

Findings from 2009-2010 Field Tests of an Induction Model for Alternately Certified Career and Technical Education Teachers

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Abstract

The U.S. Office of Vocational and Adult Education funded the National Research Center for Career and Technical Education and the Southern Regional Education Board to develop an induction model for individuals entering the career and technical education (CTE) teaching profession through alternative routes. The induction model is being developed to increase new CTE teacher competence and self-efficacy, with the long-term goal of increasing rates of CTE teacher career commitment. Consistent with Institute of Education Sciences (IES) Goal 2 guidelines for development projects, program developers are using an iterative development approach over three years to create, test, and refine the induction model to determine whether it generates trend data in the expected direction, suggesting it shows promise to achieve its short-term goals. This paper describes lessons learned from the first year of field testing and refinement of the model.

Introduction

The U.S. Office of Vocational and Adult Education funded the National Research Center for Career and Technical Education and the Southern Regional Education Board to develop and field test an induction model designed to provide fast-track preparation for individuals transitioning mid-career from industry to the career/technical education (CTE) classroom. This paper reports results 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.

Each field test was comprised of three six-hour days of training. A total of 46 teachers participated. The purpose of the field tests was to determine whether the content, scope, and delivery of four training modules were appropriate for the intended audience of new CTE teachers. These field tests took place in the first year of a three-year process of development to create a comprehensive set of induction model materials for alternately certified CTE teachers using an iterative design research methodology.

Rationale

The four professional development modules are part of a larger induction model designed to respond to conditions in the field. Those conditions include 105 different routes to alternative certification for CTE teachers (Zirkle, Martin, & McCaslin, 2007), dictating a wide array of entry requirements from state to state. At the same time, research on teacher attrition suggests that between 25-75% of new teachers leave the classroom within their first three years (Bottoms & McNally, 2005; Marvel, Lyter, Peltola, Strizek, & Morton, 2006). Finally, the vision articulated in Perkins IV demands that CTE teachers can plan, deliver, and assess engaging instruction that 1) integrates academic content, especially in reading and math; 2) ties to technical concepts and standards in the teacher's subject area; 3) connects with students' interests, talents, aspirations and broader program of study; 4) helps students see how coursework is tied to all aspects of their industry; and 5) equips students with essential 21st century skills. These conditions suggest the need for a new teacher induction model that could be adopted by states to drive up the pedagogical skills of new teachers consistent with Perkins IV while mitigating some of the common drivers for teacher attrition by providing sustained school-based support to new CTE teachers in their first year.

Conceptual Framework

Prior studies have identified factors that contribute to early career teacher attrition. Those factors include: 1) inadequate technical instructional skill (Baldacci, 2006; Lemov, 2010); 2) unsupportive professional cultures (Moore Johnson & The Project for the Next Generation of Teachers, 2006); and 3) low confidence or sense of efficacy (Tschannen-Moran & Wolfolk, 2001).

Drawing on prior research in the fields of teacher preparation and induction (Borman & Dowling, 2008; Brill & McCartney, 2008; Heath-Camp & Camp, 1990; Joerger, 2003), program developers adopted a basic conceptual framework for an induction model aimed to address teacher attrition, shown below in Figure 1:

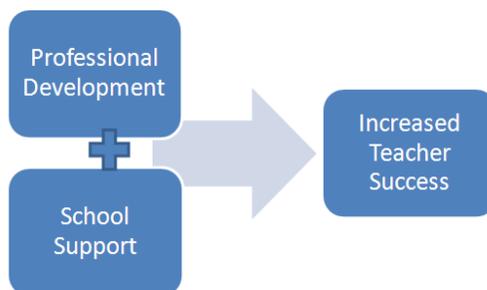


Figure 1: Basic conceptual framework.

Such a model has been implemented before, with mixed results (Glazerman et al., 2008). Induction models nearly always provide professional development, though it is often not focused enough on technical pedagogy (Lemov, 2010); and some induction models have combined professional development with collegial support through mentors and networking (Glazerman et al., 2008). To differentiate the conceptual framework – and therefore the induction model – from

the basic framework, program developers further defined each element in terms of quality. As shown in Figure 2 below, it is the *combination* of high quality professional development and high quality site-based support by mentors, administrators, and coaches that program developers expect will yield increased levels of teacher competence, self-efficacy, and career commitment, and therefore differentiate outcomes from this induction model from those of similar prior efforts.



Figure 2: Differentiated conceptual framework.

As shown in Figure 2 above, “high quality professional development” is defined as teacher learning experiences 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, and reflection on their learning (Mezirow, 1987). “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 monthly interaction with peers through online learning communities; and quarterly observation and feedback from a skilled coach. “Teacher 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 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. “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 Wolfolk (2001) and corroborated by teacher interviews and focus groups.

Theoretical Framework for Research Approach

To conduct investigation of the field test, and to generate data that can be used for program revision, program evaluators looked for a theoretical framework to provide methodological guidance. The framework selected was a “design research” approach (Middleton, Gorard, Taylor, & Bannan-Ritland, 2008). Design research is characterized by a seven phase cycle of inquiry that Middleton et al. (2008) call 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 field test reported here fits into the cycle at Phase Four which involves prototyping and trials using an “iterative, progressive and disciplined” approach (Middleton et al., 2008, p. 32). Middleton et al. (2008) wrote, “The articulation of the hypothetical structure to be investigated is critical for a design experiment to be truly an *experiment*” (p. 34). Accordingly, the aim 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 field testing.

Using this approach ensures that in successive rounds of testing and revision, program developers can explain *how* the model contributes to outcomes. This is a key departure from traditional approaches using experimental design and was, 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 three years for which the small numbers of teacher participants involved render an experimental design and/or use of inferential statistical procedures unreliable, inadequately nuanced, and poorly aligned to research questions.

Purpose and Research Questions

The field test was guided by three objectives: 1) to test the theory of change on which the induction model is based; 2) to identify content revisions to the instructional module delivered; and 3) to identify structural revisions to the design of the overall induction model. Six research questions guided the field tests:

1. Are module materials relevant, usable and clear? If not, why?
2. Is the scope of module content reasonable? If not, why?
3. Is the delivery of modules consistent with research-based adult learning principles? If not, why?
4. Do teacher participants produce artifacts reflecting the intended outcomes of each module were achieved? If not, why?
5. Are our assumptions of what constitutes “teacher competence” appropriate for first and second year CTE teachers? If not, why?
6. Do the measures used during the first year of field tests generate the kind of information needed to tell us that the model is working as intended? If not, how do they need to be revised?

Methods and Procedures

Evaluators developed a design to generate multiple data sources to inform each research question (see Table 1). Participants were selected by state agency partners. Program developers provided partners with the following criteria as guidelines for selecting participants:

- Candidates should meet all basic requirements to participate in a state-approved route to alternative certification in CTE;
- Candidates should exhibit basic mastery of the content area in which he/she will teach;
- Candidates should have one or fewer years teaching experience;

- Candidates should contribute to the diversity of the group by content area expertise, professional experience, post-secondary education level, expected teaching setting (e.g. comprehensive high school or technology center), and personal characteristics; and
- [Added for Field Tests 3-4] Candidates should possess advanced mastery of basic literacy and numeracy

Table 1
Year One Research Matrix: Evaluation of Content, Scope and Relevance

Research Question	Observations	Quick Cards	Pre-Post Constructed Response	Pre-Post TSES	End of Day Evaluation	Teacher Focus Groups	Instructor Debriefs	Expert Panel
Is content relevant, useable, clear?	X	X			X	X		
Is the scope of content reasonable?					X	X	X	
Is it delivered consistent with adult learning principles?	X	X						
Do artifacts reflect intended outcomes?			X	X				
Are our assumptions of “teacher competence” appropriate?						X	X	
Do our measures function as we need them to?								X
Population/Sample	Evaluators and Observers	Teacher Participants				Instructors	Expert Panelists	

Description of Data Collection Methods

Observation. Evaluators observed all four field tests, making entries in a log to record levels of participant engagement based on observation of body language and on- or off-task discussion. These logs were used to illuminate other data sources, such as the participant quick cards, to illuminate what was happening in the classroom at specific times throughout the field test. In addition, state partners (personnel from CTE divisions at the state department of education) as well as CTE teacher educators from local universities observed each field test and completed a structured observation journal.

Quick Cards. In order to capture participant response to specific segments of training with as much fidelity as possible, evaluators developed “quick cards” to be administered at the end of each segment of instruction, approximately every 60-90 minutes throughout the three days of training. Cards were coded with participant IDs. At the direction of evaluators, participants

paused to “card,” requiring that they record the specific time called out by evaluators and rate the immediately preceding segment of training on four dimensions of adult learning quality: 1) relevance to their classroom; 2) opportunities for dialog with peers; 3) opportunities to apply learning; and 4) adequacy of time devoted to the segment.

Pre-Post Tests. A pre-post test ‘battery’ was administered to all participants and included three elements: 1) constructed response items created for each of the four field tests, based on expected learning outcomes defined by program developers; 2) demographic information including open response questions asking about participant motivation to become a teacher; and 3) the Teacher Self-Efficacy Scale (Tschannen-Moran & Woolfolk, 2001), a validated instrument which measures teacher self-efficacy using three subscales: efficacy in student engagement; efficacy in instructional strategies; and efficacy in classroom management. Evaluators experimented with different models of administration of these over the year before settling on the optimal arrangement of administering the pre-test electronically prior to arrival at the training, and administering the post-test on paper-and-pencil at the end of the third day of training to ensure maximum participation rates.

End-of-Day Evaluation. At the end of each day of training, participants completed an end of day evaluation which asked participants to rate the following elements on the whole for each day: concepts presented, binder materials, activities, and overall value. The instrument used seven semantic differential scales on which participants were asked to rate each element: clear/confusing; realistic/unrealistic; engaging/boring; relevant/pointless; useful/useless; organized/scattered; and challenging/easy.

Focus Groups. Every teacher participated in a 60-90 minute focus group on one evening during the three day training. Participants for each focus group were purposefully selected to ensure racial and gender diversity. The focus groups during the fourth field test were selected to distribute personalities that tended to dominate conversation, based on experience with that cohort during the third field test. Protocols were modified slightly to conform to the specific content of each field test; however, the purpose of the protocol was to identify areas of strength in the modules, and areas that need improvement with a view to identifying the underlying needs of new CTE teachers that were either met or not met through the modules. Participant insights regarding sequence of content were also solicited.

Instructor Debriefs. At the end of each field test day, instructors were debriefed using a brief structured interview protocol designed to uncover expert assumptions, particularly those on-the-fly decisions that expert instructors make that deviate from planned activities. Instructors were also asked to identify aspects of the training that they felt were most successful, and to reflect on what they felt teachers learned, identifying the evidence (what did they see or hear) that led them to this conclusion.

Observer Interviews. Observers were also interviewed at the end of each day with two questions: what learning objectives do you feel teachers learned today, and what did you see or hear that tells you they learned this?

To address research question 6, a panel of national experts was convened twice to review the overall evaluation design and instrumentation. The panel was comprised of published scholars with respective expertise in using design research to develop teacher preparation experiences; evaluating large scale alternative teacher certification efforts; CTE teacher education; and general program evaluation. The panel provided substantial feedback that contributed to revisions to the instrumentation over the course of the year.

Data Analysis

All interviews, focus group transcripts, and constructed response items were analyzed using qualitative open coding (Corbin & Strauss, 2008; Miles & Huberman, 1994). Simple paired samples *t*-tests were conducted on the pre-post data from the Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk, 2001). All TSES items were entered into SPSS and were analyzed using basic statistical tests of mean differences.

Findings

Four field tests of the professional development modules were conducted. A total of 46 teachers participated, representing different levels of education, work experience, and CTE content area. See Table 2.

Table 2
Demographic Characteristics of Field Test Participants

Characteristic	<i>n</i>	%
<i>Gender</i>		
Male	24	52%
Female	22	48%
<i>Race/Ethnicity*</i>		
White	35	76%
American Indian	7	15%
African American	5	11%
Hispanic	1	2%
<i>Age</i>		
Less than 25	2	4%
25-34	17	37%
35-44	13	28%
45-54	10	22%
55-64	4	8%
<i>Highest Level of Education</i>		
High School only	1	2%
High School with professional training	13	28%
Associate's Degree	5	11%
Bachelor's Degree	19	41%
Beyond Bachelor's Degree	8	17%
<i>Subject Area</i>		
Agriculture and Natural Resources	3	6%
Arts, Audio, Video Technology and Communication Services	4	8%
Construction	7	15%
Education and Training Services	2	4%
Health Services	9	18%
Hospitality and Tourism	2	4%
Human Services	5	11%
Information Technology Services	5	11%
Legal and Protective Services	1	2%
Manufacturing	3	6%
Transportation, Distribution, and Logistics Services	3	6%
Scientific Research, Engineering and Technical Services	1	2%

*Some participants self-identified more than one racial/ethnic category

Analysis of data from each field test generated myriad findings that program developers used in successive cycles of revision and retesting over the course of the year. Selected findings that emerged in all four field tests are reported here. Findings fall into four categories: strategies that enhanced participant learning; characteristics and needs of participants; planning logistics and content of professional learning; and methodological findings.

Strategies that Enhanced Participant Learning

Data suggested three strategies used by program 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 program developers’ awareness of the importance of linking the content of the modules to specific examples tied to their CTE content areas. 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, program 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 coaching, several data sources suggest that teacher learning is best supported when there are coaches to move among small groups during cooperative learning segments. Participant interviews and focus groups both yielded strong agreement that this was an important aspect of learning for them that helped to “individualize” instruction. The quick cards show spikes in relevance, dialog, and application following segments where there was small group-coach interaction (See Figure 2).

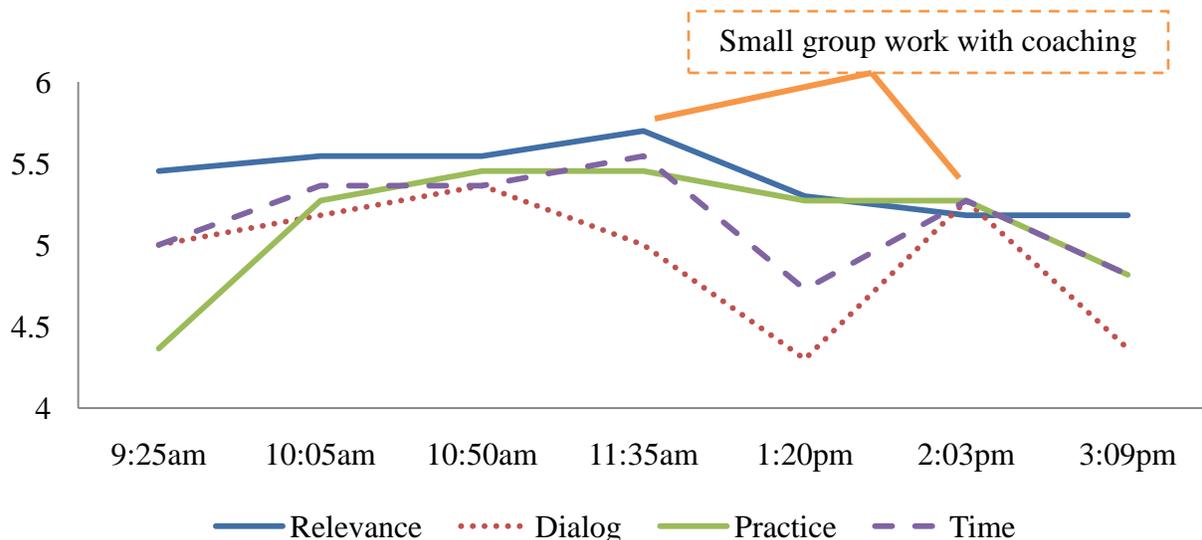


Figure 3: Quick card ratings of adult learning quality from day 1 of field test 2.

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

Finally, facilitated discussion following the formal training agenda helps 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 function.

Characteristics and Needs of Participants

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 speaks to the level of basic literacy and numeracy skills found within this group of alternatively certified CTE teachers. The second finding emerged without prompting in multiple focus groups, pointing to the key challenges and concerns facing these new CTE teachers.

Oklahoma’s state policy for recruiting alternatively certified CTE teachers introduces virtually no barriers to entry, including no minimum score requirement on tests of basic skills. Accordingly, participants in the two Oklahoma 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. The participants indicated awareness of this 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 re-worded 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 25-30 years. I'm just stating that. And some of those larger words probably need to be put in more of a 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 instruction in doing this 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.

Planning Logistics and Content of Professional Learning

Feedback from teacher-learners, as well as from state agency administrators in planning modules, underscores how important it will be to select optimal days and times for the three two-day follow-up sessions during the 2010-2011 school year. School holidays, end-of-term grading periods, and other school-based demands on teachers must be balanced with limited school resources for substitute teachers to cover participants' absences.

Across all four field tests, teachers identified key elements of the modules that they felt would be necessary for new teachers prior to entering the classroom. Those elements were segments on: 1) the use of rubrics; 2) formative and summative assessment; 3) how to use the table of specifications to align their instructional goals and assessments to technical standards and 21st century skills; 4) getting to know students; 5) engaging students in developing classroom rules and procedures; and 6) the twelve classroom management scenarios.

Methodological Findings

The expert panel reviewed the 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 interrogated the use of teacher retention as a measure of program impact given the influence of the current economic climate, as well as 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 further suggested adding a school climate measure to the evaluation design to account for other more powerful influences on teacher attrition. Evaluators are incorporating all of these suggestions into the evaluation design for the coming year.

In addition to findings generated by the expert panelists, evaluators captured key challenges to implementing the design methodologically. The original design of this model included a selection process that would allow for basic skills testing as well as pre-testing. However, the constraints of how new CTE teachers are hired interfered with implementation of rigorous selection methods. Specifically, because there is a very compressed timeline between date of hire and the beginning of the first 10 day summer institute offered as part of the induction model, the amount of time available to vet teacher applicants ranges from 0 to 10 days. It also introduces methodological challenges in generating a pre measure of teaching. Accordingly, a cross-sectional design will be employed moving forward to compare measures of teacher participants early in their first year with measures of a comparison group of teachers who do not participate in the induction model.

This same challenge has implications for the underlying stance of the project in terms of what kinds of teachers program developers aim to support. Some programs such as Teach for

America use rigorous recruitment and selection methods to screen out all but the “best and brightest” with the most potential for success. The timing challenges that emerged in preparing the field test helped program developers to clarify that this induction model is designed to raise the bar across the board, for all teachers, not only those that show exceptional potential. This will have implications for the research design because it will be more difficult to show improvement on average. Accordingly, in coming years, program evaluators will focus on creating “rich thick description” of each individual participant to enable better analysis of how elements of the induction model interact with individual characteristics.

Implications

The year-long field testing process reported here was the beginning of a three year effort to develop and refine a model of new CTE teacher induction. It was not the intention of program evaluators to produce findings that could speak to the success of this training effort in equipping teachers with teaching competency or self-efficacy. However, early findings can still be of use to researchers or program developers who are undertaking similar journeys to support new CTE teachers. Two particular findings have implications for program design and research methodology.

One such finding emerged from the discovery of state practices that influence hiring, and therefore selection, of possible participants for a two-week residential summer program. Because implementing a meaningful selection process for participants in a summer institute would require identification of prospective teachers in the spring, it is likely that participants will either not be brand new teachers, or that participants will not meet more rigorous selection criteria (because there is not enough time to “weed out” applicants who do not meet higher standards). Program developers can plan for either contingency depending on what conditions and priorities prevail in a given state. If it is the former, where participants have already completed a year of teaching, some elements of professional development could be eliminated, such as how to organize the classroom, while other elements could be more deeply explored, such as how to integrate academic content into CTE coursework. If the hiring date is late in a given state, it is likely that some participants will come to the summer institute with low level basic skills and accommodations will need to be made in instructor vocabulary as well as reading and writing assignments for teacher participants.

In terms of methodological implications, the individualized “rich, thick” profile approach that program evaluators of this induction model will take in the pilot year is likely the best research approach for any multi-state effort. The reason for this is the discovery that not only are there substantial differences in existing state requirements and support between states, but there are dramatic differences in support offered to teachers of different content areas *within* a single state. When levels of state support and training are high, it would be difficult to distinguish between effects of this induction model and effects of state support. Using a case study approach to explore and compare the experience and outcomes of individual teacher participants in light of their content areas, years of classroom experience, years of industry experience, and other state- or university-provided support and preparation, among other factors, is more likely to detect program influence than a large scale statistical model until more reliable measures of teaching are developed that could be used as the basis of a value-added model. In either case, the costs of

conducting such inquiry are substantial. Selecting representative cases to include in an in-depth case study approach can keep costs down; while having to hire consultants or train principals to conduct teacher observations with adequate inter-rater reliability can drive costs up for a large scale statistical approach.

Conclusions

The overall design research approach proved successful to the degree that program developers had clear guidance on changes to make to program materials, and some data emerged suggesting those changes improved teacher learning. Future scholarly work emerging from this project will focus on reporting the emergent evidence of the relationship between the induction model and data representing learning outcomes of teacher participants. The goal of the iterative methodology is to develop through successive cycles of revision and testing a refined product that is more likely after two more years of testing, to achieve its intended purpose, and is able to explain with some precision how the design elements of the induction model contribute to those outcomes.

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Acknowledgements

The research study was supported under the National Research Center for Career and Technical Education, PR/Award (No. VO51A07000003) as administered by the Office of Vocational and Adult Education, U. S. Department of Education. However, the contents do not necessarily represent the positions or policies of the Office of Vocational and Adult Education or the U.S. Department of Education and you should not assume endorsement by the Federal Government.

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