CHARACTERISTICS OF EFFECTIVE ALTERNATIVE TEACHER CERTIFICATION PROGRAMS

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INTRODUCTION

Alternative teacher certification has become an increasingly common part of the teacher preparation system. First established in the 1980s as a response to projected teacher shortages, alternative education programs are now found in nearly every state and many colleges and universities (Feistritzer, 2005). More recently, school districts have begun their own teacher preparation programs, often in partnership with local universities. In some parts of the country, nearly as many teachers enter the profession through alternative routes as traditional routes (Humphrey & Wechsler, 2005). For example, over 40% of New Jersey teachers entered the profession through the state's alternative certification program in 2003–04 (personal communication, New Jersey Department of Education, May 4, 2004).

The proliferation of alternative certification has added to an already confounding problem of categorizing programs. Typically, alternative certification programs offer qualified teacher candidates a streamlined preparation program that places them in the classroom more quickly than traditional university-based programs. While this is generally true, some programs considered to be alternative actually require a longer combination of coursework and internship than most university programs. Further, while traditional programs are generally structured around coursework and a culminating student teaching experience, many university programs are increasingly integrating coursework and student teaching. This blurring of the lines between alternative and traditional routes seems likely to increase.

Further complicating the categorizing of programs is the distinction often made between alternative routes and alternative certification. For some, alternative certification involves reduced training for entry into teaching, whereas alternative routes are paths other than 4-year undergraduate or 1- or 2-year postbaccalaureate programs. For the sake of simplicity, we use the terms interchangeably. Ultimately, the use of the terms alternative certification, alternative routes, or traditional certification is a matter of convenient labels rather than precise definitions.

Despite the overlap between traditional and alternative teacher preparation, alternative certification has recently become the U.S. Department of Education's favored policy response to the dual demands of improving teacher quality and increasing the teacher supply. The U.S. Secretary of Education's Third Annual Report on Teacher Quality (U.S. Department of Education, 2004) promotes alternative certification, and the federal No Child Left Behind Act includes participants in alternative certification programs in its definition of "highly qualified" teachers. At the same time, opponents of alternative certification have been sharply critical of such endorsements, charging that alternative certification places unqualified teachers in the classrooms of the neediest students.

Ironically, the endorsement of either traditional or alternative certification is based on a very thin research base. Not enough is known about what constitutes an effective alternative certification program to inform policymakers or program directors seeking to address concerns about teacher supply and teacher quality. This report is an attempt to add to the knowledge base on alternative certification. It is part of a 3-year study sponsored by the Carnegie Corporation of New York, and is the third of three reports on the subject. The first report (Humphrey, Wechsler, Bossetti, Wayne, & Adelman, 2002) reviewed the existing research on alternative certification, posited a theoretical framework for the overall study, and presented the study design. The second report (Humphrey & Wechsler, 2005) examined the myths surrounding

alternative certification's participants and programs. This report addresses the central research question of the study: What are the characteristics of effective alternative certification programs?

► Study Methods

We employed multiple data collection activities, focusing on seven alternative certification programs. We used a purposive sampling strategy to ensure that our case study programs met certain practical and theoretical criteria. We considered program scale, replicability, intensity of support, and participant characteristics. The seven programs are the Teacher Education Institute in the Elk Grove, California, Unified School District; New Jersey's Provisional Teacher Program; Milwaukee's Metropolitan Multicultural Teacher Education Program (MMTEP); the New York City Teaching Fellows Program; North Carolina's NC TEACH (North Carolina Teachers of Excellence for All Children); Teach For America; and the Texas Region XIII Education Service Center's Educator Certification Program.

All seven programs provide coursework, though the focus and amount of coursework varies, as does the developer and provider of the coursework. All seven programs also offer some type of mentoring, though the source and focus of mentoring varies. Differences between programs, however, abound. Elk Grove's Teacher Education Institute requires two substantial internships under the tutelage of a master teacher. New Jersey's Provisional Teacher Program trains teachers already hired to work as the teacher-of-record in schools. Milwaukee's MMTEP program is considerably small, serving only 20 participants, all of whom have been paraprofessionals or teacher aides in Milwaukee for at least 1 year. The New York City Teaching Fellows Program prepares several thousand teachers annually, all of whom hail from strong academic and professional backgrounds. NC TEACH was designed to support midcareer professionals who want to switch to a career in education. Teach For America recruits new college graduates from selective universities to serve as teachers in hard-to-staff urban and rural districts. The Texas Region XIII Educator Certification Program targets both midcareer professional and recent college graduates in high-need subject areas. The one characteristic common to all programs is that they are considered to be alternative, rather than traditional, teacher preparation programs. Brief descriptions of each program's design can be found in Appendix A.

For each case study program, we conducted interviews with key personnel three times over the course of the study (spring 2003, fall 2003, spring 2004). Respondents included the program director, teaching faculty, certification advisors, classroom supervisors, and other relevant personnel. We also collected and examined documents related to the programs, including program descriptions, course syllabi, existing evaluations or evidence of effectiveness, and other related documents produced by the programs or others.

We collected participant-level data over the course of the 2003–04 academic year. For each case study site, we surveyed program participants at the beginning of their participation in the program, and again at the end of their first year of teaching.[1] Our survey included questions about participants' background (e.g., past professional experiences, college degrees and majors, demographics); perceptions of preparedness for teaching; reasons for going into teaching; and reasons for choosing the alternative certification program. The questionnaire also measured

1 Our survey methodology is elaborated in Appendix B.

participants' pedagogical content knowledge in reading and mathematics, program supports they received, career plans, and perceptions of growth.

In each case study program, we followed 10–13 participants as they progressed through the first year of their program. We used a two-phase sampling strategy to select target participants. First, we randomly selected schools in which the alternative certification teachers were working. Then, in schools with more than three participants, we randomly selected participants. We observed each one in the classroom twice—once in the fall and again in the spring. We used a structured observation instrument to measure the classroom learning environment, the teacher's pedagogical strategies, and classroom management. We also conducted in-depth interviews with each participant that consisted of three parts: (1) perception of the lesson we observed, and connections between instructional strategies and the alternative certification program; (2) background, experiences in and perceptions of the alternative certification program, the school in which the participant was working, and other professional development experience, and feelings of readiness to teach; and (3) a case scenario designed to assess knowledge, attitudes, and beliefs about teaching. This strategy entailed presenting the participant with a realistic classroom-based scenario and asking how he/she would respond to the specific situation and the reasons for doing so. The case scenarios helped ground each interview in a discussion of a consistent set of teaching problems. We also conducted interviews with other individuals influential to the participant's development as a teacher, including the principal and coaches or mentors who worked closely with the participant.

The analysis presented in this paper extends our initial findings, articulated in our earlier article, *Insights Into Alternative Certification: Initial Findings from a National Study* (Humphrey & Wechsler, 2005). We found that many of the assumptions about alternative certification participants and programs put forth by both proponents and opponents of alternative certification were inaccurate. Rather than decreeing alternative certification as a wholly good or bad enterprise (as proponents and opponents, respectively, tend to do), we concluded that teacher development in alternative certification appears to be a function of the interaction between the program as implemented, the school context in which the on-the-job training occurs, and the career trajectory of the individual participant. Our analysis highlighted the importance of variations both across and within programs, and led us to question the usefulness of making comparisons across different alternative certification programs. Rather, we theorized, a better unit of analysis would be a subgroup of individuals from different programs with similar backgrounds and experience, who work in similar school settings.

This paper builds on these conclusions. In the next section, we examine the characteristics of alternative certification participants and identify two key variables—educational background and previous classroom experience—that seem likely to contribute to effective teaching. We then examine the variation of program components and identify three variables—coursework, supervision and mentoring, and school context—that also seem likely to contribute to effective teaching. Next, we describe the contributions of the variables to a variety of outcome measures. We conclude by discussing the relevance of the findings to the improvement of alternative certification in particular, and to teacher preparation in general.

CHARACTERISTICS OF ALTERNATIVE CERTIFICATION PARTICIPANTS

Given the importance of interactions between the program as implemented, the school context, and individuals' backgrounds (Humphrey & Wechsler, 2005), we need to know more about both participants and existing programs before we can identify characteristics of effective programs. In this section, we review key findings from our earlier paper and present additional data about alternative certification participants.

► The Demographics of Alternative Certification Participants

Demographically, alternative certification teachers in our sample are not very different from traditional route teachers. While the mean age of participants is slightly higher than teachers in traditional preparation programs, the age range within programs is considerably wide, with alternative certification teachers representing both older individuals as well as new college graduates. Further, national data and data from the seven case study programs indicate no considerable gender differences between alternative certification and traditional preparation participants. Some individual programs, however, attract greater percentages of men to the teaching profession than national averages.

Alternative certification programs are sometimes designed to diversify the pool of new teachers, and overall averages suggest that they are successful in attracting greater percentages of minorities into the teaching profession. However, program participants tend to reflect the racial composition of their local labor market (Humphrey & Wechsler, 2005). Only Milwaukee's MMTEP program was successful in attracting a significantly higher percentage of minority teachers than the local labor market.

► Selecting Alternative Certification Participants

Much has been made of alternative certification programs' ability to attract talented and well-educated individuals into teaching. Indeed, most programs devote considerable resources to the selection of participants. Unfortunately, research on the personal characteristics and backgrounds of individuals who will become effective teachers is thin (Wilson, Floden, & Ferrini-Mundy, 2001). As a result, different programs have different selection criteria, depending on their assumptions about the most desirable qualities. Teach For America, for example, selects well-educated young people from many of the nation's most prestigious universities. The New York City Fellows program also looks for well-educated individuals, but is also interested in candidates with significant career experience. In contrast, Milwaukee's MMTEP program only selects teacher's aides already working in the Milwaukee Public Schools. New Jersey's selection process includes a minimum grade point average and the demonstration of subject matter knowledge, but is highly decentralized, as candidates must have a job offer as a requirement for admission. Given the large number of New Jersey candidates with previous classroom experience (discussed later), it seems that the hiring principals and district officials value such experience.

While there may be a variety of personal characteristics that make for an effective teacher, most alternative certification programs bet on education background, work experience, previous

classroom experience, or some combination of the three. Our analysis led us to focus on education background and previous classroom experience as key variables.

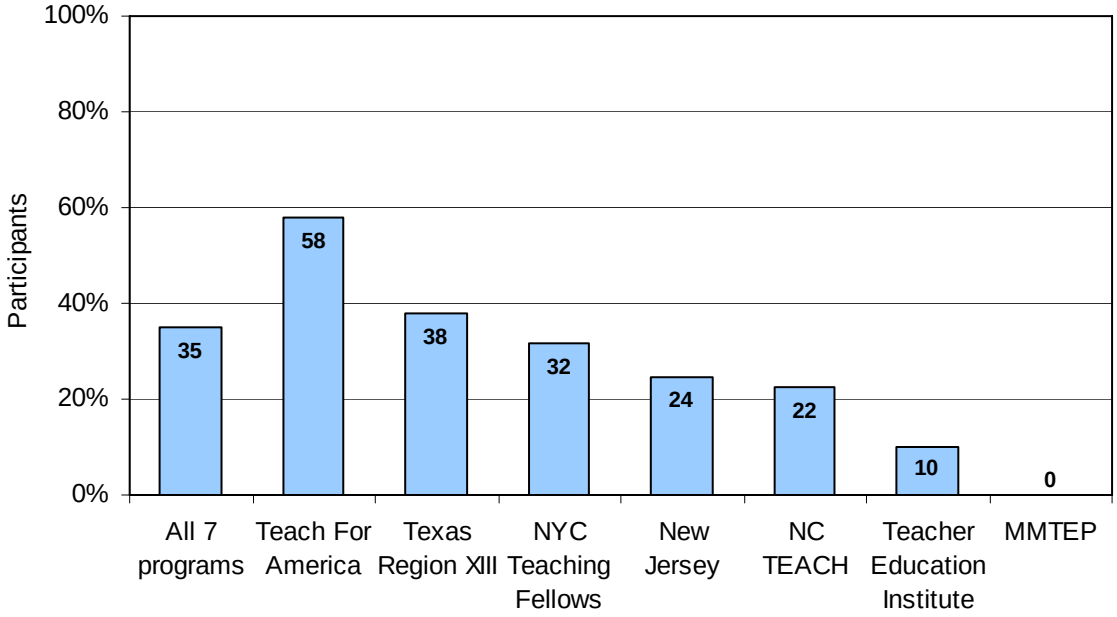
Education backgrounds of alternative certification participants

The case study programs included individuals with a variety of educational backgrounds. Some of the programs attract significant numbers of individuals who attended competitive colleges and universities, whereas others do not. The percent of participants who attended a competitive undergraduate institution reflects the recruitment priorities of the program—some specifically recruit highly educated individuals; others recruit individuals with experience in schools and a demonstrated commitment to the community (Humphrey & Wechsler, 2005). Programs like MMTEP argue that their recruiting strategy results in new teachers who are committed to their communities and less likely to move on after a few years.

We used Barron's six-scale selectivity ranking for undergraduate universities and coded participants as having attended a competitive or a less competitive institution of higher education (IHE) (Barron's Educational Services, Inc., 2002). We included Barron's two highest rankings in our "competitive" category, and two lowest rankings in our "less competitive" category.[2] Although alternative route teachers overall are more likely to have graduated from competitive universities than from less competitive ones, we found wide variation (see Exhibit 1). The percentage of alternative certification participants attending a competitive college ranges from 58% of TFA participants to none of MMTEP's participants. Of course, the competitiveness of the college or university that an individual attended is just one indicator of a well-educated individual. Because research suggests that teachers with strong academic backgrounds may be more effective than less well-educated teachers (Ballou & Podgursky, 1997; Wayne & Youngs, 2003), we explore the role of candidates' education backgrounds in our discussion of outcomes.

[2] Note that university selectivity is defined differently in this paper than in the previous report (Humphrey and Wechsler, 2005). The categories were altered for the analyses featured in this paper to create more distinct groups than the previous variable allowed.

Exhibit 1
Percent of Participants Who Attended Competitive Undergraduate Universities, by Program***

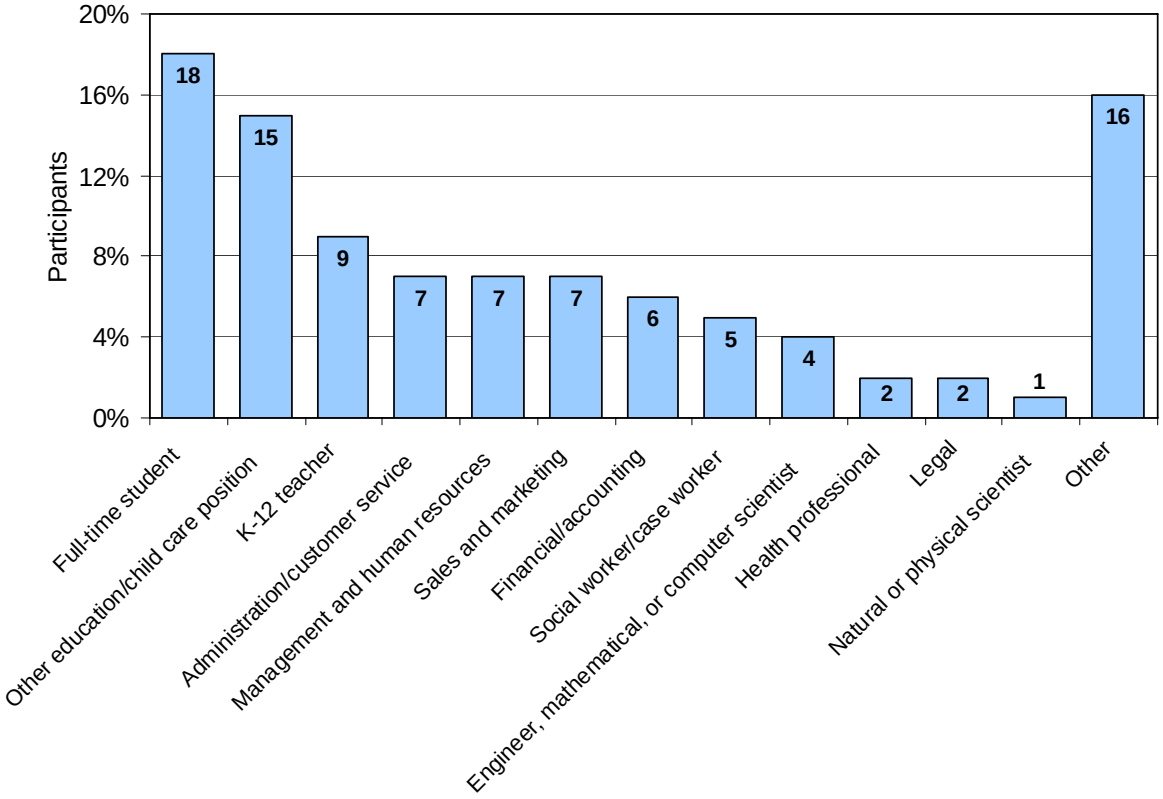


***p < .001.
Source: SRI Survey of Alternative Certification Program Participants (2003, 2004).

Alternative certification candidates' previous career and classroom experience

Although we did encounter some career changers with impressive professional backgrounds, more participants in the seven programs had been full-time students or employed in some education-related field. Exhibit 2 presents the prior careers of participants in the seven programs. Overall, relatively few participants switched from careers in mathematics and science to teaching (about 5%), only 2% came from the legal profession, and 6% came from a financial or accounting career. In contrast, about 42% of participants were either in education or were full-time students immediately before entering their alternative certification program. Accordingly, when we examined the financial changes that participants made to enter the teaching profession, we found that the majority of participants in the seven programs experienced a salary increase (Humphrey & Wechsler, 2005).

Exhibit 2
Prior Careers of Alternative Certification Participants

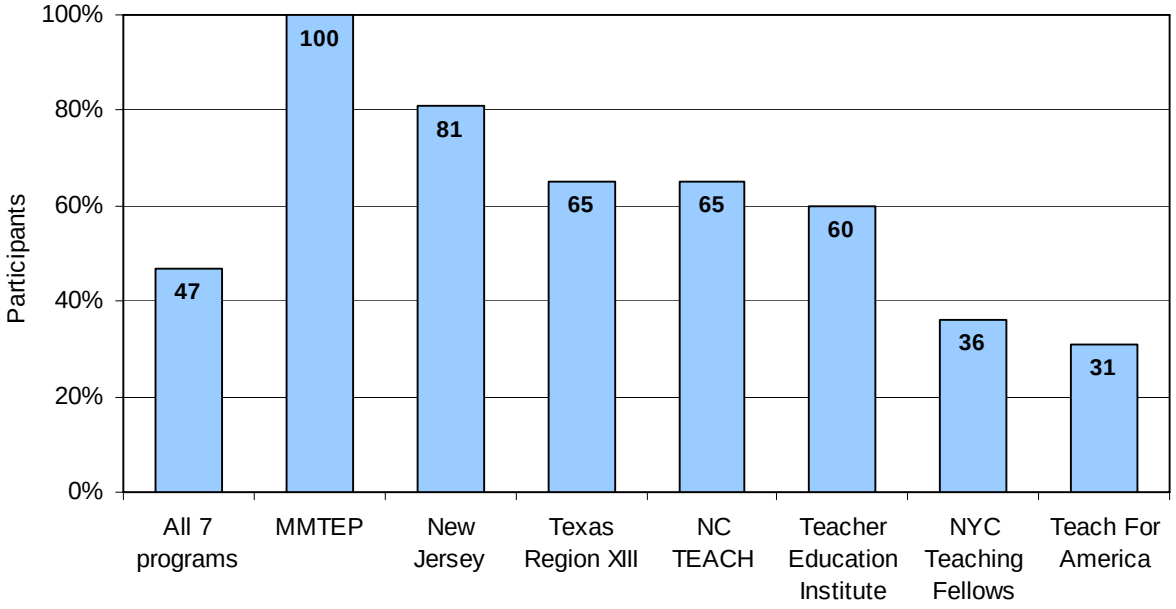


Source: SRI Survey of Alternative Certification Program Participants (2003, 2004).

Perhaps most instructive to understanding alternative certification participants, nearly half of participants had classroom experience prior to entering their program. In five of the seven programs, more than 60% of participants report having previous experience as a classroom teacher, substitute teacher, or teacher's aide (see Exhibit 3). Although further study about the quality of their time spent working in classrooms needs to be undertaken, we were surprised not just by how many participants had prior classroom experience, but by the length of those experiences. For example, New Jersey participants who had previous teaching experience averaged 39 months of experience.[3] Similarly, 41% of participate across all seven programs had at least a full academic year of classroom experience.

[3] Some of the teaching experience reported by New Jersey teachers may have been caused by delays in their paperwork. The *Newark Star-Ledger* (Teachers held up by state logjam, October 5, 2004) reported more than 1,000 new teachers had experienced delays in receiving their teaching certificates. Presumably, some of these new teachers were in the alternative certification programs.

Exhibit 3
Percent of Participants with Some Classroom Experience***



***p < .001.
Source: SRI Survey of Alternative Certification Program Participants (2003, 2004).

The large number of alternative certification participants with considerable classroom experience led us to include this variable in our analysis of outcomes. We also wanted to analyze the impact of other careers, especially in mathematics and science. However, there were insufficient numbers of candidates with the kinds of previous career experiences that might contribute to successful teaching to conduct the analysis.

These demographic and background variables provide just a small glimpse into alternative certification participants. Although we only describe a few variables here, they adequately demonstrate the complexities of thinking about effective alternative certification programs. Though we can make statements about alternative certification participants as a whole, means mask important variation both across and within programs. The variation matters, not just as a statistical exercise, but because who participants are matters to the supports they need to develop into professional teachers. Within most of the programs, participants' education, experience, and commitment vary greatly. And, as a result of the variation, participants have very different developmental needs. This basic fact complicates any attempt to identify a fixed set of program characteristics that can guarantee the successful production of effective teachers. Clarifying who participates in alternative certification programs in a more detailed manner—both across and within programs—thus, is important in determining the characteristics of effective programs.

ALTERNATIVE CERTIFICATION PROGRAM COMPONENTS

The complexity of understanding alternative certification is due not only to the variation of participant backgrounds, but also to the variation in how participants experience their programs and school placements:

> Program components espoused by program directors, course catalogs, or other media provide a general sense of the goals of, and the ideal training offered by, a program, but in practice may not accurately reflect the learning opportunities participants experience. Both the participant's characteristics and the school context may undermine even the best designed program features. Individuals learn from both the formal and the informal contexts of their schools. In most programs, this learning exists beyond the control of the alternative certification program. (Humphrey & Wechsler, 2005)

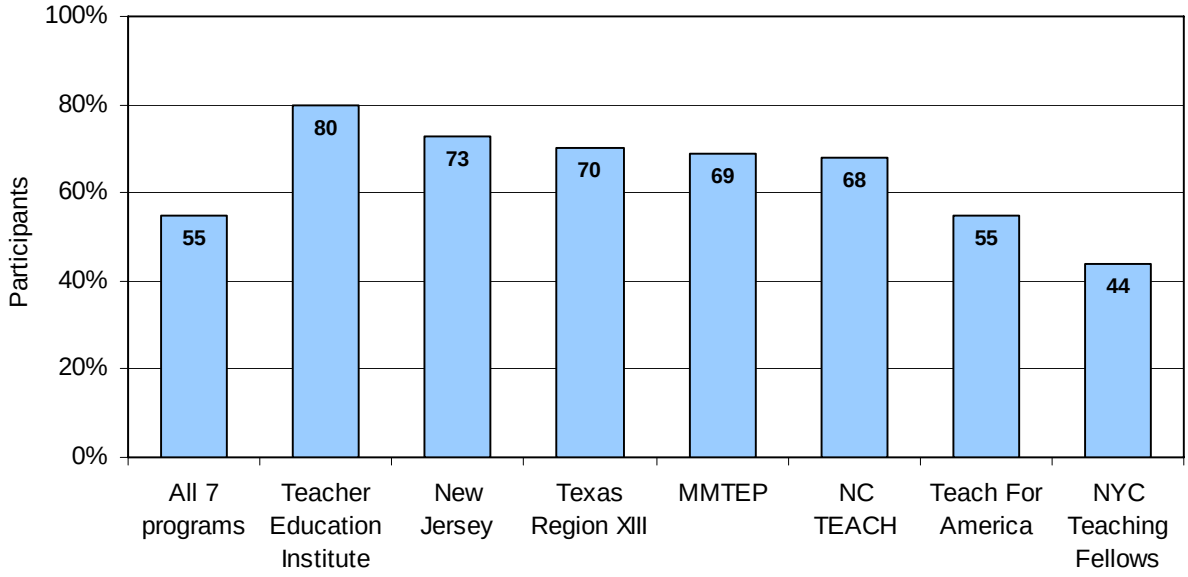
Next, we elaborate on this notion by examining how participants experienced their coursework, mentoring and supervision, and school environments. Importantly, we document the variation of participant experiences within programs.

► Participant Experiences with Coursework

Coursework is a key training component in each of the seven case study programs. Program directors reported that the coursework provided practical training focused on specific skills and knowledge that teachers need in classrooms. In fact, alternative certification coursework varies in the emphasis placed on subject-matter content, pedagogy, classroom management, educational theory, and child development. These variations exist not only among different programs, but within individual programs as well, depending on who designs the course curricula (Humphrey & Wechsler, 2005). Some alternative certification programs design their own curricula; others are designed by partner universities. In the New York City Teaching Fellows program, multiple university partners design and deliver coursework and thus participants within the one program may have very different experiences with their coursework.

In general, participants reported that coursework mattered to their development as teachers, though ratings varied by program. Across programs, over one-half of participants reported that the coursework they took during the school year was moderately to very important to their professional support (see Exhibit 4). At the extremes, over four-fifths of Elk Grove's Teacher Education but less than one-half of New York City Teaching Fellows rated their coursework highly.

Exhibit 4
Percent of Participants Reporting that their Coursework Was a Moderate to Very Important Source of Professional Support***



***p < .001.
Source: SRI Survey of Alternative Certification Program Participants (2004).

Across all programs, alternative certification participants spoke most highly about practical courses focused on specific ideas for teaching a curriculum or handling classroom management. Faced with a classroom of students each morning, participants are eager to learn specific strategies to employ immediately in their classes. One participant, for example, extolled the applied nature of her classes: "It is all practical. They are always asking us what is useful or not." Participants were much less enthusiastic about theoretical, historical, or foundational classes. Criticizing her more academic classes, another participant said, "The courses haven't provided anything that I can apply in the classroom. It's not tangible."

Alternative certification participants' appraisal of their coursework also seems to depend on their readiness to learn. Some participants, especially those with previous classroom experience, seemed more equipped to learn from their coursework. Those who could connect their coursework to prior understandings reported more benefit from the coursework. One participant, for example, entered her program with a strong foundation in special education and felt very aware of how to manage and relate to children with unique challenges. Through her coursework, then, she was able to identify weaknesses in her knowledge of instructional techniques. "I know the management part of [teaching], I know the programs…I know special ed," she said. "I am learning a lot about the technical part of [teaching]…phonemic awareness, phonics." Not only did she have the foundation to realize her own weaknesses, but then she was able to focus on developing these areas because she did not struggle with classroom management or procedures. Participants who are not too overwhelmed by their teaching duties, even those with no prior experience, are more likely to report benefits from their credentialing classes. Finding their daily teaching manageable, these participants are more likely to attend their credentialing classes ready to learn and to apply the new knowledge to their classrooms the next day.

The variation evident in participants' valuation of their coursework was also evident for other program components, such as mentoring and supervision. Next, we examine the frequency and value of the support from school administrators, program supervisors, and mentors.

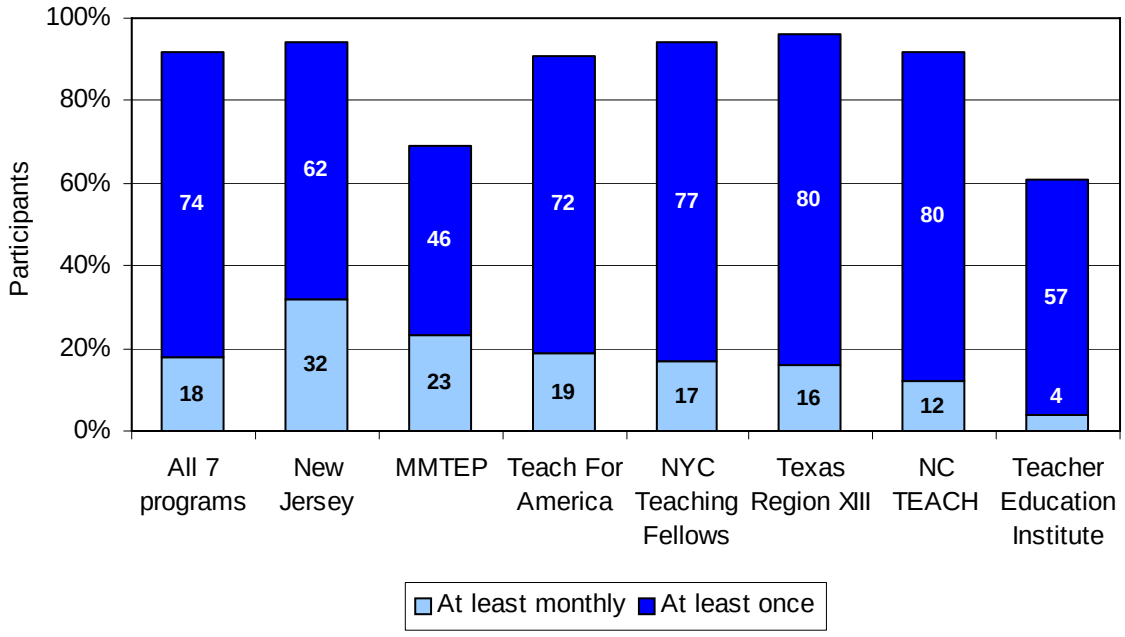
► Mentoring and Supervision

With a heavy emphasis on on-the-job training, most alternative certification programs attach great importance to mentoring. Although by no means conclusive, the research on mentoring suggests that it can be an effective strategy to reduce teacher attrition and improve teacher quality (Lopez, Lash, Schaffner, Shields, & Wagner, 2004). We identified three possible sources of mentoring and supervision for alternative certification participants: a school administrator, a mentor or supervisor from the university or alternative certification program, and a school-based mentor. We found variation both across and within programs regarding the amount, quality, and value of each type of mentor or supervisor.

Administrator supervision

Over 90% of participants in five of the seven programs reported that their school administrator observed them and provided feedback at least once or more during their first year of teaching. Given that program participants have not yet completed their preparation, having just one or a few observations is a low level of supervision by school administrators. However, only a small percentage of participants across programs reported receiving more regular supervision on a monthly basis (see Exhibit 5).

Exhibit 5
Frequency of Observations and Feedback From School Administrators***



***p < .001.
Source: SRI Survey of Alternative Certification Program Participants (2004).

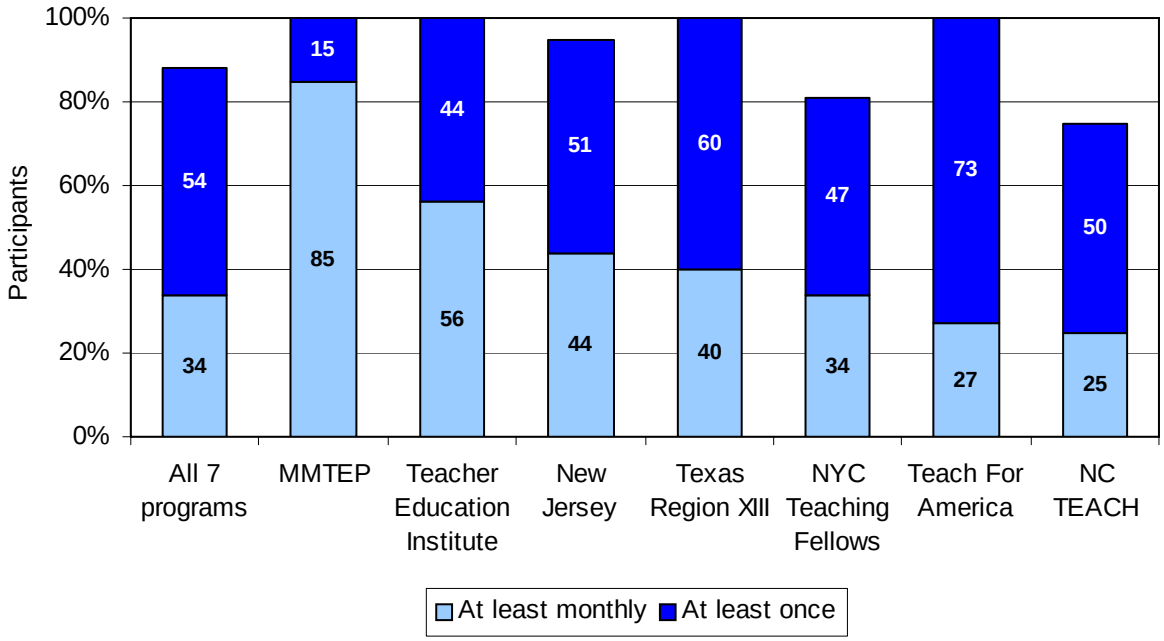
Some of the variation in the frequency of observations and feedback by school administrators reflects the program structure. In Elk Grove's Teacher Education Institute, school administrators are not responsible for supervision, with the exception of those participants with teaching assignments. New Jersey's comparative high level of administrator supervision probably reflects the fact that school administrators in New Jersey ultimately determine whether or not to recommend a participant for state certification. Given this high-stakes responsibility, we might have expected even more participants to have had frequent observations.

Despite the overall low level of observation and feedback by school administrators, participants generally consider it valuable. Across all seven programs, 37% of participants found their supervision to be very valuable, and 47% found their supervision to be somewhat valuable. We found quite a bit of variation across and within programs in how valuable such observations were to participants' development. For example, in TFA, where only 20% of participants found administrative visits very valuable, one TFA participant reported that his principal would base feedback on only five minutes in the classroom. The observation was focused on procedure rather than instruction, and the participant found the principal to be overly critical. By contrast, each of the four teachers in one of the five New York City schools we visited described the school's administration as supportive and the feedback as valuable.

Program supervision

A second source of feedback comes from program staff or university supervisors. Again, we found a good deal of variation from one program to another with regard to the frequency with which participants were observed by their programs (see Exhibit 6) and the value they placed on it. Nearly all participants in five of the seven programs reported receiving such support at least once or more during the school year. However, one-quarter of participants in NC TEACH and one-fifth of participants in the NYC Teaching Fellows Program reported never being observed by program staff or university supervisors. Milwaukee's program stands out for the high frequency of observations and feedback by program staff (85% of participants received feedback from their program at least monthly). This is a key component of the Milwaukee program and one feature that participants value a great deal. Overall, over 80% of participants in all programs who were observed and received feedback from their program staff or university supervisor found that support to be somewhat valuable or very valuable.

Exhibit 6
Frequency of Observations and Feedback From Program Staff and University Supervisors***



***p < .001.
Source: SRI Survey of Alternative Certification Program Participants (2004).

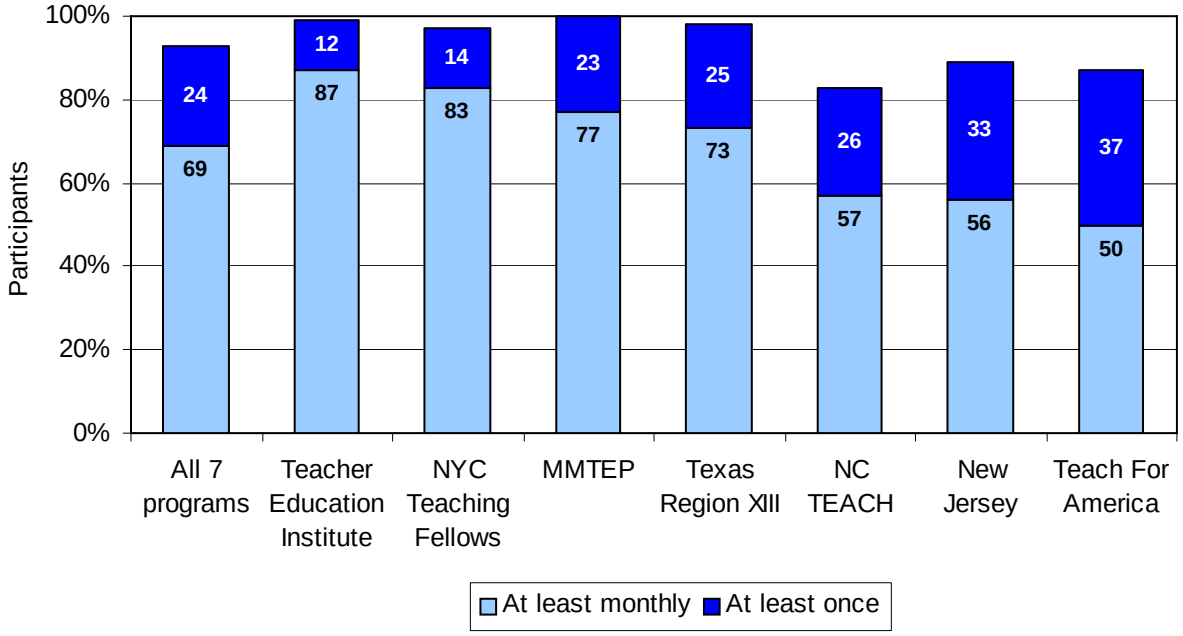
In-school mentoring

The third type of mentoring is from an in-school mentor. Arguably, the in-school mentor can provide the most intensive and valuable support to an alternative certification participant. Informal daily support and regular formal guidance can help a new teacher weather the many challenges of a difficult job. Ideally, the in-school mentor is an accomplished teacher working in the same grade or subject area who has the expertise to help guide and support a new teacher.

All of the seven programs consider in-school mentoring a prominent feature of their program design, although they used mentors in different ways. In MMTEP, mentors are full time release teachers, not housed at a specific school site, responsible for mentoring only four or five teachers. The Teacher Education Institute employs an apprenticeship model where participants work closely with two teachers, one each during two semesters. Each of the other projects in our sample used school-based mentors.

The percentage of participants who reported receiving mentor support at least monthly varied by program (see Exhibit 7). The three programs that provided the lowest percentage of participants with monthly support from an in-school mentor also had the highest percentages of participants who reported receiving no mentoring support. Specifically, 17% of NC Teach participants, 13% of Teach For America participants, and 11% of New Jersey participants reported never receiving mentor support. Overall, however, most participants reported fairly high frequency of mentoring.

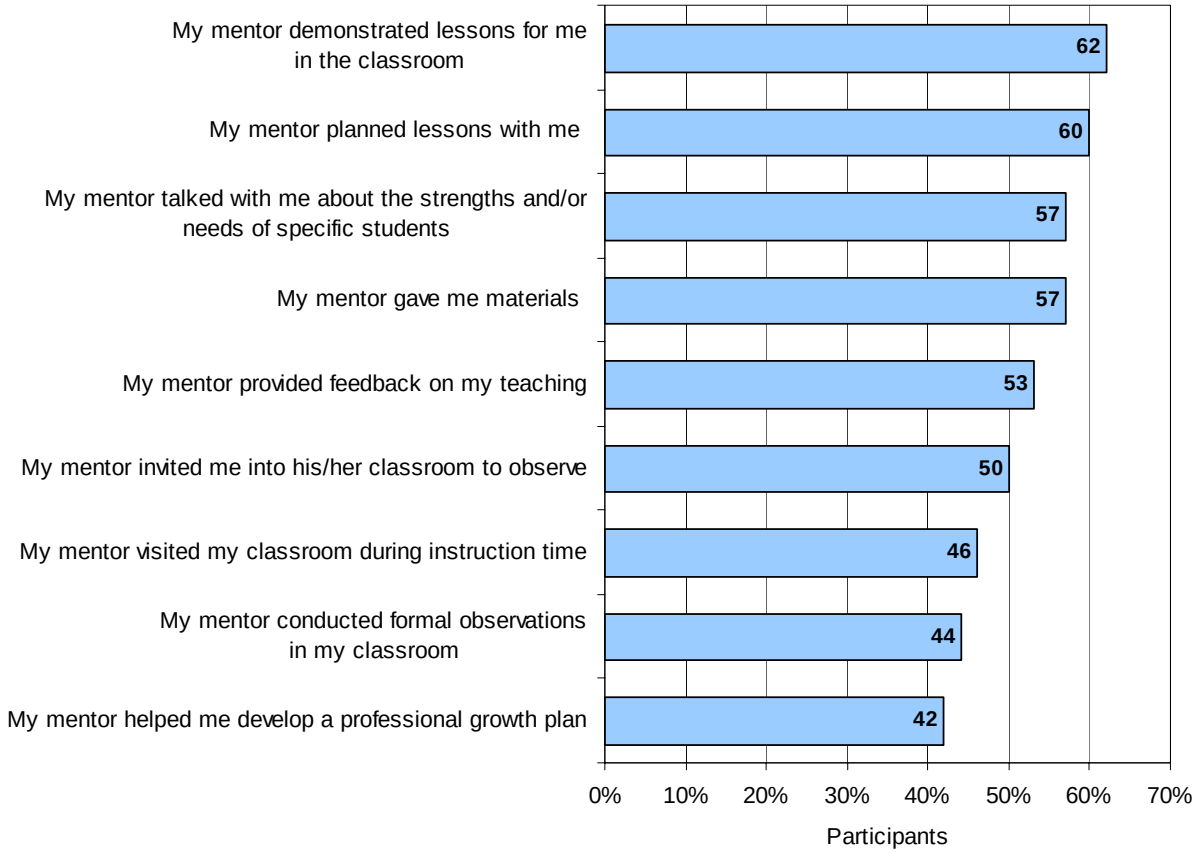
Exhibit 7
Frequency of Observations and Feedback from In-School Mentors***



***p < .001.
Source: SRI Survey of Alternative Certification Program Participants (2004).

Mentor support can take many forms, and, according to participants, not all mentoring activities are of equal value. Participants reported that the mentor activities that they most valued were watching lessons demonstrated by the mentor, planning lessons with the mentor, talking about the strengths and needs of specific students, and receiving curriculum materials from the mentor (Exhibit 8).

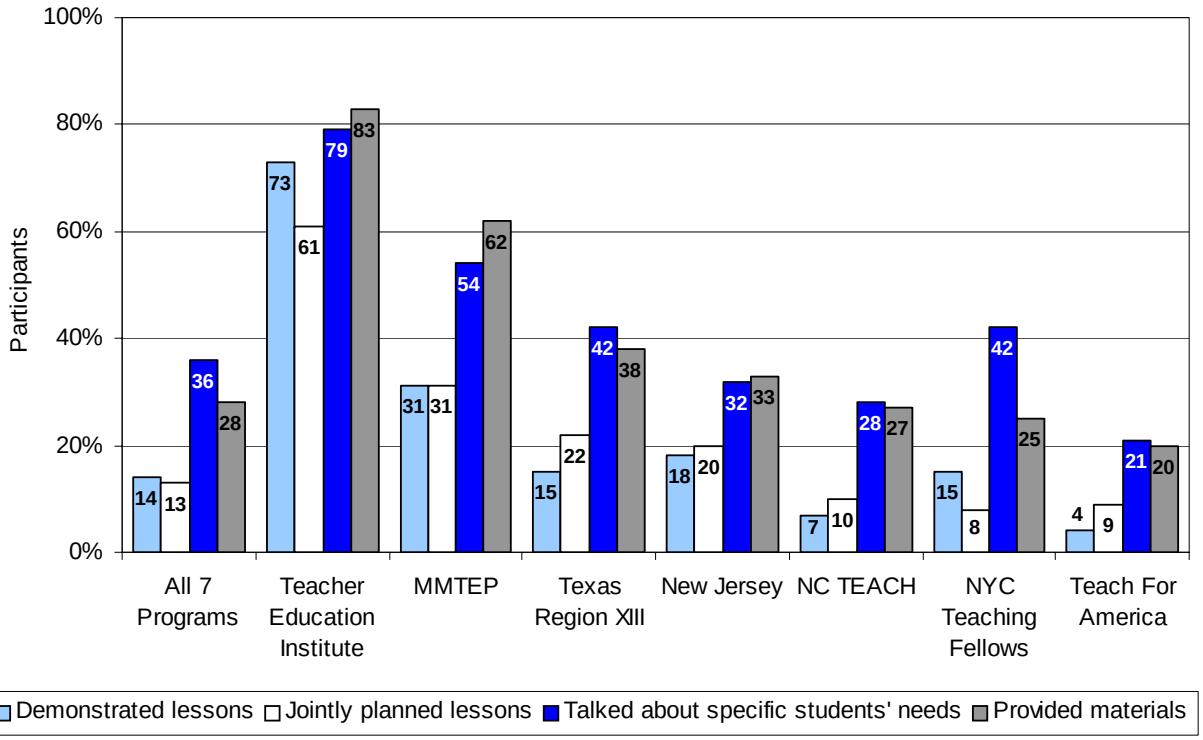
Exhibit 8
Percent of Participants Reporting Various Mentoring Activities as Very Valuable



Source: SRI Survey of Alternative Certification Program Participants (2004).

We found a great deal of variation by program with regard to the percent of teachers receiving the most valued mentor activities at least monthly (see Exhibit 9). The Teacher Education Institute is the most consistent in providing participants with their most valued types of mentoring. MMTEP is likewise strong, especially in providing materials and talking about specific students. Other programs, on the other hand, do not consistently provide any of the most valued types of mentoring. The numbers suggest an area in need of improvement. Participants are not getting a lot of the types of mentoring that they feel are most valuable to their professional development. In part, this may reflect the lack of training for mentors and the limited compensation they receive for their work, as well as the fact that many mentors are full time teachers without the ability to provide substantial in-class support.

Exhibit 9
Percent of Participants Reporting Receiving the Most Valued Mentoring Activities at Least Monthly***



***p < .001 for all variables.
Source: SRI Survey of Alternative Certification Program Participants (2004).

A frequently cited problem with mentors is that they are spread too thin. One participant described her mentor as a nice lady who has to see a lot of people. She described, "If I would go find her about something she would see that it gets accomplished. But she does not really have the time." Another reported that her mentor was responsible for 25 new teachers. In that case, the participant's first encounter with her mentor was at the end of November. Other teachers reported that mentoring, even if relatively frequent, was of poor quality. One participant described her mentor, a retired teacher:

> I did not get my mentor until 7 weeks into teaching. She was so used to chaos that I felt she lacked professionalism. She did visit each week for about two hours, but she was not that helpful. I tried to take her advice the best way I could, but we have a very different teaching style. Her advice has not worked for me…She has been about 3% helpful, but mostly a burden.

At the same time, we did find many participants who reported having outstanding mentoring support, although the styles of mentoring, as well as the content, varied widely. For example, one participant we interviewed received weekly 2-hour visits from her mentor, who observed lessons and provided feedback, helped with classroom management, and provided general advice. Her mentor was a 35-year veteran in the same school, and thus had a wealth of experience with the student population. Another participant reported that her mentor had her

write student profiles, forcing the new teacher to pay attention to the details of each students' skills and needs. This activity, she said, helped improve her communications with the students.

Through our case studies, we also found that participants valued mentors for very different reasons. Some mentors solely served as a source of emotional support, while others provided a higher level of guidance in learning to teach. Of those mentors who attended to a teacher's practice, we found that many focused primarily on classroom management and procedure rather than instructional technique. One participant who thought her mentor was "amazing" said the mentor helped her improve in such ways as speaking more quietly in small groups, writing on the board using larger print, and smoothing transitions. Others, however, received specific guidance on how to use curricula, adapt instruction for students, and make creative instructional decisions to meet students' needs. One participant reported:

> [Differentiated instruction] is one thing I've learned from my [mentor]. She'll look at [the lesson], say, "My kids can't do this." So, she'll bring in the concept another way. Fulfilling the standard, but accomplishing it another way…She has to twist [the curriculum]. I've learned to do that through her.

The structure of most programs' mentoring component leaves far too much to chance: availability of the mentor teacher to provide support, interest in supporting the participant above and beyond the call of duty, knowledge of how to work with adults, and individual teaching style. Most programs do not have a detailed process for selecting mentors, nor do they invest significant time or money into training mentors on what specific activities or supports are most effective in training new teachers. Some programs provide mentor training, but it is rarely focused on specific mentoring strategies. Further, most programs provide their mentors with only a nominal stipend, and little, if any, release time. For these reasons, quality and content of mentoring varied based on individual teaching style, interest, and personality of the mentor. With a larger investment in recruitment, selection, training, and compensation, programs could potentially remove some of the variability in mentoring.

The program components discussed this far, coursework, mentoring, and supervision, are often viewed as being within the direct purview of the alternative certification program. Another program component is the on-the-job training that is a direct result of participants working in schools. Although often not actively considered by the programs, the contexts of participants' placements, discussed next, matters.

► School Context

Following our initial school visits, we were convinced that school context played an important role in an alternative route teacher's development. Many alternative certification participants are placed in some of the most difficult schools. For example, in four of the five New York City schools we visited, fewer than half of the students met standards in English language arts or mathematics. Many participants across programs also reported that they were given the most challenging classes to teach. Across all programs, 20% of general education teachers' students qualified for special education. Similarly, 16% of their students were English language learners. One general education participant, for example, had 6 out of 21 students with individualized education plans, and another 6 who were English learners. Alternative certification participants also reported that they typically did not have opportunities to team teach, receive help from classroom aides, or have a special education teacher work with students

in their classroom. Overall, fewer than 20% of participants in our case study programs reported this kind of in-class support. The lack of in-class support added to the challenging experience of alternative certification participants. There is probably no precise recipe to create a school that helps alternative certification participant succeed, but our factor analysis of survey items identified collegial relationships, strong leadership, and adequate supplies and materials as important components.

We were particularly interested in collegial environments where the focus was on instruction, not just a school where teachers were polite to each other. Our factor analysis indicated that professional collegial environments were ones in which teachers analyzed student work samples together; sought each other's advice about instructional issues and problems; observed each other's classrooms and offered feedback and/or exchanged ideas; and discussed student assessment data to make decisions about instruction

The teacher professional communities in the participants' placement schools ranged from robust to nonexistent. While some programs such as TEI place greater percentages of their participants in school contexts with strong teacher professional communities, even TEI does not place all participants in strong collegial environments. Within single programs, then, participants may or may not have the opportunity to learn from and be supported by their colleagues.

Administrators, like teacher colleagues, can also serve as a source for growth, or can interfere with alternative certification participants' development. Our factor analysis identified schools with strong and supportive administrative leadership as ones in which the school administrators work to ensure that teachers have the supports they need to be successful; teachers trust the school administrators; and teachers and principals share opinions about instruction. Across all seven programs, two-thirds of participants reported that their school administrators worked to ensure that teachers have the supports they need to be successful. However, only 50% of participants reported that teachers in their school trust the school administrators. Thirty percent reported that their opinions about instruction were different from the principal's opinions.

As with other conditions, we found a great deal of variation in administrative support across and within alternative certification programs. For example, one alternative certification participant said that her principal had very little control of her school, as was apparent by the general lack of discipline in the school and the low teacher morale. Another participant described how a lack of administrative support has made her professional life more difficult:

> My AP is very unhelpful. She gives me useless crap that I'll never be able to use. She gave me bead patterns but no beads to go with them. She hasn't given me the photocopies I asked for. On Monday my paraprofessional was absent, and I had two boys throwing chairs around. I sent a kid to get her, and she refused to come get them.

In contrast, a participant in a supportive school described administrators who are available and helpful: "I can go to the principal of the school. I can just walk into his office. We have a grade leader who knows everything. She makes everything easy for you."

In addition to needing support from colleagues and administrators, alternative certification participants need appropriate materials and supplies for their classrooms. Many participants, however, are working in schools that do not provide the necessary materials for the job. Our factor analysis identified three indicators of adequate materials and supplies: having the

necessary textbooks and print resources to teach; being able to access instructional materials without buying them; and being able to access classroom supplies without buying them. Just over one-half of all participants reported that they have the necessary textbooks and print resources to teach. Less than half (42%) of participants across all programs reported that they can get instructional materials (e.g., lab supplies, math manipulatives, classroom library books) without buying them. Further, less than half (45%) of participants across all programs reported that they can get needed classroom supplies (e.g., paper, pencils, staples, tape) without buying them. The availability of materials influences what the participants feel they can do in the classroom. As one teacher said, "I cut out a lot of things that I would like to do with the kids because I know the final expense would be too great for me." Some participants spend a great deal of their own money buying materials and supplies for their classrooms. We heard estimates ranging from several hundred to several thousand dollars of personal money spent for professional purposes.

Each of these context variables—professional community, administrator support, and availability of materials—alone can influence teachers' development and their enjoyment of teaching. The combination of factors, however, can have a profound affect on how teachers perceive teaching and how much they are able to learn on the job. Next, we turn to an examination of how participant characteristics—educational background and previous teaching experience—and program characteristics—coursework, mentoring, and school context—contribute to different outcomes.

LINKING PARTICIPANT AND PROGRAM CHARACTERISTICS TO PROGRAM OUTCOMES

Because the variation in participant experiences within programs was sometimes as great as the variation between programs, we questioned our ability to determine characteristics of effective programs by simply comparing different programs. Consequently, we added the concept of "paths into teaching" to our analysis plan. The concept of paths into teaching, in essence, clusters groups of individuals across programs based on a set of common background characteristics and experiences. The descriptive analysis, provided above, illuminated the variables that seemed to impact teachers' experience. We focused our analysis of paths into teaching on those variables.

The variables we considered include academic background, previous teaching experience, perceived quality of coursework, frequency and value of mentoring, and school environment (see Exhibit 10 for more detail on these measures; for further elaboration, refer to Appendix B). Outcome measures include teacher self-efficacy, teacher reported growth, skills and knowledge, and career plans. Although our study did not include a student achievement component, we discuss the existing research on alternative certification and student achievement and the implications of our research on student achievement issues.

Exhibit 10
Paths into Teaching Variables

Academic background	We used Barron's 6-scale university selectivity ranking to measure the selectivity of participants' undergraduate institutions. In all analyses, levels 5 and 6 are considered "competitive," and levels 1 and 2 are considered "less competitive" universities.
Previous classroom experience	Participants are considered "experienced" if they have had 9 months or more previous experience as a classroom teacher, aide, or substitute and "inexperienced" if they have none. Those with less than 9 months of experience are only included in the regression analysis.
Perceived quality of coursework	Participants were asked to what extent they found their coursework both before and during the school year an important source of professional development. Those who rated their coursework "very" or "moderately" important on either measure are said to have had "valuable" coursework. All others are said to have had "poor" coursework.
Frequency of mentoring	We created a factor score that combined the frequency of nine mentoring activities. We consider those in the top quartile of the factor to have "frequent" mentoring, and those in the bottom quartile to have "infrequent" mentoring.
School environment	We created a factor score to measure the school environment, defined as administrator support, teacher professional community, and availability of materials. We consider those in the top quartile to have a "good" context, and those in the bottom quartile to have a "challenging" context.

Next, we describe each of these outcomes and the input variables that impact them.

► Teacher Retention and Alternative Certification

Research has shown that students of experienced teachers have higher student achievement gains than students of beginning teachers (Hanushek, Kain, & Rivkin, 1998). As a result, teacher retention is an important outcome measure of an effective program. The existing research on teacher retention among alternatively certified teachers is mixed; though it appears that some programs are more effective than others at identifying and preparing alternative route teachers who stay in the profession (Darling-Hammond, 1994; Dial & Stevens, 1993; Haberman 1999; Hutton, Lutz, & Williamson, 1990; Paccione, McWhorter, & Richburg, 2000; Stoddart, 1990; Wilson et al., 2001; Wise, 1994). The seven case study programs likewise varied in their ability to recruit and prepare teachers who stayed in the profession. Large programs like the New York City Fellows Program, NC TEACH, or the New Jersey program appear to have fairly high attrition rates, but it is not at all clear whether those rates are any better or any worse than traditional route teachers working in similar schools.

Different programs have different goals regarding teacher retention. For MMTEP, retention is a key goal and their strategy of recruiting teachers' aides is a conscious effort to develop individuals already committed to working in the Milwaukee public schools. In contrast, Teach For America's goal is leadership development, not teacher retention. Teach For America places bright young college graduates in hard-to-staff schools, asks for a two-year commitment, and fully expects its members to make significant contributions to the schools and to benefit from the experience in subsequent careers, whether in education or not. Some programs attract individuals who, at the outset, plan to stay in teaching, though the programs may not specifically recruit for this commitment. In Elk Grove's Teacher Education Institute, for example, candidates purposely seek out the program because they want to teach in the sponsoring district. Candidates understand that entering TEI enhances their chances of being hired in the district, a desirable place to work where job offers are quite competitive. Upon entering the program in the fall, more than three-quarters of TEI participants reported that they planned to teach for 10 years or more. By contrast, only 11% of Teach For America participants reported that they planned to teach for that long. In addition, nearly half of TEI participants reported that "teaching has always been their calling," compared to only 12% of Teach For America and 26% of NYC Fellows participants.

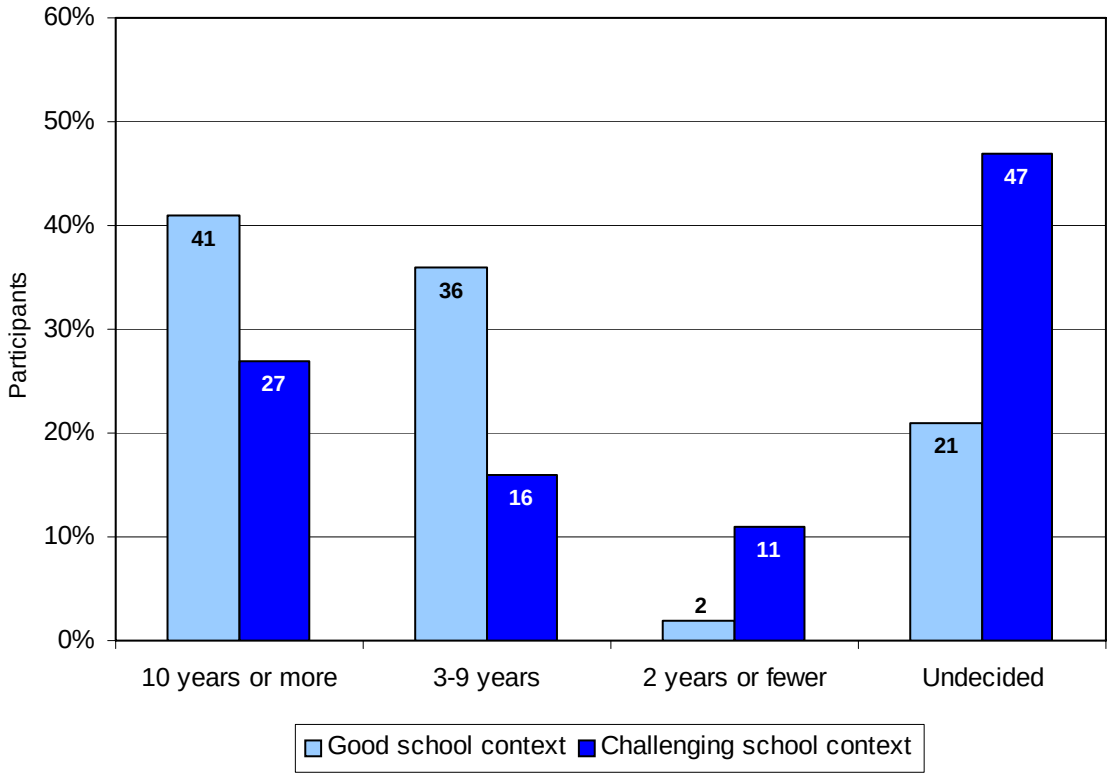
Thus, one way that programs can promote low attrition rates is to select individuals who are predisposed to a career in teaching. Besides the obvious finding regarding participant selection, we wanted to understand other participant and program features that contribute to high retention rates. We found that school context, coursework, and undergraduate institution selectivity all contributed to participants' career plans.

School context and predicted retention

At the end of the first year in their programs, those participants who were working in a positive school environment (i.e., they had a supportive principal, adequate supplies and materials, and a strong professional community) had the most positive outlooks for retention (see Exhibit 11). Specifically, participants who worked in good school contexts were significantly more likely to have decided to teach three or more years than participants who worked in challenging school contexts. At the same time, participants who worked in challenging school

contexts were far more likely to be undecided about their future career plans than participants working in good school contexts.

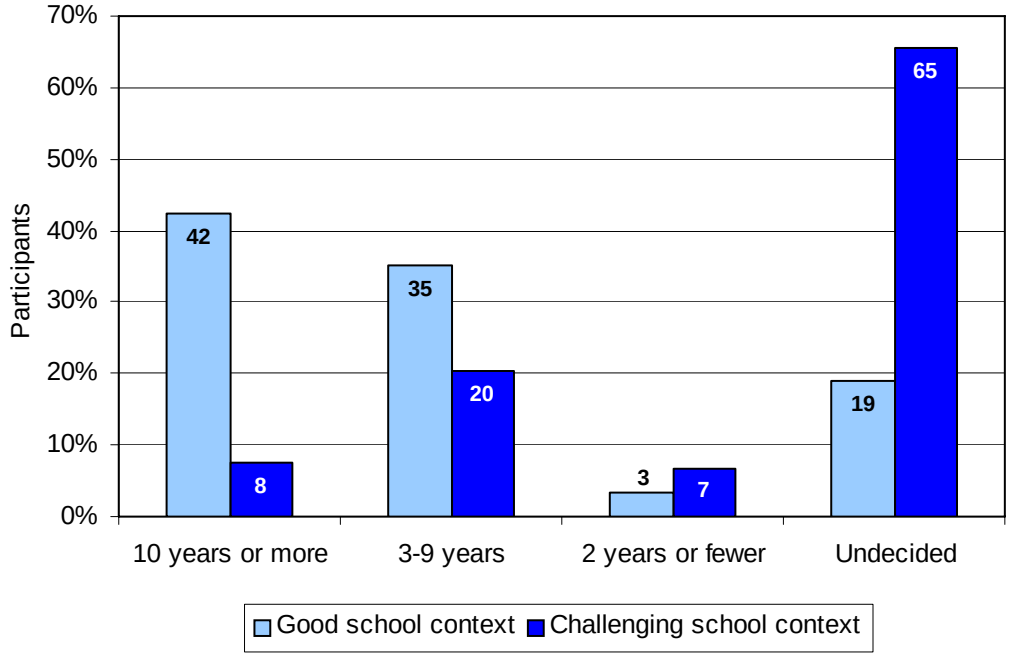
Exhibit 11
Participants' Teaching Plans After 1 Year in the Program, by School Context**



**p < .01.
Source: SRI Survey of Alternative Certification Program Participants (2004).

Perhaps even more telling was the effect of school context on those participants who were undecided about their career plans when they began their program. Participants who were undecided in the fall were significantly more likely to have decided to make a career out of teaching if they worked in a good school context than in a challenging school context (see Exhibit 12). In fact, nearly two-thirds of participants who were undecided in the fall remained undecided in the spring if they had worked in a challenging school context.

Exhibit 12
Teaching Plans of Participants Who Were Undecided in the Fall After 1 Year in the Program, by School Context***



***p < .001.
Source: SRI Survey of Alternative Certification Program Participants (2004).

Although school context was the most important factor in participants' career plans, those with valuable coursework and those from less competitive universities were planning for a career in teaching. Forty percent of participants who received valuable coursework planned to teach 10 years or longer, compared to only 22% of those who received less valuable coursework. Those from less competitive universities also planned a longer career in teaching than those from more competitive universities; 61% versus 23% planned to teach for 10 years or more, respectively. This finding should be interpreted with caution, however. Teach For America and the New York City Teaching Fellows Program have a greater percentage of participants from competitive universities, and both programs only require a 2-year commitment. Further, many participants from the most competitive universities plan to pursue a career in government or a non-profit related to education; over 25% of participants from competitive universities plan to pursue such a career, compared to less than 2% of those from less competitive universities.

Other factors such as participant reports of quality mentoring and previous teaching experience did not appear to have as much of an influence on participants' career plans. Readers should be careful not to over-interpret these findings, however. While mentoring did not appear to have an impact on participants' career plans, our earlier analysis of the mentoring showed that only a small minority of participants received the kinds of mentoring support that they found most valuable. Similarly, while having experience in the classroom did not seem to influence participants' plans, teaching experience did impact participants in other ways, discussed below. Rather than suggesting that mentoring does not influence retention, our finding is that the quality of the school placement is key to increasing the retention of alternative certification participants.

► Participant Skills and Knowledge

A complicated outcome we measured was teacher candidates' skills and knowledge. Teacher knowledge includes both command of the subject matter to be taught and the knowledge of how to teach that particular subject matter, sometimes referred to as pedagogical content knowledge (Shulman, 1987). Measuring teachers' knowledge is a challenging task. We needed instruments that were not only reliable and valid, but that were sensitive enough to measure differences among respondents and changes in respondents over time.

To increase the precision of our survey, we borrowed items from the Study of Instruction Improvement (SII) being conducted by researchers at the University of Michigan (Deborah Ball, David Cohen, and Brian Rowan, Principal Investigators). SII researchers have developed a bank of survey items that measure teachers' pedagogical content knowledge in reading/language arts and mathematics at the elementary level (see, for example, Hill, Schilling, & Ball, 2004; Phelps & Schilling, 2004). Our intent in using the SII items was to use already field-tested items.

The SII items have been tested extensively and have been tied to such outcomes as student achievement and classroom practice. Tests on the items measuring reading knowledge suggest that they do effectively measure pedagogical content rather than simply reading ability. A recent study reported that teachers and non-teachers showed no significant difference in common reading ability; however, teachers scored significantly higher than non-teachers on the measure of content knowledge for teaching reading (Phelps, 2005). Another study has recently shown a positive relationship between teacher pedagogical knowledge in mathematics and student achievement (Hill, Rowan, and Ball, 2005).

Although the items in use are tested and reliable, we present these data with several caveats. First, the survey items were not developed for novice teachers, though novices are the target population of this study. Thus, the survey items had been thoroughly tested for reliability and validity by the developers, but they had not been tested for the specific population of teachers we surveyed. Second, we were limited in the number of knowledge questions we could pose in our survey. Because our survey was more comprehensive, asking about background, program experiences, attitudes and beliefs, and pedagogical content knowledge, we had to select a sample of questions in the broader area of knowledge to keep the survey to a manageable size. From the bank of items, we selected 6 reading testlets (comprising 29 questions), and 10 math testlets (comprising 31 questions), varying in content and difficulty. Further, the questions were not matched to the teacher preparation curricula of the various programs. The questions capture a range of knowledge used by elementary school teachers, but are not necessarily taught by the seven alternative certification programs.

In addition, the use of these items had several implications for our sample. First, since the survey items were developed for elementary school teachers, we present data for this population of teachers only. Thus, our sample size in some of the programs is notably decreased, and there are no measures for NC TEACH participants, since that program only prepares secondary school teachers. Second, our design called for surveying participants at the beginning of their program and again at the end of the first year. For several of the programs we were able to survey participants within their first week of training. For a few, however, we were not able to administer the preprogram survey until part-way through the first year. So, for example, Texas Region XIII and MMTEP participants had essentially no training at the administration of the first survey. Some New York participants, on the other hand, had already completed their summer

training prior to completing the survey. Differences in initial scores and growth scores could be contributed, in part, to the variances in the timing of when the initial survey was administered.

We conducted a factor analysis of the pedagogical content knowledge items and found that the items comprised three distinct constructs.[4] The first factor, *content knowledge*, measures reading and mathematics content knowledge not specifically related to knowledge about teaching. The second factor, *reading pedagogy*, measures teachers' knowledge of strategies for teaching reading. The third factor, *mathematics pedagogy*, measures teachers' ability to understand students' thinking in mathematics. We also found a single factor solution, that we use to discuss overall pedagogical content knowledge.[5]

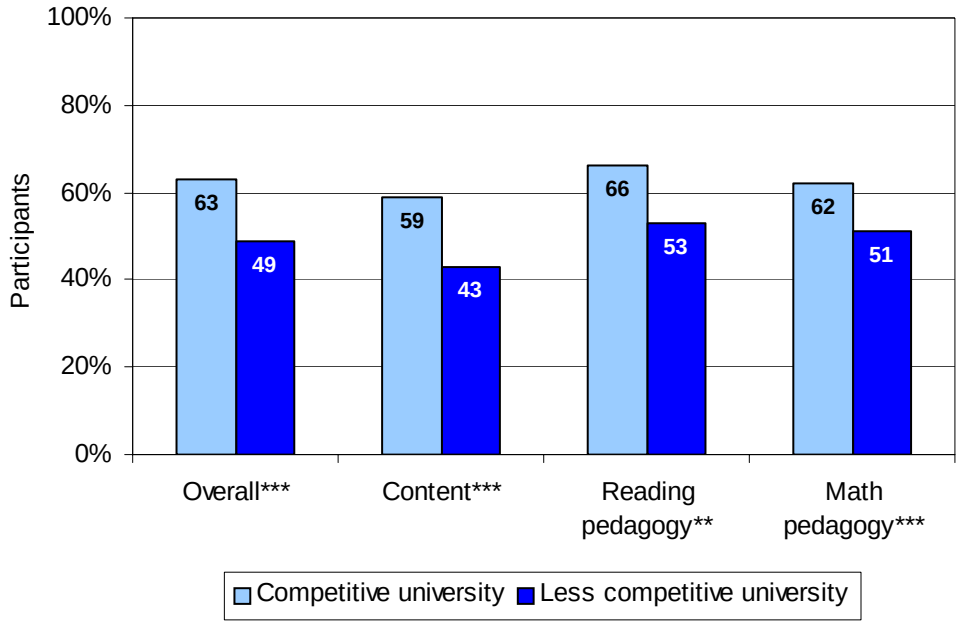
We were interested in measuring participants' knowledge both in the fall and in the spring. The fall measures are important because they represent what the participants initially bring to their students. We hypothesized that there were two factors that could possibly impact fall knowledge measures—participants' intellectual competencies (either innate or learned), or their previous experience in classrooms—since the knowledge measures were both of content and of understanding students and pedagogy. The spring measures provide insight into the contribution of the alternative certification program to participants' knowledge growth.

In order to determine the relationships between multiple variables, we used a stepwise regression analysis (for results of the regression analysis, see Appendix B). We found that only university selectivity (our proxy measure for participants' intellectual competencies) made a difference in participants' fall knowledge measures. Specifically, participants who had attended a competitive university scored significantly higher on all knowledge factors than participants who attended a less competitive university (see Exhibit 13). On the overall knowledge factor, the mean percentage of correct items for those who attended highly competitive universities was 63%, compared to 49% for those who attended less competitive universities. On the subfactors, the greatest difference was in reading and mathematics content. We found no significant differences in knowledge measures between participants with or without previous classroom experience.

[4] For further information on the analysis, including factor loadings, fit statistics, and factor score calculations, see Appendix B.

[5] Note that the factors we identified differ somewhat from the factors identified by the item developers at the University of Michigan.

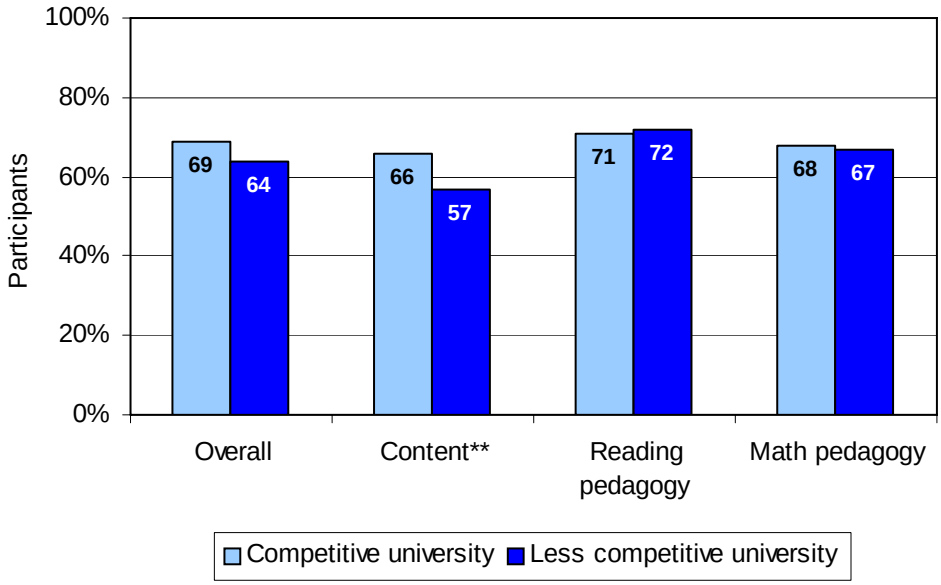
Exhibit 13
Percent of Knowledge Questions Correct in the Fall, by University Selectivity



***p < .001, **p < .01.
Source: SRI Survey of Alternative Certification Program Participants (2003).

In the spring, the differences in knowledge scores between participants who attended highly competitive and less competitive universities were less prominent and no longer significant, with one exception. On the content measure, participants who attended highly competitive universities, on average, had more items correct than those who attended less competitive universities (66% vs. 57%, respectively, see Exhibit 14). Thus, most initial differences in knowledge due to intellectual prowess are eliminated by the end of the first year of teaching, with the exception of content knowledge. Pedagogical knowledge, both in reading and mathematics, is essentially equivalent for all participants, regardless of their incoming scores.

Exhibit 14
Percent of Knowledge Questions Correct in the Spring, by University Selectivity



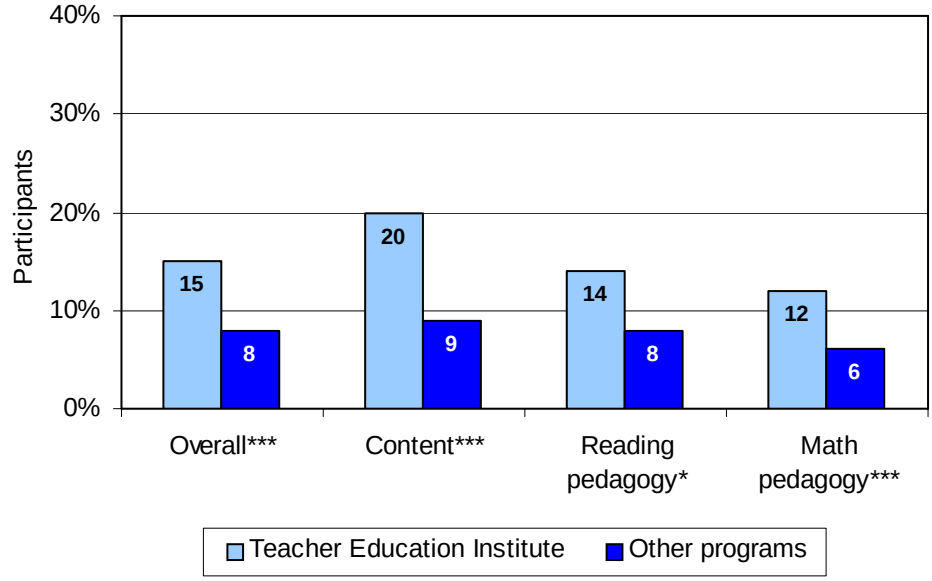
**p < .01.
Source: SRI Survey of Alternative Certification Program Participants (2004).

The pertinent question raised, thus, is what contributes to participants' growth? At the outset of the analysis, we hypothesized that many additional variables could impact teacher pedagogical content knowledge: school context, valuable coursework, high-frequency mentoring, classroom experience, in addition to university selectivity. In our regression analysis on the spring knowledge score, we found, with the exception of university selectivity, that none of the variables had a substantive impact on teacher knowledge.[6]

Recognizing that survey measures of such complicated concepts as high-quality coursework and mentoring might not be sensitive enough to fully capture the variation of treatment that participants received, in the regression analyses we also included a program variable that could account for differences in programs that may not have been captured by the other variables. We found that the growth in the percent of knowledge questions correct was significantly greater for participants in Elk Grove's Teacher Education Institute (TEI) than in all other programs (see Exhibit 15). Overall, TEI participants grew 15% compared to 8% for participants in all other programs. In raw numbers, this means that TEI participants, on average, answered eight more questions correctly in the spring than in the fall. Participants in other programs, on average, answered four more questions correctly. There was a significant difference in all subfactors as well.

[6] Coursework, context, and frequency of mentoring showed a weak but significant relationship with spring knowledge scores. Where a relationship was found, only approximately 1% of variance was explained. See Appendix B for more detail.

Exhibit 15
Percent Improvement in Knowledge Questions Correct, Teacher Education Institute vs. All Other Programs



***p < .001, *p < .05.
Source: SRI Survey of Alternative Certification Program Participants (2003, 2004).

We surmise that the strong growth apparent in the TEI program is due to several factors. First, participants in this program have more of an opportunity to learn because of their apprenticeship. During their two semester-long practicums, they have the opportunity to watch several other master teachers lead classrooms and they have the opportunity to discuss the content of the lessons and the pedagogical strategies. Second, TEI coursework has an early and consistent focus on literacy; every academic quarter interns take courses ranging from early literacy development to strategies for second language acquisition. This course of study is in contrast to programs like the New Jersey program, which, at the time of this study, did not appear to provide significant formal training in reading or math knowledge or pedagogy.

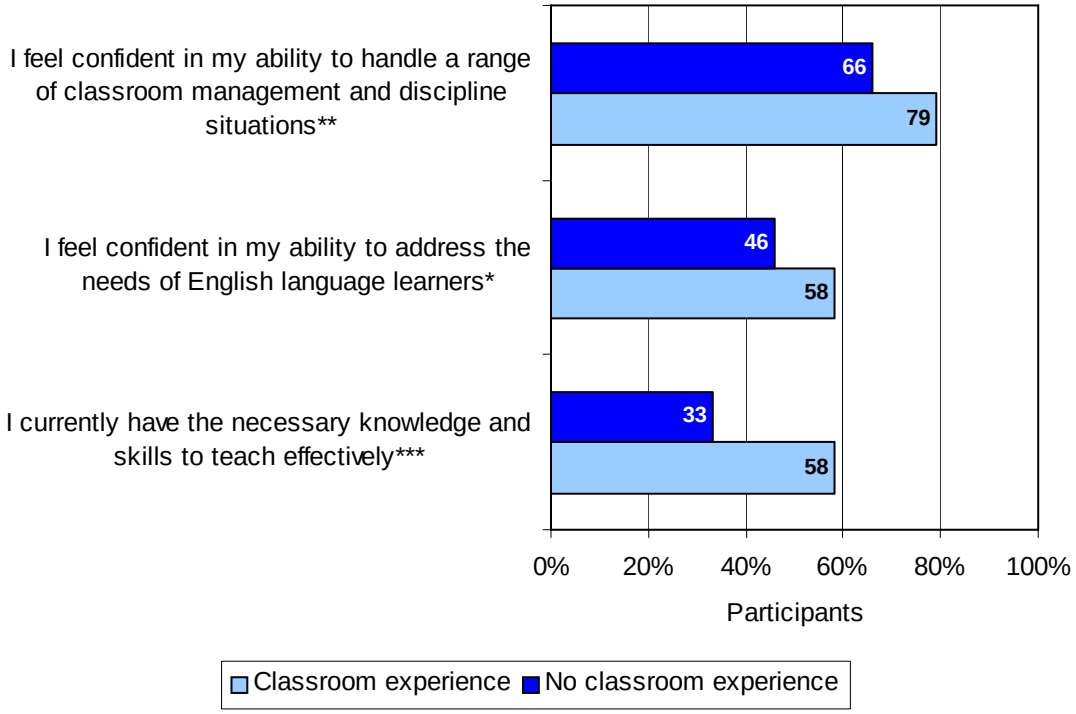
► Teacher Efficacy

Another outcome variable we analyzed was teachers' self-efficacy. Teachers' self-efficacy and confidence are important to foster early in the career, concludes Darling-Hammond, Chung, and Frelow (2002). Reviewing literature on teacher efficacy, Tschannen-Moran, Hoy, and Hoy (1998) reported that self-efficacy has been found to be related to student achievement, motivation, and students' sense of efficacy.

Teacher efficacy was impacted by three input factors: teacher experience, school context, and coursework. We measured teacher efficacy both at the beginning of the programs and again at the end of participants' first year. Because alternative certification participants begin teaching prior to receiving a majority of their training, we were curious about their efficacy going into their programs. We found that alternative certification participants who had prior experience in a classroom were significantly more likely to be confident in their teaching abilities than participants with no classroom experience. Specifically, teachers with experience felt more

confident with classroom management, their ability to address the needs of English language learners, and their general ability to teach effectively (see Exhibit 16). The selectivity of their undergraduate university did not appear to affect teacher efficacy.

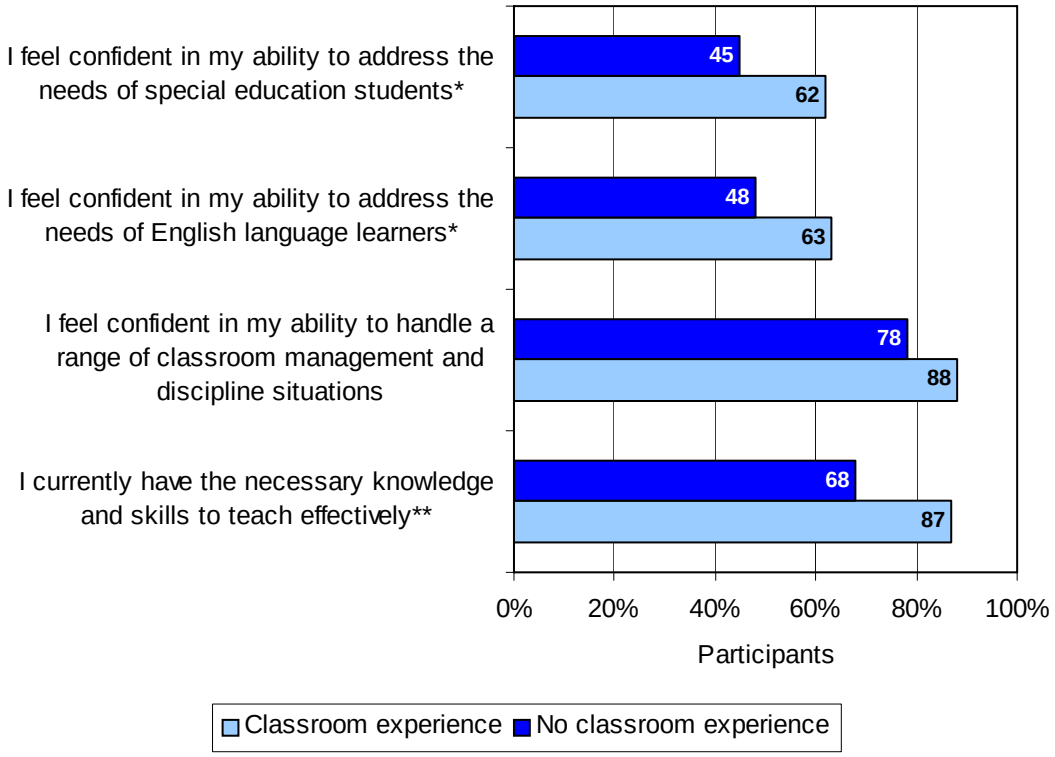
Exhibit 16
Percent of Participants Agreeing with Various Statements about Self-Efficacy in the Fall, by Experience



***p < .001, **p < .01, *p < .05.
Source: SRI Survey of Alternative Certification Program Participants (2004)

The impact of having prior classroom experience continued throughout the first year of the program. In the following spring, just as in the fall, teachers who had prior classroom experience felt more confident in their teaching abilities that those with no prior classroom experience (see Exhibit 17). Over four-fifths (87%) of participants with prior classroom experience reported that they have the necessary knowledge and skills to teach effectively, compared to just over two-thirds (68%) of participants with no such experience.

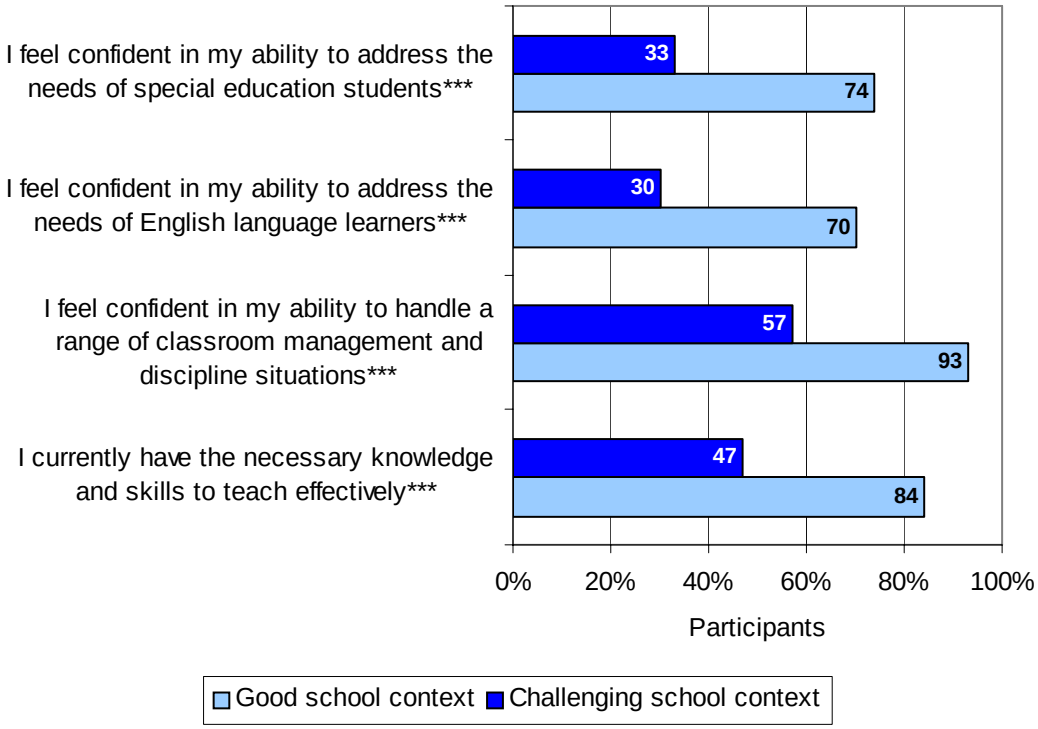
Exhibit 17
Percent of Participants Agreeing with Various Statements about Self-Efficacy in the Spring, by Experience



**p < .01, *p < .05.
Source: SRI Survey of Alternative Certification Program Participants (2004).

School context, like prior teaching experience, also impacted teacher efficacy. A supportive context can be empowering, making teachers feel like they have the skills and knowledge to be successful in the classroom. A challenging school context, on the other hand, can make alternative certification participants question their own abilities. On all four of the efficacy measures, participants in good school contexts had stronger feelings of efficacy than teachers in challenging school contexts (see Exhibit 18). They feel more confident in their ability to address the needs of special education students (74% vs. 33%, respectively) and their ability to address the needs of English language learners (70% vs. 30%). They also had more confidence with regard to their classroom management (93% vs. 57%), and in their knowledge and skills to teach effectively (83% vs. 47%).

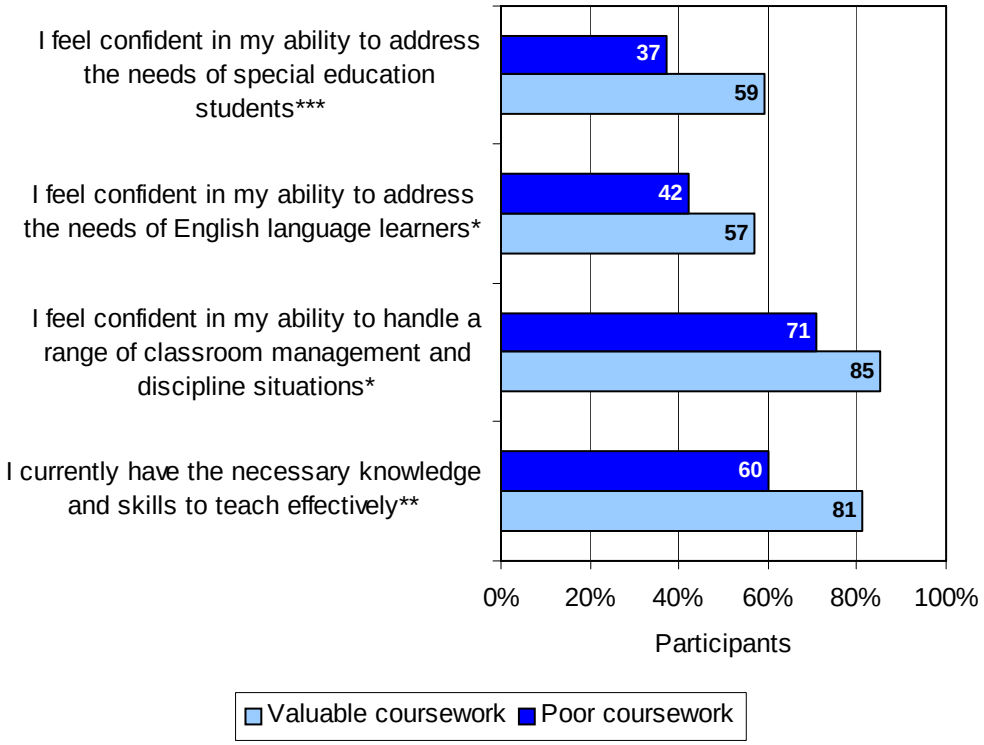
Exhibit 18
Percent of Participants Agreeing with Various Statements about Self-Efficacy in the Spring, by School Context



***p < .001.
Source: SRI Survey of Alternative Certification Program Participants (2004).

Coursework, too, had an impact on teacher efficacy. Alternative certification participants who felt that their coursework was valuable were significantly more likely to have stronger feelings of efficacy than teachers who reported their coursework as not valuable (see Exhibit 19). As with context, coursework impacted all measures of teacher efficacy.

Exhibit 19
Percent of Participants Agreeing with Various Statements about Self-Efficacy in the Spring, by Value of Coursework



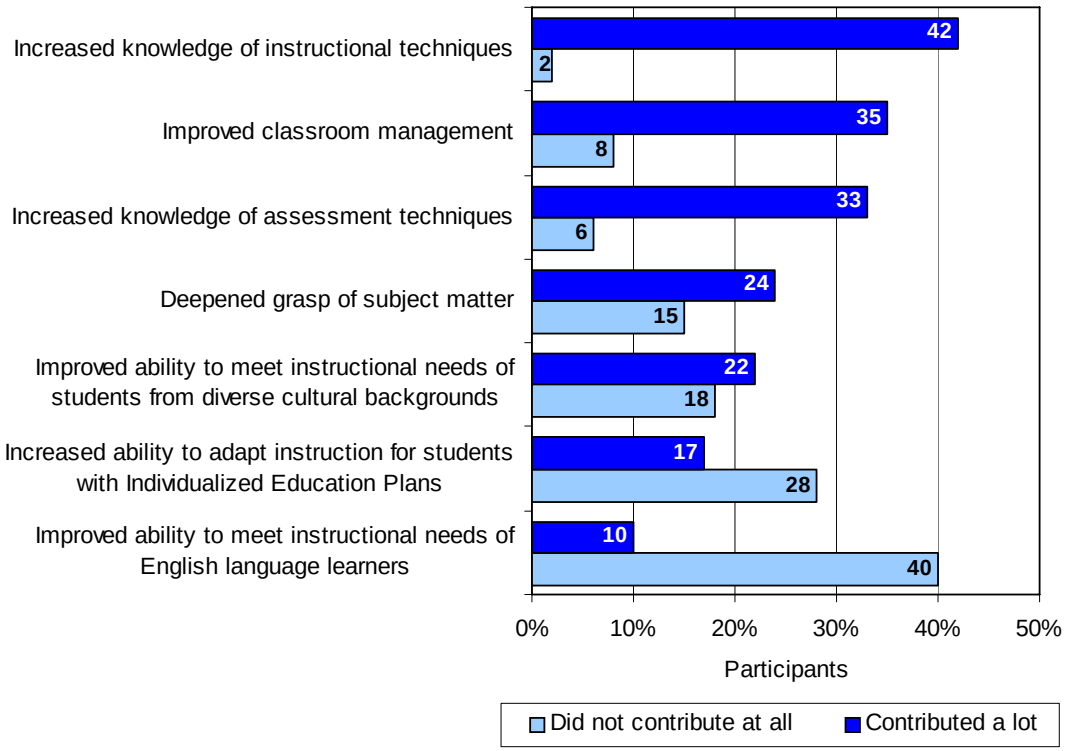
***p < .001, **p < .01, *p < .05.
Source: SRI Survey of Alternative Certification Program Participants (2004).

► Teacher Reported Outcomes

The last set of outcome measures we analyzed was teachers' self-reports on the contributions their programs made to their development. We asked about growth in many areas, including their instructional and assessment techniques, classroom management, subject matter knowledge, and their ability to meet the instructional needs of special student populations. Obviously there are limitations to self-reports, particularly for new teachers who may not have the foundation or experience from which to judge their own growth. However, they do provide insights into what the participants believe they gained from their experiences in the programs.

Across all seven programs, the areas in which the teachers reported experiencing the most growth were in instructional techniques and classroom management. Forty-two percent of participants reported growing a lot in instruction; 35% reported growing a lot in classroom management (see Exhibit 20). The area of least development across all programs was preparing participants to work with special student populations. In fact, 40% of participants reported that their programs did not improve their ability to meet the instructional needs of English language learners at all, and over one quarter (28%) reported that their programs did not increase their ability to adapt instruction for special education students at all.

Exhibit 20
Percent of Participants Reporting that Program Supports Contributed to Their Growth in Various Areas

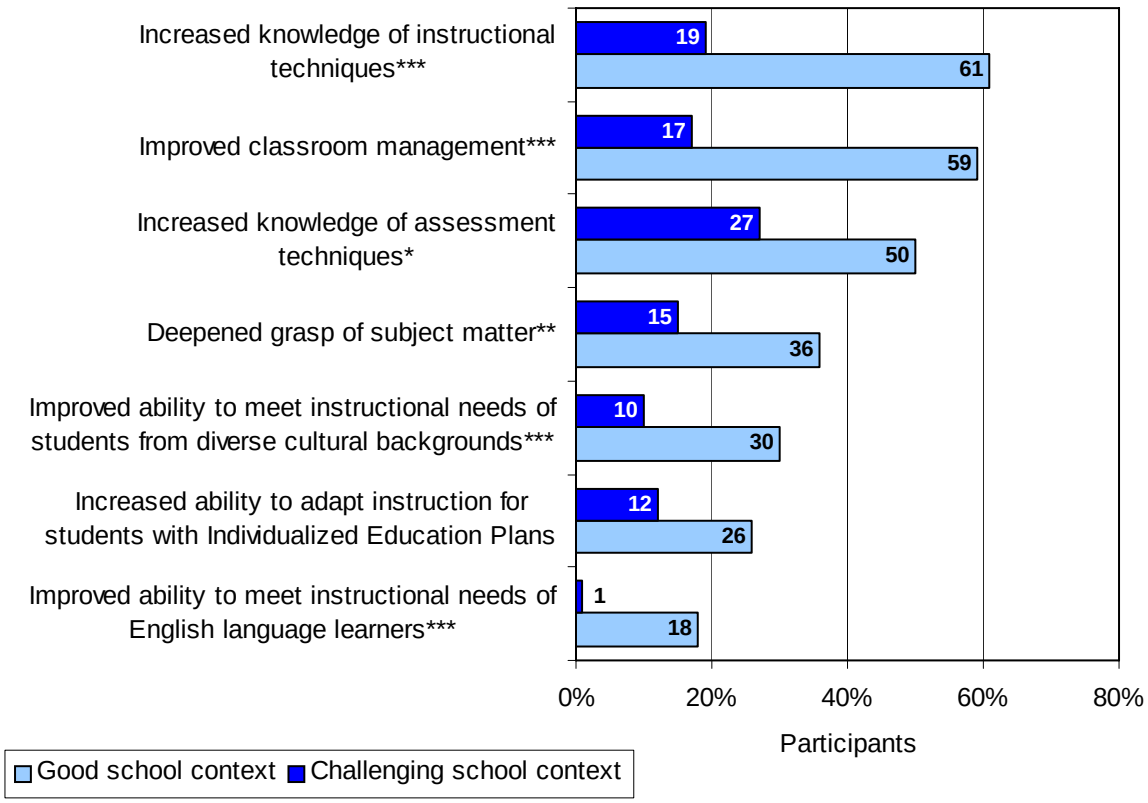


Source: SRI Survey of Alternative Certification Program Participants (2004).

The paths into teaching analysis revealed three contributing factors to teachers' reported growth: school context, coursework, and mentoring. Two factors we explored did not appear to impact teachers' reported growth: previous classroom experience and university selectivity.

School context had the greatest impact on participants' self-reported outcomes. Alternative certification participants working in good contexts reported significantly greater gains than participants in challenging school contexts. Context impacted all self-reported outcomes variables except one: increasing teachers' ability to adapt instruction for special education students. The difference between teachers in good and challenging school contexts was especially apparent in the knowledge they gained from their programs about instructional techniques, classroom management, and assessment techniques. Whereas nearly two-thirds (61%) of participants in good school contexts reported that their program increased their knowledge of instructional techniques a lot, less than one-fifth (19%) of participants in challenging contexts reported the same. Likewise, 59% of participants in good school contexts and only 17% of participants in challenging contexts reported that their program improved their classroom management a lot (see Exhibit 21).

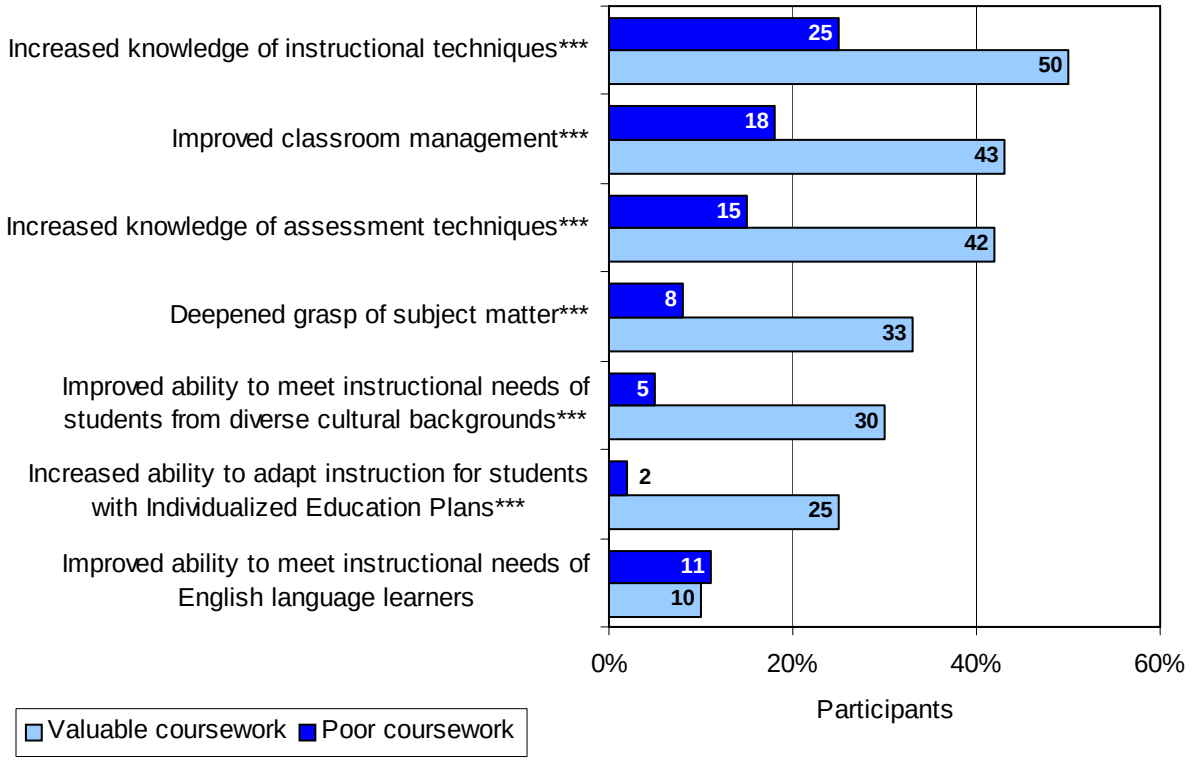
Exhibit 21
Percent of Participants Reporting "A lot" of Growth in Various Areas, by School Context



***p < .001, **p < .01, *p < .05.
Source: SRI Survey of Alternative Certification Program Participants (2004).

Despite the bad press that much teacher preparation coursework receives, there were significant differences in teachers' self-reports of growth between those who identified their coursework as valuable and those who reported their coursework to be of no value. With the exception of improving participants' ability to meet the instructional needs of English language learners, coursework seemed to make a difference (see Exhibit 22). Significantly more teachers who identified their coursework as valuable than those who identified their coursework as not valuable reported that their program increased their instructional techniques a lot (50% vs. 25%, respectively), increased their knowledge of assessment techniques (42% vs. 15%), and improved their classroom management (43% vs. 18%). On one outcome—increasing teachers' abilities to adapt instruction for students with Individualized Education Plans—coursework was the only input variable to show a difference. Clearly alternative certification participants feel that good coursework is beneficial to their growth.

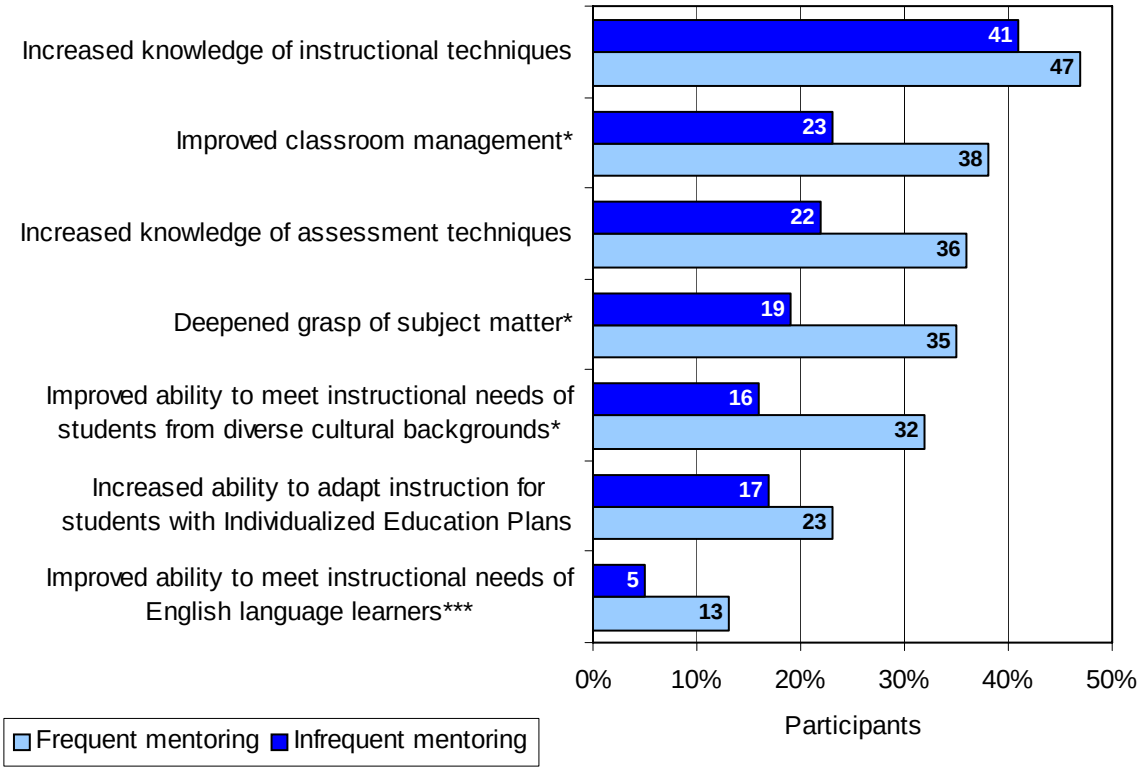
Exhibit 22
Percent of Participants Reporting "A lot" of Growth in Various Areas, by Value of Coursework



***p < .001.
Source: SRI Survey of Alternative Certification Program Participants (2004).

Despite the heavy emphasis placed on mentoring by many of the programs and by the literature on alternative certification, mentoring impacted fewer self-reported growth outcomes than either school context or coursework. Alternative certification participants with more frequent mentoring reported that their program impacted their subject matter knowledge, their ability to meet the instructional needs of English language learners and students from diverse cultural backgrounds, and their classroom management (see Exhibit 23). Given that coursework does not appear to impact teachers' instructional abilities for English language learners, it is important that frequent mentoring can contribute to teachers' growth in this area.

Exhibit 23
Percent of Participants Reporting "A lot" of Growth in Various Areas, by Frequency of Mentoring



***p < .001, *p < .05.
Source: SRI Survey of Alternative Certification Program Participants (2004).

Despite the limits of teacher self-reports, we did find strong connections between teacher growth and a variety of program inputs.

► Student Learning and Alternative Certification Teachers

The contribution of alternative certification teachers to their students' learning is both the most important outcome of an effective alternative certification program and the most difficult to accurately measure. Thus far, there is no definitive research on alternative certification teachers and student achievement. Conducting a large scale student achievement study was beyond the scope of this study. And, although this study had hoped to draw on existing research of the seven case study programs, we found no solid studies that could adequately address questions about student achievement.

Existing studies of the relationship between a teacher's route into the profession and student achievement gains are the subject of considerable controversy. Although there is solid research showing, for example, that students in mathematics classes learn more from teachers with mathematics certification, studies have not yet shown whether the type of mathematics certification (standard, alternative, emergency) makes a difference (Goldhaber & Brewer, 2000). Several reports reveal no significant differences in student performances by students of teachers

with different types of certification (Miller, McKenna, & McKenna, 1998; Stafford & Barrow, 1994). Other studies have found differences. Laczko-Kerr (2002) found that the students of Teach For America (TFA) participants performed similarly to other under-certified teachers yet did not perform as well as the students of certified teachers. Raymond, Fletcher, and Luque (2001) found that TFA participants in Houston produced more positive learning gains, and with greater regularity, than did other new teachers and all other teachers in the district, regardless of years of experience. This study has been criticized on methodological grounds, however (Laczko-Kerr, 2002; National Commission on Teaching and America's Future, 2001).[7] Further, Darling-Hammond, Holtzman, Gatlin, and Heilig (2005) reanalyzed the Houston data and reached the opposite conclusion. They found that certified teachers consistently produce significantly stronger student achievement gains than do uncertified teachers. In addition, they found that alternatively certified teachers, including Teach For America teachers, were generally less effective than certified teachers at raising student achievement. Not surprisingly, the study received sharp criticism from proponents of Teach For America.

Another recent study of alternative certification and student achievement employed an experimental design that compared achievement scores of students randomly assigned to either a Teach For America teacher or another novice or veteran teacher in the same elementary school (Decker, Mayer, & Glazerman, 2004). The study found that students of Teach For America teachers outscored the control group of non-Teach For America teachers by three percentile points on the mathematics portion of the Iowa Test of Basic Skills. In addition, students of Teach For America teachers scored about the same as the control group on the reading portion of the exam. Critics of the study raised concerns about the comparison group and pointed to the low achievement levels of both groups of students, and argued that the study's conclusions should have called into question the efficacy of Teach For America as a strategy to remedy to such low student achievement (Darling-Hammond et al., 2005; Viadero, 2004).

Our study was designed to draw on local program evaluations, but was not designed to collect original data on student achievement. While the there were at least three studies of Teach For America (described above), we found no other comparable student achievement studies on the other six programs we examined. However, our examination of alternative certification programs and participants raises serious questions about the value of student achievement studies that try to compare traditional and alternative certification programs, or compare different alternative certification programs. Despite the desire of both researchers and policymakers to have definitive student achievement studies of alternative and traditional certification, our research suggests that the variation within programs and among participants is so great that the program is probably the wrong unit of analysis. We suspect that until researchers can figure out how to cut down on the variation, we will continue to see student achievement studies that contradict each other or show minor differences. If student achievement studies are to better inform efforts to improve teacher preparation, then the studies will need to understand how the

[7] The National Commission on Teaching and America's Future (2001) criticized the study (2001) on a number of factors including the "extraordinarily unqualified group of new hires" (p. 2) against which the TFA candidates were compared. All of the TFA teachers were college graduates while in only one of the five years of the study did all of the other new teachers possess college degrees (they ranged from 65% to 94%). Additionally, all of the TFA teachers were enrolled in the alternative certification program but it is unknown how many of the non-TFA teachers participated in the alternative certification program. Further, it is unknown how many non-TFA teachers had received certification prior to starting in the district. Laczko-Kerr (2002) recommends dismissing this TFA study due to lack of scientific rigor as the data are not available for independent verification.

mix of a participant's education, background, experience, preservice coursework, school context, mentoring support, and inservice coursework combines into a path into teaching that is more or less effective at promoting student learning. Simply comparing student achievement of teachers from one program to another wrongly assumes that the program will be implemented as designed, the participants will experience the program in the same ways, and that the participants arrive at the program at the same starting point. Ultimately, the variation within programs is as great as the variation across programs, rendering program to program comparisons unhelpful.

While a complex study of teachers' paths into the profession would be a major contribution to the field, the contributions of individual inputs to various outcomes uncovered in our research have implications for improving student achievement. As we pointed out earlier, teacher retention, subject matter knowledge for teaching, and teacher efficacy have all been shown to be associated with higher student achievement. Thus, our findings suggest that an alternative certification programs that can produce new teachers who will stay in teaching for more than a few years, demonstrate subject matter knowledge for teaching, and have strong teacher efficacy are much more likely to produce student achievement gains than those who do not.

Next, we review the results of our paths into teaching analysis and discuss the implications of the findings for the development of effective alternative certification programs.

► Summary of Outcomes

Exhibit 24 summarizes the findings of our analysis of paths into teaching. An empty box does not mean that the input did not matter. Rather, our analysis revealed that each input factor contributed in some way, and that some input factors appeared to contribute a great deal to some positive outcomes. Next, we discuss each of the factors and the implications of each for alternative certification programs.

Exhibit 24
Factors Associated with Positive Outcomes

	Undergraduate university selectivity	Previous classroom experience	School context	Coursework	Mentoring
Pedagogical content knowledge	X				
Retention			X		
Efficacy		X	X	X	
Reported growth			X	X	X

School context

Most notably, alternative certification participants who worked in a school with strong leadership, adequate supplies and materials, and a collegial work environment were more likely to plan to stay in teaching, had more confidence in their teaching skills, and had a stronger sense of improvements in their teaching than those that worked in challenging schools. Clearly, placement matters.

Our case studies underscored this point through powerful, personal stories. We observed and interviewed teachers who were overwhelmed by their school's environment, which featured unruly and undisciplined students, an absence of leadership, dreary facilities, a lack of basic supplies and materials, isolated teachers, little evidence of student learning, and fear and mistrust. Although we did find some examples of alternative certification teachers who were managing in such schools, more often we found individuals who were exhausted, frustrated, and ready to quit. Three of the teachers from our original sample did quit before the year was out, and each was working in a highly dysfunctional school. Many more who were working in such schools reported that they planned to leave at the end of the school year.

By contrast, in other schools that served similar populations of students we found alternative certification teachers who were equally exhausted, but positive about their teaching and their decision to pursue an alternative route. These teachers pointed to the help they received from the school leadership and their colleagues, and the overall school climate. In these schools, the principal presented a clear vision of where the school was headed, books and materials were ample, the building was clean and well-maintained even if it was old, the interactions between teachers was positive and friendly, and student learning seemed to be underway.

Alternative certification programs are likely to face a big challenge in ensuring that their participants are placed in schools where they have an opportunity to learn and succeed. Many programs exist to ameliorate local teacher shortages. If a program's purpose is to find people to work in hard-to-staff, often dysfunctional, schools, it is unlikely they have much control over placement decisions. But, our findings are quite clear: a good school context is the most pervasive contributor to positive outcomes for teachers. Thus, an effective alternative certification program should make the placement of its participants a primary focus.

Valuable coursework

Despite some critics' negative assessment of the coursework involved in preparing teachers, coursework made a major contribution to teachers' sense of efficacy and the growth of their skills and knowledge. Although we did not analyze the content of coursework they received, our analysis of the course requirements, observations of classes, and interviews with participants suggested that much of the coursework tried to be relevant to the immediate needs of the participants.

From our case studies, we found that the value of the coursework was directly tied to other factors in the participants' experiences. Just as previous teaching experience appeared to contribute to teacher efficacy, it also appeared to provide a framework for understanding and application of the coursework. In addition, school context also appeared to play a role. Teachers

in challenging school settings appeared to be at a disadvantage in applying the lessons of the coursework.

Coursework also had its limits. Few alternative certification participants reported that their coursework contributed greatly to their ability to teach special education students and English language learners. In addition, coursework alone did not appear to contribute to improvements in teachers' subject specific knowledge of reading and mathematics or their pedagogical content knowledge in those areas.

Thus, our evidence suggests that an effective alternative certification program should have a carefully crafted and well-timed sequence of coursework that is relevant to the challenges facing alternative certified teachers. Much more needs to be known about the characteristics of effective coursework and the other factors (classroom experience, school context) that enable the participant to apply the coursework. Programs would benefit from more attention to the specific skills and knowledge associated with teaching different subject areas.

University selectivity and teaching experience

Other research has demonstrated that a strong educational background can translate into student learning gains (at least in mathematics). And common sense tells us that having well-educated teachers is desirable for many reasons. Our research found that education background does contribute to performance on measures of pedagogical content knowledge. This finding is particularly important as other research suggests that subject knowledge for teaching is related to student achievement (Hill et al., 2005). At the same time, it is notable that educational background did not appear to be a factor in teachers' efficacy, predicted retention, or self-reports of growth. Regardless, effective alternative certification programs should select well-educated individuals or take steps to strengthen candidates' subject matter knowledge and knowledge about teaching.

In addition, previous teaching experience contributed to teachers' sense of efficacy. Because teacher efficacy has been shown to be related to student achievement, individuals with significant classroom experience bring a set of attitudes and beliefs that may enhance their performance in an alternative certification program. However, participants with previous classroom experience were no more likely to have plans to stay in teaching than participants without previous classroom experience. At the same time, previous teaching experience did not appear to have an effect on pedagogical content knowledge. This was somewhat surprising as in other research, experienced teachers scored better on measures of pedagogical content knowledge than other groups. It may be that the amount of previous classroom experience of the alternative certification participants was not enough to make a difference on the assessment. The role of previous teaching experience in preparation of teachers in alternative certification programs requires more research. At the very least, our findings suggest that the needs of experienced and inexperienced candidates differ, and effective alternative certification programs recognize their differences. Programs need to tailor support to each group's particular needs if more positive outcomes are to be realized.

Mentoring

Given the importance that programs place on mentoring, it is disappointing to see somewhat limited contributions of mentoring on the outcome measures. Frequent mentoring was

an important factor in teacher reported growth in various areas of teaching skills and knowledge, but it did not appear to be a factor in the other outcome areas—predicted retention, pedagogical knowledge, or efficacy. Although much more needs to be known about mentoring, our hypothesis is that much of the mentoring that participants received was of low quality. Only a small fraction of participants reported that their mentoring was very frequent or provided the kinds of assistance that they most valued. That said, mentoring still remains a key characteristic of an effective alternative certification program. What is missing is a concerted effort by programs to provide the training and resources mentors need to be effective.

► Conclusion

Our findings indicate that an effective alternative certification program is careful to place candidates in school settings that feature strong leadership, a collegial atmosphere, and adequate supplies and materials. Only the most exceptional candidates can succeed in dysfunctional schools. Effective alternative certification programs select well-educated individuals or take steps to strengthen candidates' subject matter knowledge, and recognize that previous classroom experience is an advantage. In addition, effective programs provide carefully constructed and timely coursework that is tailored to the candidates' backgrounds and the challenges that candidates face in their schools. Effective programs also provide each candidate with a trained mentor who is given the time and resources to work with the candidate to plan lessons, share curriculum ideas, demonstrate lessons, and provide feedback after frequent classroom observations.

While our research clearly points to the contributions of each of these characteristics, a simplistic list masks the complexity of preparing teachers through alternative routes. Because of the variation in how different individuals experienced the same alternative certification program, as well as the variation in supports and training within programs, the creation of effective programs defies simple recipes. Instead, programs need to be tailored to individuals. In order to have a tailored treatment, programs need to accurately assess each participant's teaching skills, knowledge, and performance at critical junctures, beginning with their selection and continuing throughout their training. Thus, effective programs also need to collect data on their participants' development through multiple methods (assessments, portfolios of teacher assignments and student work, observations, and interviews). Then, programs need to use that information to tailor the training and supports to each participant's need.

Although our research was focused on alternative certification programs, our findings are relevant to all forms of teacher preparation. The blurring of the line between traditional and alternative certification routes and our finding that paths into teaching is the appropriate unit of analysis suggests that educational background, school context, previous teaching experience, coursework, and mentoring all contribute to a new teacher's success.

In addition, our research suggests that the proper mix of candidates' backgrounds, program supports, and school placement can produce new teachers who are effective starting on the first day of school. The conventional wisdom that all new teachers must struggle during their first year is both inaccurate and a disservice to teachers and students. Thus, the final key characteristic of effective alternative certification programs is that they reject the assumption that floundering is a necessary part of new teachers' experience. Instead, effective programs embrace the unconventional view that new teachers and their students cannot afford a lost year.

Finally, the study's findings point to the need for additional research on alternative certification. Much more needs to be known about the relative contributions of the various components of a path into teaching. Studies that compare student-learning of groups of alternative certification participants with similar backgrounds, supports, and school placements are essential to confirm the findings of our study. Unfortunately, too much of the research in progress attempts to make program-to-program comparisons, a research design that is likely to find minor differences. Our study only began to explore inside the black box of alternative certification. Much more needs to be known about what and how participants in these programs learn, how programs can be tailored to address the needs of a diverse set of participants, and how program components such as coursework and mentoring can be strengthened.

Despite the need for additional research, policymakers should not wait to improve alternative certification. Our research reveals the preliminary roadmap to effective alternative certification programs.

APPENDIX A: CASE STUDY PROGRAMS

► The Teacher Education Institute (TEI) in the Elk Grove, California, Unified School District

TEI serves about 100 participants annually, and offers certification for all grade levels, K-12, and in all subject areas. Operated as a partnership between the Elk Gove Unified School District in northern California and San Francisco State University, the program aims to meet the district's growing need for credentialed teachers and to increase teacher quality by training teachers specifically in the district's curriculum and instructional practices.

TEI is based on an apprenticeship model and includes a combination of coursework, observations, and student teaching. After attending 80 hours of coursework during the summer, program participants spend the fall semester taking courses 3 days per week and participating in a student teaching internship for 16 hours per week. Internships are conducted with a "master teacher coach" who guides the intern's development. After an 80-hour intersession course, participants spend the spring in a second internship for 4 days per week. Both the fall and spring internships include 2 weeks in which the participant is a sole classroom teacher. Coursework continues in the spring, albeit at the reduced rate of 5 hours per week.

Entry requirements into TEI include a bachelor's degree and a minimum grade point average of 2.5. The program is funded through participant tuition and fees, which total approximately $9,000 per year.

► Milwaukee's Metropolitan Multicultural Teacher Education Program (MMTEP)

A partnership between the University of Wisconsin-Milwaukee's School of Education, the Milwaukee Public Schools, the Milwaukee Teachers' Education Association, and the University of Wisconsin-Extension, MMTEP is a teacher preparation program designed specifically for individuals who have been paraprofessionals or teacher aides in Milwaukee for at least 1 year. The small program serves around 20 participants per year and offers licensure for teaching grades 1-8. The program aims to provide urban children living in poverty with effective teachers, recruit and prepare African-American and other minorities into the teaching profession, and prepare teachers who will remain in the Milwaukee system.

During a 6-week summer session, program participants take university classes and teach in Milwaukee's summer schools. Their continuation in the program depends on a positive evaluation of their ability to relate to children and on their preparedness for assuming full-time teaching responsibilities. During the following school year, participants serve as the teacher of record, supported by a trained mentor who visits the classroom at least weekly throughout the year. Participants also continue to meet weekly for their university courses during this time.

In addition to having been a paraprofessional or teacher aide in Milwaukee for at least 1 year, applicants must have a bachelor's degree, pass interviews and background checks by both the Milwaukee Public Schools and the University of Wisconsin-Milwaukee, and be admissible as postbaccalaureate students to the university's School of Education.

► New Jersey's Provisional Teacher Program

The New Jersey Provisional Teacher Program, established in 1984, was the first statewide alternative certification program in the country. Designed to allow career changers and other talented individuals streamlined access to the teaching profession, and to eliminate the need to hire emergency teachers, the New Jersey program trains teachers already hired to work in schools. To enroll in the program, individuals must first obtain a certificate of eligibility that authorizes them to seek a teaching position. Requirements for the certificate of eligibility include a bachelor's degree with a minimum grade point average of 2.75; a major in the discipline which the secondary school candidates teach; and a passing score on the Praxis II subject assessment test or National Teacher Examination (NTE) programs specialty area test. On obtaining the certificate of eligibility and accepting an offer with a school, the hiring district registers the employment with the state's Office of Professional Development, the New Jersey Department of Education issues a provisional license, and the individual is recognized as an alternative route teacher.

While working under the provisional license, the teacher attends a formal program offered by one of 32 regional training centers. Located across the state, the majority of the training centers are operated by universities, although three are run by district consortia. The employing district or school also provides mentoring, supervision, and three evaluations—two formative and one final summative. The alternative route teachers are expected to pay a mentor $450 for full-time support during their initial 20 days of teaching, and an additional $550 for continued support over a 30-week period.

The New Jersey program offers certification in all grades and subject areas. More than 40% of New Jersey's teachers attain certification through the Provisional Teacher Program. In 2002–03, 2,700 individuals were part of the program.

► New York City Teaching Fellows Program

The New York City Teaching Fellows program was created to fill vacancies in some of New York City's lowest performing schools. Having prepared about 2,600 teachers in 2003, the Teaching Fellows program is one of the largest alternative certification programs in the country.

The Teaching Fellows program is a 2-year program in which participants simultaneously work toward certification and a master's degree. Fellows participate in a 2-month preservice training during the summer that includes master's degree coursework; field placement work, in which Fellows observe and assist in classrooms; and Fellow Advisory meetings, in which Fellows meet together with an advisor to share experiences and to learn practical classroom skills and management techniques. In the following two academic years, Fellows serve as teachers of record, and ongoing program components include continued master's degree coursework, school-based mentors, university-based mentors, and meetings with other Fellows. Master's degree coursework is provided by a dozen local public and private colleges and universities.

The New Teacher Project works with the Fellows Program in recruiting and selecting candidates for the program. In addition to meeting the minimal requirements of a B.A. with a minimum grade point average of 3.0, candidates must participate in an interview event in which they teach a sample lesson, discuss education-related articles, respond to specific classroom issues, and engage in a one-on-one interview.

The program offers certification in all grades and content areas, but is especially dedicated to recruiting applicants eligible for and interested in teaching in a high-need subject area: bilingual education, English, mathematics, science, Spanish, or special education. Fellows receive a stipend during the preservice training session to help defray living costs. However, they are responsible for $4,000 of tuition costs of their subsidized master's degree program.

► North Carolina's NC TEACH

Established in 2000, NC TEACH (North Carolina Teachers of Excellence for All Children) was designed to support midcareer professionals who wanted to switch to a career in education. Administered by the University of North Carolina Office of the President in collaboration with the North Carolina Department of Public Instruction, NC TEACH serves more than 150 participants annually, and offers certification in middle grades (mathematics, science, social studies, and language arts); high school (mathematics, science, social studies, and English), and K-12 (Spanish, French, English as a second language add-on, and special populations).

NC TEACH participants attend an orientation followed by a 5-week intensive summer institute of full-time coursework. Courses are offered at each of 13 University of North Carolina host campuses. After successfully completing the summer institute, participants teach full-time in a North Carolina public school while continuing to attend NC TEACH licensure classes and seminars. While serving as the teacher of record, each participant is assigned a mentor by the local education agency.

Requirements for admission to NC TEACH include a bachelors degree; a 2.5 cumulative grade point average or higher for all postsecondary work; a degree with a major in, or relevant to, the desired licensure area; and at least 3 years of full-time work experience since graduation from college. NC TEACH participants pay regular tuition rates to their host universities' graduate schools.

► Teach For America

Teach For America (TFA) recruits new college graduates from competitive universities to serve as teachers in hard-to-staff urban and rural districts. The program's overall goals are to close the achievement gap by providing teachers to under-resourced schools and producing future leaders who are committed to closing the achievement gap. Beyond minimal requirements for applications (i.e., 2.5 cumulative grade point average and a bachelor's degree), TFA accepts corps members who have records of achievement, are committed to the TFA mission, accept responsibility for outcomes, demonstrate organizational ability, show respect for others, and possess critical thinking skills.

TFA corps members attend a 5-week summer training session, and a 1- to 2-week orientation in their placement region. Before the session and orientation take place, corps members are expected to complete assigned readings, conduct structured observations of teachers focusing on specific topics covered in those readings, and hold follow-up conversations with the teachers they observe. After completing the summer training, TFA corps members become the teacher of record in another classroom starting in the fall. During the school year, they receive ongoing support from the TFA regional office, including observations with feedback; content- or grade-specific learning teams that focus on key teaching issues; other workshops on specific instructional issues; discussion groups; and "all corps" meetings. TFA

participants are also expected to attend a certification program offered by a local university or other credentialing program.

TFA corps members make a 2-year commitment to teaching. In 2003, more than 1,800 corps members worked in 20 regions across the country.

► Texas Region XIII Education Service Center's Educator Certification Program

The Texas Region XIII Education Service Center's Educator Certification Program aims to recruit midcareer professional and recent college graduates in high-need subject areas. The Texas Region XIII program offers certification in elementary education, elementary/bilingual education, special education, middle-education in specific content areas, secondary-education in specific content areas, and career and technology.

Before becoming teachers of record, program participants take courses offered online and at the Region XIII training center in the spring. They also participate in a 2-week field experience while continuing their coursework. Participants must find employment as an intern in a school by October 1 to continue in the program. The vast majority who find a teaching job become teachers of record. During this intern year, they are supported by school-based mentors who are trained by Region XIII and by program-based field supporters. Coursework also continues during the intern year.

Program applicants must hold a bachelor's degree with an overall grade point average of 2.5 in all courses, or 2.75 in the last 60 semester hours completed; provide evidence of competency in reading, writing, and mathematics through test records, college coursework, or a master's degree; have the required coursework and semester hours for the desired certificate area; participate in an online structured interview; provide professional references; and have daily access to a computer. In 2003, more than 300 participated in the program. Participants must pay tuition, as well as testing and licensure fees, which total nearly $5,000.

APPENDIX B: QUANTITATIVE STUDY METHODS

► Survey Administration, Response Rate, and Weighting

We administered the participant survey to participants in each of the seven programs once before the program started (fall 2003) and at the end of their first year of teaching (spring 2004). In programs with less than 500 participants (Texas Region XIII, Teacher Education Institute, MMTEP, and NC TEACH), we surveyed the population. In the NYC Teaching Fellows Program, we surveyed a representative sample of 350 elementary and special education participants. In New Jersey, we surveyed the population of three of the 32 regional training centers. In Teach For America, we surveyed a representative sample of 350 teachers from one summer training institute.

We used mixed methods of survey administration to maximize the survey response rate. In Texas Region XIII, the Teacher Education Institute, MMTEP, and New Jersey, the survey was administered during course time in both fall and spring. In both TFA and NC TEACH, program directors encouraged participants to complete the survey during course time in the fall, but in the spring, the survey was mailed directly to individuals. The survey was mailed to NYC Teaching Fellows directly in both the fall and the spring. Because of varying program schedules, and because of the multiple methods used to collect the survey data, we accepted completed questionnaires between April and December 2003 for the preprogram survey, and between March and August 2004 for the postprogram survey. Follow-up, which included mailing surveys and reminders to both home and school addresses and phone calling, was also conducted during this time, with a focus on programs with fewer respondents.

Exhibit B-1 displays the program populations at the time of each survey, as well as how many participants were surveyed, how many responded, the response rate and the range of the weights used in the analyses featured in this paper. In all analyses, participants were assigned weights based on the following characteristics: program, placement (general vs. special education and elementary vs. secondary), and status in the program (whether the participant was in the program in only the fall, only the spring, or both). There are multiple weights for each participant, depending on the analysis completed. For this reason, only the weight range is displayed in Exhibit B-1.

After closing the survey, we conducted a non-response study of the NYC Fellows Program. We sampled 10 nonrespondents who represented a range of schools, based on an official need rating assigned by the New York City Department of Education. Six of the 10 sampled teachers responded to the phone survey. Several participants expressed that they never received the survey, or that it was sent to a different address, and others said they did not respond simply because they were very busy in their school placement. Based on these reports and their responses to survey questions (which were consistent with those who responded), we believe that our sample of NYC Fellows respondents does not differ significantly from the population.

Exhibit B-1
Survey Participants, Respondents and Weight Ranges, by Program

		FALL SURVEY	SPRING SURVEY	BOTH FALL AND SPRING SURVEY
TEXAS REGION XIII	**POPULATION**	**340**	**236**	**216**
	SURVEYED	**340**	**236**	**216**
	RESPONDED	**285**	**229**	**209**
	RESPONSE RATE	**84%**	**97%**	**97%**
	WEIGHT RANGE	**1.00–2.05**	**1.00–1.09**	**1.00–1.13**
TEACHER EDUCATION INSTITUTE	**POPULATION**	**76**	**69**	**69**
	SURVEYED	**76**	**69**	**69**
	RESPONDED	**71**	**68**	**67**
	RESPONSE RATE	**93%**	**99%**	**97%**
	WEIGHT RANGE	**1.00–2.33**	**1.00–1.02**	**1.00–1.05**
MMTEP	**POPULATION**	**19**	**17**	**17**
	SURVEYED	**19**	**17**	**17**
	RESPONDED	**17**	**13**	**13**
	RESPONSE RATE	**89%**	**76%**	**76%**
	WEIGHT RANGE	**1.00–1.13**	**1.31**	**1.31**
NC TEACH	**POPULATION**	**478**	**302**	**296**
	SURVEYED	**478**	**302**	**296**
	RESPONDED	**322**	**143**	**124**
	RESPONSE RATE	**67%**	**47%**	**42%**
	WEIGHT RANGE	**1.08–4.43**	**1.50–2.33**	**2.35–2.55**
NYC TEACHING FELLOWS	**POPULATION**	**1606**	**1265**	**1265**
	SURVEYED	**350**	**266**	**266**
	RESPONDED	**126**	**61**	**52**
	RESPONSE RATE	**36%**	**23%**	**20%**
	WEIGHT RANGE	**10.91–18.25**	**19.34–36.40**	**18.3–24.75**
TEACH FOR AMERICA	**POPULATION**	**716**	**639**	**625**
	SURVEYED	**350**	**302**	**302**
	RESPONDED	**206**	**138**	**99**
	RESPONSE RATE	**59%**	**46%**	**33%**
	WEIGHT RANGE	**2.44–5.00**	**3.11–6.81**	**4.64–8.62**
NEW JERSEY	**POPULATION**	**279**	**353**	**261**
	SURVEYED	**279**	**353**	**261**
	RESPONDED	**170**	**217**	**125**
	RESPONSE RATE	**61%**	**61%**	**48%**
	WEIGHT RANGE	**1.48–3.50**	**1.00–14.00**	**1.91–2.01**

► Factor Analysis

We conducted factor analyses on all items that we believed were part of a latent factor. We used MPLUS statistical software because of its ability to build models with dichotomous and ordered categorical variables. MPLUS produces sample correlations, eigenvalues, and the following statistics of model fit: (1) chi-square test, which, if significant, indicates a poor model fit; (2) The Root Mean Square Error of Approximation (RMSEA), which indicates satisfactory model fit if below 0.06; and (3) the Root Mean Square Residual (RMR), which indicates satisfactory model fit if below 0.08 (Hu and Bentler, 1999). It is important to note that the chi-square test is sensitive to sample size, with large samples often returning statistically significant

chi-square values. For this reason, our analyses paid particular attention to the RMR and RMSEA as indicators of model fit, since neither is sensitive to sample size.

We initially conducted exploratory factor analyses (EFA). Based on the results of the EFA, we selected the items to be included in each factor. In most cases, we chose the factor with which the item loaded most strongly; in a few cases where items had multiple strong loadings, we grouped the item with the factor best fitting conceptually. Next, we discuss how we created each of the factor scores for school context, pedagogical content knowledge, and mentoring.

School context

The school context variable is a factor score comprised of three separate factors: supportive administration, availability of materials, and teacher collaboration around instruction. The supportive administration and availability of materials factors were part of a larger set of questions with a 4-point Likert scale of agreement on various statements. The four-factor solution of these items, which included factors for teacher trust and teacher stress level, had an RMSEA of 0.06 and an RMR of 0.02, as well as an eigenvalues that indicated a four factor solution. The teacher collaboration items were part of a single analysis, with an RMSEA of 0.05 and an RMR of 0.02, as well as an eigenvalues that indicated a one factor solution.

To create the school context factor score, we calculated the z-score of each item comprising the subfactors, using the unweighted mean and standard deviation. We then summed the z-scores of the items that belong in the factor, and calculated a z-score of that sum, producing three separate factor scores. To create the single school context factor, we summed the scores of the three factors and calculated the z-score of the sum, using the weighted mean and weighted standard deviation of the sum. The result of these score calculations was a single continuous variable, which at the high end of the distribution indicates a supportive school context, as defined by the factors, and at the low end indicates a challenging school context.

Frequency of mentoring

The frequency of mentoring variable was created by completing a factor analysis on items with a 5-point Likert scale of frequency of various mentoring activities. Exploratory factor analyses found three separate factors: (1) classroom visitation and feedback, (2) instructional planning and provision of materials, and (3) observations of the mentor's teaching. This model produced an RMSEA of 0.06 and an RMR of 0.02. In order to create this factor score, we calculated the z-score of each item comprising the subfactors, using the unweighted mean and standard deviation. We then summed the z-scores of the items that belong in the factor, and calculated a z-score of that sum. This produced three separate factor scores. To create the single frequency of mentoring factor, we summed the scores of the three factors and calculated the z-score of the sum, using the weighted mean and weighted standard deviation. The result of these score calculations was a single continuous variable, which at the high end of the distribution indicates frequent mentoring and at the low end indicates infrequent mentoring.

Pedagogical content knowledge

The pedagogical content knowledge analysis was completed by conducting a factor analysis on 56 dichotomous variables (with correct or incorrect answers). A missing data analysis was conducted, and only those respondents who answered over 80% of the questions in both the reading and math sections were included. In addition, respondents who answered "don't know" to over 75% of the pedagogical content knowledge questions were omitted. All others were included, and missing responses were treated as incorrect answers. Before conducting the factor analysis, items were grouped into 16 testlets, or groups of similar questions. Exploratory factor analyses of these testlets found three separate factors: general content knowledge (in both reading and math), reading pedagogy, and mathematics pedagogy. This model produced an RMSEA of 0.01 and an RMR of 0.04. We also found a satisfactory one factor solution, which produced an RMSEA of 0.06 and an RMR of 0.06.

Since we were concerned with being able to make comparisons between fall and spring score, we used the spring weighted means and weighted standard deviations to create both the fall and spring factor scores. We calculated the z-score of each item comprising the subfactors, using the unweighted mean and standard deviation. We then summed the z-scores of the items that belonged in the factor, and calculated a z-score of that sum. To calculate growth scores, we subtracted the fall z-score from the spring z-score, then calculated the z-score of the difference, using the weighted mean and standard deviation of the fall score. This analysis only included elementary school teachers, which notably decreased our sample size, as well as eliminating from analysis NC TEACH, which only trains secondary teachers.

This produced three separate factor scores and a one-factor solution that encompassed all three. The result of these score calculations was a single continuous variable, which at the high end of the distribution indicates high achievement on the measure of pedagogical content and at the low end indicates a poor pedagogical content knowledge. Note that in conducting our exploratory regression analysis (discussed below) we used the pedagogical content knowledge factor scores. However, all pedagogical content knowledge analyses discussed in the body of this report used a simple average variable of the percent correct in each of the domains identified by our exploratory factor analysis.

► Outcome analyses

In our analysis of paths into teaching, we were ultimately interested in which of the possible teacher characteristic and program treatment variables made an impact on specific outcomes. Toward this end, our preliminary analysis of the data used each of our outcome variables (teacher pedagogical content knowledge, teacher efficacy, and teacher reported growth) as dependent variables in multiple regression analyses with the following as independent variables: school context, coursework, frequency of mentoring, classroom experience, and university selectivity, as well as program and placement variables, which were included in select analyses. Our strategy was to conduct multiple regression analyses to study the relationships between key program components, context, and outcomes, in order to examine the amount of variance in outcomes that is explained by each of the inputs.

The data presented in the body of the paper are based on the initial regressions, but the crosstabulations displayed are a more readable representation of the findings. The regression

analysis was the preliminary step in our overall analysis of paths into teaching. The results of these regressions helped deepen our understanding of the components and their impact on each of the outcomes. We used a stepwise regression (the REG Procedure in SAS, with a FORWARD selection model), specifying a .10 level of significance restriction for entry into the model. Now we turn to talk briefly about each of the variables included in the outcomes analysis.

School context. In the regression analysis, we used the factor score, which is a continuous variable, with a low score indicating challenging school context and a high score indicating a good school context. In the analyses represented in the body of the report, respondents were divided into weighted quartiles, with those in the top quartile considered to be in a "good" context and those in the bottom quartile considered to be in a "challenging" context. Note that these quartiles are not exactly even, due to response clustering. These two groups of participants are, indeed, teaching in quite different situations. For example, 83% of participants in good contexts reported that they have the instructional materials they need without purchasing them (compared to only 6% in challenging contexts). Similarly, 76% of participants in good contexts talk at least weekly with colleagues about instruction, compared to only 30% of those in challenging school contexts. Finally, 88% of participants good contexts reported that their administrator is trusted by teachers, compared to less than 5% of those in schools with a challenging context. See Exhibit B-2 for the number of participants in each category.

Coursework. We asked about the importance of coursework both before and during the school year. To create the coursework variable for the regressions, we combined the two 5-point scale responses, retaining the highest value. In the body of the report, we considered those who received "moderately" or "very" important coursework at either point to have had "valuable" coursework, while all others (including those who did not receive coursework) were considered to have received "poor" coursework. See Exhibit B-2 for the number of participants in each category.

Frequency of mentoring. In the regression analysis, we used the factor score, which is a continuous variable, with a low score indicating low-frequency mentoring and a high score indicating high-frequency mentoring. In the analyses represented in the body of the report, respondents were divided into quartiles, with those in the top quartile considered to have received high-frequency mentoring and those in the bottom quartile considered to have received low-frequency mentoring. Note that these quartiles are not exactly even, due to response clustering. Those in the high quartile received much more mentoring support; for example, 43% of those in the top quartile reported having planned lessons with their mentor at least monthly, while over 90% of those in the bottom quartile never participated in this activity. It is important to understand, however, that even in the top quartile of mentoring frequency, over half of participants received such support less than a few times over an entire year. See Exhibit B-2 for the number of participants in each category.

Classroom experience. In our regressions we used a dichotomous variable that indicated whether a participant had greater than 9 months of classroom experience, either as a teacher, substitute or aide. In the body of the report, we considered participants experienced if they had 9 months or more of classroom experience and inexperienced if they had none. See Exhibit B-2 for the number of participants in each category.

University selectivity. In the regression analysis, we used the Barron's 6-point scale university ranking, with a low score indicating the least competitive university and a high score indicating the most competitive university. In the analysis presented in the body of the report, levels 5 and 6 are considered "competitive" and levels 1 and 2 are considered "less competitive" universities. See Exhibit B-2 for the number of participants in each category.

Program and placement variables. In some of the regression analyses, it was important to use several additional variables to control for differences not captured by other variables. We used seven dichotomous variables to represent participant's program, as well as dichotomous variables that represented whether a participant had a full-time placement, was a special education or bilingual teacher, or had a prior career in math or science.

Exhibit B-2 displays the number of participants (both weighted and unweighted) that fall into each category of the paths into teaching variables. Note, however, that numbers associated with exhibits in the body of the report may differ, based on individual item responses.

Exhibit B-2
Number of Participants in Each Paths into Teaching Category, as Reported in Exhibits 10-23

	UNWEIGHTED NUMBER	WEIGHTED NUMBER
GOOD SCHOOL CONTEXT	**316**	**718.77**
CHALLENGING SCHOOL CONTEXT	**110**	**702.45**
FREQUENT MENTORING	**265**	**654.58**
INFREQUENT MENTORING	**182**	**642.09**
CLASSROOM EXPERIENCE	**461**	**1141.57**
NO CLASSROOM EXPERIENCE	**311**	**1368.99**
COMPETITIVE UNIVERSITY	**386**	**1086.26**
LESS COMPETITIVE UNIVERSITY	**180**	**437.48**
VALUABLE COURSEWORK	**659**	**1833.98**
NON-VALUABLE COURSEWORK	**190**	**952.03**

► Results of Regression Analyses

In each of the analysis represented below, we report r-square statistics, as well as the percent of variance explained by each variable, as reported in the final model. A number in

parenthesis indicates a negative relationship between the independent and dependent variables. A dash indicates that an independent variable was not used in the analysis of that particular outcome.

Exhibit B-3
Pedagogical Content Knowledge (PCK): Percent of Variance Explained[8]

	SCHOOL CONTEXT	COURSEWORK	FREQUENCY OF MENTORING	CLASSROOM EXPERIENCE	UNIVERSITY SELECTIVITY	ELK GROVE	NEW JERSEY	TEACH FOR AMERICA	NEW YORK	R-SQUARE
FALL 1-FACTOR PCK	-	-	-		**12.3*** **			**0.9***		**.1317**
FALL CONTENT FACTOR	-	-	-		**10.4*** **			**0.8**		**.1117**
FALL READING PEDAGOGY FACTOR	-	-	-		**2.7*** **			**5.8*** **		**.0845**
FALL MATH PEDAGOGY FACTOR	-	-	-		**7.2*** **	**(1.5)****				**.0872**
SPRING 1-FACTOR PCK					**13.3*** **	**0.9**	**(4.7)*** **			**.1893**
SPRING CONTENT FACTOR		**1.2***			**7.6*** **	**5.5*** **	**.9)****	**1.2***		**.1736**
SPRING READING PEDAGOGY FACTOR			**(1.1)***		**10.9*** **	**1.1***	**(4.8)*** **			**.1793**
SPRING MATH PEDAGOGY FACTOR					**9.2*** **		**2.3)****			**.1147**
GROWTH 1-FACTOR PCK	**1.3**				**2.1***	**8.2*** **	**(4.5)*** **		**1.6***	**.1761**
GROWTH CONTENT FACTOR		**1.1**			**7.1*** **	**5.8*** **	**.4)***			**.1546**
GROWTH READING PEDAGOGY FACTOR				**(3.2)****	**3.1****	**2.4***				**.0874**

[8] The following variables were also included in the regressions on spring and growth PCK scores but were left out of the above chart, since they were not significant in any model: a dichotomous variable indicating if a teacher was in a full-time placement or not; dichotomous program variables for Texas Region XIII, MMTEP, and NC TEACH; frequency of mentoring. In addition, dichotomous variables indicating a previous career in math or science was included in the fall, spring, and growth regressions.

GROWTH MATH PEDAGOGY FACTOR					**2.2***	**1.6***	**.2)****	**1.1**		**.0811**

***p < .001, **p < .01, *p < .05. (The absence of an asterisk indicates p < 0.10. A dash indicates that the variable was not used in analysis.)

Exhibit B-4
Fall Teacher Self-Efficacy: Percent of Variance Explained

	CLASSROOM EXPERIENCE	UNIVERSITY SELECTIVITY	BILINGUAL TEACHER	R-SQUARE
I CURRENTLY HAVE THE NECESSARY KNOWLEDGE AND SKILLS TO TEACH EFFECTIVELY	**5.2*** **	**(0.3)**	**-**	**.0550**
I FEEL CONFIDENT IN MY ABILITY TO HANDLE A RANGE OF CLASSROOM MANAGEMENT AND DISCIPLINE SITUATIONS	**2.2*** **	**(0.6)***	**-**	**.0278**
I FEEL CONFIDENT IN MY ABILITY TO ADDRESS THE NEEDS OF ENGLISH LANGUAGE LEARNERS		**(0.4)**	**9.4*** **	**.0979**

***p < .001, **p < .01, *p < .05. (The absence of an asterisk indicates p < 0.10. A dash indicates that the variable was not used in analysis.)

Exhibit B-5
Spring Teacher Self-Efficacy: Percent of Variance Explained

	SCHOOL CONTEXT	IMPORTANCE OF COURSEWORK	FREQUENCY OF MENTORING	CLASSROOM EXPERIENCE	UNIVERSITY SELECTIVITY	BILINGUAL TEACHER	SPECIAL EDUCATION TEACHER	R-SQUARE
I CURRENTLY HAVE THE NECESSARY KNOWLEDGE AND SKILLS TO TEACH EFFECTIVELY	**7.7*** **		**0.4**	**1.5*** **		**-**	**-**	**.0966**
I FEEL CONFIDENT IN MY ABILITY TO HANDLE A RANGE OF CLASSROOM MANAGEMENT AND DISCIPLINE SITUATIONS	**7.6*** **			**1.2** **	**(0.8)***	**-**	**-**	**.0946**
I FEEL CONFIDENT IN MY ABILITY TO ADDRESS THE NEEDS OF ENGLISH LANGUAGE LEARNERS	**4.6*** **		**1.6*** **	**0.1***	**(0.8)***	**4.5*** **	**-**	**.1200**

I FEEL CONFIDENT IN MY ABILITY TO ADDRESS THE NEEDS OF SPECIAL EDUCATION STUDENTS	**5.4*** **			**1.3*** **	**(2.2)*** **	**-**	**22.7*** **	**.3168**

***p < .001, **p < 0.01, *p < 0.05. (The absence of an asterisk indicates p < 0.10. A dash indicates that the variable was not used in analysis.)

Exhibit B-6
Teacher Reported Growth: Percent of Variance Explained

	SCHOOL CONTEXT	IMPORTANCE OF COURSEWORK	FREQUENCY OF MENTORING	CLASSROOM EXPERIENCE	UNIVERSITY SELECTIVITY	BILINGUAL TEACHER	SPECIAL EDUCATION TEACHER	R-SQUARE
THE SUPPORT I RECEIVED DURING MY FIRST YEAR DEEPENED MY GRASP OF THE SUBJECT MATTER I TAUGHT	**.7***	**8.4*** **	**13.4*** **			**-**	**-**	**.2244**
THE SUPPORT I RECEIVED DURING MY FIRST YEAR INCREASED MY KNOWLEDGE OF INSTRUCTIONAL TECHNIQUES APPROPRIATE FOR THE GRADE LEVEL/SUBJECT I TAUGHT	**4.2*** **	**14.0*** **	**1.0****			**-**	**-**	**.1916**
THE SUPPORT I RECEIVED DURING MY FIRST YEAR INCREASED MY KNOWLEDGE OF ASSESSMENT TECHNIQUES	**5.1*** **	**9.2*** **	**0.6***		**(0.7)***	**-**	**-**	**.1551**
THE SUPPORT I RECEIVED DURING MY FIRST YEAR IMPROVED MY ABILITY TO MEET INSTRUCTIONAL NEEDS OF ENGLISH LANGUAGE LEARNERS	**1.4*** **	**4.4*** **	**9.9*** **		**(0.6)***	**6.0*** **	**-**	**.2215**
THE SUPPORT I RECEIVED DURING MY FIRST YEAR IMPROVED MY	**6.3*** **	**12.1*** **	**1.1****			**-**	**-**	**.1957**

CLASSROOM MANAGEMENT								
THE SUPPORT I RECEIVED DURING MY FIRST YEAR INCREASED MY ABILITY TO ADAPT INSTRUCTION FOR STUDENTS WITH IEPS (INDIVIDUALIZED EDUCATION PLANS)	**7.6*** **	**3.9*** **	**0.3**	**0.6***	**(2.0)*** **	**-**	**12.5*** **	**.2683**
THE SUPPORT I RECEIVED DURING MY FIRST YEAR IMPROVED MY ABILITY TO MEET INSTRUCTIONAL NEEDS OF STUDENTS FROM DIVERSE CULTURAL BACKGROUNDS	**2.0*** **	**11.9*** **	**4.9*** **			**-**	**-**	**.1885**

***p < .001, **p < 0.01, *p < 0.05. (The absence of an asterisk indicates p < 0.10. A dash indicates that the variable was not used in analysis.)

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