the content of the professional development modules was field-tested between June 2009 and February 2010 in a series of four sessions each including three, six-hour days of professional development. Two of the four field test sessions were held in State 1 and two were held in State 2. A total of 46 teachers participated, representing different levels of education, work experience and CTE content areas. The results of field test data were clear as to changes needed in induction model materials to meet the needs of alternative route teachers. Many learning activities were revised to fit the audience in order to provide more time for reflection or to clarify content. Field test participants identified key elements of the modules that they felt would be necessary for new teachers prior to entering the classroom, including: (a) the use of rubrics, (b) formative and summative assessment, (c) how to use a table of specifications to align instructional goals and assessments to technical standards and 21st- century skills, (d) getting to know students, (e) engaging students in developing classroom rules and procedures, and (f) classroom management scenarios. Data suggested that three strategies used by induction model developers were particularly effective in supporting participant learning: (a) use of examples in participants' content areas, (b) use of "floating" one-on-one and small-group coaching during cooperative learning segments, and (c) facilitated small-group discussion in the afternoon or evening to structure reflection.

The results of the induction model's ability to impact teacher commitment, competence and self-efficacy (2010-2011) are also presented in this report as the Year 4 Phase 2 findings. During the 2010-2011 school year, the induction model and materials were field-tested with a cohort of new State 1 CTE teachers. State 2 was not able to participate because of a lack of internal financial support. The professional development was conducted by SREB staff. The purpose of the field test was to determine the promise of the model to impact new teacher commitment, competence and commitment to the profession. Overall, teachers participating in the induction model improved their self-efficacy in instruction, classroom management, and student engagement; teachers were positive about their school working environments; teachers reported that the induction model professional development was intensive, time-consuming, helpful and applicable instructionally; teacher commitment to the profession remained steady at 80% throughout the school year; 70% of the teacher cohort remained in the teaching profession for the 2011–2012 school year; and the induction model showed promise in supporting the broader context of school reform.

The final phase of field-testing, Year 5 (2011-2012) determined if the induction model could be implemented with fidelity by state stakeholders. Two states field-tested the induction model with a cohort of first-year career tech teachers during the 2011-2012 school year. Instructors in both states were trained on the model by the director of the

program, and they were provided with the materials to implement the program in their respective states. Although the two states did not implement the model with complete fidelity, they did achieve successful results. In State 1, 89% of participating CTE teachers were returning for their second year of teaching; in State 3, 88% of teachers were returning. For State 1, the cohort of participating teachers increased their self-efficacy in instruction, classroom management and student engagement. For State 3, the pre- to post-Teacher Sense of Efficacy Scale scores slightly decreased. Teachers in both state cohorts have made a commitment to remain in the teaching profession for the next five years.

The CTE teacher induction model and findings discussed in this report respond to core needs of the field, but the professional development challenge is far more extensive than these projects alone address beyond the first year of teaching. Secondary CTE serves a large segment of secondary students and must contribute to their academic as well as technical learning. Most CTE teachers will need considerable professional development to broaden their teaching skills and to learn to use data for instructional improvement. The professional development they receive should be directly related to the courses they teach and of sufficient intensity and duration to influence their instruction. In the present economic climate, providing adequate time for effective professional development may be the most difficult challenge of all.

Chapter 1:
Introduction and Statement of the Problem

Increasing secondary enrollment in CTE programs, the declining number and size of traditional CTE teacher preparation programs, and the growing number of teacher retirements have created a concern about the lack of supply of CTE teachers (DeWitt, 2010; National Association of State Directors of Career-Technical Education Consortium [NASDCTEc], 2009). To compound this supply challenge, high-quality CTE teaching in the 21st century has placed new demands and responsibilities on CTE teachers, from integrating grade-level literacy and numeracy that will support increased student achievement to designing intellectually challenging projects and real-world problems that will engage an increasingly diverse population of learners. Research is needed to identify the best strategies for bringing teachers into the field, for helping them make a successful transition to teaching, and for encouraging their long-term commitment to the profession.

When new CTE teachers lack crucial skills, they often become so discouraged by the complexity of the work and lack of formal and informal organizational supports that they leave the profession (Hunt & Carroll, 2003; Joerger, 2003). The U.S. Department of Education published a study on teacher attrition and mobility which estimated that 25% of all new teachers leave within the first three years (Marvel, Lyter, Peltola, Strizek, & Morton, 2006). The ultimate problem resulting from poorly trained CTE teachers with inadequate school support and subsequent high rates of teacher attrition is that CTE students will not receive engaging and academically rigorous instruction, increasing the probability that they will drop out (Castellano, Stringfield, Stone, & Wayman, 2003).

Alternative routes to CTE teacher licensure, embraced for nearly 100 years as a viable way of transitioning those with highly valued industry experience into the teaching profession, are one strategy for meeting the demand for more and better CTE teachers. The requirements for these pathways vary greatly (Zirkle, Martin, & McCaslin, 2007), and a debate continues to rage as to whether alternative route teachers are less or equally effective as traditionally prepared teachers in impacting student achievement (Constantine et al., 2009; Darling-Hammond, 2009). For alternatively certified CTE teachers to make a successful transition to teaching and meet the demands of preparing students for further learning and the workplace, sufficient ongoing support is needed. Induction experiences, professional development and support activities designed to help teachers in the first few years of teaching, can provide the additional support that alternatively certified teachers need to meet the challenges of CTE teaching (Joerger & Bremer, 2001; Ruhland & Bremer, 2004).

The Need for Quality CTE Teachers

The current policy context in CTE reflects the belief that increasing teacher quality through effective preparation and professional development is instrumental to improving the academic and technical achievement of CTE students. In 2006, the Perkins IV legislation called for the professional development of CTE teachers to be "high quality, sustained, intensive, and focused on instruction, [increasing teachers'] academic knowledge and understanding of industry standards." This legislation echoed the push for improvement in teacher quality under the

federal *No Child Left Behind* (NCLB) mandate, and the recommendations of the National Assessment of Vocational Education that called for better teacher quality in CTE (Cramer, 2004; Silverberg, Warner, Fong, & Goodwin, 2004). State CTE leaders have identified recruiting, training and retaining high-quality CTE teachers as a critical priority to meet the challenge of improved student achievement (*High Schools That Work* Board, 2007), and the Association for Career Technical Education's (ACTE's) Teacher Quality Task Force lists developing stronger induction and mentoring programs among its top priorities (DeWitt, 2010).

Much is required of teachers in meeting the challenge of improving students' technical and academic achievement (Gray & Walter, 2001). Career and technical education leaders have put forth a new mission for the field that includes both college and career readiness (NASCDTEc, 2010). Implementing a CTE curriculum within the concept of career pathways and programs of study requires teachers to have an understanding of career development; to support academic achievement by integrating rigorous, grade-level literacy and numeracy; and to engage all students in learning, including the significant percentage of students in CTE courses who have special learning needs. To fulfill this mission demands an understanding of sophisticated instructional strategies such as cooperative learning and project-based learning.

Unfortunately, many CTE teachers are typically less academically and pedagogically prepared than teachers of other subjects (Cramer, 2004; Gray & Walter, 2001). Alternatively certified CTE teachers are less likely to have a baccalaureate degree and more likely to be farther removed from college (Gray & Walter, 2001). Even if CTE teachers have a postsecondary degree, they often come to teaching straight from the workplace; most have been out of school for a longer period of time than other teacher candidates. Additionally, their postsecondary focus of study may have required fewer academic courses (Cramer, 2004). These circumstances suggest that alternatively certified CTE teachers may lack the skills and confidence to integrate the level of reading, writing, and mathematics that students will need to succeed in school as well as the workplace.

The Challenge of Alternative Routes to Teaching

In the field of education as a whole, there has been an explosion in the number of teachers entering through alternative certification programs. All states now offer alternative routes to certification, although their requirements vary. It is estimated that between 20% and 33% of all new teachers enter the teaching field through alternative pathways (Feistritzer, 2007; U.S. Department of Education, Office of Postsecondary Education, 2006; Walsh & Jacobs, 2007). Although alternative routes to certification seem to be filling a need that grows out of teacher turnover and resulting teacher shortages (Garcia & Huseman, 2009), there is disagreement about the quality of the preparation and effectiveness of alternatively certified teachers. Programs are criticized for leading to high attrition rates, particularly because teachers have no clinical student teaching experience (Darling-Hammond, Chung, & Frelow, 2002). Another contention is that there can be a negative impact on student achievement if teachers enter the classroom before they are adequately prepared. Recent evidence, however, suggests that there may be little if any difference in the effect that alternatively versus traditionally prepared teachers has on student achievement. A study conducted by Mathematica Policy Research found no difference between the mathematics and reading achievement of elementary school students whose

teachers entered the profession through an alternative route and the achievement of students who had traditionally certified teachers (Constantine et al., 2009).

Because industry experience is a valuable qualification for CTE teachers, alternative routes have existed for nearly 100 years in the CTE field, particularly in the areas of trade and industrial education and health occupations. Ruhland and Bremer (2003) found the percentage of alternatively certified CTE teachers to be about 28%, but the numbers may be much higher. In a survey of 12,000 CTE teachers at *High Schools That Work* sites in 30 states, 75% of teachers reported entering through an alternative route (Bottoms & McNally, 2005). To date, no experimentally designed studies exist comparing traditional versus alternatively certified CTE teachers' impact on students' academic and technical achievement. However, the increased demand for CTE teachers due to higher enrollment, teachers leaving the profession, and the decline in the number and enrollment in traditional teacher preparation programs underscores the need for alternative certification programs as a pathway to CTE teaching (NASDCTEc, 2009), and these programs will likely remain a "prevalent, if not the dominant" route to CTE teaching in this century (Gray & Walter, 2001, p. xiii).

Two challenges must be overcome in ensuring we have quality alternatively certified CTE teachers: the wide variation in the requirements and the inadequate support provided to teachers as they enter the profession through alternative routes. An analysis of existing alternative routes to CTE certification and licensure revealed that requirements for these teaching pathways vary from state to state and even within states (Zirkle et al., 2007) . Of the 105 alternative routes identified, 53 required bachelor's degrees and 32 required completion of an organized teacher preparation program similar to a traditional pathway. Many pathways provide newly hired CTE teachers with provisional certification if they have experience in the career field in which they are to teach (Ruhland & Bremer, 2003; Zirkle et al., 2007). As teachers begin their first year under the provisional certificate, they are required to complete pedagogical course work provided by a university, state agency, or local district over an extended period of time. This route may or may not require a postsecondary degree, depending on whether one was required in the career field. In addition to variations in required work experience, current employment and educational experience, the alternative certification pathways also vary in the requirement of induction or mentor programs. Only 21 of the 105 alternative routes identified required teachers to take part in an induction or mentoring program (Zirkle et al., 2007).

Needs of Teachers Who Enter the Profession through Alternative Routes

As a consequence of entering the field through alternative routes that do not provide traditional pedagogical preparation, teachers may lack the knowledge, skills, and confidence required to plan, deliver, and manage a challenging, engaging and meaningful learning experience for students. In the field of education in general, many alternatively certified teachers, although they tend to have high expectations and strong idealism when they begin teaching, struggle to meet the demands of their jobs (Honawar, 2007a, 2007b). Only half of the alternatively certified teachers surveyed in a study for Public Agenda and the National Comprehensive Center for Teacher Quality said they felt prepared to teach compared to more than 80% who had completed a traditional teacher preparation program, and 54% reported needing more time working with a classroom teacher during pre-service (Rochkind, Ott, Immerwahl, Doble, & Johnson, 2007).

Fewer than half of alternatively certified teachers said they received any training in the summer prior to teaching (Honawar, 2007a, 2007b). Stone (2000, cited in Suell & Piotrowski, 2007) studied alternatively prepared teachers in California and found that they listed their top needs as curriculum development, followed by classroom resources, teaching strategies, techniques for handling difficult students, and classroom management.

Historically, research studies have pointed toward the unique needs of alternatively certified CTE teachers. Using survey data from a national stratified sample of 352 CTE teachers in 15 states, 43% of whom were alternatively certified, Heath-Camp and Camp (1990b) found that CTE teachers entering teaching from business and industry with little pedagogical training seemed to have more problems than CTE teachers who were traditionally certified. Similarly, in a study investigating the nature of teacher concerns and effective induction practices of a group of North Carolina CTE teachers, alternative route CTE teachers were found to have more concerns in general than those entering teaching from a traditional route (Kirby & LeBude, 1998). Many CTE teachers who were alternatively certified knew nothing about their curriculum and needed orientation, help, and time to learn its scope and how to prepare lessons (Heath-Camp & Camp, 1990a). Few new CTE teachers received curriculum guides or even any feedback or evaluation on their work (Camp & Heath-Camp, 1991). Furthermore, beginning CTE teachers entering teaching from business and industry tend to be unfamiliar with lesson planning, CTE student organizations, the administrative red tape of schools, or student misbehavior (Heath-Camp & Camp, 1990b).

More recent research found similarities between the needs of beginning CTE teachers and those of beginning secondary teachers in general, including the development of skills to address classroom management issues, learn instructional methods, motivate students, and manage demands on personal time and resources (Joerger & Bremer, 2001). In addition to these skills, the Joerger and Bremer study outlined specific topics to meet the needs of CTE teachers in the areas of personal management (managing time effectively); pedagogy (designing effective lessons and using alternative teaching methods); students (motivating and disciplining); curriculum (determining scope, sequence, and pace of courses); program (facility management); system (advocating for funding and support); and community (establishing support from parents). Similar to these areas, alternative route CTE teachers surveyed at *High Schools That Work* sites expressed the need for professional development in four instructional categories: planning, instructional methods, assessment and supporting students (Bottoms & McNally, 2005).

Ruhland and Bremer (2004) studied traditionally and alternatively certified CTE teachers' perceptions of their first year of teaching. Traditionally certified teachers were more likely to report they were better prepared in pedagogy; alternatively certified teachers were more likely to report they were better prepared in knowledge of subject matter. The alternatively certified teachers in the study expressed a need for additional ongoing support in two areas of classroom practice: classroom management and working with special needs students. These needs are echoed by online survey data from those who employ CTE teachers at *High Schools That Work* sites (Bottoms & McNally, 2005). Supervisors identified classroom management as the most prevalent major deficiency among CTE teachers employed within the last five years. More than half of the respondents identified teaching strategies as a weakness for new CTE teachers.

Forty-three percent of administrators surveyed believed that newly hired CTE teachers lack the skills to address student diversity and special needs.

In summary, CTE teachers who enter through alternative routes are more likely to feel confident about their knowledge of the career field and less likely to feel confident in their ability to teach that knowledge to students. Alternative route CTE teachers' major areas of concern in assuming their teaching responsibilities are classroom management and student motivation, as well as planning instruction for special needs students. These concerns were also echoed by the administrators who supervise them. Research indicates that these teachers also need professional development in planning, instructional methods, assessment, and how to support struggling students. In addition to professional development, CTE teachers who enter through alternative routes require support through feedback about their work, strategies for managing added demands on time and energy, and resources for planning and teaching.

Quality Induction Programs for Alternatively Certified Teachers

In response to the needs of beginning CTE teachers and in recognition of the essential role that alternative certification plays in a field in which recruiting teachers with valuable work experience is key to maintaining and improving the quality of the teaching force, a consistent, high-quality approach to induction programs for alternatively certified teachers is needed. Joerger and Bremer defined induction as "all of the teaching and professional activities and events experienced by beginning teachers from the time they sign their initial teaching contracts until they are fully and successfully acculturated into the profession" (2001, p. v.). Induction programs are designed to improve the transition to teaching, increasing teaching effectiveness and career commitment.

Induction programs typically focus on the basics teachers need to survive their first year of teaching—classroom management, obtaining resources, designing a lesson plan—as well as becoming familiar with the school and learning to be a reflective practitioner. Induction activities include ongoing personal support, assessment and feedback, continuing education and socialization into the profession (Joerger & Bremer, 2001). But typical induction programs assume prior knowledge and classroom experience associated with traditional certification routes, and the processes and jargon used in these programs may not be appropriate for alternatively certified teachers (Szuminski, 2003). Alternatively certified CTE teachers have unique needs that require a unique set of induction strategies.

At beginning of their first year of teaching alternatively certified CTE teachers specifically need:

- a mentor in the same or related instruction area;
- a support group;
- curriculum, resources and tips from previous instructors;
- an orientation to career and technical student organizations;
- more preparation time prior to the beginning of courses; and
- access to a variety of workshops (Joerger & Bremer, 2001).

As part of the first year of teaching, alternatively certified teachers also require continuous orientation that addresses all aspects of teaching, a handbook that includes resources and

supplies, and a help hotline that provides solutions and connects them with other new and beginning teachers (Joerger & Bremer, 2001).

Ruhland and Bremer (2004) asked beginning CTE teachers about factors important to them in deciding whether or not to continue in the teaching profession. In this study, traditionally and alternatively prepared teachers were equally likely to remain in the profession, but that likelihood depended most on the degree to which the first year of teaching was a positive experience. Differences between why alternatively and traditionally certified teachers were likely to remain in the profession were found on three factors: sense of accomplishment, availability of a mentoring program, and recognition and support from a supervisor. Ruhland and Bremer concluded that these differences may be due to a lack of self-confidence experienced by alternatively certified teachers in their first year of teaching, indicating a need for additional support.

In a study of the perceptions of alternatively certified CTE teachers toward their mentoring and preparation activities, Briggs and Zirkle (2009) reported that teachers valued a summer workshop experience prior to the first year of teaching and subsequent courses that focused on teacher tasks that included classroom and lab management, instruction and making presentations. Visits from course instructors were also important to the beginning teachers. The study findings outlined teachers' top priorities for mentoring topics, including: planning, time management, student assessment, ways to prevent burnout, classroom management, and working with the political and cultural climates of their schools and districts. Teachers perceived mentoring to be most useful when the assigned mentor was from a similar content area, when duplication of course and employment materials was reduced, when paperwork was reduced and when the mentors met with mentees on a regular basis.

Although the aforementioned research clearly indicated that beginning teachers and CTE teachers specifically expressed a need for better support in the first year of teaching, recent research from a study of comprehensive induction by Glazerman et al. (2008) concluded that mentoring and professional development do not make a significant difference in teaching practice, student outcomes, or career commitment. There is a vast difference in the experiences and knowledge of the beginning teachers who received induction services in the Glazerman study and the CTE teachers for whom the proposed induction model described in this chapter is designed. Over 90% of the teachers in the Glazerman induction study were already certified to teach. They majored in education in college and participated in 11 or more weeks of student teaching, primarily at the elementary school level. Furthermore, the Glazerman comprehensive induction study focused on the mentor relationship and helping beginning teachers use evidence from their practice to recognize and implement effective instruction. The proposed model is a coherently integrated combination of professional development and support designed to scaffold CTE teachers' learning and maximize impact on teaching practice. The selection of specific induction activities and the quality of their delivery are essential to the success of induction models. Briggs and Zirkle (2009) highlighted the problem that exists today of poorly designed mentoring and induction programs that lack practical and research-based topics specifically designed for CTE teachers. Further research is needed to inform the field about the specific induction activities that will ultimately result in improved teacher performance and career commitment.

Chapter 2:
An Induction Model That Responds to the Problem

The Conceptual Framework

Prior studies have identified factors that contribute to early career teacher attrition. Those factors include: (a) inadequate technical instructional skill (Baldacci, 2006; Lemov, 2010), (b) unsupportive professional cultures (Moore Johnson & The Project for the Next Generation of Teachers, 2006), and (c) low confidence or sense of efficacy (Tschannen-Moran & Woolfolk Hoy, 2001).

Drawing on prior research in the fields of teacher preparation and induction (Borman & Dowling, 2008; Brill & McCartney, 2008; Heath-Camp & Camp, 1990a; Joerger, 2003), model developers adopted a basic conceptual framework for an induction model aimed to address teacher attrition, shown in Figure 2.1.

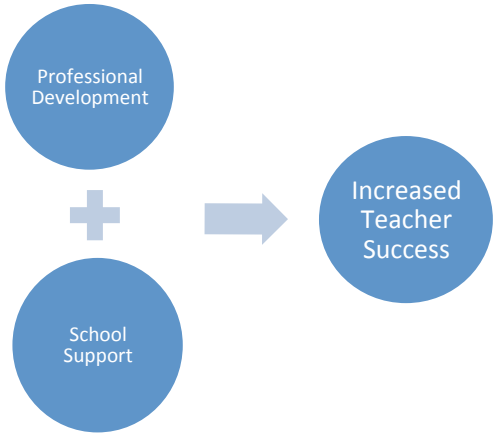

Figure 2.1: Basic conceptual framework.

Such a model has been implemented before with mixed results (Glazerman et al., 2008). Induction models nearly always provide professional development, although it is often not focused enough on technical pedagogy (Lemov, 2010); some induction models have combined professional development with collegial support through mentors and networking (Glazerman et al., 2008). To differentiate this conceptual framework – and therefore the induction model – from the basic framework, model developers further defined each element in terms of quality and identified assumptions to be tested about each element. As shown in Figure 2.2, it is the co*mbination* of high quality professional development and high quality site-based support by mentors, administrators, and coaches that model developers expect will yield increased levels of career commitment, teacher instructional competence and self-efficacy, and therefore differentiate outcomes from this induction model from those of similar prior efforts.

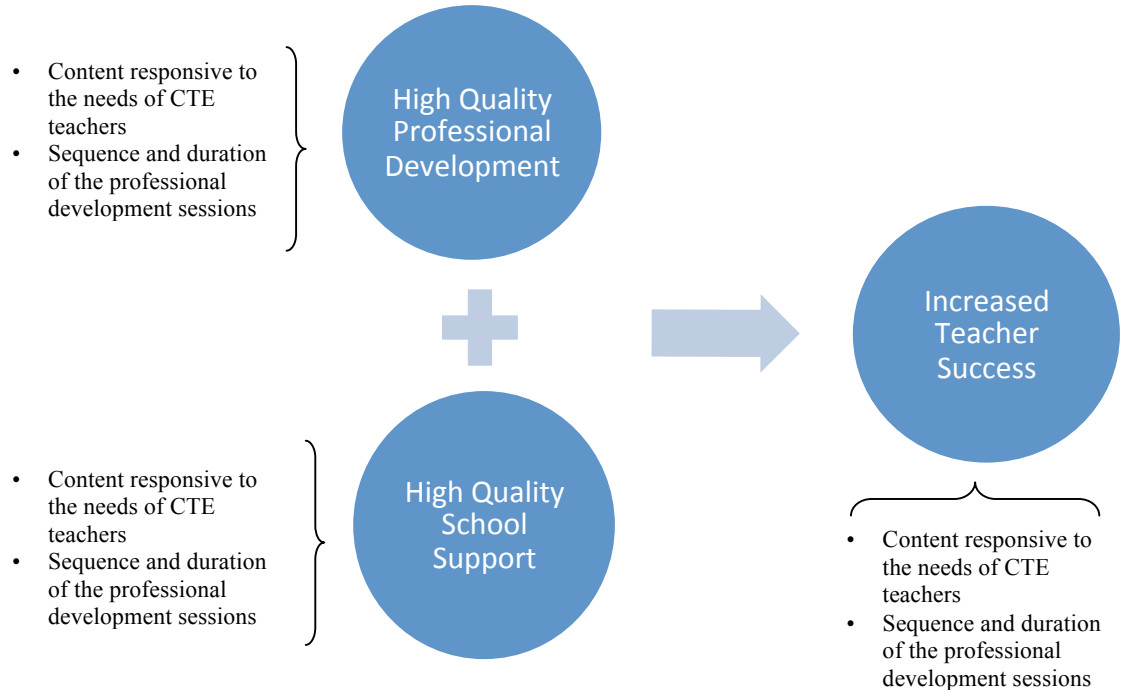

Figure 2.2: Differentiated conceptual framework.

As shown in Figure 2.2, *high quality professional development* is defined as content responsive to the needs of CTE teachers, appropriate sequence and duration of the professional development sessions and a quality of instruction consistent with research on effective adult learning. Specifically, professional development must engage teachers with new content and experiences that include dialog with peers, application of new learning through authentic tasks implemented over time, and reflection on their learning (Mezirow, 1997). *High quality school support* is defined as regular structured weekly interaction between a new teacher and a qualified mentor and separate structured weekly interaction with an administrator; regular interaction with peers; and regular observation and feedback from the professional development instructor. Teacher *instructional competence* is operationally defined as performance in instructional planning, use of instructional strategies, assessment, and classroom management as measured by a validated classroom observation protocol. Teacher *self-efficacy* is defined as the degree to which teachers feel they can influence students and their learning as measured by the Teacher Sense of Efficacy Scale (TSES) developed by Tschannen-Moran and Woolfolk Hoy (2001) and corroborated by teacher interviews and focus groups. It is critical to note that there is an established relationship between career commitment and teacher self-efficacy. Teacher *career commitment* is defined as teacher self-report of intent to remain in the field of teaching for more than three years as measured by an instrument for assessing career commitment. Klassen and Chiu reported in 2010 that teachers with greater classroom stress reported lower self-efficacy and lower job satisfaction, while teachers with greater classroom management self-efficacy or greater instructional strategies self-efficacy had greater job satisfaction. Kitching, Morgan and O'Leary in 2009 found that for early-career teachers, student engagement and student achievement

triggered positive feelings of success while student behavior and home difficulties of students caused dissatisfaction in new teachers.

Professional Development Component

Teacher professional development is among the most comprehensively researched aspects of the schooling enterprise. The proposed induction model draws substantially on this knowledge base. Sparks and Hirsh (1997) reviewed the literature and best practices in professional development and identified the following characteristics of training most likely to lead to changes in on-the-job behavior, such as the training designed for the proposed induction module. Those characteristics:

- focused on individual and organizational development (DuFour, DuFour, & Eaker, 1998; Senge, 1999);
- aligned with school and district strategic plans (Fullan, 2001);
- focused on student needs and learning outcomes (DuFour et al., 1998);
- focused on job-embedment (DuFour et al., 1998);
- facilitated teachers' study of their own teaching and learning rather than placing "experts" in the role of "transmitting" knowledge (Darling-Hammond & Sykes, 1999);
- focused on both content-specific and generic instructional skills (Ball & Cohen, 1999); and
- involved the principal as instructional leader to sustain growth (Fullan, 2001; Senge, 1999; Sergiovanni, 1999).

The interrelationship between training and organizational support is a strong theme and justifies the vital school support aspect of the proposed induction model.

Content of the professional development. The framework and content for the professional development component of the induction model, specifically aimed at increasing new CTE teachers' commitment to the field, instructional competence and self-efficacy was developed in the first year of the program. Four professional development modules were framed around the perceived needs of beginning teachers and the authentic tasks they face during the first year of teaching (Bottoms & McNally, 2005; Heath-Camp & Camp, 1990a, 1990b; Joerger & Bremer, 2001; Rochkind et al., 2007), and standards outlining what both beginning and expert teachers need to know and be able to do (Danielson, 1996; Interstate New Teacher Assessment and Support Consortium [INTASC], 1992; National Board for Professional Teaching Standards [NBPTS], 1997).

The four professional development modules include: (a) instructional planning, (b) instructional strategies, (c) classroom assessment, and (d) classroom management. The framework for these modules is outlined in Table 2.1. These content areas respond directly to the need for new CTE teachers to be better prepared to deliver high quality, engaging instruction that integrates rigorous academic material with CTE content around intellectually demanding projects and activities (Hunt & Carroll, 2003; Joerger, 2003; Joerger & Bremer, 2001; Bottoms & McNally, 2005). Furthermore, a significant component of all four modules focuses on assessing and

addressing the diverse needs of all learners, thereby responding to the need for highly competent CTE teachers able to intellectually, emotionally, socially, and behaviorally engage all "students including special populations" (Perkins IV).

Table 2.1
Framework for Professional Development Modules

Title and Description	**Outcomes—Areas of Teacher Instructional Competence**
Module 1: Instructional Planning Effective CTE instruction is carefully planned to target the technical, academic, and 21st-century skills within a career pathway that prepare students for both further learning and the workplace.	Create short-term and long-term standards-based instructional plans based on the varying learning needs of students. Specific Areas of Emphasis: • Plan instruction that reflects the new mission of CTE, supporting both college- and career-readiness. • Set instructional goals that incorporate industry standards, 21st-century skills, and grade-level academics (reading, writing, and mathematics). • Make instructional modifications for diverse learning needs. Reflect, both individually and collaboratively, on the effects of instruction and use the reflective process to continually improve instructional practice. Specific Areas of Emphasis: • Reflect individually with guiding questions and the use of a professional portfolio. • Reflect collaboratively through the use of protocols for providing feedback and looking at student work.
Module 2: Instructional Strategies Research-based instructional strategies engage and motivate students and deepen learning.	Use instructional strategies that actively engage students in learning and encourage the development of problem-solving, critical-thinking, and team-work skills. Specific Areas of Emphasis: • Use project-based learning with real-world problems and tasks. • Design intellectually challenging assignments. • Use cooperative learning. • Integrate academic skills, including embedded literacy and numeracy.

Title and Description	Outcomes—Areas of Teacher Instructional Competence
Module 3: Classroom Assessment Assessment provides a clear picture of students' performance in relation to the standards, informing teaching practice and further learning.	Use formal and informal assessment strategies to evaluate student progress toward learning goals, and provide feedback to improve student learning. Specific Areas of Emphasis: • Use formative and summative assessment methods that prepare students for workplace and postsecondary types of assessment (for example, employer and college-readiness exams). • Incorporate student self-assessment, especially through a portfolio of work. • Use rubrics to clearly define assessment criteria. • Create written exams that mirror standardized-assessment-type or employer-type exam questions. • Assess student progress in using reading, writing, and mathematics to solve problems and take action in the field. • Develop a plan for grading and reporting student progress.
Module 4: Classroom Management A well-managed classroom centers on respectful, collaborative relationships that support student learning.	Create a learning environment that encourages student motivation, positive behavior, and collaborative social interaction. Specific Areas of Emphasis: • Establish appropriate rules and routines for the CTE lab. • Create a culturally responsive classroom. • Offer rewards and recognition to encourage effective effort and increase student motivation. • Design extra help to support all students in reaching standards. • Communicate with parents and engage them in supporting students' success.

Concept papers were developed for each module, outlining specific content and the rationale for that content based on literature and best practice. Expert panels reviewed the concept papers, ensuring that the content was comprehensive and appropriate for a teacher induction model. Professional development sessions—detailed through a guide for participants and a guide for instructors—were designed for each module. The instructor guide includes an overview and objectives for units based on topics within the module and learning activities and objectives for each lesson. Presentation slides and suggested artifacts to support the learning activities have also been developed for the instructor. The participant guide includes an overview and objectives for each unit (also printed in the instructor guide), handouts to support the learning activities led by the instructor, planning forms, suggested activities beginning teachers can do with their assigned mentors and building administrators and field activities for implementing and reflecting on the use of the plans developed in the professional development sessions.

Duration and sequence of the professional development. In addition to the content of the modules, the professional development component of the induction model includes a suggested sequence and duration of the professional development sessions to affect the intended outcomes of commitment to the profession, instructional competence and self-efficacy. The sequence of the modules is designed to provide support before, during, and

after first-year CTE teachers begin classroom teaching through three phases: (a) 10 days of intensive instruction during the summer prior to the first year of teaching, (b) successive nine-week segments of application and reflection through delivery of instruction in their own classroom, aligned with each quarter of the school year, (c) three, two-day workshops corresponding with each quarter of the school year that focus on refining and deepening understandings, and (d) 10 days of structured reflection, reinforcement and revision in the summer following the first year of teaching.

This sequence responds to the inadequacy of existing models of first-year teacher preparation that fail to provide adequate individualized support to new CTE teachers throughout the first year in the classroom (Alliance for Excellent Education, 2008). Providing such support addresses three problems: early career teacher attrition as a result of a difficult first year (Kapadia, Coca, & Easton, 2007; Smith & Ingersoll, 2004), longer time-to-competency of new teachers (Villar & Strong, 2007), and the varying needs of the widely diverse population of adult learners that are CTE teachers. Ruhland and Bremer (2001) found that CTE teachers' commitment to the field is dependent upon the degree to which the first year experience is positive. In addition, alternatively certified CTE teachers need a continuous orientation that addresses all aspects of teaching (Joerger & Bremer, 2001; Heath-Camp & Camp, 1990a).

The recommended sequence of delivery for the professional development in this induction model begins with a 10-day summer institute prior to the first year of teaching. Alternatively certified CTE teachers value a summer experience prior to beginning their new role (Briggs & Zirkle, 2009) and need more preparation time prior to the start of the school year (Joerger & Bremer, 2001). The first summer session includes the most essential concepts from each topic that the teachers need in the classroom, including curriculum and instructional planning, how to get to know students, and how to set the right tone in the classroom. These topics have immediate relevance and applicability to their first weeks on the job. Teachers plan out the first nine weeks of instruction in some depth and craft a skeletal outline of instruction for the next nine weeks. They also identify a significant, authentic activity, problem or project that would cover at least 10 days of instruction and involve project-based learning. As they plan that project-based unit, they identify the embedded literacy and mathematics skills and look for instructional strategies and methods for enhancing those components. Additionally they learn how to assess students' learning using both paper-and-pencil and performance assessments, focusing on technical skills, literacy and mathematics. All of these instructional design choices are made for the purpose of best preparing teachers for their first days and weeks on the job where they have an opportunity to test their new learning in the authentic environment of their classroom, consistent with research indicating that adults learn best when they can apply and reflect on their learning (Knowles, 1975; Mezirow, 1997). As designed, the summer institute is intense and rigorous. It is understood that this 10-day experience is likely to involve productive struggle for the beginning teachers as they make a transition to a new career role.

Delivery of the professional development. In addition to addressing the content and sequence of professional development, the induction model also outlines, through the instructors' and participants' guides for each module, specific delivery methods that reflect the primary principles of adult learning (Knowles, 1975; Knowles & Associates, 1984) and model instructional practices that teachers will be expected to use in their own classrooms. Instruction

will incorporate cooperative learning, as well as project- and problem-based learning (Merrill, 2007; Schmidt, 1993). Cooperative learning provides an opportunity for social interaction and social construction of knowledge and skills among the adult learners. The module instruction is organized around projects that involve the complex tasks of teaching, engaging beginning teachers in problem-solving, decision making, and investigative activities, and providing the opportunity to create realistic products that teachers will actually use in their classrooms (Jones, Rasmussen, & Moffitt, 1997; Thomas, 2000; Thomas, Mergendoller, & Michaelson, 1999). Finally, the professional development instructor models specific instructional strategies CTE teachers can use in their classrooms; new teachers practice using the strategies in front of colleagues and receive feedback on the degree in which they use the strategies effectively.

Support Component

In addition to professional development, the induction model provides beginning CTE teachers with the support of a trained, on-site mentor and administrator, coaching from the professional development instructor, and participation in an ongoing community of practice through electronic conversations and guided reflection.

Mentoring. As a result of their research, Heath-Camp, Camp, Adams-Casmus, Talbert, and Barber (1992) and Joerger and Bremer (2001) recommended a structured mentoring program for providing support and encouragement to participating teachers. In a literature review on beginning teacher induction, Serpell and Bozeman (2000) found that many researchers regard mentoring as the most critical component of induction programs, with teachers regarding it as one of the most helpful parts of induction. The review also pointed out those new teachers who had mentors said they were more prepared and more likely to stay in teaching. Smith and Ingersoll (2004) found that teachers who had mentors in the same subject field and who collaborated with other teachers were more likely to stay in teaching after their first year. Similarly, Ruhland and Bremer found that mentoring is a factor in the likelihood that alternatively certified CTE teachers remain in the profession. Mentoring relieves the isolation many new teachers feel, and it provides them with collaborative problem-solving, emotional support, motivation and encouragement, and information and suggestions (Joerger, 1997). The literature is very clear that mentors themselves must be veteran teachers who are rigorously selected; that there should be administrative support for the mentoring; and that contact between the mentor and the beginning teacher should occur at least weekly, if not daily (Allen, 2003; Burk, Ford, & Mann, 1996; Feiman-Nemser, Carver, Schwille, & Yusko, 1999; Feistritzer & Chester, 2000; Hunt & Carroll, 2003; Villar & Strong, 2007; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007; Zeichner & Schulte, 2001).

In the induction model for CTE teachers, trained mentors address the problem of CTE teacher dissatisfaction with teaching and school culture (Rowley, 1999). Each new CTE teacher participating in the model has a mentor who is a master teacher at his or her school. All teachers selected as mentors participate in a two-day training session to prepare them to support new CTE teachers. The mentor training focuses on developing skills as mentors of CTE teachers, providing explicit guidance on how to differentiate mentor support to new teachers early in the school year and during subsequent months. The mentors are oriented to the content of the professional development that the beginning teachers receive, establishing common

expectations and vocabulary (Briggs & Zirkle, 2009). During the school year, mentors meet with the new teachers for at least 15 to 20 minutes each day for the first month and then for an hour per week during the rest of the school year to discuss critical issues that have arisen. They also participate with their beginning teacher in the electronic communities of practice and monthly webinars.

Coaching. Since alternatively certified CTE teachers value visits from professional development instructors (Briggs & Zirkle, 2009), the induction model includes a coaching component to undergird the mid-year instructional support element. The coaching component of the model recognizes that the problems of practice new teachers encounter are not solved solely through training. Technical assistance and coaching are necessary to help new teachers translate their own learning about how to deliver quality instruction and manage classrooms into effective classroom strategies in practice (Yoon et al., 2007). The instructors from the initial summer workshop also fulfill the role of instructional coaches for new teachers. The instructor acting as coach returns three times during the year before each follow-up workshop to determine how well the new teacher is implementing what he or she is learning and to seek evidence that the practices teachers are learning at each training session are being put into place. The instructor communicates with the mentor and local administrator prior to each school visit to discuss what would be most helpful to the new teacher during the visit.

The instructor, in the role of coach, observes the new CTE teacher's classroom instruction, particularly in view of the four strands from the training, observes any gaps that need to be addressed, and provides a written critique with suggestions on how to continuously improve in each area. The instructor, in his or her role as coach, seeks evidence that the administrator and mentor are supporting the new teacher and gives suggestions for further support. The instructor, as coach, is expected to meet with the new teacher, the mentor, and the administrator to engage in a professional dialogue on the new teacher's successes in the classroom, gaps or challenges in implementing the new knowledge and skills, and necessary adjustments for addressing these gaps. Finally, the instructor, in the role of coach, identifies issues and topics that can be dealt with at the follow-up weekend workshops and determine how the initial training can be improved and modified to better meet the needs of the beginning teachers. All instructors use a common format when they conduct coaching visits and a common rubric to describe their findings on the new teachers' accomplishments, challenges, plans, and the presence and quality of support from the administrators and others.

Communities of practice. Encouraging the development of professional networks and communities of practice responds to two aspects of the problem this proposed induction model is designed to address. The first of these problems is the instructional competence and self-efficacy of teachers. Engagement in communities of practice is known to contribute to meaningful adult learning (Mezirow, 1997), maximizing learning outcomes from the professional development modules. The second problem the induction model is designed to address is organizational support. Teachers benefit from being able to learn and grow through collaboration in professional learning communities (Ball & Cohen, 1999; Borko, 2004; Stone, Alfeld, & Pearson, 2008). Sharing experiences in a group is also important for adult learning (Knowles & Associates, 1984). New teachers also benefit from a peer support group limited to beginning teachers and including face-to-face and electronic meetings and other mechanisms to discuss

common experiences, successes, challenges, solutions, and resources (Heath-Camp et al., 1992; Joerger & Bremer, 2001). Communities of practice create a collegial environment that can meet teachers' needs for encouragement and a sense of belonging, thereby reducing feelings of isolation that may lead new teachers to give up and leave the classroom.

The community of practice is sustained by electronic communication including monthly webinars. During the webinars, teachers and their mentors are invited to share their successes and challenges of practice. With their professional development instructor as the webinar leader, participants discuss how they can incorporate the research-based practices and strategies in their instruction to address challenges. The intent is for new teachers to walk away with a clear idea of how to solve the problems they encounter.

In the proposed induction model, instructors play a key role in building a community of practice around the knowledge and skills participating new teachers are developing. In addition to the workshops and webinars throughout the year, beginning teachers participate in electronic coaching that includes reviewing (on a monthly basis) new teachers' electronic reflective journals. In these journals, new teachers describe what worked each week, what did not work, new insights they gained, where they had difficulties, where they need help, what they plan to do in the following week to try to address issues that have emerged and how they hope to build on their successes for the coming week. At the end of each month, teachers are asked to review their entries and summarize the big ideas learned over the course of the month, deficits they still need to address, and how they plan to address them. These journals add an important reflection for the teachers and a qualitative dimension that will assist the evaluation of the program implementation.

Administrator and school system support. The problems of teacher career commitment, instructional competence and self-efficacy are ultimately owned by school districts and schools. New teachers especially need to feel supported by administrators and colleagues. This includes time allotted for preparation, collaborative planning and peer assistance, and supportive and timely feedback (Hunt & Carroll, 2003; Stigler & Heibert, 1999; Yoon et al., 2007; Yopp & Young, 1999). Indeed, research suggests that the problems of career commitment of CTE teachers are likely the result of school systems (Camp & Heath-Camp, 1991; Ruhland & Bremer, 2004). The induction model requires buy-in and support from district and school leaders (Szuminski, 2003). Such buy-in ensures:

- Teachers' attendance at the training to understand and subsequently implement the practices learned is a priority for the school and district.
- The school in which the teacher works has plans to support implementation of the practices learned.
- The district is committed to supporting teachers as they attend training and return to the school site to apply what they have learned
- Participants in the training know why they are there and understand what they are expected to do to prepare for the training, and know what they must do when they return to their schools.

The administrator support element of the induction model addresses the key aspect of ensuring the success of the participating CTE teachers. The designated administrator supervising the beginning teacher participates in two days of training along with the mentor assigned to the beginning teacher, which includes an overview of the content of the professional development sessions. The supervising administrator is expected to meet with the mentor and the new CTE teacher at least monthly to discuss implementing what the teacher learns in the training. The supervising administrator is also expected to visit the new CTE teacher's classroom weekly for the first month (then monthly) and observe classroom practices, using a checklist targeted around the four strands from the training. The supervising administrator meets with the teacher and the mentor to provide feedback. In addition, the supervising administrator is expected to support the time needed for the new teacher and mentor teacher to meet, and is encouraged to be supportive in an informal way (e.g., when meeting in the hallway, asking how it's going and what support is needed).

School climate, a topic that has been studied for more than a century, is included in the conceptual framework. The conceptual framework supports the notion that placement of new teachers in positive school environments increases teacher retention rates. Recent studies show that a positive school environment is connected to student achievement, school success, violence prevention, healthy development of students and teacher retention (Cohen, McCabe, Mitchell, & Pickeral, 2009). Collie, Shapka, and Perry found in 2012 that teacher stress related to student behavior and workload impacted the level of job satisfaction. In 2012, Hughes reported that based on teacher survey results, 84% of teachers planned to remain in the profession until retirement. These data seemed to show that teacher retention could be increased by reduced workloads, increased salaries and improved parent and teacher participation.

Summary of Assumptions

In an effort to address the unique needs of CTE teachers entering the profession through an alternative route and to meet the demands of CTE teaching in the 21st century, this induction model was designed on a differentiated conceptual framework that high quality professional development combined with high quality school support will result in improved commitment to the teaching profession, competence and self-efficacy. Table 2.2 summarizes the assumptions of the induction model.

Table 2.2
Underlying Assumptions for Conceptual Framework

Conceptual Framework	**Underlying Assumptions to be Tested**
Relevant content based on the unique needs of CT teachers entering through an alternative route	• Five major areas of content include: instructional planning, instructional strategies, assessment, classroom management and reflection on practice.
A sequence of professional development sessions including a 10-day summer experience prior to the first year of teaching; quarterly two-day sessions throughout the first year; and a 10-day summer experience after the first year	• An intensive, rigorous summer experience best prepares the teachers for the demands of the first weeks of school. • Productive struggle is a necessary part of making the transition to teaching. • A continuous learning experience throughout the first year enhances reflection and on-the-job learning. • A summer experience after the first year enhances reflection that promotes a well-planned second year.
Quality instructional delivery	• High quality adult learning experiences include dialogue with peers, an opportunity to address the authentic problems of teaching, and reflection on learning. • Modeling, practice and feedback will help teachers develop instructional skills.
The support of a trained, on-site mentor	• Mentors need to follow a structured schedule of regular contact with the mentee that addresses the challenges of the transition to teaching.
The support of a trained administrator	• Administrators need to meet regularly with the beginning teacher as well as observe and provide feedback on instruction.
Coaching from the professional development instructor	• Regular visits from the professional development instructor include classroom observation and feedback, as well as making connections with mentors and administrators.
A community of practice	• Ongoing interaction with colleagues, both face-to-face and electronically, builds a community of support and enhances reflective practice.

Chapter 3:
Methodology: Iterative Development Process to Develop the Model

Theoretical Framework for Research Approach

The theoretical framework selected for this study includes generating data to successively develop and revise the induction model. This is a "design research" approach (Middleton, Gorard, Taylor, & Bannan-Ritland, 2008) which allows for iterative development of the model over successive cycles of field-testing. Design research is characterized by a seven-phase cycle of inquiry that Middleton et al. (2008) called the "'complete' design experiment." The aim of the design experiment is to investigate the relationship between the intended function of an intervention, the design or form of the intervention, and the behavior resulting from the intervention. The purpose of the inquiry is not only to generate data that can be used to make revisions to the teacher induction materials and delivery, but to refine the theory of change based on learning that emerges through the cycles of field-testing.

Using this approach ensures that in successive rounds of testing and revision, model developers can explain how the model contributes to outcomes. This is a key departure from traditional approaches using experimental design and is, in part, a response to the guidelines for Institute for Education Sciences (IES) Goal 2 development and innovation projects (Albro, 2010). Independent of Goal 2 guidelines, however, these methods remain the most appropriate for developing a "product" (a finished set of materials that comprise an induction model for new CTE teachers) over the course of several years for which small numbers of teacher participants render an experimental design and/or use of inferential statistical procedures unreliable, inadequately nuanced and poorly aligned to research questions. This research study employs a mixed-methods approach. A mixed-methods approach is most closely associated with qualitative analysis, although quantitative analysis can be a part of the approach. Mixed-methods research is fully integrated into a single analysis or is displayed side by side in sequential order. This approach taps into different domains and facets of knowledge.

To develop this induction model, an iterative cycle of three rounds of design, testing, revision and retesting was used to refine the model and the theory of how the model contributes to intended outcomes. In the first round (Phase 1), the relevancy of the content and viability of the instructional delivery methods of the professional development modules were tested on teacher participants in two states (States 1 and 2) through a series of two-day workshops. The methods were qualitative and quantitative and included focus groups, demographic information, the Teacher Sense of Efficacy Scale (TSES), a teacher content knowledge questionnaire, end-of-day evaluation, quick notes and facilitated discussions.

In the second round (Phase 2), the full induction model, including both professional development and support components, was tested with one cohort of beginning CTE teachers (State 1). The methodology was mixed—quantitative (pre- and post-surveys, teacher observation checklists) and qualitative methods (focus groups, interviews). A final round of field-testing (Phase 3), involved a stakeholder-led implementation of the teacher induction model in two states (State 1 and State 3), with one cohort of new CTE teachers in each state. This phase was also a mixed-

methods approach. It was a balance between qualitative (focus groups, interviews) and quantitative (pre- and post-surveys, teacher observation checklists).

Research Questions and Data Collection Methods

The tables below summarize the major research questions for the three phases of field-testing, as well as the data collection methods related to each question.

Table 3.1
Research Questions and Data Collection for the Phases of Field-testing

Phase of Field-testing	**Research Questions**	**Data Collection Methods**
Phase 1: Test of Content Relevance and Instructional Delivery	1. Are professional development materials relevant, useable and clear? If not, why?	• Teacher educator and state partner observations • Teacher focus groups
	2. Is the scope of module content reasonable? If not, why?	• Teacher focus groups • Teacher educator and state partner observations
	3. Is the delivery of professional development consistent with research-based adult learning principles? If not, why?	• Teacher quick card ratings of adult learning quality
	4. Are our assumptions of what constitutes "teacher competence" appropriate for first and second year CTE teachers? If not, why?	• Teacher educator and state partner observations • Teacher Sense of Efficacy Scale (TSES) • Teacher surveys
	5. Do the measures used during the iterative field test generate the information needed to tell us that the model is working as intended?	• Instructor debrief interviews
Phase 2: Test of the Promise of the Model[1]	1. Do induction program completers demonstrate improvement on measures of competence in instructional planning, assessment, instructional strategies and classroom management?	• Participant surveys • Q-sort • Teacher interviews • Teacher focus groups • Instructor debrief interviews • Classroom observations by administrators and professional development instructors
	2. Do induction program completers demonstrate improvement on a pre-post measure of teacher self-efficacy?	• Teacher Sense of Efficacy Scale (TSES)
	3. Do induction program completers demonstrate commitment to remain in the teaching profession?	• Teacher survey of commitment to the field • Teacher interviews

Phase of Field-testing	Research Questions	Data Collection Methods
	4. Do students in classrooms taught by induction model completers report having classroom conditions associated with high quality CTE instruction?	• Student surveys
	5. What school-level factors may mitigate the efficacy of the induction model?	• Pride Surveys administered to teachers in participating teachers' schools or tech centers
Phase 3: Test of the Feasibility of the Model to be Implemented by Stakeholders	1. Do induction program completers demonstrate improvement on a pre-post measure of teacher self-efficacy?	• Teacher Sense of Efficacy Scale (TSES)
	2. Do induction program completers demonstrate commitment to remain in the teaching profession?	• Teacher survey of commitment to the field • Teacher interviews
	3. Is it feasible that this model can be implemented as designed? Are extraordinary resources required (e.g., money, personnel, time, and technology)?	• Feasibility survey for state coordinators • Instructor interviews • Instructor and state coordinator focus group • Teacher focus groups • Classroom observations by administrators and professional development instructors • Mentor logs
	4. Are state partners able to implement the induction model with fidelity? If not, what changes need to be made to the materials? What kinds of support do states need to implement the model with fidelity?	• Instructor interviews • Instructor and state coordinator focus group • Teacher focus groups
	5. Do measures of implementation fidelity capture all key practices necessary to optimally operationalize the model?	• Instructor interviews • Instructor and state coordinator focus group • Teacher focus groups • Mentor logs

[1]Questions for Phase 2 originally supported a quasi-experimental research design. Teachers who participated in the CTE teacher induction program were to be compared to new CTE teachers who did not participate in the program. Because of centers and schools in State 1 were unable to participate as control sites, this design was dropped and the research questions were rewritten. (See End of Phase State Coordinator Interview Appendix DD.)

Measures and Methods of Analysis to Determine Fidelity of Implementation

In the second and third phase of the field-testing when the full induction model was being tested, it was important to determine whether or not the model was implemented with fidelity. Table 3.2 illustrates the types of data collected to determine the quality and fidelity of the delivery of the model. The criteria for determining whether the induction model was implemented as intended were:

- All elements of the model were delivered
- The professional development elements of the model were delivered consistently with standards of high quality adult learning. Those standards include:
    - content
    - relevance to adult learners
    - duration and sequence of delivery
    - instructional delivery methods
    - opportunity for adult learners to engage in dialogue and reflection
    - learning through authentic work
    - sufficient time for reflection and deep learning
    - modeling, practice and feedback on CTE instructional strategies
- The administrator support element of the model was delivered through a minimum of one meeting per month and one classroom observation per quarter.
- The mentor support element of the model was delivered through a minimum of one meeting per week for the first two months.
- Coaching visits were performed by the professional development instructor (at least three).
- Regular electronic communication was maintained, such as a website, emails and webinars.

Table 3.2
Data to Determine Quality and Fidelity of the Delivery of the Model

Purpose	**Sources**	**Format**
To assess fidelity of delivered program to planned program	Program instructional staff, state coordinators, teacher, program evaluators	Instructor interviews, informal observations of professional development, teacher and instructor focus groups, feasibility survey
To assess fidelity of delivered program to prepared materials	Program evaluators	Informal observations, teacher focus groups
To assess quality of delivered program	Teachers	Instructor interviews, teacher and instructor focus groups
To assess quality of mentor support	Mentors, Teachers	Log of meetings with mentees
To assess quality of administrator support	Administrators, Teachers	Observations of teachers
To assess quality of coaching support	Instructors, Teachers	Observations of teachers

Purpose	Sources	Format
To assess quality of electronic communication	Program evaluators, Teachers, state coordinators	Informal observations, teacher focus group, feasibility survey

Data to Determine Promise of Intended Outcomes

Another goal of the iterative field tests in Phase 2 and Phase 3 was to test the promise of the model to produce its intended outcomes: improved commitment to the field, competence and self-efficacy. The purpose of this aspect of the data collection was to produce actionable knowledge used to make improvements to the induction model. Highlights of measures and methods of analysis are organized below the research question for each intended outcome. The Phase 2 questions and their corresponding data collection methods are:

1. Do induction model completers demonstrate improvement on measures of competence in instructional planning, assessment, instructional strategies and classroom management?

a) **Danielson's framework observation**. Danielson's (1996) observation protocol was adapted for school administrators and professional development instructors to assess teacher participants' classroom practice. Adaptations reflected the intended outcomes of the professional development modules (instructional planning, instructional strategies, classroom assessment, and classroom management).

b) **Surveys of students in classrooms taught by participants**. Students of teachers participating in the induction model were surveyed regarding their perceptions of teacher competence as manifested in the classroom. Items from the *High Schools that Work* Assessment and student survey were used to generate a new measure of student perception of teacher practice. Items asked students to report classroom conditions and assignments associated with high quality CTE instruction including that teachers demand students read more, teachers require students to integrate math into their CTE course work, students take more written exams, students keep written portfolios, and students have opportunities to redo work, etc. Surveys were administered to students in the spring.

Analysis of Data. This combination of measures is designed to create a corroborated portrait of teacher knowledge and practice. Principal observations of classroom practice provide the primary data source on teacher competence in each of the four professional development content areas. Student surveys provide additional support on teacher competence.

2. Do induction model completers demonstrate improvement on a pre-post measure of teacher self-efficacy?

a) **Teacher Sense of Efficacy Scale (TSES)**. This instrument was developed by Tschannen-Moran & Woolfolk Hoy (2001) and includes three, eight-item subscales: *Efficacy for Instructional Strategies; Efficacy for Classroom Management;* and *Efficacy for Student Engagement.* In prior studies, reliabilities for the full scale of the TSES ranged from .92

to .95, and .86 to .90 for the subscales (Tschannen-Moran & Woolfolk Hoy, 2007). This instrument was administered to all teacher participants at the beginning or before the first professional development module and again following the end of the second 10-day summer institute.

Analysis of Data. TSES scores were analyzed in SPSS using pre-test, post-test analysis to determine whether teacher participants increased their self-efficacy on each of the three scales. Scoring instructions are outlined in Tschannen-Moran and Woolfolk Hoy (2007) and were followed carefully to arrive at accurate scale and subscale scores.

3. Do induction model completers demonstrate a commitment to remain in the teaching profession?

a) **Interviews with teacher participants**. Interviews were conducted with teacher participants about their experiences in teaching and about their future career plans.

b) **Surveys of teacher participants**. Teacher commitment surveys were administered to teacher participants concerning their plans to continue teaching CTE, expected number of years teaching, the strength of a match with their long-term career goals, and their intent to seek alternative employment.

Analysis of Data. These data were analyzed using both quantitative and qualitative methods. Mean average years were calculated. In addition, responses to the open-ended survey question asking for reasons regarding career commitment were using a grounded theory approach (Strauss & Corbin, 1990) to generate themes explaining why CTE teachers plan to leave the profession.

4. Do students in classrooms taught by induction model completers report having classroom conditions associated with high quality CTE instruction?

a) **Modified *High Schools That Work* student survey focused only on assessing the CTE classroom instruction.** The *High Schools That Work* student survey was modified to include only those questions that pertained to CTE classroom instructional practices.

Analysis of Data. These data were analyzed using quantitative methods in SPSS. Mean averages of the students' responses will be reviewed to provide a snapshot of CTE teachers' instructional practices, their inclusion of core content subjects in career tech classes, and the use of student portfolios in career tech classrooms.

5. What school-level factors may mitigate the efficacy of the induction model? The efficacy of the induction model is predicated on a supportive and collegial environment in the school. The supervising administrator and mentor are key factors in providing support to the new CTE teacher; however, the prevailing school culture can be equally powerful as a deterrent to reflective practice, teacher-teacher collaboration and a hospitable environment for new teachers.

a) **Working conditions surveys of other teachers in the school to assess climate**. Instruments such as the North Carolina Teacher Working Conditions Survey, the Pride Survey, or the International Survey Associates Teaching Environment Survey are broadly used, reliable, and well-validated measures of school climate including the degree of teacher collaboration, the quality of instructional leadership provided by the principal and decision-making norms. A school climate survey was administered to the faculties in the participating teachers' schools in spring 2011.

Analysis of Data. The research company that developed the working conditions survey will score the surveys. School results from the working conditions survey will be compiled and aggregated to provide an overall picture of the working conditions in the participating teachers' schools.

The Phase 3 research questions and their corresponding data collection methods are:

1. Do induction model completers demonstrate improvement on a pre-post measure of teacher self-efficacy?

a) **Teacher Sense of Efficacy Scale (TSES)**. This instrument was developed by Tschannen-Moran & Woolfolk Hoy (2001) and includes three, eight-item subscales: *Efficacy for Instructional Strategies; Efficacy for Classroom Management;* and *Efficacy for Student Engagement.* In prior studies, reliabilities for the full scale of the TSES ranged from .92 to .95, and .86 to .90 for the subscales (Tschannen-Moran & Woolfolk Hoy, 2007). This instrument was administered to all teacher participants at the beginning or before the first professional development module and again following the end of the second 10-day summer institute.

Analysis of Data. TSES scores were analyzed in SPSS using pre-test, post-test analysis to determine whether teacher participants increased their self-efficacy on each of the three scales. Scoring instructions are outlined in Tschannen-Moran and Woolfolk Hoy (2007) and were followed carefully to arrive at accurate scale and subscale scores.

2. Do induction model completers demonstrate a commitment to remain in the teaching profession?

a) **Interviews with teacher participants**. Interviews were conducted with teacher participants with teachers about experiences in teaching and about their future career plans.

b) **Surveys of teacher participants**. Teacher commitment surveys were administered to teacher participants concerning their plans to continue teaching CTE, their expected number of years teaching, the strength of a match with their long-term career goals, and their intent to seek alternative employment.

Analysis of Data. These data were analyzed using both quantitative and qualitative methods. Mean average years were calculated. In addition, responses to the open-ended survey question

asking for reasons regarding career commitment were using a grounded theory approach (Strauss & Corbin, 1990) to generate themes explaining why CTE teachers plan to leave the profession.

3. Is it feasible that this model can be implemented as designed? Are extraordinary resources required?

a) **Feasibility Survey.** A feasibility survey (multiple choice, short response) was designed for state coordinators to determine their ability to implement program, program guidelines and feedback mechanisms.

b) **Focus Group.** Focus groups were conducted with state coordinators and instructors. Questions focused on ability to implement the program, program strengths and weaknesses and lessons learned.

c) **Interviews.** Interviews were conducted with instructors. Questions centered on delivery and content of professional development components, use of modules, pacing, time devoted to modules, etc.

Analysis of Data. The results of the feasibility surveys (total of two) are compared by State 1 and 3 to determine similarities and differences and adherence to the fidelity of the model including the time frame. To analyze the focus group and interview responses, the grounded theory approach (Strauss & Corbin, 1990) was used to determine themes.

4. Are the state partners able to implement the induction model with fidelity?

a) **Focus Groups.** Focus groups are conducted with state coordinators and instructors. Questions focused on ability to implement the program, program strengths and weaknesses and lessons learned.
b) **Administrator Observation Forms.** During the initial summer training, school administrators were provided with feedback forms based on the Danielson Framework (described earlier), and they were instructed to observe participating teachers on a regular basis throughout the school year.
c) **Instructor (Coach) Feedback Forms.** Instructors observed participating teachers on site three times throughout the year.
d) **Mentor Logs.** During initial summer training, mentors were provided with mentor logs and instructed to list the dates they met with their first-year CTE teachers and to list the topics discussed.

Analysis of Data. To analyze the focus group responses, the grounded theory approach (Strauss & Corbin, 1990) is used to determine themes. To analyze the administrator observation forms and instructor feedback forms, the pre- and post-data are analyzed to determine whether or not teachers show an increase in their performance**.**

5. Do measures of implementation fidelity capture all key practices?

a) **Fidelity Framework.** This framework is based on the measures of implementation fidelity. These measures of implementation fidelity are found earlier in chapter three of this report.

Analysis of Data. To analyze the fidelity framework, the following data points – content, relevance to adult learners, duration and sequence of delivery, instructional delivery methods, opportunity for adult learners to engage in dialogue and reflection, learning through authentic work, sufficient time for reflection and deep learning, and modeling, practice and feedback on CTE instructional – were analyzed based on the grounded theory approach (Strauss & Corbin, 1990) to determine how well the individual states implemented the program.

Chapter 4:
Findings

The findings section of this report includes a summary of the findings of Phase 1, 2, and 3 field tests. They include:

- Phase 1: The Validity of the Induction Model and Changes in the Professional Development Modules Suggested Through the Data — Findings from four field tests conducted to study and refine that induction model between June 2009 and February 2010 with three cohorts of early career CTE teachers in two states
- Phase 2: The Promise of the Model to Impact Commitment to the Profession, Teacher Competence and Self-Efficacy from 2010-2011 — Findings of a field test of a cohort of first year CTE teachers in State 1 who participated in the alternative induction program
- Phase 3: Stakeholder/State Implementation of the Training — Findings focus on State 1 and State 3 participating teacher cohorts implementing the program with fidelity

Phase 1 Field Test: The Relevance and Instructional Delivery of the Induction Model Content (2009–2010)

This field test was comprised of four separate professional development sessions, each lasting three, six-hour days. A total of 46 teachers participated, representing three cohorts in two states. The purpose of the field tests was to determine whether the content, scope and delivery of four professional development modules were appropriate for the intended audience of new CTE teachers.

The research questions were:

1. Are the professional development materials relevant, useable and clear? If not, why?
2. Is the scope of the module content reasonable? If not, why?
3. Is the delivery of the professional development consistent with research-based adult learning principles? If not, why?
4. Are the assumptions of what constitutes teacher competence appropriate for first and second year CTE teachers? If not, why?
5. Do the measures used during the iterative field test generate the information needed to tell us that the model is working as intended?

The teachers who participated in the field tests were almost equally male/female. The majority of participants were White, with 15% being American Indian. Thirty-seven percent of the teachers were ages 25-34 and 28% of the teachers were ages 35-44. Forty-one percent of the participants had a bachelor's degree. The most highly represented careers were construction (15%) and health services (18%). (See the Demographic and Background Information Appendix A and Demographics Characteristics of Field Test Participants for Phase 1 Appendix B.)

Analysis of data from each field tests generated myriad findings that model developers used in successive cycles of revision and retesting over the course of the year. Selected findings that emerged in all four workshops during the field tests are reported here.

1. **Are the professional development materials relevant, useable and clear?**
2. **Is the scope of the module content reasonable?**

Field test participants identified key elements of the modules that they felt would be necessary for new teachers prior to entering the classroom, including: (a) the use of rubrics; (b) formative and summative assessment; (c) how to use a table of specifications to align their instructional goals and assessments to technical standards and 21st-century skills; (d) getting to know students; (e) engaging students in developing classroom rules and procedures; and (f) classroom management scenarios. Data suggested that three strategies used by induction model developers were particularly effective in supporting participant learning: (a) use of examples in participants' content areas; (b) use of "floating" one-on-one and small-group coaching during cooperative learning segments; and (c) facilitated small-group discussion in the afternoon or evening to structure reflection.

3. **Is the delivery of the professional development consistent with research-based adult learning principles?**

Data suggested three strategies used by model developers were particularly effective in supporting participant learning: (1) use of examples in participants' content areas; (2) use of "floating" one-on-one and small-group coaching during cooperative learning segments; and (3) facilitated small group discussion in the afternoon or evening to structure reflection. Participants in the first focus group raised model developers' awareness of the importance of linking the content of the modules to specific examples tied to their CTE content areas. (See Focus Group Protocol Form Appendix F.) One participant said, "I need more specific training in the areas I teach*,"* while another participant stated plainly, "I really can't use the material I learned here because it is not connected to my content." Following that feedback, model developers took explicit steps to determine the content areas of participants in advance of subsequent field tests, and put together resource binders with content-specific examples for every teacher's content area. In the focus group for the third field test, participant comments suggested this change was having its intended effect. One participant noted, "You go to other trainings and [what they present] doesn't really apply [to me]. It's overall, generalized teaching strategies. You come here and it's reversed. Here, you sit down and you have people who understand what CTE teaching is…and say, 'This is how you apply this to your classroom.'"

With regard to one-to-one instructor guidance, several data sources suggested that teacher learning was best supported when instructors moved among small groups during cooperative learning segments. (See Daily Instructor Debrief Appendix K.) Participant interviews and focus groups both yielded strong agreement that this was an important aspect of learning for them that helped to "individualize" instruction. (See Teacher Interview Protocol Appendix J.) The quick cards showed spikes in relevance, dialogue and application following segments that included small group-coach interaction. (See Note Card Completed by Teachers Forms Appendix H.)

The evaluators originally attempted to observe research-based adult learning principles using an observation tool. (See Module Observation by Evaluators Appendix G.) However, after attempting to use the form during the first field test, the evaluators realized that what they

observed did not reflect what the teacher participants may have felt about the same situation. Instead the evaluators decided to go to the previously mentioned quick cards to have the teacher participants fill them out throughout the day to gauge how the teachers felt about the previous session focusing on adult learning principles.

Participants in the focus groups noted that the coaches did not need content expertise in their CTE area, but only expert knowledge in the process – whether it was rubrics, or testing or instructional strategies. Finally, observers noted that while the cooperative learning strategies used throughout the modules were consistent with adult learning principles, they were not equally effective for all groups, particularly those that do not receive a visit from an instructor during their small-group discussion.

Finally, facilitated discussion following the formal professional development agenda helped teachers further process their new knowledge. Though participants liked a brisk instructional pace, they indicated in focus groups that having an informal but semi-structured time to debrief, process, and digest what they learned was tremendously beneficial to their learning and to facilitating connections among participants. During the field test, the focus groups performed this debriefing function.

4. Are our assumptions of what constitutes "teacher competence" appropriate for first and second year CTE teachers? If not, why?

Pre- and post-results on the TSES for this group of teachers were positive on a 9-point scale. Teachers scored on average 6.41 on the student engagement pre-assessment. The post-assessment score was 7.3. Their pre-assessment score on instructional strategies was 6.65 and the post-assessment score was 7.58. Their pre-assessment on classroom management was 6.92 and the post-assessment was 7.7. Overall they made almost a one-point gain in each area. Their beginning scores were typical of new teachers; the rise in scores showed teachers who believed they were doing well as teachers. (See Teachers' Sense of Efficacy Scale Appendix C and Teachers' Sense of Efficacy Scale Results Appendix D.)

Two findings emerged primarily from analysis of focus group transcripts regarding the characteristics and primary concerns of the participants in these field tests. The first finding pointed to the level of basic literacy and numeracy skills found within this group of alternatively certified CTE teachers. The second finding, motivating students, emerged without prompting in multiple focus groups, indicating the key challenges and concerns facing these new CTE teachers.

State 1's policy for recruiting alternatively certified CTE teachers introduces virtually no barriers to entry, including no minimum score requirement on tests of basic skills. State 2's does have new CTE teacher entry requirements. Accordingly, participants in the two State 1 field tests demonstrated a wide range of basic literacy and numeracy skills. Observations by instructors and guest observers suggested that the concepts of integrating academic content such as literacy and numeracy skills were especially challenging for these CTE teachers, some of whom did not have strong mastery of those basic skills themselves. (See Material Review by Outside Observers form Appendix L.) The participants indicated awareness of this lack of mastery during focus

groups. Referring to the Buck Institute text on project-based learning, one participant said, "There were a lot of large words in there that could have been reworded in another way. I can't tell you those words because I didn't know the meaning of them. And that went kind of rough. A lot of us are not college people, okay? We worked in the field for 25 to 30 years. I'm just stating that. And some of those larger words probably need to be put in more of layman's terms." Other field test groups noted concern regarding the cognitive demand of integrating academic content into CTE instruction as part of the constellation of skills expected of a brand new teacher, noting that teachers are not likely to be receptive to doing this type of instruction until the second half of the first year.

Regardless of their pre-existing levels of basic skills, all field test groups of teacher participants indicated that what is foremost on their minds is how to motivate students and manage their classrooms. One focus group participant said, "My biggest battle right now is keeping the kids interested. We can write rubrics until we're blue in the face, and write lesson plans, and write long-range plans, and write critical maps and all this stuff. But, for whatever reason, it's just keeping the kids' interest and motivation." The verbatim phrase, "You can lead a horse to water but you can't make them drink," came up independently in several focus groups.

5. Do the measures used during the iterative field-test generate the information needed to tell us that the model is working as intended?

Yes, the measures did generate the needed information to tell us the model is working as intended. Selected findings that emerged in all four field tests fell into four categories: characteristics and needs of participants, strategies that enhanced participant learning, planning logistics and content of professional learning, and methodological findings. (See Pre-and Post-Assessment Tool for Content Knowledge forms for all field test Appendix E.)

Two findings emerged regarding the characteristics and primary concerns of the participants in these field tests. The first finding spoke to the low level of literacy and numeracy skills found within this group of CTE teachers. The second finding, motivating students, emerged in several focus groups, pointing to the key challenges and concerns CTE teachers have in engaging and motivating students.

Feedback from teachers and state agency administrators underscored how important it was to select optimal days and times for three, two-day follow-up sessions during the 2010-2011 school year. Some dates had to be avoided as professional development days.

Across all four field tests, teachers identified elements of the modules that they felt would be necessary for new teachers prior to entering the classroom. Those elements were sections on: (a) the use of rubrics; (b) formative and summative assessment; (c) how to use the table of specifications to align their instructional goals and assessments to technical standards and 21st-century skills; (d) getting to know students; (e) engaging students in developing classroom rules and procedures; and (f) the twelve classroom management scenarios.

The expert panel reviewed the model's design and instrumentation twice during the first year of field-testing. Recommendations from the panelists focused on enhancing the qualitative

methodologies to generate more descriptive data, including adding interviews of individual participants and adding detailed questions to protocols for observers and instructors regarding their observations of participant learning.

Panelists also questioned the use of teacher retention as a measure of the program's impact given the influence of the current economic climate and the short time frame for the project. In lieu of retention data, panelists recommended the use of measures of career commitment as a more accurate proxy for the outcome the program aims to achieve, and it further suggested adding a school climate measure to the evaluation design to account for other more powerful influences on teacher attrition.

Phase 2 Field Test: The Promise of the Model to Impact Commitment to the Profession, Teacher Competence and Self-Efficacy (2010–2011)

The second phase of the iterative development methodology was a field test of the full induction model to determine whether the model showed promise toward the intended outcomes. One cohort of beginning CTE teachers in State 1 was recruited to be a part of the field test based on recommendations by their local administrators. There were 10 teachers in this cohort.

The research questions were:

1. Do induction program completers demonstrate improvement on measures of competence in assessment, classroom management, instructional planning and instructional strategies?
2. Do induction program completers demonstrate improvement on a pre-post measure of teacher self-efficacy?
3. Do induction program completers demonstrate commitment to remain in the teaching profession?
4. Do students in classrooms taught by induction program completers report having classroom conditions associated with high quality CTE instruction?
5. What school-level factors may mitigate the efficacy of the induction model?

The cohort in State 1 showed a more ethnically diverse group of teachers (60% White, 20% American Indian, 10% Asian) in comparison to all State 1 teachers as a whole; it's an older group of new teachers (40% were ages 35-44) because they were career changers, and 50% of participating teachers had at least an undergraduate degree. (See Demographic Characteristics Appendix M.)

The cohort participated in the full induction model, beginning with a 10-day summer institute and continuing with three, two-day sessions throughout the school year. In the second summer, another 10-day institute concluded the program. The mentors and administrators for these teachers participated in a two-day training session and followed a schedule of meetings and activities with the beginning teachers throughout the year. The professional development instructor made three classroom visits to each participant and provided feedback on their teaching. The beginning teachers had access to a program website and were invited to participate in monthly webinars as part of an ongoing community of practice.
The first part of the report on Phase 2 findings is devoted to a profile of a successful CTE professional development participant, who represents a composite of teachers who remained in

the program, and it profiles an unsuccessful participant, who represents a composite of those teachers who withdrew from the program. The profiles are followed by findings grouped by the themes that emerged from the data: CTE professional development, commitment to the teaching profession, school culture, and curriculum and instruction. The information contained in the two teacher profiles is not representative of any one teacher who participated in the CTE professional development induction model. Rather the profiles reflect a combination of participant data collected. The sources of data include results from an initial and a concluding focus group with teacher participants, a pre- and post-self-efficacy scale for teacher participants, pre- and post-teacher commitment surveys, a pre- and post-Q-Sort activity where teacher participants indicate strengths and weaknesses of the CTE professional development, teacher participant interviews, mentor surveys, administrators' classroom observations, pride surveys, student surveys and instructors' observations.

Teacher Profile: Teresa—Successful CTE Teacher Completer

Teresa's Introduction. Teresa had been a cosmetologist at a local styling salon in a mid-size city for 25 years. She enjoyed her work, but she realized she would have to find a job that was less physically demanding. Teresa had never thought of becoming a teacher until a friend suggested it. She always had a good rapport with children; had an associate arts degree in cosmetology; and knew her career inside and out. Teresa contacted her local district about job opportunities. She discovered that there was a cosmetology teacher opening at the tech center in an adjoining county. The tech center offered classes for both high school students and adults. Based on her good references and academic and work records, Teresa was offered the cosmetology teaching job at the career tech center.

Her center director knew about the CTE teacher professional development induction model for alternative career tech teacher certification and recommended that Teresa take part in this 14-month professional development opportunity. Teresa was unclear about what she was getting in to, but she thought she would give the professional development a try. She was concerned that the professional development stretched from an initial two-week summer professional development to professional development during the school year to a concluding two-week professional development the next summer. Teresa thought the time commitment was a bit extensive. Her biggest worries, however, were setting up her classroom and disciplining her students.

Teresa's School—Themes of School Culture and School Leadership. Teresa was employed to work at a technical center in a mid-size city. The state-of-the-art facility served both high school and community college students. The center director has been at the helm for five years and was recognized for being a strong administrator who was highly organized, a disciplinarian and treated teachers fairly. The center program was well organized, and the majority of educators at the center were veteran teachers. Center students regularly won state and regional awards (in several career pathways), and school pride was evident among the students and teachers.

Summer 2010 Professional Development—Themes of Training Rigor, Teacher Participant Collegiality, Teacher Participant Commitment to the Profession. Teresa and nine other career tech teachers met in the central part of the state for the initial two-week CTE professional development in July 2010. Because Teresa was several hours from home, she elected to stay at

local university housing at no charge. This allowed Teresa to concentrate on the professional development and get to know the other teacher participants. She was the only cosmetology teacher at the professional development. Other career tech teachers represented the building trades, business technology and culinary arts.

Teresa and other teachers participated in some assessments for evaluation purposes. One was the Teacher Sense of Efficacy Scale (TSES) and another was the Teacher Commitment to the Profession survey. There were three components to the TSES. On a 9-point scale, Teresa's pre-assessment scores were 5.4 on efficacy in classroom management; 6.2 on efficacy in student engagement, and 5.8 on efficacy in instructional strategies. These scores were at the average range in comparison to other teacher participants in the cohort. On her teacher commitment survey, she reported that she planned to teach at her current school in the immediate future; teaching had not been a long-term career goal; and she strongly agreed that she planned to teach for at least five years.

There were four professional development strands—instructional planning, instructional strategies, classroom discipline and classroom assessment. Interfaced with these strands was teaching the standards, literacy, and numeracy in CTE classes. These strands were integrated throughout the initial two-week professional development. The intensive professional development was designed to be practical, rigorous and "on time" for new teachers. There were instructional strategies, hands-on activities (such as creating a first-day lesson plan, and developing a syllabus), role playing exercises, delivery of the content, opportunities for participants to "teach back" what they had learned and lots of interactions among participants. What teachers learned and developed during the summer professional development prepared them to teach effectively during their first year of teaching.

By the third day of training Teresa was overwhelmed and exhausted. The many acronyms and educational terms presented were all new to her, and some of the activities were complicated. The days were long and filled with new ideas. She began to wonder if she had made a mistake by entering the teaching profession and participating in the training. The height of her frustration was day four of the training when the instructor asked teacher participants to develop curriculum maps for the entire school year. Teresa struggled with the assignment. It seemed like too mammoth a task to undertake in a couple of days, and the integration of the curriculum with the assessment and upcoming activities was daunting. The instructor had presented how to plan a curriculum—deciding which units to teach; determining how long the units would be; and outlining the major learning outcomes, activities, and corresponding assessments. The teachers were expected to develop their own curriculum map for the year and then share it with the group. The instructor coached Teresa on how to proceed. She received advice from some of other teacher participants as well. She felt calmer the second week of training. The vocabulary was beginning to make some sense to her, and the instructional strategies seemed practical and motivating. She also enjoyed the other teacher participants in her cohort. The teachers were friendly, willing to share instructional strategies and non-judgmental. Because of the training, Teresa had daily lessons planned for the first quarter of the school year, which reassured her.

Teresa commented at the conclusion of the training that information she picked up over the past two weeks had been very helpful. She found the classroom management techniques to be the

most practical, along with the ways to infuse literacy and numeracy into her lessons. Teresa mentioned that the pacing for the training was a bit off—too much time spent on some strategies and not enough on others. She did request that some activities be geared to teachers' career focus. Teresa did feel fairly confident that she had acquired some tools to start the school year off on the right track.

She was assigned a mentor at her center who was an accomplished and experienced educator in business technology. The plan was for the mentor and Teresa to meet at least once a week. The mentor planned to observe Teresa and provide feedback on a monthly basis. Her tech director also had specific times scheduled when she would observe and meet with Teresa throughout the school year. The SREB CTE instructor set up a schedule to observe Teresa and provide feedback on a quarterly basis. Teresa's mentor, instructor and administrator followed through and observed and offered feedback on a regular basis to Teresa during the school year.

Mid-Year: January 2011—Themes of Student Achievement, Student Behavior, CTE Teacher Expertise. Teresa came home exhausted the first three months of the school year and began to wonder if teaching was more physically demanding than working in a styling salon. She was amazed at some of the problems her students brought to school such as lack of food, abusive parents and serious health issues. In addition, the school and CTE program paperwork was overwhelming. Surprising to Teresa, however, was the fact that she did not have any serious student discipline problems. Most student issues were related to their tardiness and absences. Teresa sincerely cared about her students, and held them to high academic, technical and career standards. She planned each lesson thoroughly, used the curriculum map she had developed, and presented the students with clear expectations regarding academics and behavior. Some of her lessons had not been particularly successful and her students had scored poorly on some tests, but the feedback she had gotten from her mentor, SREB coach, and center director indicated she was at a satisfactory level with her instruction. She was more successful in integrating literacy into her instruction than numeracy. Teresa really felt like her greatest weaknesses were having disengaging lessons from time to time and using inappropriate assessment techniques. Teresa felt like she was still too dependent on lecturing, and the assessment tools she was using did not seem to get at students' actual strengths and weaknesses. Her observations from her director, coach and mentor supported her concerns.

Teresa completed the school year successfully, although she did have several students drop out of her CTE program because of chronic absenteeism. Her director remarked that Teresa was much better prepared than other first-year teachers she had employed in past years. In fact, several veteran teachers asked Teresa to share some of her literacy strategies with them. Teresa's classroom management skills were solid and she was able to cover the curriculum by the conclusion of the school year. Student assessments showed that a majority of students had completed the CTE program at least at an adequate level. Teresa sat down with her mentor and director to outline goals for her second year of teaching.

Conclusion: Summer 2011—Themes of Teacher Expertise, Teacher Commitment to the Profession, Training Rigor. Teresa's return to summer training affirmed that she had made a good decision to enter the teaching profession. On the teacher self-efficacy survey, she increased by at least one point in the all three areas—classroom management (6.5), student engagement

(7.3), and instruction (6.9). These scores are above average in comparison to other teachers in the group. Once again Teresa found summer training to be rigorous and exhausting, using up every brain cell she had. This time, however, she knew what to expect. She reconfirmed her commitment to teaching on the post-teacher commitment survey. During training the professional development numeracy sessions made more sense to her. There was a review of many of the instructional strategies previously taught at training and the introduction of several new ones. The teach backs were helpful and Teresa was ready to move forward to her second year of teaching.

Teacher Profile: Thomas—Unsuccessful CTE Teacher Completer

Thomas' Introduction. Thomas had never thought about becoming a teacher, but the economy was tight and he needed a job. He had lots of experience as a restaurant chef and had jumped from restaurant to restaurant in several cities around the state over the past 10 years. Thomas thought his best bet was to try his hand as a culinary science teacher at a local high school. He was a smart and creative guy and thought he had his cooking skills down. Thomas also had completed a couple of years of community college course work. He figured he could cut it as a teacher. Once he was hired at a high school located in a small town, Thomas' high school principal strongly suggested that he participate in the CTE new teacher induction training. The principal was concerned about Thomas's lack of experience in education. Thomas agreed, but he did not like the two-week time period devoted to the summer training. The training cut into his summer work and family activities.

Thomas' School: Themes of Culture and School Leadership. The high school where Thomas was hired to teach had a satisfactory reputation. There was little turnover among staff members, and the principal had been in place for 10 years. The previous culinary arts teacher had not run a good CTE program, and he finally chose to retire. Faculty members at the high school were not collegial, and school pride was minimal. Minor student discipline problems at the high school were ongoing and never seemed to be resolved.

Summer 2010: Themes of Training Rigor, Teacher Participant Collegiality, Teacher Participant Commitment to the Profession. Because Thomas lived close to the center where the summer training was held, and he had family responsibilities at night, he drove back and forth each day. This cut him off from building relationships with the other teachers and affected his level of engagement with the training. There were some assessments for evaluation purposes that Thomas and other teachers took part in at the beginning of the training. One was the TSES and the other was the teacher commitment to the profession survey. There were three components to the TSES: On a 10-point scale, Thomas' assessment scores during the first summer training were 4.2 on efficacy in classroom management; 5.4 on efficacy on student engagement, and 5.6 on efficacy on instructional strategies. These scores were below average in comparison to other teachers in the group and low in comparison to other studies of new teacher TSES results. On his teacher commitment survey, Thomas reported that he did not plan to teach at his current school for more than two years; teaching had not been a long-term career goal; and he disagreed that he planned to teach for at least five years.

Thomas found the summer training to be unbearably long, and he missed three of the ten days due to household chores and family obligations. When he was at the training, he barely

participated in the activities and the quality of his work was less than adequate. The terminology was new to him as well as all the educational acronyms. He thought the training really did not apply to culinary arts and the units of study he would be teaching. Instructors also noted a lack of effort on Thomas' part. Like the other new teachers taking part in the training, he struggled with the curriculum map but managed to cobble a plan together for the upcoming school year. He completely disregarded the sessions on literacy and numeracy because he did not view himself as a reading or math teacher. Cooking was his thing. Thomas did enjoy the teach-backs and was quite skillful at providing helpful feedback to others. He was assigned a mentor from another tech center who would work with him on a regular basis throughout the school year. The SREB coach and the high school principal also planned regular meetings and feedback with Thomas.

Mid-year: January 2011— Themes of Student Achievement, Student Behavior, CTE Teacher Expertise. Thomas' classroom was located in an isolated building on the fringe of the high school campus. He did not like the culinary curriculum the previous instructor had developed because it was too complicated to follow. Thomas scrapped it and instead developed his own course of study. This meant his curriculum map and other related classroom products he had created during summer training were no longer relevant. He was not able to put together a culinary CTE program of study because of a lack of time and effort on his part. In addition, there was limited kitchen equipment in his classroom. His lessons were scattered and planned on the fly. There was no organization or scaffolding, and he had students watch and critique cooking shows or had them look at cookbooks and answer questions about the recipes. Students picked up on Thomas' lack of planning and organization and were disruptive in class. Many times a school administrator had to be called in to Thomas' classes because the students were out of control. His principal provided him with some techniques for getting his students under control, but Thomas only half-heartedly tried some of them. Thomas blamed the unacceptable student behavior on others. He said that most of his students did not want to work in a culinary field; he felt the school counselor put some students in his classes because they needed an extra credit. Thomas also had trouble making it to school on time. He usually arrived late to his first-period class because he had dropped off his daughters at school. His mentor did not fulfill his obligations; he was rarely in Thomas' classroom and provided no feedback or support. Thomas was the only teacher in his building so he felt isolated from the other teachers. Thomas' principal at one time had perceived Thomas as a smart, knowledgeable, talented chef and promising teacher. Over time, however, the principal began to view him as a problematic instructor who could not control his class, had an attitude problem, could not follow the curriculum and honor established work hours. Thomas' classroom observation ratings went down rather than up as the school year progressed. When the SREB coach visited the classroom, it was chaotic and Thomas ignored any suggestions made by the coach. As the school year continued, Thomas put less and less effort into his teaching. He did not make it to all the CTE training sessions during the school year. When he did show up, he did not turn in assignments or actively participate in sessions. Thomas' students did very poorly on their end-of-the-year assessments. Both Thomas' principal and Thomas agreed that teaching was not a good fit for Thomas and his contract was not renewed for the following school year.

Conclusion: Summer 2011—Themes of Teacher Competency, Teacher Commitment to the Profession, Training Rigor. Thomas' OSTES post-scores remained flat—efficacy of classroom management (4.3), student engagement (5.3) and instructional strategies (5.6). These scores

reflect earlier OSTES research studies of teachers who completed the survey and had low job satisfaction. On the Teacher Career Commitment survey Thomas stated that he did not want to remain in the teaching profession. Thomas dropped in on summer training when he could, mentioning frequently the ways his high school had not supported his quest to become a teacher. Thomas developed lackluster work products during the two weeks. He ultimately decided the best bet for his future was returning to restaurant work, perhaps in a state that was more economically on the upswing.

Phase 2 Findings

1. Do induction completers demonstrate improvement on measures of competence in assessment, classroom management, instructional planning and instructional strategies?

Eight CTE teachers from State 1 took part in a late afternoon hour-long focus group. (See Focus Group Protocol Appendix Q.) Teachers were in the midst of completing their initial two-week training. Five CTE teachers participated in a late afternoon hour-long post-focus group during the final week of training. Teacher participation in the focus groups was voluntary. Teachers not participating had family or professional commitments. In both instances, teachers were asked questions about the training regarding its content, effectiveness, pacing, vocabulary, assignments, activities, relevancy and impact. Teachers also responded to questions about the overall induction model. Responses to focus group questions were analyzed using an open coding and sorting process (Miles & Huberman, 1994) to identify common themes across respondents.

Teachers were asked specific questions about the induction model professional development that they participated in from summer 2010 to summer 2011. New teachers found the initial 2010 summer professional development overwhelming; it was planned to be this way by developers. During the summer of 2010, the teacher vocabulary acquisition was problematic. Teachers described it as "complicated information." Teachers did not know the acronyms and other educational terms that were being presented by trainers. The terms did not begin to start making sense to teachers until the final days of initial training. In 2011, the vocabulary was not a problem for participants. During the summers of 2010 and 2011, participants felt overwhelmed with information during the two-week time period. This was particularly true in 2010. Participants also were confused by the sequencing of topics in 2010. They did not realize that the four instructional modules of instructional planning, instructional strategies, classroom management, and assessment were linked together. They thought a new topic was presented every day of the training. During the summer of 2011, they responded that the sequencing of topics was appropriate.

In 2010 and 2011, teachers remarked that the pace of instruction was an issue at times—sometimes too fast and other times too slow—racing through such topics as student writing and then stalling on the lesson unit planning. During both summer sessions participants found some topics redundant. In 2010 and 2011, participants said that there needed to be more individualization of instruction based on their specific career pathway. Several teachers remarked in 2010 and 2011 that there was a big difference between being a CTE teacher in a comprehensive high school and a technical center (for example, length of classes, type of

instruction, format of curriculum, number of different classes taught) and that the training needed to reflect those differences.

In 2010 and 2011, teachers valued the collegiality, opinions, and feedback from their fellow teachers. In 2010, teachers had some concerns about the usefulness of products they were developing. In 2011, they felt differently. Teachers liked that the training was product-based (lesson plans and units of study) and that the materials they developed could immediately be used in their classrooms. Teachers stated in 2010 and 2011 that there were a variety of new ideas contained in the training. Highlights included the writing strategies, literacy and math across the content areas and opportunities to refine and improve upon their work. One educator remarked, "I would have been lost without the CTE training this year. It was my base of support." This statement supports the conceptual framework that includes high quality professional development (Mezirow, 1997).

In 2011, participants provided concluding statements about their CTE training experiences. All the teachers agreed that participating in the professional development had made them better teachers, and they would participate in the professional development again. They encouraged trainers to continually revise the professional development modules to reflect emerging trends and resources and to level the complexity of the professional development materials. In some cases, training topic instruction was highly complex and at other times too simple. Finally, for the induction model to be completely successful, participants said that it required the true integration of CTE partnerships across the state.

Teacher participants in 2011 said that they had learned many things over the past year, including:

- "I could become a successful teacher."
- "I am resilient."
- "Innovative teaching techniques equal effective teaching."

Teacher participants created various types of authentic work products (discipline plan, rubrics and lesson plans) throughout the year-long professional development period. They were asked in 2011 if they would feel comfortable sharing these products with others. "I have shared my materials with other teachers at the center," remarked one teacher. "Because of my emphasis on numeracy throughout my plans, one teacher thought I was an Algebra teacher." Participants said that they now had an in-depth understanding of teaching that they really should not have for being just first-year teachers. One teacher-participant noted, "I went beyond just surviving the first year." He said that colleagues at his center were jealous that they did not get to participate in the CTE professional development because of its focus on innovative teaching strategies.

One teacher participant remarked that during his first year of teaching he did not use lesson plans, and his students could get him off topic easily. He participated in the CTE professional development during his second year of teaching. In his classroom this year he stayed on topic, incorporated numeracy and literacy and used classroom management skills he had learned in the training. This upset his students who complained that they had enrolled in the class to fix air conditioners, not do math and reading. The teacher reminded the students that math and reading

were related to heating, ventilation and air conditioning (HVAC) installation and repair. One teacher-participant stated, “This program raises the bar for CTE teachers.”

The Q-Sort was administered individually to teachers at the conclusion of summer professional development in 2010 and 2011 to determine their viewpoints on summer professional development. (See the Q-Sort Protocol Appendix R and Results Appendix S.) All 10 teachers took the Q-Sort in the summer of 2010; however, only seven teachers took park in the Q-Sort the second time. The results for each Q-Sort statement related to professional development were sorted in four different ratings: disagree, neutral, agree and split. If the majority of the participants gave the statement a negative value, then the statement was given a rating of disagree. If the majority of the participants assigned a positive value to the statement, then the statement was given an agree rating. If most of the statements were given a value of 0 with a few values of -1 or 1, the statement was given a neutral rating. If some of the participants assigned positive values while others assigned negative values, such as half of the group agreeing strongly (+3) with the statement and the other half disagreeing strongly (-3), the statement was rated split.

Participants were given index cards with 32 statements that describe aspects of the training. The participants then were asked to assign a value to the statements, using one of seven possible values— -3, -2, -1, 0, 1, 2, 3—to indicate their level of agreement with the statement. Participants were told to use a negative value to indicate disagreement (with -3 indicating strong disagreement) and to use a positive value to indicate agreement (with 3 indicating strong agreement). A value of 0 indicated that the participant did not feel strong agreement or disagreement with the statement. The participant also may have given a 0 if he or she had not experienced a situation similar to the statement.

The Q-Sort was intended to determine how the participants viewed the training. The results showed how the participants viewed the five themes embedded in the 32 Q-Sort statements. Q-Sort Results Appendix S shows the changes in the group’s opinions from the beginning of the year to the end of the year. Less than half of the statements saw shifts in the group consensus. When comparing the pre- and post- results, teachers were positive about the professional development and their jobs as teachers. Teachers agreed that they could improve students’ reading ability, but they disagreed that academics should be taken care of by other teachers or the sending school. They agreed that they learned something from the other teachers at the professional development, and they were split as a group as to whether they had classroom management down pat. They agreed they knew the material they were supposed to be teaching, and that you can’t motivate some students. They agreed that they had the opportunity to take what they learned [from the professional development sessions], apply it to their content area, share that idea and get feedback.

Instructors kept notes about the changes they made to the professional development materials. (See Daily Instructor Debrief Appendix U.) The changes fell into one of the following categories: a re-explanation/reinforcement of a concept or strategy, taking out a portion of the training, individualizing a training section for a particular career pathway and their plans for the future. Specifically the results showed that participants were pleased with the professional development they received with a few exceptions. These exceptions included not using examples

from various career pathways, not always understanding the professional development vocabulary and not believing that all students can be motivated.

Teacher participants were individually interviewed at the start of the induction model and at the mid-year point in the intervention in January 2011. (See Teacher Interview Protocol Appendix T.) They were asked questions about their career aspirations, the training, their school settings, classroom experiences and level of support from mentors and principals. Responses to teacher interview questions were analyzed using an open coding and sorting process (Miles & Huberman, 1994) to identify common themes across respondents. Themes that emerged from their responses included the impact of the teaching environment, changes in teaching, classroom discipline, and level of support from other educators, caliber of students, quality professional development, feeling overwhelmed, view of students, and integration of literacy.

Mentors and administrators were trained on the purposes and implementation of the CTE Induction Program and their roles in supporting the participating teachers. To ensure the effectiveness of the mentor and administrator training, they were asked to participate in a short pre-/post survey on what their roles would include. (See Mentor and Administrator Survey Appendix V.) School administrators were trained to use a CTE teacher observation checklist adapted from the Danielson Framework (1996). (See Observation Checklist for Administrators and Instructors Appendix W.) Administrators were asked to observe CTE teachers on a regular basis, complete the observation checklist, and provide regular feedback to teachers. All but one teacher's ratings remained the same or increased throughout the school year. What was significant about using the observation checklist was that it influenced administrators to observe new teachers' classrooms and provide feedback. Mentors were provided a log to keep track of their interactions with the teacher participants and the mentors submitted the log back to SREB at the end of the year. (See Mentor Log form Appendix AA and Mentor Log Results Appendix BB.)

Instructors visited, observed, and offered feedback in beginning CTE teachers' classrooms on a regular basis throughout the school year. (See End of the Phase Instructor Interview Appendix CC.)

The results for the most part were promising. Teachers reported that the CTE teacher induction model professional development was intensive, time-consuming, helpful and applicable, and instructionally based on focus groups' observations and interviews. The classroom observation results of 90% of the participating teachers increased or remained constant beyond the basic level throughout the school year. All the teacher participants found the CTE training to be extremely helpful and of high quality, but overwhelming and strenuous. Several of the participants mentioned that they realized they could not teach the way they were taught and embraced the new instructional strategies that were introduced to them. One teacher noted, "My mind has been like a sponge." Another stated, "My teaching has changed." The majority of teachers reported that they had positive support and feedback from their mentors and principals. Several teachers did report they were working in negative work environments with little or no support from mentors and principals. Their negatives also included working in isolation, not having the technology to support the career pathway and/or a lack of teacher collegiality in the school. (The teachers with the negative work environments wanted to leave the profession.) For those

struggling as teachers, classroom discipline was also an issue—either being too strict with students or having classes that were out of control. Several teachers stated that students were dumped into their CTE programs and did not have the interest *or* the skills to successfully complete the required work. One teacher individualized her instruction for students who did not have the necessary skills for that career pathway. A third of the teachers reported that they were overwhelmed with school work that included school clubs, competitions, assessments, forms and/or student testing. How teachers viewed students varied widely—from teachers feeling like students were being coddled and nurtured by other educators to a CTE teacher noting that, "My classroom is a friendly place." Another teacher said, "This [my classroom] is the place for them [students]." A final teacher mentioned, "Keep it [my classroom] fun and keep it real." Several teachers mentioned that they had integrated literacy strategies into their classrooms with beneficial results. Teachers reported the CTE electronic networking was not successful. The electronic network was unwieldy to use; they did not have time to participate; it was not a priority to use it.

2. Do induction program completers demonstrate improvement on pre-post measure of teacher self-efficacy?

To determine the level of teacher confidence in their student engagement, instructional strategies and classroom management practices, the 10 CTE teachers completed the long form of the Sense of Teacher Efficacy Scale at the first summer professional development, and seven of those 10 teachers were administered the long form assessment at the second summer professional development institute. The TSES was analyzed using two data points on a 9-point scale – a pre-data point at the beginning of the study and a post-data point at the end of the study. The TSES data was compared using the means of subscale results for the entire group at each data point.

Participating teachers' averaged 6.8, 6.65, and 6.8 in student engagement, instructional strategies, and classroom management respectively, and on the post-assessment the scores were 7.57, 7.84, and 7.88. With student engagement there was a .77 increase, with instructional strategies there was a 1.19 gain, and with classroom management there was a 1.08 increase. It is critical to note that the greatest increase was in instructional strategies, and the lowest was in student engagement.

Instructional strategies are a critical component of the professional development and it would follow that teacher gains would be the greatest in this area. Student engagement is a more complex skill and more difficult to master, so a lower teacher score in this area is not surprising.

Overall, teachers participating in the SREB CTE training improved their self-efficacy in instruction, classroom management, and student engagement based on pre- and post-measures on the TSES. This increase supports participating teachers remaining in the profession.

3. Do induction completers demonstrate commitment to remain in the teaching profession?

The teacher commitment survey was a pre/post measure to determine participating teachers' future career plans and how long they planned to teach. (See Career Commitment Question Appendix O and Results Appendix P.)

The teacher commitment survey was an instrument created by SREB designed to provide feedback on the participants' level of commitment to the teaching profession, and it was based on five questions. With the two beginning and ending data points, the data was reviewed to see whether the participants' level of commitment changed and whether the results from the first summer institute could reflect the teachers' attitude throughout the first year.

Of the ten CTE teachers in the training cohort, seven had a commitment to the teaching profession that was sustained throughout the school year. All but one of these seven had seen teaching as a career goal, and of these seven, all plan to stay in teaching for at least five years. Of the three who did not possess a commitment, one left the profession mid-year 2010–2011; one left at the conclusion of the first year; and one left the teaching profession the fall semester 2011.

Teacher commitment to the profession remained steady at 70% throughout the school year based on pre- and post-measures of the teacher commitment survey. Ultimately these seven teachers remained in the teaching profession for a second year.

4. Do students in classrooms taught by induction model completers report having classroom conditions associated with high quality CTE instruction?

A modified *High Schools That Work* student survey was administered in the spring of 2011 to participating teachers' students who were at least 18 years old. (See Student Survey Appendix Y.) There were 67 student surveys returned from seven of the schools. The purpose of the survey was to provide a snapshot of CTE teachers' instructional practices, their inclusion of core content subjects in career tech classes and the use of student portfolios in career tech classrooms.

The data were analyzed by reviewing the mean results of the entire population and if possible, comparing teacher results. (See Student Survey Results Appendix Z.) The activities reported occurring on a weekly basis in career tech classrooms were nothing surprising, except for debating and discussing what had been read with other students. For the highest percentages of teacher practices in CTE classrooms, it was significant that 85% of students said their instructors helped them understand the connection between what they were studying and why it was important—definitely an important finding as it is related to relevance. Another noteworthy finding was that 61% of students said their instructors took into consideration the way they learned best. This was an example of student-centered learning. For the inclusion of core content subjects, it was surprising that mathematics was rated so low at 37%. This may indicate that participating CTE teachers felt ill-equipped to teach math. For students' portfolios, perhaps the only thing out of the ordinary were the low percentages on formal evaluations of my work experiences (44%) and charts and graphs representing what I prepared (41%).

Students whose teachers were in the induction model reported that over 50% of teachers included reading in their instruction; 71% used student portfolios; and 75% applied academic knowledge to career tech education based on student surveys.

5. What school-level factors may mitigate the efficacy on the induction model?

One of the research questions for Phase 2 had to do with the school-level factors that could mitigate the efficacy of the CTE teacher induction model. School climate was one of the factors that was investigated, and the Pride Survey was used to determine the climate of participating teachers' schools. The Pride Survey provided information on how a school was managed, what was important and how staff and students were treated. It was administered to all teachers in nine of the 10 high schools or tech centers of participating teachers in the spring of 2011. The tenth high school did not participate because the CTE teacher at that school had resigned at the conclusion of the first semester. Of the nine schools, teacher surveys from two of the schools could not be scored because there were too few surveys submitted. The survey results were aggregated. There were 136 teacher respondents total.

Overall the Pride Survey teacher results reflected the positive climate at the school. (See Pride Surveys: Facts about Participating High Schools and Tech Centers Appendix X.) This is one indication that CTE teachers were probably in good school situations. The majority of survey participants were White and female. Surprisingly, the majority of teachers responding did not grow up in the community where they were now teaching. Teacher respondents in the CTE schools represented a majority of professionals who were happy in their profession and plan to stay at their current schools for the next five years. They worked in schools where school pride was evident and there was respect among colleagues. These teachers' principals took care of school discipline problems effectively.

The survey results did imply that these schools were traditional in their approach to instruction and student learning. These schools did not appear innovative or dynamic, nor did there appear to be a push to have all students working to their full potential. Other negative results were: (a) Teachers' instructional time was not being protected by administrators: (b) the school lacked a strong mentoring program for new teachers; (c) there was some student apathy and (d) there was not enough professional development on how to instruct English-language learners. Generally these results reflected that when participating new teachers were in schools with a primarily positive climate, it increased their chances of staying in the profession.

Phase 3 Field Test: Stakeholder/State Implementation of the Training (2011-2012)

Two states (State 1 and State 3) participated in the state implementation of the teacher induction model in Phase 3 (2011-2012). A cohort of new CTE teachers from each state took part in the program.

For Phase 3, the questions used in Phase 2—concerning the promise of the model to impact teacher commitment to the profession, competence and self-efficacy—were tested again as research questions 1 and 2. Research questions 1 and 2 determined the level of fidelity by focusing on the participating teachers. The remaining research questions center on the state's ability to implement the model with fidelity.

The research questions were:

1. Do induction program completers demonstrate improvement on a pre- and post-measure of teacher self-efficacy?
2. Do induction program completers demonstrate commitment to remain in the teaching profession?
3. Is it feasible that this model can be implemented as designed?
4. Are the state partners able to implement the induction model with fidelity?
5. Do measures of implementation fidelity capture all key practices?

The demographics of State 1 and State 3 cohort participants vary. State 1's cohort of teachers is younger than State 3's, more highly educated and more ethnically diverse. (See Demographic Characteristics of Stakeholder/State Cohort Appendix EE.)

State 1's population of nine teachers is composed of more female teachers (67%) than male teachers (33%). The majority of the teachers in State 1 are between the ages of 35-44 (67%). There is diversity in the ethnicity (78% White, 22% American Indian), and the education level of teacher participants in State 1 ranges from a high school graduate to beyond a bachelor's degree.

State 3's population of 16 teachers is composed of more males (63%) than female teachers (38%). The teacher cohort population in State 3 is 100% White and 50% of the teachers in State 3 are between the ages of 45-54. In addition, most teacher participants in State 3 have only a high school education plus professional training (51%).

Phase 3 Findings

1. Do program completers demonstrate improvement on a pre- and post-measure of teacher self-efficacy?

Nine participating teachers from State 1 averaged 5.95, 6.03, and 6.03 in student engagement, instructional strategies and classroom management respectively, and on the post-assessment the scores were 7.30, 7.30 and 7.86 on a 9-point scale. (See Teacher Sense of Efficacy Results for State 1 Appendix FF.) With student engagement, there was a 1.35 increase; with instructional strategies there was a 1.27 gain; and with classroom management there was a 1.83 increase. It is critical to note that the greatest increase was in classroom management, and the lowest was in instructional strategies. All three areas increased by over 1 point; these are healthy gains in these areas for new teachers. Note that the majority of teachers in this cohort were female and in the 35 to 44 age range. It appears that they had a realistic notion of what they would encounter in the classroom. Their relative youth as career tech teachers also worked in their favor in managing the students. These results are similar to the results of State 1's Phase 2 results.

Fourteen participating teachers' pre-assessment scores from State 3 averaged 7.22, 7.49 and 7.50 in student engagement, instructional strategies, and classroom management respectively, and on the post-assessment the scores were 6.99, 7.11 and 7.61. (See Teachers' Sense of Efficacy Results for State 3 Appendix GG.) When examining past research on new teacher self-efficacy results, these pre-test scores were very high. On the post-test with student engagement there was a 0.23 decrease; with instructional strategies there was a 0.38 decrease; and with classroom

management there was a 0.11 increase. Note that the only increase was in classroom management, with student engagement and instructional strategies both decreasing.

These results are not similar to the cohort results of State 1's results for Phase 2 and Phase 3. State 3 had a decrease in teachers' self-efficacy in student engagement and instructional strategies. One reason could be that since the pre-results for State 3 were similar to the post-results for State 1, State 3's teachers came in with an inflated degree of self-efficacy in these areas, but the reality of teaching caused them to more realistically rate their levels of self-efficacy after the conclusion of the school year. Note that the majority of teachers in State 3 were males, while in State 1 the majority of teachers were females. Entering the program, females might have had a more realistic view of teaching than males. There was an older group of teachers in State 3 (majority 45-54 years old) in comparison to State 1 (majority 35-44 years old). The older teachers in State 3 might have had a more difficult time motivating and engaging students than they first imagined. Finally the instructors from State 3 were very good about observing in new teachers' classrooms and providing specific and helpful feedback. This valuable feedback might have given State 3 teachers a more realistic picture of what was expected and changed their perception about the effectiveness of their teaching.

When the results for State 1 and State 3 are combined, the results show gains. (See Teachers' Sense of Efficacy Scale Results for Both States Appendix HH.) Participating teachers from both states averaged 6.75, 7.19 and 6.88 in student engagement, instructional strategies and classroom management respectively, and on the post-assessment the scores were 7.06, 7.25, and 7.63 on a nine-point scale. With student engagement there was a .31 increase; with instructional strategies there was a 0.06 gain; and with classroom management there was a 0.75 increase. The combined gains for both states still show an increase, which means the decreases by State 3 were not enough to outweigh the increases of State 1. Both states were able to achieve results, but State 1 held to the fidelity of the program to a greater degree than State 3. These results could reflect how well the program was implemented.

Interestingly, the TSES mean score for experienced teachers in previous studies was at seven on a nine-point scale. Studies that focused on the self-efficacy of beginning teachers revealed that their mean score was lower than experienced teachers, but above the midpoint of 4.5. This suggests that new teachers with low self-efficacy scores increased their self-efficacy or left the field of teaching within the first couple of years (Tschannen-Moran & McMaster, 2009).

State 1 teachers participating in the induction model improved their self-efficacy in instruction, classroom management, and student engagement based on pre- and post-measures of the Teacher Sense of Efficacy Scale. State 3 teachers slightly decreased in these areas, except for a small increase in classroom management. State 1 teachers were primarily female and younger, and appeared to have a realistic idea of their own self-efficacy both pre- and post-survey. State 3 teachers who were primarily male and older might have had a self-inflated view of what it takes to be a good teacher, had high pre-scores on self-efficacy that decreased on post-scores. In focus groups conducted throughout the school year, several of the males mentioned that they were not worried about classroom management, but instruction instead. Several females said for them it was just the opposite. They knew how to teach their career area but controlling their students worried them.

2. Do induction program completers demonstrate the commitment to remain in the teaching profession?

Of the nine teachers in the training cohort, all had a commitment to the CTE teacher induction model and stayed with the year-long program. (See Teacher Commitment Questions Appendix II and Teacher Career Commitment Results for State 1 Appendix JJ.) Five teachers saw teaching as a long-term career goal after completing the program and all participating teachers planned to stay in teaching for at least five years. Teacher A had originally hoped to not be teaching next year, but by the summer of 2012 wanted to teach the next year. Teacher D may have misread the question since she stated teaching is a long-term career goal, yet on another question she answered she did not want to be teaching next year. Only one teacher believed teaching did not match a personal need for her. Teacher H decided not to return to teaching for the next year due to an immediate need to return to a previous job for more pay. The teacher cohort from State 1 overall had a high commitment to the teaching profession. This positively impacted their commitment to attending the professional development sessions and their performance in the classroom.

Of the 16 CTE teachers in the cohort, 15 teachers made an original commitment to the teaching profession, and 14 teachers had a commitment to the alternatively certified teacher induction model offered by continuing to attend the program. (See Teacher Career Commitment Results for State 3 Appendix KK.) One teacher returned to a previous job in November 2011; one teacher remained in teaching but quit the professional development program in January 2012 because of being overcommitted with professional responsibilities. Only six teachers saw teaching as a long-term career goal after completing the program; however all fourteen teachers planned to stay in teaching for at least five years. Similar to the State 1 cohort, only one teacher believed teaching did not match a personal need. This cohort overall had a high commitment to the teaching profession, and this was reflected in their commitment to attending the professional development sessions and their positive performance in the classroom.

Teachers in both states made a 100% commitment to remain in the profession for five years based on pre- and post-measures of the teacher commitment survey. Only one teacher from State 1 and one teacher from State 3 stated that teaching did not fit with their professional plans. Eighty-nine percent of State 1 teachers planned to return for a second year of teaching; 88% of State 3 teachers planned to return.

3. Is it feasible that this model can be implemented as designed?

Yes, but modifications are needed. State coordinators of the induction model in the two states were critical to its success. Among their many responsibilities, coordinators were expected to help publicize the program, recruit new CTE teachers, coordinate decision-making and communicate the guidelines of the induction program to the public. The following state coordinator feasibility survey results support the degree of program fidelity found in States 1 and 3. (See the Feasibility Survey Appendix QQ Feasibility Survey Results Appendix RR.)

The feasibility nine-question survey was a simple instrument created for the study to provide feedback on how each state coordinator implemented the program. State coordinators checked statements that accurately represented what had taken place with program implementation in their state. They also had the opportunity to add additional statements. The feasibility survey was administered to the two state directors at the conclusion of the induction model implementation in summer 2012. This is a summary of their responses:

- State 1 and State 3 varied on new teacher selection criteria. These criteria are often determined by states.
- Administrator and mentor requirements were the same for both states.
- Instructor selection was similar for both states.
- State 1 presented the CTE professional development materials as designed, and State 3 initially substituted materials. By the conclusion of the school year, State 3 was following the materials.
- State 1 attempted to implement webinars and State 3 did not.
- Obtaining teacher participant feedback about the professional development sessions was similar for both states.
- The professional development issues differed in State 1 (training, scheduling concerns) and State 3 (teacher attendance, changing professional development materials).
- The states made decisions about professional development implementation differently (group decision vs. individual decision).
- The states saw program success similarly.

In summary, State 3 had more stringent entrance requirements for new CTE teachers (without a bachelor's degree) than State 1 did. State 3 required at least six years of experience in an endorsement area or one or more industry credentials/certifications, a high school diploma, completion of 24 college credits with at least a "B" grade within three years, taking the Praxis I exam during the first year and passing it with a DOE-designated score within three years, receiving an overall pass on the Level I Educator Portfolio, and completing 24 additional college credits. State 1 required, for non-bachelor degree holders, professional experience or credentials, provisional certification, certification exams or competency exams and pursuit of a degree in career and technical education.

Principals in State 1 had two choices about where they sent their new CTE teachers for professional development. State 3 had one new teacher program induction choice, and the coordinator also included two second year teachers in the professional development. For State 3, this had an impact on the type of teacher participants in the program because it included all new CTE teachers in the state. The professional development issues varied between the two states. State 1 had difficulties scheduling the professional development sessions throughout the year because of competing local school activities. State 3 had trouble with participant attendance from time to time but initially adapted the professional development materials. Another critical point was that State1 and State 3 made program decisions (use of professional development materials, scheduling professional development sessions) differently. This impacted the degree of program fidelity. State 1 made program decisions as a group, and that appeared to increase fidelity and unity. State 3 decisions were usually made by an individual, and that had the potential to create dissent and decrease fidelity.

As in Year 4, school administrators were trained to use a CTE teacher observation checklist adapted from the Danielson Framework (1996). This training took place in State 1 and State 3. Principals and directors were asked to observe teachers on a regular basis, complete the observation checklist and provide regular feedback to teachers. State 3's principals/directors were already using the Danielson Framework; this additional tool assisted the principals/directors in determining teacher success.

Six of the nine administrator/principals in State 1 completed and submitted observation checklists at least once. Four of the six who provided a checklist provided more than one checklist, so less than half of the principal/directors provided researchers with more than one observation. Of these four observations, two of State 1 teachers had large increases in their ratings while the other two had a single increase in their ratings.

Eleven of the 16 administrator/principals in State 3 provided an observation checklist. When program evaluators wanted the second checklist, two teachers had already dropped out of the program. Of those 14 principal/directors who could have provided more than one checklist, seven did so. The director of the teacher who dropped out of the program (but was still teaching) was willing to provide additional completed checklists if needed. Of these seven teachers, four had large increases in most areas; one teacher increased in more areas than she decreased; and the other two teachers had more decreases in their checklist than increases. The teacher checklists were valuable because they determined if administrators were in new teachers' classrooms observing. Once again, administrators need to know what to look for when observing teachers and how to provide constructive feedback.

Teacher participants' mentors in States 1 and 3 were asked at the beginning of the year (fall 2011) to keep a log of their interactions with their mentee. The mentors were reminded twice that SREB would be collecting their log at the end of the school year; however, no confirmation was required by the mentors in whether they were keeping up with the log or not. A tool was provided at the beginning of the year in Microsoft Word that the mentors could use if they wanted.

Six of the nine mentors in State 1 provided mentor logs at the end of the year. Of these six, three of the mentors provided over 80 hours of mentoring with the highest being 108 hours over the year. Two mentors provided around 50 hours of mentoring throughout the year, and the last mentor stated their mentee stopped needing assistance after the winter break. The final results were that five of the six mentors provided about 50 or more hours of mentoring throughout the school year.

State 1 paid its mentors for their service. Payment for mentor service almost ensures that mentors will meet with their designated teachers. State 3's mentor program was developed by the district or school. In some cases participating teachers were paid, depending on the district in which they worked. Payment of mentors could positively impact mentors working with teachers. Of the 16 teachers who started in the program, one of the teachers never had a mentor, and one of the participating teacher's mentor was an instructor for the program. Of the 14 mentors who could have provided a log, only two mentors provided a log at the end of the year. One of the mentors provided 40 hours of mentoring over the course of the school year, and the other mentor

provided only 21 hours over the school year. Once again the mentor logs were valuable because they showed whether mentors were meeting with new teachers. The quality and helpfulness of the mentor feedback provided to teachers was unknown.

As in Year 4, professional development instructors used the CTE teacher observation checklist when they observed the teachers during their school visits. The instructors were asked to submit their observation checklists to program evaluators.

The instructors for State 1 provided two sets of observation checklists for six of nine teachers who finished the program. Of those six teachers, four had gains in most areas, one teacher had gains in some areas, and one teacher had as many increases as decreases from the two observation points. One of the teachers did not have two observations because she was not in class on the second observation due to the class participating in state contests. The remaining two teachers did not have their observations submitted to the program evaluators.

State 3 instructors provided two sets of observation checklists for eleven of the 14 teachers who finished the program. One instructor did not provide a checklist for the three teachers she coached, but visited the classrooms, conducted the observations and provided written comments. Of the eleven teachers who had both checklists, eight showed gains in most areas. One teacher showed no gains and another teacher's increases were equal to the decreases. Only one teacher showed decreases; however, these decreases were from "Distinguished" in instruction to "Proficient". It is a possible that the initial observation had inflated results, which meant the teacher would have had minimal increases in their observation checklist. Instructors in State 3 fulfilled their coaching responsibilities during Phase 3.

Instructors also provided information about what they planned to teach for their part of the summer professional development session and the strengths and weaknesses of the session. (See Planned Action Interview Appendix LL and Instructor Dailey Interview Appendix MM.) These were collected several times during the summer professional development session.

States being able to implement the CTE new teacher induction model with fidelity is the heart of the research evaluation during Phase 3. The fidelity framework represents the implementation of the CTE professional development program for States 1 and 3. (See Fidelity Framework Appendix SS.) The fidelity framework includes program planning; delivering the professional development model; administrator, mentor and coaching support; and electronic facilitated discussion components. Themes related to these components that emerged from interviews, focus groups and surveys are used as framework subheadings with supporting commentary.

Both State 1 and State 3 were able to implement the CTE professional development model within the proposed time frame of 14 months. Both states conducted its initial intensive two-week summer institute in 2011, offered professional development throughout the 2011-2012 school year (a fall, winter and spring weekend for State 1 and one Saturday a month for State 3), and held summer institute 2 for two weeks in 2012. The model was implemented as designed except: (1) State 3 was adapting the CTE curriculum instead of adopting it; (2) some instructors in State 1 did not carry out their teacher observation responsibilities; (3) some administrators and mentors in both states did not carry out their assigned roles; and (4) both states failed to use

webinars. Based on the results of State 1 and State 3, this program can be implemented as designed with a few modifications. These modifications include substituting webinars with face-to-face meetings, and holding professional development on weekdays rather than on weekends. What should not be changed is using all four modules as designed at the summer and weekend professional development sessions, mentoring new teachers, providing strong support from well-trained principals and veteran teachers who can conduct the observations to determine if instruction is intellectually demanding and if students are motivated and engaged.

4. Are state partners able to implement the model with fidelity?

States 1 and 3 did not implement the model with complete fidelity, but they did achieve positive results by producing successful first-year CTE teachers who will be returning to the classroom for a second year of teaching. In some situations, the lack of fidelity was beyond the control of the states. In both states administrators and mentors did not always follow the guidelines of the program, including observing new CTE teachers and providing support. Both states were not able to conduct the webinars because of transmittal problems or lack of platforms. Initially State 3 did not follow the curriculum. This was primarily due to the first trained instructor quitting and the state director having to hire instructors at the last minute who did not attend the initial instructors' training. This problem was resolved when the newly hired instructors were able to attend instructor training in spring 2012. In order to get highly positive results, state coordinators and instructors must use in the modules as instructed from start to the finish. Mentors and administrators must participate in professional development that provides explicit coaching techniques for mentors and explains what administrators should specifically look for in CTE classrooms (like student engagement and integration of core content areas in instruction).

It is clear that the career/technical education organizational structure of a state and the state's culture influence the implementation of a program (or programs). This was certainly the case for this study. Whether a state is highly centralized or decentralized educationally, unionized or non-unionized, rural or urban, and economically stable or unstable can impact the feasibility results. In states where there is a more top-down approach to program implementation and a more unified leadership structure, it is going to be more feasible to implement the teacher induction professional development program because everyone is operating from the same set of guidelines with one leader. States with decentralized state career tech programs are going to have a more difficult time getting all the schools and tech center representatives to meet and work together. There are components of the teacher induction model implementation that state directors had little control over. They included the principal and mentor component and the technology support. State coordinators could not mandate that principals and mentors fulfill their responsibilities. State coordinators were not in a position to fix faulty technology. In addition, the State 3 state coordinator could not control the original instructor quitting the program after having received the CTE training.

5. Do measures of implementation fidelity capture all the key practices?

Yes, the measures of implementation fidelity do capture all the key practices. There are six measures of implementation fidelity. They include: (1) All elements of the model are delivered; (2) the professional development elements of the model are delivered consistently with standards

of high quality adult learning; (3) the administrator support element is delivered through at least one meeting a month and one classroom observation per quarter; (4) the mentor support is delivered through one meeting a week for the first two months; (5) at least three instructor coaching visits take place at the school site; and (6) regular electronic communication with teacher participants is maintained.

This is supported by States 1 and 3 holding all required professional development sessions and holding them for the correct periods of time based on emails, program schedules, instructor and administrator observations and mentor logs. In some cases, participating teachers in both states did not receive all the visits and corresponding feedback from mentors, instructors and/or administrators.

The quality of instructor delivery varied from satisfactory to excellent in State 1 and in State 3 based on teacher focus groups. (See Teacher Focus Group Appendix NN.) There were sessions for administrators and mentors in State 1 and in State 3 on how to observe and support new CTE teachers. Some mentors and administrators did not fulfill their commitments. Instructors were required to observe teachers in their school setting and provide feedback. Some instructors were unable to get in the required number of visits. State coordinators participated in professional development on how to set up electronic communities. Both states struggled with this feature of the program.

Participant responsiveness to the professional development as a whole in both states was high based on instructor interviews, instructor debriefs and instructor focus groups. (See End of Event Appendix OO and Instructor Focus Group PP.) Teachers remained engaged in professional development instruction for most of the time and listened attentively, participated in discussion and took part in individual and small-group work.

Chapter 5:
Lessons for the Field

The CTE teacher induction program includes an intensive professional development component that has classroom assessment, classroom management, instructional planning and instructional strategies modules. The other primary component of the program is structured and has regular support and feedback for new CTE teachers from instructors, mentors and school administrators.

Summary of Assumptions, Findings and Proposed Additions

After three, year-long phases of field-testing, preliminary findings emerged related to the assumptions being tested about the conceptual framework. Plus, new additions to the conceptual framework were proposed. These preliminary findings and proposed additions are summarized in Table 5.1.

Table 5.1
Findings for the Conceptual Framework's Assumptions with Underlying Assumptions and Additions to the Conceptual Framework

Conceptual Framework	Underlying Assumptions to be Tested	Findings
Relevant content based on the unique needs of CTE teachers entering through an alternative route	• Five major areas of content include: instructional planning, instructional strategies, assessment, classroom management, and reflection on practice.	• The content of the modules is relevant and meets the needs of CTE teachers. Data from each round of field tests were used to revise the modules according to CTE teachers and instructors' recommendations.
A sequence of professional development sessions including a 10-day summer experience prior to the first year of teaching; quarterly two-day sessions throughout the first year; and a 10-day summer experience after the first year	• An intensive, rigorous summer experience best prepares the teachers for the demands of the first weeks of school. • Productive struggle is a necessary part of making the transition to teaching. • A continuous learning experience throughout the first year enhances reflection and on-the-job learning. • A summer experience after the first year enhances reflection that promotes a well-planned second year.	• The intensive summer experience put teachers through a "productive struggle" in which they needed support and coaching from the instructor, but as the year progressed, teachers expressed how valuable the initial intensive summer was to their competence as a teacher. • Continuous learning experiences established a sense of community as a cohort and helped teachers learn how to reflect on their instruction, provide face-to-face feedback to others, and continuously improve. • The summer experience after the first year provided a culminating, reflective experience, an opportunity to deepen understanding, and to apply what was learned to start planning for the next whole school year.

Quality instructional delivery	• High quality adult learning experiences include dialogue with peers, an opportunity to address the authentic problems of teaching, and reflection on learning. • Modeling, practice and feedback will help teachers develop instructional skills.	• Teachers experienced the kinds of strategies that they were expected to use in their own classrooms. • Teach-backs, when implemented, were helpful in preparing teachers for the real classroom.
The support of a trained, on-site mentor	• Mentors need to follow a structured schedule of regular contact with the mentee that addresses the challenges of the transition to teaching.	• Teachers who had regular contact with their mentors experienced a greater sense of support and felt a part of the school. These experiences led to teachers remaining in the teaching profession.
The support of a trained administrator	• Administrators need to meet regularly with the beginning teacher as well as observe and provide feedback on instruction.	• Teachers who had regular contact with their administrators experienced a greater sense of support and felt a part of the school. These experiences let to teachers remaining in the teaching profession. Some teachers were elevated to leadership roles in their school improvement efforts.
Coaching from the professional development instructor	• Regular visits from the professional development instructor include classroom observation and feedback, as well as making connections with mentors and administrators.	• Teachers valued the constructive and specific feedback they received on instructor coaching visits. • Instructors felt the visits allowed them to better plan the follow-up professional development experiences.
A community of practice	• Ongoing interaction with colleagues, both face-to-face and electronically, builds a community of support and enhances reflective practice.	• Teachers felt a strong sense of community with the colleagues in their cohort based on the face-to-face professional development sessions throughout the year.
Proposed New Additions to Conceptual Framework	• **New Assumption to be Tested**	• **Results**
Screening of prospective CTE teachers for minimum qualifications	• Prospective teachers should pass a basic exam in literacy and mathematics to be admitted into the CTE induction program. Teachers should also possess good communication skills. These skills support effective classroom teaching.	• Teachers who lacked these skills experienced greater difficulty with the professional development content and the expected level of teaching competence during the field tests.
Certification requirements	• The CTE teacher certification process should be accelerated and teachers should participate in "just-in-time" professional development. CTE teachers only have several years to successfully complete all certification requirements.	• For State 1, field test 1, 70% of teachers successfully completed the program; for State 1, field test 2, 100% of teachers successfully completed the program; for State 3, field test 1, 88% of teachers successfully completed the program.
Hiring deadlines	• New CTE teachers should be hired by July 1 so they can participate in	• Teachers in State 1 were all hired before July 1 and were able to

	intensive professional development and be in their classrooms for planning purposes before school starts. New CTE teachers should be hired in time to participate in intensive summer professional development and conduct classroom planning before the new school year begins.	participate in the professional development. Several teachers in State 3 were hired after July 1 and were not able to take part in the professional development. These teachers had to wait an additional year to take part in the training.
Additional professional development in embedded mathematics	• New CTE teachers need to have a strong foundation in mathematics to be effective 21st-century CTE teachers. Fifty hours of math instruction should be added to the CTE teacher induction program.	• Many participating teachers in State 1 and 3 struggled with the current math professional development component.
Role, expectations and mission of CTE teachers	• The role, expectations and mission of CTE teachers must be updated to meet the needs of the 21st century. Twenty-first century CTE teachers have a dual role—to successfully advance readiness for college and careers and to teach a blended academic curriculum.	• Participating teachers in State 1 and 3 responded well to the professional development and most were able to complete the program successfully.

Discussion

The research findings in Table 5.1 support the research base presented in chapter two. This base includes the need for quality professional development for teachers (Sparks & Hirsh, 1997); the benefit of professional development being framed around the needs of new teachers, and the authentic tasks they face during the first year of teaching (Bottoms & McNally, 2005; Heath-Camp & Camp, 1990a, 1990b; Joerger & Bremer, 2001; Rochkind et al., 2007); and the need for new teachers to have a continuous orientation that addresses all aspects of teaching (Joerger & Bremer, 2001; Heath-Camp & Camp, 1990a).

It was evident from three rounds of field-testing that the content of the modules was relevant and met the needs of new CTE teachers. The initial summer institute put teachers through productive struggle that aided in their competence as teachers; each teacher cohort became face-to-face community learners who supported reflection on instruction, feedback and continuous learning; strategies were taught that participating teachers were expected to use in their own classrooms; and participating teachers valued the constructive feedback and support they received from mentors, administrators and coaches. As one new teacher stated about the entire training, "As time has gone on [the training] has made sense."

The CTE teacher induction model has held up solidly during field-testing, and it has benefited from an iterative development research model in which improvements were identified and applied in subsequence iterations of testing. The model provides participating teachers with the strategies, experiences, information and support they needed to become successful teachers. It is the most comprehensive and successful model available today for strengthening the CTE teacher induction experience. Field-testing showed that this model produces successful teachers who make a commitment to remain in the profession.

That said, there are new conceptual framework pieces that need to be added and assumptions tested. States 1 and 3 did not require entrance exams for prospective CTE teachers, and several participating teachers struggled because of weak academic or communication skills. Higher standards in the selection of CTE teachers must be in place in order for new CTE teachers to have successful professional development and teaching experiences. Prospective CTE teachers should be required to take an exam that demonstrates they have at least the literacy and math skills of a high school graduate. Based on our research, if teachers don't have these skills they won't be successful in the classroom. One CTE teacher dropped out of the program because of feeling overwhelmed by everything she was expected to learn. Some teachers exhibited math phobia and struggled to overcome their dislike of mathematics. CTE teachers should have a baseline of mathematics and literacy knowledge and an understanding of what it means to be an effective 21st-century career and technical high school teacher.

New CTE teachers must be better prepared, and there has to be intensive "just-in-time" preparation for them before they enter the classroom. Such teachers need to know how to motivate and engage students. They need to know how to teach technical skills and integrate the core content areas of literacy, math and science into their classroom instruction. Teachers need to know how to assist students in finding their niche both academically and professionally. Twenty-first century CTE teachers must be able advance students' readiness for college and careers and teach a blended academic program. These are the overall goals of the new CTE teacher induction program.

Because of the critical need for new CTE teachers to participate in initial and intensive "just-in-time" summer professional development before they enter the classroom for the first time, new CTE teachers must be hired by July 1. If they are hired after July 1, it is likely they won't be able to participate in the intensive professional development and will miss learning the skills and strategies needed to be effective during their first year of teaching. In fact this is what happened in State 3. Several teachers were hired after the July 1 date and had to wait an entire year to participate in the professional development program. In addition, it is critical that these teachers are paid for participating in the two-week professional development sessions. This professional development is part of their work, and they should be compensated for it.

Based on the content knowledge and instructional performance of former CTE teacher participants in States 1 and 3, math is an area of weakness for many. Several teachers admitted that their math instruction had been weak in high school or that they disliked math because they did not understand it. In order to be effective 21st-century CTE teachers, CTE teachers need the knowledge and the ability to integrate higher level mathematical concepts and strategies into their classroom instruction.

State Scale-Up

Scaling up the CTE teacher induction model should be a goal for states. This model is a new approach for effectively preparing new CTE teachers that includes new ways of doing things. For example, new CTE teachers who had participated in the professional development said:

- "We liked that the CTE professional development was product-based and we could immediately use the materials we developed in our classrooms."
- "Writing strategies, literacy and math across the curriculum and opportunities to refine and improve our work [during the professional development sessions] were key."
- "I would have been lost without the CTE training this year. It was my base of support."
- "Innovative teaching techniques equal effective teaching."

The CTE teacher induction program is not just the inclusion of updated professional development materials, but it is a comprehensive and intensive approach for preparing new teachers for the 21st-century classroom.

There are three complimentary components to the state scale-up of the CTE teacher induction model. They include personnel guidelines, state structure guidelines and CTE teacher induction model guidelines.

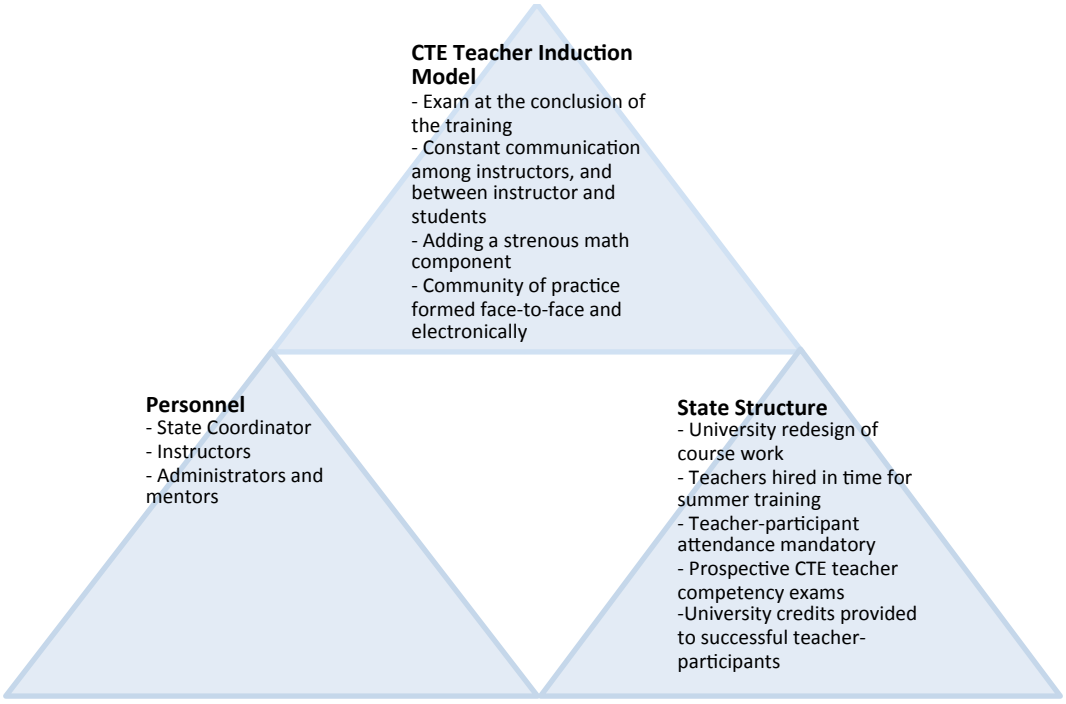

Figure 5.1: The CTE teacher induction model's scale-up components.

The program **personnel** who must be in place for the scale-up include: (1) a designated state coordinator, (2) instructors for the professional development component of the model, and (3) mentors and school administrators who provide the support to the participating teachers at the school sites. For the model to be successful, a state coordinator who is capable of handing multiple responsibilities associated with the professional development component of the model must be selected. Specifically the coordinator is responsible for (1) selecting and ensuring that the instructors are trained for the intensive alternative induction program; (2) serving as liaison with universities and the state agency; (3) communicating with the sending principals/directors about their responsibilities associated with the program; (4) locating the professional development training sites, scheduling and communicating the professional development session

locations; (5) providing information about the intensive professional development program to participating teachers; and (6) following the state requirements for certification of new CTE teachers. State coordinators must have a strong understanding of the program and should attend most, if not all, the professional development sessions. The instructors selected to teach in the professional development component must have deep background knowledge of CTE, be exemplary classroom teachers, and must have fully taken part in the CTE teacher induction instructor training before providing professional development to others. The teachers selected to serve as mentors must be exemplary CTE teachers, have taken part in the two-day mentor training and agree to fulfill all the mentor responsibilities. One participant stated, "The mentor relationship is critical. I am always asking my mentor questions." School administrators must agree to fulfill all the school leader's responsibilities associated with the program and participate in the two-day training.

State structures need to be in place to support the success of the CTE teacher induction model. A redesign of university requirements that mesh with the four professional development modules that are offered to new CTE teachers will need to occur. The state should mandate entrance competency exams for prospective CTE teachers that include technical, math, science and literacy components. New CTE teachers must be hired before summer 1 training begins, preferably by July 1 so they can fully take part in the professional development the first summer. The state and districts must require participating teachers to participate in all professional development sessions. Teachers who successfully complete the CTE new teacher induction program should be awarded course credits at no cost to them.

The ***CTE teacher induction model*** requires the addition of a rigorous math component and a comprehensive exam covering the components of the professional development at the conclusion of the 14-month program. It is also critical that program instructors stay in frequent communication with each other, that instructors provide specific and accurate feedback to participating teachers and that participating teachers form a community of practice both face-to-face and electronically. The communication between coach/instructor and teacher and among the teachers is valuable. As one participant stated, "To be able to come back once a month [for professional development] and meet with everybody, to learn new things, helps us grow as teachers."

Research Study Results

The conclusion of this research report is devoted to revisiting the key findings from each phase. The results from Phase 1 included the field test of the professional development modules. Many learning activities were revised to provide more time for reflection or to clarify content.

The results of the induction model's ability to impact commitment to the profession, teacher competence and self-efficacy were reported in the Phase 2 findings. Overall teachers participating in the induction model improved their self-efficacy in instruction, classroom management and student engagement. Teachers were positive about their school working environments. Teachers reported that the induction model professional development was intensive, time-consuming, helpful and applicable instructionally. Teacher commitment to the

profession remained steady at 80% throughout the school year; and 70% of the teacher cohort remained in the teaching profession for the next (2011–2012) school year. These findings supported the strength and intent of the CTE new teacher induction model.

The Phase 3 results determined if the induction model could be implemented with fidelity by state stakeholders. Although the two states did not or could not implement the model with complete fidelity, they did achieve successful results. In State 1, 89% of the participating CTE teachers were returning for their second year of teaching; in State 3, 88% of teachers were returning. New teachers in both state cohorts have made a commitment to remain in the teaching profession for the next five years. These findings support states being able to implement the model with medium to high fidelity.

The findings from phases 1, 2 and 3 offer a research foundation of a new CTE teacher induction model using an iterative development approach (goal 2 study) that is now ready for research at an experimental level and that includes a treatment and a control group of teachers. This CTE teacher induction model is also ready for national dissemination.

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Appendices

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