DO TEACHERS DIFFER BY CERTIFICATION ROUTE? NOVICE TEACHERS' SENSE OF SELF-EFFICACY, COMMITMENT TO TEACHING, AND PREPAREDNESS TO TEACH

A Dissertation

by

LINDA REICHWEIN ZIENTEK

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2006

Major Subject: Curriculum and Instruction

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May 2006

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ABSTRACT

Do Teachers Differ by Certification Route? Novice Teachers' Sense of Self-efficacy, Commitment to Teaching, and Preparedness to Teach. (May 2006)

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Alternative teacher certification (ATC) programs are one method created to help alleviate teacher shortages (Cox, Matthews, & Assoc, 2001; Hallinan & Khmelkov, 2001). While much debate has arisen over ATC programs, very few have empirically examined their impact on the teaching pool (Darling-Hammond, Berry, & Thoreson, 2001; Darling-Hammond, Chung, & Frelow, 2002; Goldhaber, 2000; Ingersoll, 1999; Shen, 1997, 1999). The present study was designed to explore differences by certification type and program characteristics based on novice teachers' demographics, educational attainment, sense of self-efficacy, and sense of preparedness to enter the classroom.

Results from the present study suggest ATC programs are somewhat diversifying the teaching population by bringing in more minorities and science majors, but do not appear to be bringing in more experienced scientists and mathematicians nor do they appear to be alleviating the teacher shortage. In this sample, traditionally certified teachers felt better prepared than ATC teachers with the biggest differences on Promoting Student Learning. Regardless of certification route, prior classroom

experience was a strong predictor of Overall Preparedness and a teacher's perception of his or her ability to be an effective teacher. For ATC teachers, a positive mentoring experience was a strong predictor of Overall Preparedness.

The discussion of whether or not ATC programs should exist should now be replaced with a discussion of how to ensure that these programs produce better teachers and improve student learning. The underlying theme from the present study was that, in order to feel prepared and have high self-efficacy, novice teachers needed instruction in the majority of the components identified by research and by the National Commission on Teaching and America's Future (1996), including positive mentoring experiences, field based experiences, and curriculum based on child development, learning theory, cognition, motivation, and subject matter pedagogy. Results from the present study support the assertion that teacher preparation programs, program components, mentoring experiences, and field-based experiences do impact teacher effectiveness in the classroom.

DEDICATION

Thank you to my husband Gilbert and my children Jason, Jacob, and Jenna along with my parents, brother and sister, and friends for their continued support and for all that they have taught me.

ACKNOWLEDGEMENTS

The product of this dissertation came with the assistance of many people. First, I would like to thank my committee for their assistance with this project. Thank you to my advisor Dr. Robert M. Capraro for his guidance throughout these past four years. Thank you to Dr. Mary Margaret Capraro for her continued support. Thank you to Dr. Kulm for his assistance throughout my degree. Thank you to Dr. Janie Schielack for her support and for allowing me to work with the ITS program. Thank you to Dr. Bruce Thompson for all of the research knowledge he has taught me and for his continued patience and humor. Thank you to Uri for his support, encouragement, and faith in my abilities.

My education would not have been possible without some very influential teachers and professors from my past. Thank you to my thesis advisor Dr. Wasin So for guiding me through my master's thesis and helping me attain the skills necessary to succeed in this Ph. D. program. Thank you to Dr. Cecil Hallum, Dr. Patrick Van Fleet and Dr. David Ruch for your wonderful sense of humor and mathematical expertise.

None of my accomplishments would have been possible without the assistance and support of my family and friends. Thank you to my parents for raising me to believe I can accomplish whatever I set out to do. Thank you to my brother Robert and sister Deanna for teaching me the important things in life. Thank you to my uncle Henry for his endearing support and pride in whatever his family members set out to do. A special thank you goes to H. F. for always being there for me and for all of your constructive criticisms. Thank you also to Amelia, Beth Ann, Mandy, Becky, Laurie, Bonnie, Jody,

Randy, and Teresa for your friendship and support as I have continued to work on this project.

Of course none of this would have been possible without my husband. Thank you to Gilbert for always supporting me and believing in me. Thank you also for your encouragement and willingness to let me spend many hours working on this project. I would never have been able to accomplish my career goals without your support and for making me always know what is important in life. Thank you also to my children, Jason, Jacob, and Jenna, who have supported me while I worked diligently on the project.

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CHAPTER I

INTRODUCTION

With the proliferation of alternative teacher certification programs, policy makers and school districts must be certain effective alternative teacher certification programs are created so that qualified teachers enter the teaching field. The present study was designed to explore the quality of teacher preparation and differences by certification type and program characteristics based on novice teachers' demographics, educational attainment, sense of self-efficacy, and sense of preparedness to enter the classroom.

Research Questions

The following research questions were investigated: (1) Do novice teachers differ by certification route in their sense of self-efficacy, perceptions of preparedness to teach, overall preparedness, mentoring experience, reasons for entering the classroom, plans to remain in teaching, and classroom preparation? (2) Are alternative teacher certification (ATC) programs (a) diversifying the teacher population or (b) producing teachers with exceptional content knowledge? (3) Does a teacher's perception of preparedness and self-efficacy depend on certification route, classroom preparation, mentoring experience, prior classroom experience, or entrance and exit qualifications? (4) Does a teacher's perception of overall preparedness depend on classroom preparation, prior career

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This dissertation follows the style of *Educational & Psychological Measurement.*

experience, mentoring experience, prior career experience, entrance and exit qualifications, or practice teaching? (5) Does a teacher's commitment to teaching depend on classroom preparation (i.e., experience with lesson plans, pedagogical preparation, and field experience)? (6) Do differences exist between teachers with different degrees and by teachers who teach at different grade bands?

Background

Higher educational systems are faced with the dilemma of supplying increasing numbers of "highly" qualified teachers in the classroom. The enactment of the No Child Left Behind Act (NCLBA, 2002) coupled with a projected shortage of teachers has resulted in policy reformations and novel and innovative forays into teacher education by various public school systems and private entities (Cox, Matthews, & Assoc, 2001; Hallinan & Khmelkov, 2001). With the publication of two reports in 1986, the reformation movement of teacher education was underway. Reports by the Carnegie Task Force on Teaching and The Holmes Group both advocated a twofold approach to education reform. These publications suggested enriching the professional education of teachers by eliminating undergraduate teacher certification programs and requiring graduate level preparation and a mentoring system (Hallinan & Khmelkov, 2001). The creation of alternative teacher certification (ATC) programs coincided with the reports by Carnegie and Holmes.

Alternative certification programs are one method created to help alleviate teacher shortages. One possible solution is to offer better pay and working conditions as incentives to recruit and retain qualified teachers in rural and high-poverty schools

(Schouten, 2002). Two key principles to recruiting and preparing teachers are to (a) raise academic standards for teachers and (b) lower barriers to allow talented people into the teaching profession (U. S. Department of Education, 2003). The key question is to find out which policies will lead to stronger teaching and increased student learning. A pressing concern is how to lower barriers without lowering standards.

Variation on the design, implementation, and reporting of existing programs complicates the influence of ATC programs. Evidence of opposing views on alternative and traditional teacher certification (TTC) routes include Darling-Hammond and Youngs' (2002) article and the Secretary of Education's 2002 report (U. S. Department of Education, 2003). Darling-Hammond and Youngs cited inconsistencies in the *Secretary's Annual Report on Teacher Quality* as well as finding that, in the Secretary's report, most of the references were

> …to newspaper articles or to documents published by advocacy organizations, some of these known for their vigorous opposition to teacher education… The report cites almost no research that would meet scientific standards, misrepresents findings from a large number of sources, and includes many unsupported statements about teacher education and teacher certification. (Darling-Hammond & Youngs, 2002, p. 13)

The authors concluded that Secretary Paige's report on ATC programs is "… replete with misinformation… " (Darling-Hammond & Youngs, 2002, p. 21). In the *Second Annual Report on Teacher Quality*, Secretary Paige questioned Darling-Hammond's results that 40% to 60% of the variance across states in average student

achievement levels was accounted for by teacher qualifications. Paige went on to say that "…aggregation bias may account for Darling-Hammond's estimates of the effects of certification being light years out of the range of effects that have been reported by all other studies of this topic…" (U. S. Department of Education, 2003, p. 45). Responses by both of these educators illustrate the continual debate regarding teacher education reform.

Rationale for Study

Alternative teacher certification programs are one avenue to entering the teaching profession. While much debate has arisen over ATC programs, very few have empirically examined the effects of ATC programs on the teacher pool (Darling-Hammond, Berry, & Thoreson, 2001; Darling-Hammond, Chung, & Frelow, 2002; Goldhaber, 2000; Ingersoll, 1999; Shen, 1997, 1999). While the researchers investigated how well ATC programs addressed teacher shortages and prepared qualified teachers, limitations existed which included the aggregation of all ATC programs, regardless of program characteristics. Darling-Hammond et al. disaggregated the data further to support this notion that program preparation differ across preparation programs but feelings are relatively stable within programs. Therefore, aggregation of all ATC programs will not give the information necessary to determine if different pathways are producing teachers who feel well prepared.

Previous studies reported few if any statistically significant differences between ATC teachers and TTC teachers in regards to their age, gender, ethnicity, and performance in the classroom (Goldhaber, 2000; Shen, 1997, 1999). Teachers from ATC

programs were more apt to teach in schools with more than 50% minority enrollment and had higher educational attainment when the sample was restricted to mathematics and science teachers. Shen (1997, 1999) concluded that ATC programs reduced teacher shortages in mathematics and science and were effective in recruiting mathematics teachers. Differences have been found between ATC teachers and TTC teachers in their senses of self-efficacy and how well prepared they felt (Darling-Hammond et al., 2002). High self-efficacy is important, as it has been traced to a teacher's ability to promote more positive learning environments and higher student achievement, along with a stronger commitment to teaching and a willingness to try innovative teaching strategies (Smith, 1996).

Even fewer studies compared program characteristics between ATC programs and TTC programs. Pituch and Miller (1999) found that if ATC programs provided regular mentoring, there was no statistically significant difference between their students' achievement and the achievement of the students of traditionally certified teachers. The researchers also found no statistically significant differences between behaviors thought to underlie effective teaching, teachers' perceptions of initial preparation, or teaching competence after three years of teaching experience.

With the growing number of ATC programs, school districts and policy makers must ensure that effective programs are created and qualified teachers produced. Five components of effective ATC programs as identified by Ruckel (2000) include: (1) strong academic coursework, (2) field-based programs, (3) strong working relationships with mentors, (4) group preparation, and (5) collaboration among state departments of

education, higher education, and school districts in the planning and delivery of programs. In a review of published reports since 1999, Zientek, Kadhi, and Capraro (2005) found that the majority failed to report entry requirements or a definition of highly qualified.

The present study sought to determine if certification route affects novice teachers' perceptions of their initial levels of preparedness and self-efficacy, their commitment to teaching, and their level of content knowledge. The present study also sought to determine the demographics obtained with different programs and to determine which program characteristics impact self-efficacy and perceptions of level of preparedness in the classroom. Results from the present study were compared to Shen's (1997, 1999), Humphrey's and Wechsler's (2005), and the Darling-Hammond et al. (2002) results.

Variables

Alternative teacher certification (ATC) is often used to describe programs with varying prerequisites, completion requirements, and content expectations. According to Wright (2001), ATC programs are defined as "accreditation programs designed to allow individuals with significant subject-area background to complete their teacher preparation education while teaching full-time in a participating school district" (Wright, 2001, p. 24). ATC is also defined as "a state-approved program that waives coursework in pedagogy" (Chappelle & Eubanks, 2001, p. 312) and can range from non-degree to master's degree programs and from programs that involve no mentoring to long-term induction year commitment to teachers. For the present study, ATC programs included

all programs not considered to be the traditional route regardless of similarities to TTC programs. A beginning teacher was defined as someone within their first three years of teaching.

In the present study, previous work experience, reasons for entering the teaching profession and commitment to teaching were used as independent variables. Diversification of the teaching population was measured by gender, age, and ethnicity (Shen, 1997, 1999). To determine educational attainment, participants' highest degree and credit hours in their teaching field were obtained. While research has been inconsistent in explicating the factors or conditions that determine *highly qualified* teachers, a minimal set of indicators include (1) at least a bachelor's degree, (2) full state certification, and (3) competency in the teaching field (U. S. Department of Education, 2003). By this definition, a highly qualified teacher does not need to hold either a major or minor in his or her teaching field. Because novice teachers in the present study did not hold full state certification until the completion of their first year, exceptional content knowledge was determined by whether or not the teacher had a major or 24 credit hours in his or her teaching field.

Teacher efficacy has been linked to student achievement and affective growth. Research suggests that teachers with high self-efficacy tend to set higher goals for themselves and for their students (Ross, 1995). Self-efficacy was defined as a teacher's belief that he or she can make a positive impact on student learning (Smith, 1996). Novice teachers' sense of preparedness was utilized as a proxy measure of a program's ability to foster within its graduates a sense of feeling prepared to assume sole classroom

responsibility. The participants' sense of preparedness was measured by five factors on a scale from one to six with the prompt "I feel prepared to": (a) Promote Student Learning, (b) Teach Critical Thinking and Social Development, (c) Use Technology, (d) Understand Learners, and (e) Assume Instructional Leadership (Darling-Hammond et al., 2002). Self-efficacy and feeling prepared to teach were each rated on a scale from one to six with six indicating the highest level of the trait.

A traditionally certified teacher was defined as a teaching certificate earned through a 4-year university as part of an undergraduate degree. Alternative teacher certification (ATC) programs are not specific, and the term is often used to describe programs with varying prerequisites, completion requirements, and content expectations. According to Wright (2001), ATC programs are defined as "accreditation programs designed to allow individuals with significant subject-area background to complete their teacher preparation education while teaching full-time in a participating school district" (p. 24). ATC is also defined as "a state-approved program that waives coursework in pedagogy" (Chappelle & Eubanks, 2001, p. 312) and can range from non-degree to master's degree programs and from programs that involve no mentoring to programs that require long-term induction year commitments of teachers. For the present study, ATC programs included all programs not considered to be the traditional route, regardless of similarities to TTC programs. A novice teacher was defined as someone within their first three years of teaching.

Study Considerations

This dissertation study builds upon research by Darling-Hammond et al. (2002). One possible limitation of the present study is that the data are self-reported. Some critics will question the adequacy of self-reported data (Wilson, Floden, & Ferrini-Mundy, 2001). However, due to the large sample size and the attempt to reach as many novice teachers as possible, collecting data by means other than self-report methods was not possible. In future studies, information could be collected from schools, programs, and a subset of teachers on teachers' qualifications, program characteristics, and student achievement. Furthermore, while the present study gives valuable information about which topics influence teacher preparedness, some may argue that these results do not take into account the depth of coverage of the topics nor do we have the ability to determine if teachers' perceived perception of preparedness is a true indicator of their actual effectiveness in terms of student achievement. While the depth of coverage of topics can not be determined, the goal of the present study was to first determine if the topics were important and later research can determine the amount and depth of coverage required to impact teacher effectiveness. Perceptions of preparedness were dependent on Overall Preparedness which is highly correlated with self-efficacy. A teacher's sense of self-efficacy is an important factor for teacher effectiveness because teacher efficacy has been linked to student achievement, a teacher's commitment to teaching, and teacher retention (Wheatley, 2002). Therefore, Perceptions of Preparedness and Overall Preparedness will be used as a proxy for teacher effectiveness.

The present study used a convenience sample. Due to the data collecting method

and the use of a purposeful sample, the response rate is unknown. School districts did not provide the total number of students and many went through principals to distribute the survey. The principals may or may not have provided the survey to teachers. According to Wilkinson and the APA Task Force on Statistical Inference (1999), using a "convenience" sample is not detrimental to the study nor does this disqualify the study from publication. Recommendations specify that the researcher not conceal the sampling information and should compare characteristics of the sample with the general population. To overcome this limitation, the total population of teachers was calculated and consideration given to attrition rates for teachers in their first, second, and third year of teaching. The sample demographics were compared to the population to determine if they are representative of the general population.

CHAPTER II

BACKGROUND LITERATURE

The higher educational system is faced with the dilemma of supplying an increasing number of *highly qualified* classroom teachers. The enactment of the No Child Left Behind Act (NCLBA) (2002) coupled with a projected shortage of teachers has resulted in policy reformations and novel and innovative forays into teacher preparation by various school systems, and public and private entities (Cox et al., 2001; Hallinan & Khmelkov, 2001). Alternative teacher certification programs were created to bring talented individuals into the classroom and to address teacher shortages. While their inception has incited a heated debate about the effect alternative teacher certification (ATC) programs will have on teaching quality and student achievement, ATC programs have proven they are here to stay and provide a viable source of certified teachers in the classroom. Therefore, determining if ATC programs should exist is futile. The focus should now be on developing highly qualified ATC programs that produce effective teachers with a high sense of self-efficacy. The purpose of the present study was to determine if ATC programs are fulfilling their promise of producing highly qualified teachers. The present study contrasted beginning teachers' sense of self-efficacy and feelings of preparedness by their certification route.

The State Board for Educator Certification (SBEC) numbers, along with the percentages of minorities entering the classroom through ATC programs, indicates ATC programs in Texas are bringing in large ATC programs across various states. In 1999,

2661 Texas teachers entered through ATC programs. The number increased to 7113 in 2003 (SBEC, 2004). If approximately 14% of the ATC population was African American, this population changed from about 373 in 1999 to about 996 in 2003. With a 26% Hispanic population, this population changed from about 692 in 1999 to about 1850. Because the traditional population is declining and the percentage of minorities in these programs is remaining relatively the same, the conclusion is that ATC programs are successful in recruiting more minorities in the teaching profession.

Teacher Shortage

Estimating the magnitude of the teacher shortage is difficult, if not impossible. Within the first five years of teaching, an estimated 50% of all new teachers will leave the profession (National Education Association, 2005). In addition to the estimated number needed and the estimated number leaving, teaching quality needs to be put into the equation when addressing teacher shortages. One estimate is that approximately two million new teachers will be needed in the next ten years (Cox et al., 2001). Because this study was conducted in Texas, particular attention will be given to teacher shortages in Texas.

From 1995 to 2002, the Texas teaching population grew by more than 50,000 teachers. Driving forces behind this increase were an increase in student enrollment and a decrease in student-teacher ratios. In Texas, no classrooms went unfilled. When qualified teachers are no longer available, school districts can fill classrooms either by hiring an unqualified teacher or by increasing the student-teacher ratio. If teacher shortage is defined as the number of classrooms left without a teacher, then no teacher

shortage exists. Most would not be satisfied by this definition because teacher qualifications are ignored (Fuller, 2002).

The number of certificates issued can be a deceiving indicator of how well the teacher shortage is being addressed. The number of certificates issued is not a good indication of the number of teachers entering the teaching pool because many beginner teachers receive multiple teaching certificates. In 1999 in Texas, 25,377 certificates were issued to 15,411 beginner teachers and in 2003, 28,349 certificates were issued to 20,698 teachers. Therefore, the number of certificates represents about 61 to 73% of program graduates actually qualified by state standards to enter the classroom. These certificate numbers do not include emergency certified teachers or teachers on probationary certificates.

Another reason the number of certificates is not a good indicator of how the teacher shortage is being addressed is because of the percentage of teachers who never enter the teaching profession. In Texas, approximately six percent of teachers from ATC programs, 10-11% of teachers from undergraduate programs, and 14-15% of teachers from post-baccalaureate programs, do not teach the first few years after being certified. Even more troubling is the fact that approximately 20% of post-baccalaureate teachers either never entered teaching or left after one year (Herbert, 2004).

Further complications exist when predicting teacher shortages. For one, no system has been established to measure the qualifications of teachers who have not yet obtained their standard certificates, which include out-of-state teachers, emergency certified teachers and ATC graduates on probationary certificates (Fuller, 2002). A

confounding issue is that teacher shortages can occur at different levels (i.e., national, state, regional, district, or campus) for various reasons (Herbert & Ramsay, 2004). In addition, demand and shortages for teachers is geographic and subject-matter specific with the greatest demand in inner cities and rural areas and mostly in secondary mathematics, science, and special education (National Center for Education Information, 2002). Once all of these factors are taken into consideration, the issue of out-of-field teaching enters into the equation (Fuller, 2002). After evaluating all of the evidence, Fuller hypothesized an approximate teacher shortage of 45,000 for the 2001-2002 academic years, which was approximately a 5,000 increase over the previous year.

Several factors contributing to the teacher shortage are a retiring baby boom, an increase in school enrollment, and competition for better-paying jobs (Cox et al., 2001). Teachers leave their current teaching positions for a variety of reasons including retirement, school staffing actions, dissatisfaction, or personal reasons. Low salaries, discipline problems, and minimal input into decision-making also contribute to teacher turnover (Ingersoll, 1999).

Despite the estimated teacher shortage, no Texas classrooms went unfilled. Some classrooms were filled with out of field teachers, emergency certified teachers, or long-term substitutes. Some of these teachers had minimal teacher preparation. If all certified teachers were to teach, the teacher shortage would greatly be alleviated. In 2002, there were 420,000 Texas individuals holding teaching certificates with only 290,000 of them employed in Texas public schools (Herbert & Ramsay, 2004). In 2002, approximately 14,488 Texas teachers were on emergency certificates. The real questions may be how to

encourage the existing teaching pool to enter the teaching field and how to retain the current teaching population.

Influences on Teacher Preparation

Calls for changes in education have resulted from changes in the diversity and the socio-economic composition of classrooms. With the increase in cultural diversity, education has faced the challenge of assuring all children, regardless of talent or socio-economic background, have the opportunity to receive the best education possible from a highly qualified teacher. Consensus is yet to be reached on what factors determine a highly qualified teacher. The NCLBA classified a teacher as being highly qualified if he or she holds " ... at least a bachelor's degree from a four-year institution; hold full state certification; and demonstrate competency in their subject area …" (U. S. Department of Education, 2003, p. 4). Passing a state certification exam, where the state develops the exam and establishes the passing score, meets the bar for demonstrating competency in a given subject area. Many researchers and teacher educators contend that better evidence of "highly qualified" should be based on student academic achievement (Berry, 2001; Boser, 2002; Darling-Hammond & Youngs, 2002; Goldhaber, 2000; Gonzalez, 1999). While there is evidence that individual teachers influence student performance, solid evidence is lacking on what these teacher attributes are and how they are best acquired (American Association of Colleges for Teacher Education, 1997; Andrew, 1999; Baines, McDowell, & Foulk, 2001).

Historically in the United States, no national standards have existed. Certification requirements and teacher preparation have been and continue to be controlled by the

states. With no consensus on what determines a highly qualified teacher, communication has been difficult. In order to form a consensus on what teachers and students should know, national organizations have formulated curriculum and teacher preparation recommendations and legislation has been passed.

Reports by content specific professional organizations have been one method to influence education and teacher preparation. These reports include, but are not limited to, the 1893 *Report of the Committee of Ten,* The 1898 *Report of the Chicago Section of the American Mathematical Society, The 1989 and 2000 National Council of Teachers of Mathematics Principles and Standards, The 1995 National Science Standards* and the 2001 publication of *The Mathematical Education of Teachers* (Bidwell & Clason, 2002; Conference Board of the Mathematical Sciences, 2001; National Academy of Science, 1995; National Council of Teachers of Mathematics, 1989, 2000; National Education Agency, 1893).

An historical overview of these documents shows how some of the same concerns and problems voiced today were voiced in the late 1800s and early 1900s and were repeated throughout the 20th century with the same major goal of producing highly qualified teachers. These reports aided in providing equity for a more diverse student population. These reports also helped unify the country on student and teacher expectations with the major theme that teachers need strong content knowledge, professional development opportunities, and a good mentoring experience.

The 1893 *Report of the Committee of Ten* had three recommendations for better trained teachers: (a) To utilize agencies already in existence to provide professional

development opportunities to practicing teachers, (b) to provide financial support to pursue these endeavors, (c) to offer stated courses of instruction in elementary and secondary subjects, and (d) to provide a mentoring system for new teachers. This mentoring system should consist of the best teacher in each department giving part of his/her time towards " ... helping the other teachers by inspecting and criticizing their work, and showing them, both by precept and example, how to do it better" (National Education Agency [NEA], 1893, p. 54). The 1893 report recommended that teachers not tie themselves to one method of teaching but should use each one with the aim of cultivating students who are independent thinkers.

The 1898 *Report of the Chicago Section of the American Mathematical Society* recommended, if possible, that teachers be "under the careful supervision of an experienced teacher" (Bidwell & Clason, 2002, p. 207). They noted that even in the late 19th century, many teachers were placed into the classroom with no prior experience or pedagogical knowledge accompanied by no support or encouragement from experienced colleagues. They concluded this resulted in new teachers teaching the way they learned. They further concluded that the teachers who were striving for excellence often had a painful path to follow.

By 1944, *The Second Report of the Commission on Post-War Plans* recommended teachers in grades 1-8 demonstrate competency in all subject areas that may be taught over this grade band with special coursework relating to subject matter. Teachers in all grades should have extensive opportunities for professional development and an internship under skillful supervision (Bidwell & Clason, 2002).

The 1980s brought about the creation of the United States Department of Education (DOE), which in turn influenced teacher certification. The DOE was created to ensure that each child had equal opportunities in education and to promote excellence. The DOE (a) established policies for federal aid for education, (b) established policies for distributing funds, (c) collected data and disseminated research on America's schools, and (d) focused national attention on education (United States DOE, 2005).

In addition to the DOE, in the 1980s standards were developed in various subject areas with the recommendations of strong content knowledge, use of various methods of teaching, and continued professional development (National Academy of Science, 1995; National Council of Teachers of Mathematics, 1989, 2000). The enactment of these national standards by professional organizations aided in developing a consensus on what should be taught and who should be teaching. The National Council for Teachers of Mathematics (NCTM) *Standards* expressed the need for equity in education and the right for all children to receive a quality education. The 1989 NCTM *Standards* influenced state standards by increasing the levels of communication and by forming a consensus among the mathematical community about what and how mathematics should be taught and aided in established curriculum guidelines. Two more documents followed: the 1991 *Professional Standards*, and the 1995 *Assessment Standards*.

Educators then began to reevaluate the NCTM standards (Van de Walle, 2004). This reevaluation was an attempt to interrelate the three standard documents on curriculum, assessment, and teaching that existed from 1989 to 1995 (Rosen, 1996). The resulting document was the 2000 NCTM *Principles and Standards*. According to Burrill

(1997), the NCTM standards aided in developing state and local curriculum guidelines and by 1997, 46 states had developed standards aligned with the NCTM *Standards*. Because these standards are built around the underlying concepts of the NCTM document, educational entities across county, state, and country lines were able to communicate mathematical goals with a clearer understanding of what each organization emphasizes.

Teacher preparation standards were also being developed. In 1995, the establishment of the Interstate New Teacher Assessment and Support Consortium (INTASC, 1995) set out to establish compatible policies for teacher preparation along with collaborations on the development of professional development opportunities for teachers. The Professional Teaching Knowledge Standards followed by the American Board for Certification of Teacher Excellence (National Center of Alternative Certification, 2005).

In addition to organizational standards, legislation has begun to play a role in teacher quality. One of the greatest legislative impacts on education in recent history was the enactment of the NCLBA (2002). The NCLBA, like the NCTM *Standards,* expressed the need for equity in education and the right for all children to receive a quality education. The purpose of the NCLBA is "To close the achievement gap with accountability, flexibility, and choice, so that no child is left behind" (United States DOE, 2005, p. 1). Within the NCLBA are provisions for teacher preparation and recommendations for retaining and recruiting teachers.

Teacher Certification

The evolution of teacher certification practices and curriculum has been diverse and varied across the United States (Hover, nd.). In the 1800s, teachers in elementary schools were often poorly educated and certification varied from state to state. Education in secondary schools was difficult due to the poor education students received in primary grades. During this time period, the leaders realized successful education would depend upon qualified teachers and the common school movement evolved. Massachusetts became the first state to create a State Board of Education, which led the establishment of normal schools to prepare teachers (Gutek, 1995). By the mid 1880s normal schools were being formed across the United States with the purpose of preparing teachers to teach in tax-supported common schools. Normal schools later transitioned into teacher colleges, and the development of university education programs followed (Capraro, Burlbaw, & Zientek, 2006; Gutek, 1995; Hover, nd). Today, certification programs extend beyond the colleges and universities but still vary from state to state.

At the state level, education agencies and state boards have been established to oversee teacher certification and to compile reports about the status of the teaching population. In Texas, the State Board for Educator Certification disseminates information about certification requirements and information about the current teaching population. This includes attrition rates, teacher shortages, and certification numbers, which are reported by programs, subject area, and region. Teachers can obtain preparation through colleges and universities, school districts, regional service centers, community colleges, and other entities. Colleges and universities offer teacher

preparation through traditional certification in undergraduate programs and professional development schools and through ATC post-baccalaureate preparation programs.

Requirements for becoming a Texas teacher include (a) holding a bachelor's degree, (b) completing an approved teacher preparation program, and (c) passing the appropriate certification tests. Teachers seeking certification must pass the Texas Examinations of Educator Standards (TExES) exam in their content area and in pedagogy (SBEC, 2005a). Texas teachers can obtain certification in EC-4 (early childhood through Grade 4), ESL (English as a second language), bilingual, and as a generalist. Texas teachers can obtain all level certification in art, music, kinesiology, and special education. Texas teachers can obtain middle school (Grades 4-8) certifications in mathematics, science, and English language arts/reading. Texas teachers can obtain secondary (Grades 8-12) certification in English language arts/reading, history, mathematics, social studies and science. Texas teachers can obtain Grade 6-12 certification in Spanish.

Undergraduate Traditional Certification Programs

Traditional undergraduate university programs offering preparation for teachers have been the primary approach to teacher preparation since the development of the normal schools. The prospective teacher obtains a degree in an academic area along with preparation to become an effective teacher. Undergraduate teacher preparation programs produce the most teachers but the gap between them and alternative programs is closing. In Texas in 2004, approximately 16,000 standard certificates were issued from traditional programs with approximately 14,500 certificates issued from alternative and

post-baccalaureate programs. This is a dramatic change from 2002 where approximately 23,000 certificates were issued from traditional programs and 10,000 issued from alternative and post-baccalaureate programs (SBEC, 2005b). In reality, the numbers total to approximately 34,500 certificates issued in 2004 compared to approximately 33,000 certificates issued in 2002. Therefore, while ATC programs issued more certificates, these programs do not appear to have alleviated the teacher shortage.

Although the increase in ATC certificates may surprise some, predictions of this phenomenon extend back to the mid 1980s. In 1984, Weaver predicted that new proposals to by-pass traditional certification programs, especially a plan already in force in New Jersey, would likely "force schools of education to vehemently defend the claim they are the best places from which to recruit schoolteachers" (p. 187).

Alternative Certification Programs

About the same time the Carnegie Task Force on Teaching and the Holmes Group's suggested reformations in teacher preparation, ATC programs were being developed with the goal of bringing talented individuals into the teaching profession. New Jersey was the first state to receive publicity regarding ATC when it enacted legislation for alternative routes to certify teachers in 1984. In 1985, New Jersey created an ATC program not to address the teacher shortage but to recruit more qualified candidates into teaching. New Jersey's ATC program was designed to be an alternative to emergency certification. Emergency certified teachers were being placed in the classroom with no prior instruction or preparation (Schouten, 2002). As previously noted, this was a problem existing as far back as the late 19th century. Reports suggest

the New Jersey program was successful in recruiting quality candidates and minorities into the teaching profession and more than doubled the supply of qualified teaching applicants in the past fifteen years (Klagholz, 2001).

Texas followed in 1985 by implementing a single ATC program in the Houston Independent School District (Schouten, 2002). In 1986, there were 18 states that allowed ATC programs, and by 1992 there were 40 (Shen, 1997). In 1992 former President George Bush advocated ATC by suggesting barriers be removed so that talented people who have demonstrated competency in their fields and who would like to teach can enter the teaching profession (Haberman, 1999). Educational region centers and private entities followed in providing alternative preparation routes to teacher certification.

At the time the present study was conducted in Texas, educational entities such as the State Board of Educator Certification (SBEC) oversaw the certification process and worked in conjunction with the Texas Education Agency to provide highly qualified teachers, while simultaneously addressing the teacher shortage. Today, the SBEC has been dissolved into the Texas Educational Agency. In 2003, the National Center for Alternative Certification (NCAC) was developed to provide trusted information about alternative teacher certification. In 2004, NCAC held their first annual conference to define challenges of ATC programs and devise strategies to overcome these challenges (National Center for Education Information, 2005).

Research investigating differences by certification route vary and one source of variation may be accounted for in the categorization of programs by certification route. Some researchers divide teacher certification routes into university versus non-university

routes while others divide teacher certification routes according to whether or not teachers receive their certification as part of their undergraduate degree. For the present study, alternative certification was defined as any entry into teaching other than obtaining certification as part of an undergraduate degree. Consideration was then given to the various routes within alternative certification.

Alternative teacher preparation can be provided by colleges or universities in post-baccalaureate programs of professional development schools, or in approved programs by region centers, community colleges, school districts, and for profit organizations. Entrance and exit requirements as well as components of these programs vary. Common entrance requirements may consist of interviews, grade point averages, letters of recommendations, or demonstration of content knowledge. Differences in content knowledge may be passing a content exam or completing a set number of content hours. The content hours required also vary from program to program. In one program, content knowledge was based solely on the passing of a retired state content examination. Another problem is that participants' experiences may vary within programs. According to Humphrey and Wechsler (2005),

Participants experience the program as implemented, not as planned. 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. (p. 22)

In addition to variation in entrance requirements in programs, variations exist between states. Most states require a bachelor's degree and proof of content knowledge;

but from there, qualifications differ. Some states require a degree in the teaching field; some states require a set number of hours in the teaching field, while some have no set hours in content area. Some states require either a degree in the teaching field or work experience in the teaching field and some require work experience regardless of degree. For example, Pennsylvania requires "10 years of exceptional service in a career compatible with the subject to be taught or a B. A. or an advanced degree in the subject to be taught" (Feistritzer & Chester, 2003, p. 37). Minnesota requires experience in the field being taught and documentation of successfully working with students. Most states require no service or experience with children. Allen (2003) found research to be inconclusive on the importance of entrance requirements and selection processes with only three studies addressing this question. While two studies found a correlation between academic success and teacher success, the third study suggested that entrance requirements that were too stringent would reduce the teacher candidate pool, and especially the pool of minority candidates.

In Texas, ATC teachers must hold a bachelor's degree, demonstrate proficiency in college level skills, and demonstrate appropriateness for the degree as determined by the program. Teachers receive a probationary certificate for one year, which can be renewed a second year. During this time, the ATC teacher receives full benefits. The intern has a mentor who has received appropriate training. The teacher and the mentor each observe each other. The intern completes preparation in teaching methods and classroom management. Preparation occurs either prior to entering the classroom or during the intern year. The completion of the internship and passing of the state exams in

content and pedagogy leads to full certification (Feistritzer & Chester, 2003). In 2001, 65% of Texas teachers were TTC whereas in 2003 this percentage had declined to 46%. The percentage of certificates issued to TTC declined from 73% to 54% over this time period (SBEC, 2004).

Regional Service Centers

In 1965, a Title III grant entitled the Elementary and Secondary Education Act provided funding for instructional preparation and services for teachers. From this grant, 20 regional centers in Texas were formed to service Texas teachers. Today, these regional service centers provide professional development for teachers, train prospective teachers, and assist schools in acquiring grant funds. The regional centers are service organizations and district or campus participation is voluntary (Education Service Center Region 12, 2005). In 2002, alternative routes to teacher certification were offered in 15 of the 20 Texas regions (Feistritzer & Chester, 2003). The percentage of alternatively and traditionally certified teachers varies within regions.

Community Colleges

Community colleges are responding to the dilemma of teacher shortages by expanding their role in teacher preparation. Community colleges have been contributing to America's teacher pool for years. From the beginning, teachers were among graduates of two-year colleges who went directly into the clinical preparation. This preparation concept goes back to laboratory schools as envisioned by John Dewey (Hallinan & Khmelkov, 2001).

Today, many teachers begin their teacher preparation at community colleges.

This preparation includes undergraduate education courses, ATC programs, and articulations agreements with four-year institutions. Through service-learning programs and pre-education advising, community colleges can reach diverse populations, provide field-based preparation, reach nontraditional students seeking employment transitions, and determine individuals' predispositions to teaching early on in their education (Franco, 2000).

Community colleges' expanding roles are not limited by geographic regions. In Arizona, community colleges offer extensive online teacher preparation course. In Maryland, 50% of teachers begin at two-year institutions and state officials approved an Associate's of Arts in Teaching degree enabling community college graduates to transfer all credits to a public or private university in the state. Nevada's Great Basin College currently offers a Bachelor's of Arts in Elementary Education degree (Cox et al., 2001). In Texas, an Associate's Degree of Arts in Teaching has been approved and a number of community colleges offer ATC programs in a majority of subject areas and grade levels including high need areas such as mathematics, foreign language, and science.

Not everyone has favored community college involvement in teacher certification. David Imig, the president of the American Association of Colleges for Teacher Education, commented that the public is setting higher expectations for teachers. Imig believes that there must be a process for four-year institutions to be able to establish standards for incoming prospective teachers transferring from community colleges (Cox et al., 2001). Others argue that community colleges have been contributing to America's teacher pool for years. This involvement dates back to when teachers were

among two-year college graduates who went directly into the schoolhouses. Today, many of the current teacher population began at community colleges before transferring to four-year universities and approximately 15 Texas community colleges are offering alternative certification programs.

Not all colleges of higher education view community colleges involvement negatively. According to Jan Hughes, associate dean in the College of Education at Texas A&M University, the university does "not see community colleges as competition. We see them as an opportunity, as a partnership" (Cox et al., 2001, p. 18). Texas A&M Regents' Initiative project established partnerships with community colleges, which created cohorts of students majoring in high need areas. These students received performance stipends and guaranteed admission into the College of Education provided they met the program requirements.

Post-Baccalaureate Preparation Programs

Prospective teachers who already have college degrees can obtain teacher certification by enrolling in post-baccalaureate programs offered through colleges or universities. Typical post-baccalaureate programs admit prospective teachers to the college and the prospective teachers complete graduate credit courses. The teachers are under supervision from a college or university faculty member and complete paid internship while completing coursework.

Professional Development Schools

By 1986, the teacher education reformation movement was underway with the publication of two reports: The Carnegie Task Force on Teaching as a Profession

released *A Nation Prepared: Teachers for the 21st Century* and The Holmes Group released *Tomorrow's Teachers*. Both of these reports advocated a twofold approach to education. These publications suggested enriching the professional education of teachers by eliminating undergraduate teacher certification programs and requiring graduate level preparation and a mentoring system (Hallinan & Khmelkov, 2001).

The current professional development schools (PDS) models probably resemble the Holmes Group's *Tomorrow's Schools* and a host of other reform proposals. Professional development schools hold the possibility of reinventing teacher preparation but thus far have only been adopted by few and are supported by soft money (National Commission on Teaching and America's Future [NCTAF], 1996). Even so, professional development schools have been considered successful in the reformation movement and integrate teaching practice with academic research and preparation. The major goals are to prepare future teachers with state-of-the-art teaching practices and to bring together researchers and practicing teachers to test new knowledge and teaching practices. In professional development schools, student teaching and internships are directly linked to coursework and partnerships between universities and schools are established (NCTAF, 1996).

There is evidence suggesting that a professional-development-based teacher program produces better results than traditional programs because it promotes teacher confidence and self-efficacy in teaching. Consequently, these teachers are less susceptible than their counterparts to the reality shock of teaching and usually have lower attrition rates during their first few years (Hallinan & Khmelkov, 2001).

Unfortunately, despite professional development schools' attempts to successfully become prototypes of the best teaching practices, traditional modes of teaching continue to prevail in the classroom (Hallinan & Khmelkov, 2001).

Other Educational Entities

In addition to universities, regional service centers, and community colleges, school districts and for-profit organizations offer ATC programs. In the 1980s, the Houston Independent School District was one of the first districts to begin offering teacher preparation. Today, there are four large Texas school districts offering ATC programs. For-profit organizations are also now actively involved in teacher preparation as well as recruiting agencies such as Troops for Teachers and Teach for America. In 2002 in Texas, five private entities had developed teacher preparation programs (Feistritzer & Chester, 2003).

Alternative versus Traditional Certification Programs

A heated debated has ensued since the inception of ATC programs. Allen (2003) warned against weighing claims on either side of the debate due to the thinness of research. Proponents for ATC programs believe the difference in pedagogical knowledge obtained in ATC programs and TTC programs is irrelevant because content knowledge enhances student achievement while pedagogy knowledge does not. While this view may offer support for ATC programs, this does not explain why graduates of ATC programs would be equivalent or better classroom teachers than graduates of TTC programs. Traditional teacher certification programs require both content knowledge as well as education courses. When attacking the TTC programs, the assumption is that

content knowledge enhances student achievement while pedagogical knowledge does not. With this argument, the discussion regarding number of education courses becomes a moot point. Another argument used to support ATC programs is the myth that education courses are not intellectually challenging.

The same advocates for ATC programs who herald the need for content knowledge must also face the realization that many ATC teachers do not have substantial amounts of content knowledge. For example, a teacher can enter a teacher certification program with a minimal number of post-high school courses and minimal preparation prior to entering the classroom. This teacher may be entering the classroom with minimal content knowledge and minimal pedagogical preparation; yet, s/he will be considered by the certification program as ready to meet the challenges of the classroom.

Another argument for ATC programs is that ATC teachers obtain on-the-job training. Humphrey and Wechsler (2005) found that on-the-job training depended upon the school context and played a major role in the ATC's development. Whereas some teachers received quality mentorship and support, other teachers were left to flounder for themselves or were caught up in a bureaucratic system of varying philosophical views. Differences in experiences varied by school and within school districts. Therefore, the advantages of on-the-job training depended upon the context of the school.

Berry (2001) identified four myths in support of ATC programs. The first myth is that teachers only need content knowledge. Research has not proven that content knowledge is enough to adequately teach students. Teachers' content knowledge does not help them understand how students think, how to motivate students, nor how cultural

differences affect student's learning. The second myth is that ATC programs attract highly qualified individuals into the teaching profession. Research results are inconsistent and sometimes conflicting on whether or not ATC programs are attracting highly qualified individuals. Humphrey and Wechsler (2005) found that only about one percent of alternatively certified teachers were natural or physical scientist with only another four percent having served in fields relating to mathematics, engineering, or computer science. The third myth is that ATC programs produce more effective teachers whose students obtain a higher level of student achievement. Research results in this area are often misleading with researchers comparing first year TTC teachers to ATC teachers who have been teaching up to seven years. The fourth myth is that ATC teachers are just as apt to stay in the teaching profession. According to Berry (2001), about 60% of ATC teachers leave after three years compared to 30% of TTC teachers. Due to the recent growth in ATC programs, research is inconclusive for long-term retention rates of ATC teachers. Research has concluded that ATC teachers tend to leave teaching at larger rates than TTC teachers (Allen, 2003; Capraro, 2004). Berry (2001) concluded that despite these myths, ATC programs should not be eliminated, but should be encouraged to contain core components identified as characteristics of effective ATC programs.

Studies have been conducted to explore these myths. Pituch and Miller (1999) found that if ATC programs provided regular mentoring, there was basically no difference in their students' achievement from the students of traditionally certified teachers. The researchers also found no statistically significant difference between

behaviors thought to underlie effective teaching, perceptions of initial preparation, or teaching competence after teaching three years. Humphrey and Wechsler (2005) found that despite programs acknowledgement of the importance of mentoring, quality and support of new teachers was unpredictable.

Shen (1997, 1999) published two reports comparing ATC and TTC teachers to determine if differences existed in TTC and ATC teachers regarding demographics, work experience, academic qualification, career patterns, and what and where they taught. First, he investigated the impact of teaching routes regardless of teaching content and then he limited his investigation to mathematics and science teachers. Across both subject matters, the results indicated that ATC programs did not bring older people into the classroom but did bring in more minorities. ATC teachers had lower academic qualifications compared to TTC teachers and did not consider teaching a lifelong career compared to the TTC teachers (Shen, 1997). In contrast, when limited to mathematics and science, Shen found that although ATC teachers had obtained a higher educational level than TTC teachers, there was no statistically significant difference between ATC and TTC mathematics and science teachers in their devotion to teaching, and ATC programs reduced the teacher shortage but failed to recruit more males, minorities, and older people into the teaching profession (Shen, 1999).

Across all subject areas, Allen (2003) and Herbert (2004) found that ATC programs were more apt to diversify the teaching field by bringing in a greater percentage of minority teachers than TTC programs. Humphrey and Wechsler (2005) found that alternative certification programs tend to reflect the racial composition of

their labor market and their results indicated ATC programs were not bringing in more males in the teaching profession. Teacher reports by the SBEC show that ATC programs are producing the majority of minorities and males in the teaching profession. In 2003, approximately 34% of males were produced in traditional undergraduate programs compared to 50% of females. Only 26% of African American teachers were produced by traditional programs compared to 51% of the Hispanic population. Within the traditional undergraduate programs, only 5% of their population is African American and 28% Hispanic. In comparison, approximately 14% of the alternatively certified population is African American and 26% Hispanic (Herbert, 2004). These percentages have remained relatively the same over the past five years.

The SBEC numbers, along with the percentages of minorities entering the classroom through ATC programs, indicate ATC programs in Texas are bringing in more minorities. This contradicts Humphrey and Wechsler's (2005) results of seven large ATC programs across various states. In 1999, 2661 Texas teachers entered through ATC programs. The number increased to 7113 in 2003 (Herbert, 2004). If approximately 14% of the ATC population was African American, this population changed from about 373 in 1999 to about 996 in 2003. With a 26% Hispanic population, this population changed from about 692 in 1999 to about 1850. Because the traditional population is declining and the percentage of minorities in these programs is remaining relatively the same, the conclusion is that ATC programs are successful in recruiting more minorities in the teaching profession.

Shen's (1997) conclusions that ATC programs failed to recruit older, more

experienced teachers into the classroom supports the concern that ATC programs allow current graduates to forgo the TTC process. Even so, ATC programs did bring in some experienced people and offer a means for more mature individuals to enter the teaching field. Humphrey and Wechsler (2005) found that almost half of their sample consisted of teachers who had prior classroom experience as either a classroom teacher, a teacher's assistant, or a substitute teacher. Recruiting more mature teachers into teaching is important. According to Dill, Hayes, and Johnson (1999), most of the students coming from low socioeconomic status that went on to excel in college had an adult, often a teacher, who took an interest in them and believed in them. Many 21- to 23-year-olds are trying to handle the stress of their first full-time job and have difficulty handling the emotional and intellectual needs of their students. ATC programs remove barriers and enable mature individuals to enter the teaching profession.

While Shen (1999) did find that ATC programs reduced the teacher shortage in high need areas, the question of whether or not ATC teachers are as qualified as TTC teachers remains unanswered. According to Goldhaber (2000), if all else is held constant, there is no evidence that TTC teachers outperform emergency certified teachers, a conclusion that contradicts the findings of both ATC and TTC advocates. Goldhaber did find evidence that students of teachers who hold private school certifications or certifications out of field do not perform as well as students whose teachers who hold a standard, probationary, or emergency certificate in mathematics (Goldhaber, 2000). Darling-Hammond et al. (2001) later questioned the present study because of the small sample of emergency certified teachers and the similarities of the

emergency and traditionally certified teachers in Goldhaber's research sample.

Another study found ATC and TTC teachers were not inferior among teacher evaluations performed by their school-site administrator. The results also indicated that after three years, no observable differences existed in student output or perceptions of competence. The results were dependent on programs with mentoring components, post-graduation preparation, in-service classes, and ongoing university supervision (Miller, McKenna, & McKenna, 1998). Humphrey and Wechsler (2005) found that with the exception of Teach for America, ATC teachers indicated they planned to stay in teaching for at least 10 years ranging by program from 34% to 77%. Contrary to these findings, other studies indicate ATC teachers were less confident and less inclined to stay in the profession. The findings varied across states and programs (Wilson et al., 2002).

Effective Teacher Preparation Programs

With the proliferation of ATC programs, policy makers and school districts must ascertain the effectiveness of these programs to produce qualified teachers. To complicate this evaluation, variations exist in the design, implementation, and reporting of existing ATC programs. Many believe evidence of a *highly qualified* and effective teacher should be measured by student achievement (National Education Agency, 2005). Evidence shows that teacher effectiveness has an additive and cumulative effect on student achievement. While there is evidence that individual teachers influence student performance, a consensus does not exist on what teacher attributes positively impact student achievement or how these attributes are best acquired.

Certification licensure and the route to certification are presumed to have a direct

influence on the teacher's method of teaching and knowledge. Conflicting reports have been published on the role certification route has in determining teacher quality (Goldhaber, 2002). Much debate has focused on the area of certification and subject area competency. Some believe certification route is a major component in determining highly qualified teachers. Others cite reports that a teacher's general cognitive ability followed by experience and content knowledge are linked to student achievement; whereas preparation in pedagogy and certification requirements is not highly linked to student achievement (U. S. Department of Education, 2003). Darling-Hammond (2000), in her review of literature, cited a published report that when limited to the first five years of teaching, years of experience was more of a determining factor on student achievement than certification route. After five years, years of experience did not appear to be a determining factor between student achievement and teacher effectiveness (Darling-Hammond, 2000). As previously mentioned, Goldhaber (2000) concluded that if all else is held constant, there is no evidence that traditionally certified teachers outperform emergency certified teachers albeit his findings were later refuted (Darling-Hammond et al., 2001).

Goldhaber (2002) and Darling-Hammond's (2000) review of literature found various factors that have been attributed to impact on student achievement with varying results on the degrees of their impact. These factors include internal and external factors. Internal factors include: (a) teacher's self-efficacy, (b) teacher's content knowledge, (c) teacher's verbal abilities, (d) teacher's scores on certification exams, (e) teacher's certification background, (f) teacher's years of experience, (g) teacher's mentoring

experience, (m) teacher's beliefs, and (n) teacher's pedagogical background. External factors include (a) size of the school or district, (b) number of non-English learners in a classroom, (c) proportion of school staff to teachers, (d) pupil-teacher ratios, and (e) number of students in a classroom.

Teacher preparation programs can address some of the internal factors attributed to student achievement. Teacher factors attributed to student achievement will be addressed if teacher preparation programs contain the following: rigorous courses in content and pedagogical knowledge, introduction to a variety of teaching methods, emphasis on reflection as an aid in teaching and in building teacher-efficacy, a well-organized and effective mentoring system, and a strong emphasis on verbal abilities.

Alternative teacher certification programs vary greatly in length, topics, and rigor. Because preparation programs differ, the argument for ATC versus TTC should not just reside in the name but also in the design of the ATC programs. In spite of the route taken, effective modern educational programs should contain common characteristics and the one common goal of making better teachers (National Commission on Teaching and America's Future, 1996). There should be clear understanding of quality teaching that is communicated through courses and field experiences. Curriculum should be based on child development, learning theory, cognition, motivation, and subject matter pedagogy. Coursework and clinical experiences should be integrated with at least thirty weeks of field-based experience and extensive use of various assessments (case studies, teacher research, performance assessments, and portfolios) that ensure learning is applied to real-world problems.

Effective educational programs should be guided by practice and performance standards, a clear understanding of the community, and strong relationships between school and university based faculty (Hallinan & Khmelkov, 2001).

Pedagogical and Content Knowledge

Wilson, Floden, and Ferrini-Mundy (2002) sought to answer five questions about teacher education programs. On all five of the questions, research was sparse and inconsistent. On the first question, referring to the effects of subject matter preparation, no reports directly assessed teacher content knowledge and student outcomes. They did find seven studies investigating the amount of content preparation required of teachers but the studies varied in sample size, content area, and grade level. Some studies found educational coursework to be important while some studies found subject knowledge important. In mathematics, one study found a threshold effect occurring at five mathematics courses. Wilson et al. (2002) found the results to be inconsistent between studies and across subject areas. In a report for the Education Commission of the States, Allen (2003) concluded content knowledge is important but the results were inconclusive about the necessity of holding a major in the teaching area. Research also indicates a threshold effect may occur at a minimal number of courses. Suggestions for testing content knowledge include testing in the content area, which is the method undergone by Texas teachers to demonstrate content knowledge.

On the second question, referring to the effects of pedagogical preparation to student learning and teacher behavior, no reports directly assessed the effects of pedagogical preparation. Wilson et al. (2002) found five reports comparing certified to

uncertified teachers and several on the value added by education coursework. Unfortunately, certified versus uncertified does not give an indicator of a teacher's previous pedagogical preparation and value added research was limited by the design and sample (i.e., small sample sizes or limitations of one school in the sample). Allen (2003) concluded limited support exists on the importance of pedagogical knowledge with an even less clear consensus on how prospective teachers should acquire pedagogical knowledge. Acquiring this knowledge is not limited to coursework but may also be obtained through field experience, student teaching, or job experience.

The impact of teaching theory coursework on teacher effectiveness has been unclear. Despite the inconclusiveness of studies about how pedagogy coursework impacts the classroom, research from the Schools and Staffing Survey has established a link between beginner teacher attrition and theory courses. In Ingersoll's study of beginner 2000-2001 teachers who left teaching after one year, 28% of them did not receive preparation in child psychology and learning theory (SBEC, 2003). These results indicate learning theory coursework is important to the success of retaining teachers and suggest that such courses are important for teacher's success in the classroom.

Teaching Methods

The Schools and Staffing Survey has linked teacher attrition to teachers' knowledge of learning theories. In traditional programs, most students complete coursework on teaching and learning theories, whereas alternatively certified teachers may or may not have obtained access to learning theories (SBEC, 2005a). With the debate continuing over the impact of ATC on students, questions arise to what effect

certification routes, with varied degrees of preparation, will have on the implementation of teaching theories teachers use in the classroom.

If learning to teach students with various learning styles is not addressed during teacher preparation or through continued mentoring and professional growth, teachers will continue to teach in the manner in which they were taught. Most have been taught with the traditional approach. In an attempt to educate large numbers of students, the traditional approach was developed in the 1900s. Administrators modeled the educational system according to factory organizations. According to the National Research Council (2000), "[c]hildren were regarded as raw materials to be efficiently processed by technical workers (the teachers) to reach the end product ... The emulation of factory efficiency fostered the development of standardized tests for measurement of the 'product' ... In short, the factory model affected the design of curriculum, instruction, and assessment in schools" (p. 132). Teachers were to produce students who could successfully complete the tasks at hand and keep records of progress often at the expense of teaching (National Research Council (NRC)]], 2000).

According to Woolley and Woolley (1999), teachers' beliefs are affected by three sources: (a) personal experiences, (b) experiences as a student, and (c) formal knowledge. Most American teachers learned in the traditional way and "they have neither models nor experience teaching the ways that would best facilitate their students' development of mathematical understanding" (Schoenfeld, 2002, p. 20). For most teachers, this is the only experience they remember in the classroom. Without familiarization and preparation in different teaching methods, they will repeat what they

have learned and teach as they were taught. The result is the continuation of the traditional classroom based on rote work and memorization. Teachers have had a lifetime to learn one teaching style and very little time or professional opportunities to learn alternate teaching methods. Treisman concluded that "[b]eginning teachers don't teach in a behaviorist manner because they lack skill or content knowledge. It is the system they have been socialized to—it is what they understand a class should be. This is one of the very great dangers of the new Texas rules for temporary credentials" (Treisman, 2004).

Current research concludes that methods courses as well as the cooperating teacher affect teaching styles. Woolley and Woolley's (1999) research "suggests that methods courses may be more powerful in shaping students' beliefs than sometimes reported, and that although student teachers learn from their cooperating teachers, their fundamental beliefs about teaching do not change in only one semester" (p. 22).

Research also indicates that regardless of certification route, teachers will face the possibility of being unprepared to teach in a standards-based classroom and will tend to return to traditional teaching methods (Herrington, Herrington, & Glazer, 2002). In TTC, university courses often concentrate on theoretical perspectives without engaging students in genuine situations. Even teachers who have been trained in non-traditional beliefs about teaching often return to the traditional approach once they have entered the classroom and no longer receive subsequent support. Therefore, if programs do not address learning theories and provide inservice professional development, the "long apprenticeship" for behaviorist learning theories will continue.

Because students learn in different ways, the goal for teacher certification programs is to create effective teachers who can teach students in a variety of teaching styles so as to give all students the opportunity to learn. Teachers' ideas about their subject directly influence what and how they teach. Interdependence exists between beliefs and knowledge (National Research Council, 2000). Teachers will teach what they deem important and in the method they believe is important. Most traditional beliefs are centered on the behaviorist learning theory. The behaviorist teacher views the learning as "replication and repetition; a view of teaching content knowledge as exposition and practice; and a view of assessing knowledge as paper and pencil testing for the sole purpose of grading and ranking" (Herrington, Herrington, & Glazer, 2002, p. 1). In the traditional classroom, the teacher lectures; the focus is on having students repeat a new pattern until the pattern becomes automatic (Mergel, 1998). Once the material is covered, skills are assessed and the students are then awarded grades. The assessment instrument is designed to determine if they can complete the task. If they conform to expectations, they receive a high grade. If they do not conform to expectations, they receive a low grade.

According to A. G. Thompson (1992), the 1989 NCTM *Standards* noted that traditional teaching methods have emphasized "mastery of symbols and procedures, largely ignoring the processes of mathematics and the fact that mathematical knowledge often emerges from dealing with problem situations" (p. 128). With the rise in cultural diversity in schools, the importance of socio-cultural theories in the classroom has become even more important and teachers need sustained support in order to

successfully implement these theories.

Through the implementation of the NCTM *Standards* and the rise in cultural diversity, socio-cultural theories and the introduction of Vygotsky's theories have propelled their way into the classroom (Moll, 2001). Constructivism, which has been associated with Piaget, Vygotsky, and Dewey, has made its debut in the educational system and involves two principles: (a) "knowledge is actively constructed by the learner, not passively received from the environment", and (b) "coming to know is a process of adaptation based on and constantly modified by a learner's experience of the world" (Jaworski, 1996, p. 2). Students construct a view of their abilities from past experiences and from the social world around them. The belief is that learners create their reality as they interpret it from their own experiences. Each person's experience and their past experiences are unique to them. Knowledge then is formed from prior experiences and by a person's belief system (Mergel, 1998) and is constructed by reflecting on experiences in their lives. From these experiences and reflections, come new understandings. Unlike behaviorism, with constructivism the processes of learning are explored and reflective thinking is essential to learning. Some refer to reflective thinking as a mode of thought. Through reflective thinking, curriculum and knowledge are connected (NRC, 2000). The student changes old beliefs and becomes a creator of knowledge through questioning, exploring, and assessing knowledge.

Social constructivism, based on Vygotsky's principles, goes a step further than the individual and investigates how the student learns by communicating with others and should be addressed in teacher preparation programs. Vygotsky's work is based on the

idea that people are continually in conversation with themselves and the world. Every function of learning occurs twice: once in the "interpsychological" realm where they have conversations between people and in the "intrapsychological" realm where they have internal conversations with themselves (Lerman, 2000). Throughout the learning process, the child is in continual communication with self or those in the learning environment. In the classroom, the students and the teacher are continually reflecting on what they are learning.

Scaffolding is an important technique in teaching based on Vygotsky's *zone of proximal development* and a concept that teachers need to learn in their teacher preparation programs and under direction by experienced teachers. Scaffolding is the skill of directing children so they can reach knew knowledge and is a "contrast between what a child can do independently, his or her actual level of development, and what the child can do with the assistance of others" (Moll, 2001, p. 14).

Vygotsky's principles have changed education by emphasizing the social role in education, the interplay between the person's inner conversations and the person's conversations with the world, and the need for designing activities that maximize the teacher's abilities to scaffold the student's learning while taking into consideration social and cultural influences. All of these have resulted in changes in activity structures within the classroom and concepts that many new teachers have not experienced. Standards-based activities are prepared to guide students' learning and discussions are encouraged (Sfard, 2003). The content focuses not only on deep content knowledge but also conceptual knowledge and making connections between concepts. Problem solving is

important and real-world application problems are introduced (Forman, 2003; NCTM, 2000). Assessments also differ in the standards-based classroom and include both formative and summative assessments. These assessments are made by journal entries, observations, and portfolios along with paper pencil tests (NCTM, 2000).

Teachers enrolled in TTC are usually introduced to various approaches to learning, curriculum design, and assessments. Students in ATC programs may or may not be introduced to various teaching methods. Regardless of their classroom experience in the certification program, research implies that without continued professional growth these teachers will return to the traditional teaching methods. Therefore, ATC programs need to address theoretical teaching theories and both alternative and traditional certification programs need to provide continued professional support.

Technology is another skill teachers will need to master in today's classroom. The National Council for Teachers of Mathematics (NCTM) has recognized the importance of technology by including technology as one of the six principles in the NCTM's *Principles and Standards* (NCTM, 2000). Learning how to incorporate a new tool may require changes in sequence of topics and requires more time and resources to properly implement the strategies in the classroom. Variables influencing teachers' use of technology in the classroom include administrative support, time constraints, misconceptions, students' attitudes, and teachers' beliefs (Byron & Bingham, 2001; Van de Walle, 2004).

While administrative support is vital, this is not a factor teacher preparation programs can influence. While teacher preparation programs do not directly influence

time constraints, they can teach teachers classroom management and curriculum development that will help teachers utilize their available time productively. The implementation of technology in the classroom requires teachers to modify their teaching strategies and often calls for redesigning the curriculum (Byron & Bingham, 2001). Instead of concentrating on only the pencil and paper concept, teachers now have the opportunity to develop conceptual activities that allow students to develop a deeper understanding. For successful implementation, technology needs to be embedded in the curriculum and should not be considered as an add-on to an already existing program (NCTM, 2000).

Misconceptions in the role of technology in the classroom also create barriers and influences teacher's decision to implement technology. In education, the integration of technology in the classroom has been hampered by a minority of people who advocate the use of technology as "dumbing down the curriculum" and as a "crutch" for the students (Van de Walle, 2004, p. 103). These misconceptions may come from mathematic educators, administration, parents, or teachers. Parents who are seeking the best for their children sometimes become concerned when they hear these terms (Van de Walle, 2004).

Teacher certification programs can address teachers' misconceptions and give teachers the tools needed to help others overcome these misconceptions and understand the value technology can have in education. Parents and educators need to be educated regarding the role technology plays in scaffolding and learning. Parents need to understand that technology allows students to make connections and can allow students

to “work at higher levels of generalization and abstraction” (NCTM, 2000, p. 24). With the proper preparation, the teacher can help influence the students’ attitude and level of anxiety. Students may feel frustrated with new tools. Merriweather and Tharp (1999) found students’ attitudes towards calculators affected their use of the calculator. Students who were uncomfortable with graphing calculators chose to forgo their use and resorted to paper and pencil methods or methods with which they were comfortable. With consistent use, the students’ attitudes will improve. In order for the teacher to be successful, they must be confident in their abilities to integrate technology into the curriculum (Merriweather & Tharp, 1999).

Teachers must learn how to help students feel comfortable by assisting students to reach the middle ground while providing the learner with a challenging experience, by being confident teaching with technology, and by reinforcing the use of the calculator with consistent implementation in the curriculum.

Teachers’ beliefs play a major role in implementing technology. The teacher is the facilitator who supports and guides the learning process by offering learning tools and guiding the inquiry process (Manouchehri, 2004). Without the teachers’ support and willingness to try new methods, traditional methods will persist. Without intensive preparation and professional development opportunities, teachers will find it difficult to implement new teaching methods and tools that differ in the way they were taught (i.e., in the behaviorist manner). The “long apprenticeship” will be difficult to undo. Hence, the teachers’ beliefs are an important variable in whether or not the teacher will implement technology in his or her instruction. Teachers’ knowledge, skills, and

attitudes on technology should be addressed during teacher preparation.

Mentoring

Mentoring has been linked to new teacher success. Mentoring is not a new phenomenon and support for new teachers was a concern voiced as far back as the late 1800s and early 1900s. The 1893 *Report of the Committee of Ten* recommended a mentoring system in which the best teacher in each department gives part of his/her time towards " ... helping the other teachers by inspecting and criticizing their work, and showing them, both by precept and example, how to do it better" (NEA, 1893, p. 54). Research indicates new teachers who participate in an induction program are nearly twice as likely to remain in the teaching profession as those who do not participate in an induction program (National Education Association, 2005). Sustained mentoring through the first three years has been suggested for continued teacher effectiveness (Holloway, 2003). During the 1980s, interest in mentoring grew dramatically. In 1986, 14 states had mentoring programs under development and by 1987, only three states did not having mentoring programs (Brown, 2003).

Effective ATC programs should contain a mentoring component (Wilson, Floden, & Ferrini-Mundy, 2001). Teachers have found that while education programs can prepare them to teach, they do not prepare them for the challenges faced each day in the classroom. Mentors can help novice teachers face these challenges. In teaching, mentoring is defined as pairing an experienced teacher (the mentor) with an inexperienced teacher (the mentee) with the final goal of an increase in students' skills and knowledge. In order for mentoring to be successful, teachers must be identified who

want to be mentors versus teachers being assigned as mentors. The most experienced and best teachers in the classroom may not be the best mentors if they do not desire to take on the role of mentor (McCord & Bowden, 2003). Also of vital importance is to carefully match the mentor and new teacher especially in terms of the same grade level or subject (NEA, 2005).

Mentoring programs, which are supported by schools districts and colleges of education, benefit both the mentor and novice teacher. The mentors benefit as they reflect and continually evaluate their teaching (Ganser, 1999). Mentors serve many jobs including: counselor, teacher, challenger, coach, observer, facilitator, trainer, master, tour guide, advocate, role model, reporter, and equal.

Successful mentors do not behave as supervisors but as colleagues who advise and assist new teachers (NEA, 2005). Mentoring should not be utilized as part of an assessment system contingent upon teacher certification or job renewals. If the mentor is serving as an evaluator, the novice teacher may not be open and communicate with the mentor (Sweeny, nd). Mentors need to be chosen before they begin organizing their yearly schedule so they can arrange time so as to become an effective mentor (McCord & Bowden, 2003). The mentors must also be trained in communication skills and about stages and needs of new teachers. The mentor should also realize that while they are there to help, they cannot be the "fix it" person and the success of the new teacher is not all determined by mentoring alone. Other factors will inevitably affect the success of the new teacher (Ganser, 1999). For success to occur, the mentor and mentee must be placed in close proximity so regular meetings can occur. Mentors and mentees should meet

preferably two to three times a week with length of time varying based on the novice teacher's needs (McCord & Bowden, 2003).

State educational agencies have begun to recognize the importance of mentoring. The Texas Beginning Educator Support System (TxBESS) was established in 1999 to provide support for beginning teachers. This support comes in the form of standards-based preparation and preparation for mentor teachers (SBEC, 2005a). Although one component of the system is mentoring, the system is much more this and is an actual induction program for beginning teachers. In the mentoring component, collaborations with school districts and teacher preparation programs are an essential component of the TxBESS system. The principal is given the directive to support newly hired beginner teachers and a support team is established consisting of the principal, a mentor teacher, and a representative from the teaching program. Criteria for mentors are established and then ongoing support and training for the mentors are provided. Mentor guidelines include establishing rules for frequency and length of meetings.

Humphrey and Wechsler (2005) concluded quality mentoring was important to on-the-job training and had the ability to "make a good situation better or a bad situation worse" (p. 20). While they found that all programs believed mentoring was important, most of the programs in their sample exerted little effort in controlling mentoring; thus, ATC teachers received varying degrees of mentor quality within their program.

Field Experience and Student Teaching

Field experience is another component contained in effective ATC programs. Parkay (1982) found that field experience instilled more confidence in teachers and

impacted effectiveness in the classroom. Teachers indicate that clinical experience obtained in field experience may be the most important component of teacher preparation. An important factor in field experiences is the cooperating teacher. Field experience can occur at any time during the preparation program and vary greatly between programs. Field experience can "show what the job of teaching is like, sometimes to help teachers learn about classroom management, and sometimes to give practical opportunities to apply concepts encountered in university coursework" (Wilson et al., 2001, p. ii).

When teachers participate in field experiences that are focused and contain well-structured activities, teachers can change their stereotypical views. Goldsby, Allen, Kelly, and Parker (2003) found that 75% of pre-service teachers in their sample believed early field experiences were critical in their preparation and 19% characterized field experience as a necessity. Student teaching faired about the same with 92% of the sample determining student teaching as critical or necessary in their teaching preparation.

Wilson et al. (2002) sought to determine the effects of student teaching and field experiences. This was difficult to determine because of the inadequacy in determining from self-reported data where and what teachers learn. Despite the inability of researchers to determine the effect of field experiences in the classroom, results do indicate a link to field experiences, student teaching, and attrition. Results from the national Schools and Staffing Survey concluded that approximately 25% of beginner teachers who left the classroom did not receive student teaching. Approximately 27% of

beginner teachers who left teaching did not receive observations of other classes and 26% did not receive feedback on teaching. These figures are dramatically different from teachers who received preparation in these areas and who left at rates around 12% to 13% (Fuller, 2002). However, this still does not explain whether the benefits came directly from field experiences, but demonstrates there is value added to field experiences and observations.

Classroom Management

Classroom management is a concern of all teachers and especially for beginner teachers. Some research has indicated that more than 50% of classroom time is spent on classroom management. In their study, Meister and Melnick (2003) found three concerns of beginner teachers: (a) "managing the behavior and diverse needs of students", (b) "time constraints and work overload", and (c) "conflict with parents and other adults" (p. 87). Research has concluded that there needs to be a stronger nexus between teacher preparation and the reality of the classroom. Another important conclusion is that new teachers do not possess the necessary knowledge to understand the relationship between and among management, behavior, and academic talents needed in the classroom.

Some teachers are capable of successfully handling aggressive or difficult-to-handle children, accepting them while other teachers reject these students. According to Gordon (2001), teachers take either a humanistic or custodial orientation towards discipline. In the humanistic approach, students are viewed as responsible individuals who need regulation. The teacher is sympathetic to the individual. In the custodial approach, the teacher does not trust the students. The teacher believes the students are

naturally deviant and in need of strict control and punishment.

Recommendations for teachers by Backes and Ellis (2003) include (a) having clear expectations for students, (b) dealing with today's problems today, (c) having respect for students, (d) providing sound instruction, (e) having the day filled with activities, (f) dealing with problems at the lowest level, (g) not becoming a target, (h) picking your battles, (i) keeping the lines clear, and (j) caring about the students. The number of recommendations illustrates the complexity of classroom management. Teachers must develop lesson plans, teach students, and respond appropriately to students' behaviors (Backes & Ellis, 2003). Preparation in the certification program along with mentoring and professional development will aid in assisting novice teachers to successfully accomplish the task of classroom management.

Professional Development

Professional development is important for novice and experienced teachers. A direct link has been established between teachers' feelings of competence and professional development. Teachers who had eight or more hours of professional development on a task or worked collaboratively with other teachers felt more prepared to meet the demands of classroom teaching (Holloway, 2003). Survey results from the National Center for Education Statistics (1999) found that teachers believed they benefited most from professional development that directly influenced their teaching. Approximately 80% felt their teaching improved a lot or moderately by more than eight hours of professional development in instruction methods, content area, educational technology, and classroom management.

Ideally, teaching follows a high quality program where novice teachers receive support, and experienced teachers continue their education through professional development (Wilson et al., 2001). Without professional development, teachers often work in isolation and receive little experience to update skills. Unfortunately, professional development is often one of the first items to be eliminated when budgets are cut (NCTAF, 1996). Teacher preparation programs should instill in their teachers the importance of professional development and should form collaborations with districts and schools to provide continued professional development to teachers.

Teaching Efficacy

Teaching efficacy is one factor investigated in the present study. Teacher efficacy is the "extent to which teachers believe their efforts will have a positive effect on student achievement" (Ross, 1995, p. 228). A teacher's sense of self-efficacy is an important factor for teacher effectiveness because teacher efficacy has been linked to student achievement, a teacher's commitment to teaching, and teacher retention (Wheatley, 2002). Relationships have also been established between teaching efficacy and classroom management and mentoring experiences. According to Gordon (2001) there are two forms of teacher efficacy: (a) *Teaching efficacy,* which is the belief that teaching can influence student achievement regardless of influences such as socioeconomic, family, friends, and school, and (b) *personal teaching efficacy*, which is the belief in one's own ability to make a difference. *Teaching efficacy* is based on the belief that their actions will produce an outcome whereas *personal teaching efficacy* relates to a self-appraisal system of one's own abilities.

Research suggests teachers with high self-efficacy tend to set higher goals for themselves and for their students and that teacher efficacy can fluctuate (Ross, 1995). Teacher efficacy has also been linked to teachers' abilities to handle classroom management. Research has linked high teacher efficacy with the humanistic orientation and low teacher efficacy with the custodial orientation of classroom management. Gordon found that teachers with low teacher efficacy were more likely to be embarrassed when visitors entered the room, were more likely to become angry with students, felt guilt over their students behavior, felt less confident in managing students, and felt less affection for students with behavioral problems. Low efficacious teachers were also more likely than high efficacious teachers to create negative consequences such as negative conduct grades or removal of privileges and were more likely to resort to severe punishments such as sending students to the principal's office. Teachers with low teaching efficacy are also more likely to leave the teaching field early in their career and were more likely to say that if they could choose again, they would not enter teaching. Gordon also found that self-efficacy did not differ by gender, type of school, grade level, salary, educational attainment, number of students in the classroom, or school atmosphere.

Gordon (2001) also reported that self-efficacy was related to teaching curriculum, teachers' beliefs about their students' abilities, and mentoring experience. Teachers with high teaching efficacy believed they could make their own decisions about curriculum, tended to believe their students had higher general academic abilities, and were more likely to have had a supervisor or mentor teacher (69%). In Gordon's

study, low teaching efficacy was also related to teacher stress with 89% of these teachers identifying teaching as moderately to extremely stressful compared to 46% of teachers with high teaching efficacy.

Mentoring has also been linked to high teaching efficacy. This recommendation has been documented at least as far back as 1893 and continues to be a recommendation for teacher success. In addition to mentoring, suggestions for improving self-efficacy include having teachers reflect on their beliefs and practices and to redefine success in the classroom (Ross, 1995). These are all concepts that can be developed in teacher preparation programs.

Wheatley (2002) hypothesized that teacher efficacy faith and teacher efficacy doubts are important in educational reforms. As reforms are implemented, teachers often feel insecure and efficacy doubts bring about needed reflection. Wheatley argued that at least initially or during times of innovative teaching reformations, the concept of teacher efficacy reflects actual teacher effectiveness. Because the present study was conducted at the end of the school year when attitudes are on the rise, the assumption was that teachers are not being affected by reformations or the survival period identified by Gless and Baron (1992). The apparent circular dependence of mentoring, teaching efficacy, classroom management, field experience, and student achievement illustrates the importance of evaluating the interaction of these components when evaluating novice teacher's experiences.

Recruiting and Retaining Teachers

While an effective teacher preparation program increases the probability that a

teacher will be successful, many other factors contribute to teacher effectiveness. With the projected need of two million teachers in the next decade and with 50% of them leaving within five years, educators need to determine how to recruit and retain new teachers. In Texas from 1998 until 2002 approximately 67,500 teachers left the classroom. This number represents approximately 26% of the teaching force. According to the Schools and Staffing Survey, Ingersoll reported that teachers in the United States who did not (a) participate in student-teaching, (b) receive feedback on teaching, (c) observe other classes, and (d) receive preparation in learning theory and instructional materials, were more apt to leave the classroom (Fuller, 2002). Teachers leave for variety of reasons, including: discipline problems, unfamiliarity with students, administrative problems, late hiring, and low pay. In order to help new teachers succeed, they need administrative support, mentoring, and induction workshops.

Research indicates that teachers who participate in induction workshops are twice as likely to stay in teaching (Ganser, 1999; NEA, 2005). Teachers' success depends on themselves, their work conditions, and support. The mentoring component cannot account for or make up for novice teachers' own weaknesses but can aid in helping them overcome those weaknesses. New teachers must also have support beyond the mentor, which includes fellow teachers and administration. In addition to support, new teachers should not be overburdened with activities outside of the classroom, such as extracurricular sponsorships (Ganser, 1999). They also need knowledge of what to expect, observation time, and emotional support (NEA, 2005). The support system should extend to all teachers because even experienced teachers need ongoing

mentoring, resilience and empowerment, professional development, and sustained support (Holloway, 2003).

Retaining teachers should begin prior to teachers entering the classroom and early on in the educational process. According to NCTAF (1996),

> National data indicate an overall attrition rate of about 75% along the pipeline from the beginning of undergraduate teacher education through about the third year in teaching: About 60% of those who start out in undergraduate teacher education programs complete them; of these, about 60% enter teaching in the next year; of these, about 70% stay for more than three years. Although graduate programs are more successful at placing and keeping recruits in teaching, they are still the exception to the rule. (p. 34)

From these estimates, only about 32% of the teachers who begin an undergraduate program are still teaching about seven or eight years later. Therefore, retaining teachers should be a high priority and should begin early in the educational process. To retain highly qualified teachers, competent teachers should be rewarded and incompetent teaches removed. Districts should establish a career continuum where teachers receive compensation for knowledge and skills. Barriers for teacher mobility should be removed and incentives should be provided for teachers in shortage areas (NCTAF, 1996).

If high teacher efficacy is related to classroom management and teacher attrition and mentoring has been shown to impact teacher efficacy, mentoring is an important component to retain new teachers. According to the SBEC, first year teachers are about

two and a half times more likely to leave teaching than more experienced teachers (SBEC, 2004). Efforts should be made early on to attract and retain students interested in teaching. Preparation programs such as TxBESS training should be implemented and successful retention programs should be examined further. In Texas, TxBESS participants returned to teaching at higher than average rates. Research has indicated that TxBESS has been especially beneficial to non-white beginning teachers. (Charles A. Dana Center, 2002). The SBEC indicated they would like to research the impacts of the preparation to all teachers and provide preparation to all beginner teachers teaching in schools with high turnover rates. They would also like to further research the effects on high need schools and overall teacher effectiveness (SBEC, 2004).

Professionalizing the teaching field may be another method for retaining teachers. As Darling-Hammond (1985) noted, "Teaching is the only profession in which there is so little concern for clients that we are willing to give new practitioners the most difficult and burdensome assignments, leave them without teaching materials, close the door, and tell them to sink or swim on their own" (p. 214). According to Darling-Hammond (1985), in order to retain and recruit highly qualified teachers, teachers need to be valued and responsive teaching will need to be valued in reform endeavors. If teaching is not valued, the more capable candidates will not enter the teaching profession. From 1970 to 1981, the percentage of women seeking degrees in education decreased by half with the most academically able choosing other professional degrees.

Future of Teacher Certification

We expect high standards for students; yet, we are reluctant to establish national

standards for our teachers and teacher preparation programs. Developing high quality programs is necessary in order for the success of our teachers and students. The NCTAF supports ATC programs that offer "carefully constructed curriculum that integrates courses on learning theory, development, teaching methods, and subject matter knowledge with an intensively supervised internship prior to entry" (NCTAF, 1996, p. 53). These programs usually have partnerships with schools and often concentrate preparation in a 9 to 12 month time frame with additional mentoring offered during the first year of teaching. These programs differ from their counterparts that offer a few weeks of preparation prior to entering the classroom and whose teachers tend to (a) be dissatisfied, (b) leave at higher rates, and (c) are rated lower by supervisors.

The number of alternative certification routes continues to grow. To investigate the growth and influence of ATC programs, several factors need to be considered. The percentage of certificates obtained by TTC teachers has decreased. In 2000, 71% of teachers went through TTC programs, compared to 46% in 2003. In addition, TTC teachers are more apt to receive multiple certificates than ATC teachers with almost all non-university based ATC teachers receiving one certificate. In 2003, the ratio of traditionally certified teachers and certificates was 68 TTC teachers for every 100 certificates, the ratio of post-baccalaureate teachers and certificates was 76 PB teachers for every 100 certificates, and the ratio of alternatively certified teachers was 90 ATC teachers for every 100 certificates.

In addition to the increase in the number of ATC teachers, one trend is that a larger percentage of non-university ATC teachers enter the classroom in comparison to

their counterparts. In the past, more non-university based alternatively certified teachers (94%) entered the classroom compared to traditionally certified teachers (90%) and post-baccalaureate teachers (84%). These percentages indicate that when comparing teacher numbers by certification route, the results do not give an adequate idea of the number of ATC teachers entering the classroom in comparison to TTC teachers. In some Texas regions, the number of ATC teachers already outnumbers TTC teachers. Research has also concluded that in the long run, ATC teachers leave the classroom sooner than TTC teachers (Allen, 2003) and that in the first five years of teaching, there is a link between student achievement and years of experience (Darling-Hammond, 2000). With the increase in ATC teachers, the decreased retention of ATC teachers, and the link between beginning years of experience and student performance, the influence of ATC programs may be greater and may be on balance somewhat unfavorable.

Today, there are state and national organizations devoted to alternative certification groups and national conferences devoted to this topic. According to Bradshaw (1998), the Human Capital Theory supports the growth of ATC programs. Students of both liberal arts and traditional certification routes devote equal amounts of time to their education; yet, with the creation of ATC programs both can enter the teaching profession upon graduation. If students find liberal arts programs more interesting or leading to more opportunities than traditional programs, then the value of what traditional programs has to offer is not recognized. A result is that fewer students will seek the traditional route.

The population of non-traditional candidates seeking to enter the teaching

profession, and how best to prepare them, are major forces behind the growth of ATC programs. Demand and shortages for teachers are geographic and subject matter specific with the greatest demand in inner cities and rural areas and mostly in secondary mathematics, science, and special education (National Center for Education Information, 2002). Proponents believe ATC programs reduce teacher shortages, raise teacher quality, and diversify the teaching population. Opponents believe that ATC programs degrade teaching by lowering entry costs and hindering student learning (Shen, 1997).

Assessing Alternative Certification

How to best prepare the population of non-traditional candidates seeking to enter the teaching profession is a question that needs to be addressed. By re-administering Darling-Hammond's measure as well as incorporating components of Shen's and the No Child Left Behind Act of 2001 (2002) recommendations, the present study seeks to corroborate their results and to find factors within certification routes and programs that affect teachers' perceptions of preparedness. The present study investigated which characteristics of certification programs produce teachers with a high sense of self-efficacy who feel prepared to enter the classroom. The present study also sought knowledge about why ATC teachers in this sample chose to enter the teaching field, program components, program prerequisites, teachers' content knowledge, their level of preparedness, and sense of self-efficacy. The present study investigated variables contributing to these teachers' overall sense of preparedness and relationships between their devotion to stay in the teaching field, their age, their reasons for entering the teaching field, prior career experience, and their overall sense of preparedness.

According to the National Center for Education Statistics (1999),

> information about teacher qualifications and preparation does not completely address whether pre-service and continued learning and work environments adequately prepare teachers to meet the often complex and changing demands they face in their classrooms. Teachers' feelings of preparedness may indicate the extent to which their preparation prepares them to meet these challenges. (p. 6)

In the present study, feelings of preparedness were used as a proxy for a programs' ability to prepare their teachers to face the challenges and demands in the classroom. The present study also investigated what variables in combination affect teachers' sense of preparedness including teachers' mentoring experiences and content knowledge. Humphrey and Wechsler (2005) suggested more research should be conducted on the new teacher and the relationship between mentoring and prior career experience.

New knowledge was obtained on the relationship between teachers' mentoring experience and their perceptions of preparedness and between components of programs and perceptions of preparedness. New information was also gathered regarding the relationships between self-efficacy, content knowledge, reasons for entering the profession, prior career experience, and teachers' devotion to teaching.

CHAPTER III

METHOD

The purpose of the present study was to compare differences in novice teacher's self-efficacy and perceptions of preparedness by certification route. The following research questions were examined.

Research Question I. Do novice teachers differ by certification route in their sense of self-efficacy, perceptions of preparedness to teach, overall preparedness, mentoring experience, reasons for entering the classroom, plans to remain in teaching and classroom preparation?

Research Question II. Are alternative teacher certification (ATC) programs (a) diversifying the teacher population or (b) producing teachers with exceptional content knowledge?

Research Question III. Does teacher's perception of preparedness and self-efficacy depend on classroom preparation, mentoring experience, prior classroom experience, or entrance and exit qualifications?

Research Question IV. Does a teacher's perception of overall preparedness depend on classroom preparation, prior career experience, mentoring experience, prior career experience, entrance and exit qualifications, or practice teaching?

Research Question V. Does a teacher's commitment to teaching as defined by their plans to remain in teaching depend on certification route or prior classroom preparation? Does a teacher's commitment to teaching depend on classroom preparation (i.e., experience with lesson plans, pedagogical preparation, and field experience)?

Research Question VI. Do differences exist between teachers with different degrees and by teachers who teach at different grade bands?

Sample

Novice teachers in their first three years of teaching were contacted through school districts and programs. Teachers were contacted by the human resource department, school principal, program director or researcher and were requested to complete an online survey.

The sample consisted of novice Texas teachers (i.e., teachers within their first three years of teaching). A stratified sampling approach was used and regions across the state were identified from the Texas State Board of Educator Certification (SBEC). Information was collected on the number of alternative, post-baccalaureate, and standard certificates issued in the 20 regions of the state as represented by the regional education service centers. Regions with more than 300 alternative certificates issued in the 2003-2004 school year were targeted although other areas were not excluded (see Table 1). People can obtain multiple certificates or can obtain a certificate by examination; hence, the number of certificates issued in a region does not equal the number of initial teachers.

The sample was obtained through school districts, regional service centers, for-profit certification programs, community colleges, universities, and content specific organizations. Superintendents, research departments, or human resource personnel departments from 23 school districts were contacted and research requests completed for 18 school districts and programs. Ten school districts approved the research study in time to administer the survey by the end of the school year. Three school districts approved the survey but not in time to give the survey in the time frame allotted for the study. In one

large school district, five elementary schools were randomly sampled, and seven middle schools and 11 high schools were chosen according to their teacher turnover rates.

Table 1

Estimate of Teacher Certificates Issued by Region

	Alternative Certificates			PB Certificates			Standard Certificates		
Region	2003 -2004	2002 -2003	2001 -2002	2003 -2004	2002 -2003	2001 -2002	2003 -2004	2002 -2003	2001-2002
1	1,572	1,295	752	171	174	160	1,428	1,466	1,586
2	151	95	83	122	177	111	692	929	838
3	97	104	59	28	25	37	232	326	270
4	2,740	2,266	1,697	543	788	905	1,688	2,186	2,309
5	111	76	11	142	223	181	268	327	369
6	86	58	40	119	133	142	1,407	2,395	2,637
7	91	40	35	427	528	282	848	1,225	1,641
8	21	0	0	16	15	35	130	124	130
9	19	34	13	47	67	10	142	262	182
10	1,989	1,632	835	518	585	488	1,171	1,208	1,244
11	1,777	1,538	1,082	440	626	485	2,576	3,302	3,667
12	361	245	168	57	81	49	430	618	637
13	337	383	336	699	797	618	1,331	1,795	2,137
14	13	15	11	38	42	57	306	455	496
15	0	0	0	41	59	47	354	655	680
16	132	127	92	53	100	103	294	441	495
17	0	0	0	204	190	248	556	766	876
18	91	94	136	139	142	136	468	477	400
19	397	348	249	16	24	38	651	1,117	825
20	340	344	236	407	559	415	990	1,465	1,434
Total	10,325	8,694	5,835	4,227	5,335	4,547	15,962	21,539	22,853

Note. Teachers may receive multiple certificates. Data was obtained from SBEC (2005b).

Teachers received a request to participate in the present study (Appendix A). Following the guidelines of the Internal Review Board, participating teachers agreed to a consent form prior to accessing the online survey (see Appendix B). Teachers were directly notified of the project approval once the state test of student achievement, the Texas Assessment of Knowledge and Skills (TAKS), was completed. Approaches to contacting teachers varied. Three school districts distributed names and e-mails to the researcher and postcards were then sent requesting teachers to participate in the present study. One small school district distributed the teachers' names along with their corresponding schools to the researcher. Principals were then requested by the researcher

to forward the information to the teachers. One large district had the researcher contact principals to request their assistance in locating beginner teachers. One school district informed the principals of the research and requested their participation. The researcher then contacted the principals to request their participation in locating teachers within their first through third year of teaching. Not all principals were willing to participate.

Of the four regional service centers who were contacted, three agreed to participate with the declining regional service center indicating they no longer had contact information with their teachers. Two for-profit certification programs were contacted. One agreed to participate while the second program questioned the validity of the present study. An e-mail was sent to a community college organization comprised of members interested in alternative teacher certification. Six community colleges indicated an interest in participating in the present study and three e-mailed the survey request to their participants. Nine universities were requested to participate in the present study. Four indicated they did not have contact information for their current graduates, one stated this would be too difficult for them to attempt, one university contacted the researcher back stating they would participate at a later date, two did not respond, and one university agreed to participate. Four mathematics professors from different universities working with secondary teachers were contacted in July. One professor agreed to disseminate the survey to recent graduates. One professor indicated they did not have contact information, and two professors did not respond.

To locate teachers' last teaching position, the participating university sent names and social security numbers of recent graduates to the Texas Education Agency. Due to the lengthy process and late notification time, teachers' names from the university and

their corresponding place of employment the previous year was not received until the end of June. E-mails of these teachers were located by a web-search and requests for participation were sent. The number of teachers from the university reached prior to August 1 is not determinable because teachers were not under contract during July. Some school district web pages indicated teachers might not be accessing e-mail during the summer months. To complicate the process of contacting teachers, some teachers were no longer working at the schools and some emails were not posted on the web. Due to these difficulties, the assumption is that a number of teachers probably did not receive the survey request prior to August 1.

In July, state organizations in science, mathematics, and reading were asked to distribute the survey link to their members. One science organization responded by distributing the survey via e-mail. In response to this request, a museum distributed the survey to participating teachers in a summer program. Upon request, school districts and certification programs received results of their teacher's sense of self-efficacy and level of preparedness according to the factors defined by Darling-Hammond et al. (2002) and mentoring components of their school district or program (see Appendix C).

Overall, 1353 teachers completed the survey. Because some teachers were identified by school districts, portions of the sample were teachers teaching within their first through third year of teaching for the district versus first through third year teachers. Teachers who were not within their first three years of teaching or teachers or who had missing data on their certification route or variables linked to Darling-Hammond et al. (2002) factors were omitted from the analysis leaving a sample of 1197 teachers. Data were obtained from the SBEC regarding demographics of the current Texas teacher

population. These results were compared to the sample to investigate representativeness of the sample to the population.

In the sample, 767 (64%) were White, 308 (26%) were Hispanic/Latino, and 61 (5%) were African American (see Figure 1). In addition, 415 (35%) obtained their certification through traditional teacher certification routes and 782 (65%) obtained their certification through alternative teacher certification routes. With respect to experience, 610 (51%) were first year teachers, 291 (24%) were second year teachers, and 296 (25%) were third year teachers.

With regard to grade level, 655 teachers (56%) were certified at the elementary level, 425 teachers (36%) were certified at the middle-school level, and 478 (40%) were certified at the secondary level. Some teachers obtained their certification at more than one level. Therefore, 88 teachers (7%) were certified at both the elementary and middle school levels but not the secondary level and 162 teachers (14%) were certified at all three levels. Undergraduate majors of the sample are identified in Table 2 with 481 (62%) of the 776 teachers who chose *Other* as their undergraduate major certified at the elementary level.

Of the 782 ATC teachers, 183 (23%) received their certification through university based post-baccalaureate programs, 7 (1%) received their certification through a school district, 223 (29%) received their certification through a for-profit entity, 97 (12%) received their certification through a community college, and 270 (37%) obtained their certification through a regional service center (see Figure 2).

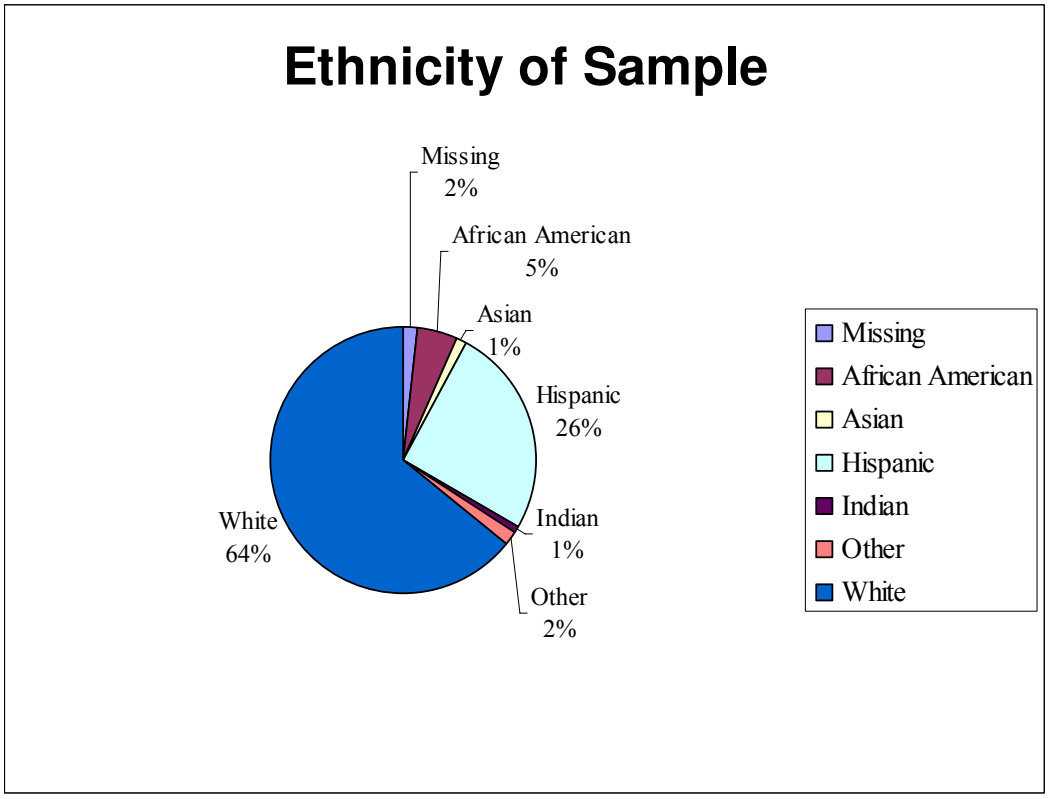

Figure 1. Ethnicity of Sample.

Table 2

Percentages of Undergraduate Majors

Undergraduate Major	Frequency	Percent
Mathematics	59	5
Science	125	11
Language Arts/Social Studies	159	13
Other	776	65
Missing	78	7

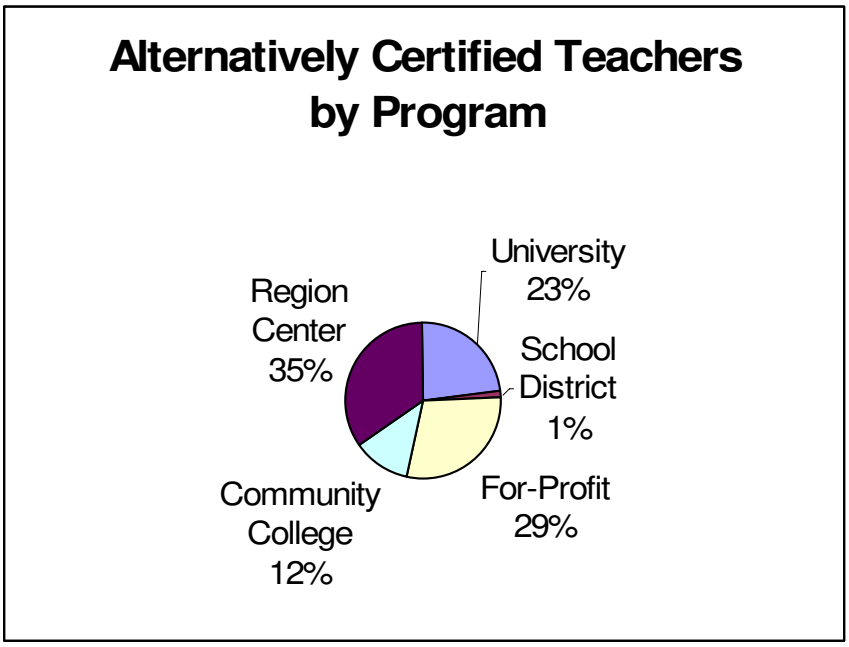

Figure 2. Alternatively Certified Teachers by Program.

Instrumentation

Surveys were separated into three parts. Part I contained questions regarding demographics, educational attainment, certification route, program characteristics, commitment to teaching, mentoring experience, and reasons for entering the profession (Ruckel, 2000; Shen, 1997, 1999). Part II contained nine items on teachers' sense of self-efficacy. In the present study, teacher-efficacy served as a proxy to determine teachers' effectiveness in the classroom, classroom management, and likelihood of staying in the teaching field. Part III contained 35 questions from Darling-Hammond et al, 2002 on how well-prepared teachers felt. Darling-Hammond et al. (2002) reported that the 35 items comprised five factors: (a) Promote Student Learning (13 Items), (b) Teach Critical Thinking and Social Development (8 Items), (c) Use Technology (5 Items), (d) Understand Learners (5 Items), and (e) Assume Instructional Leadership (4 Items) (see Appendix D). Four questions from the original survey were eliminated because they were

not linked to an underlying factor on previous data. Items were reprinted with permission from both the primary author and journal.

Prior to conducting their analysis, Darling-Hammond et al. (2002) converted data from a five- to a four-point scale by collapsing answers given as a one or a two, indicating that possibly very few teachers gave a response score of "one". To ensure teachers chose positively or negatively and to better differentiate teacher responses, the original scale was converted to a six-point scale. Modifications were made to an item when the first two alternatively certified teachers indicated they did not know what was meant by *teaching field*. Clarification was made to define teaching field as "area of certification" and a question was added regarding what subjects they were teaching.

The survey was administered April through July. This timeline was chosen because research indicates new teachers typically transition through five distinct phases during their first year of teaching (Gless & Barron, 1992). Consideration was given to changes in teachers' attitudes. Beginner teachers tend to encounter different phases during the first year of teaching. The new teacher begins with the anticipation phase. During the anticipation phase, the new teacher often romanticizes the new role as a teacher. The new teacher then enters the survival and disillusionment phases. The rejuvenation stage, which begins in January after the winter break, gives to a slow rise in attitude with April bringing about large positive changes in attitudes. New teachers have had a break and an opportunity to synthesize information from the first half of the year. They have learned from past mistakes, are realistic about teaching, and have a sense of accomplishment. In the rejuvenation stage, beginning teachers begin to feel relieved they have made it through the year while at the same time experiencing self-doubt and

questioning their own effectiveness. May brings the reflection stage, they begin to see an end and begin looking forward to the next year. Because the present study was conducted at the end of the school year when attitudes are on the rise, the assumption was that teachers' attitudes would not be impacted by reformations or the survival period identified by Gless and Baron.

Data Analysis

A preliminary analysis was conducted to investigate reliability and validity issues. A bootstrap factor analysis was conducted to determine replicability and invariance of factors. All statistical analyses are correlational in nature and obtained results are attenuated by the reliability of the data in hand; therefore, reliability scores were reported (Capraro, Capraro, & Henson, 2001; Crocker & Algina, 1986; Thompson, 2003; Vacha-Haase, 1998). Item-total correlations, Cronbach's alpha, and Cronbach's alpha if item were deleted was reported for the entire survey and for each subscale. Composite scores were computed for each factor on level of preparedness. Self-efficacy scores were coded as *Teaching Efficacy* and *Personal Teaching Efficacy*. A coefficient alpha was computed for each of the five factors.

To ensure teachers from different school districts were comparable, canonical correlation analysis was conducted to determine if perceptions of preparedness and self-efficacy depended upon attributes of the school and socio-economic factors. The assumption is that school district is serving as a proxy for socio-economic factors and for administrative influences. For this sample, perceptions of preparedness and self-efficacy did not depend upon attributes of the school district and socio-economic factors, $R_c^2 = .196$, $p = .217$, $N = 1184$. Therefore, statistical tests utilizing perceptions of preparedness

and self-efficacy can be considered independent of the school district.

American Psychological Association (APA) Recommendations

Recommendations of the APA Task Force on Statistical Inference were followed. The APA Task Force on Statistical Inference (TFSI) published recommendations and guidelines for reporting research results and met to clarify controversies surrounding statistical methods including the use of statistical significance testing (SST). Among the recommendations, the TFSI included the reporting of *p* values when conducting SST and the reporting of effect sizes and confidence intervals (Wilkinson & APA TFSI, 1999).

Statistical significance testing (SST) has been a debated topic resulting in a number of publications including an entire book devoted to the subject (Abelson, 1997; Anderson, Burnham & Thompson, 2000; Frick, 1996; Harlow, Mulaik & Steiger, 1997; Kline, 2004; Thompson, in press) In 1999, the APA Task Force on Statistical Inference (TFSI), which met to clarify controversies surrounding statistical methods including the use of SST, published recommendations and alternatives to common statistical methods. When using SST, the TFSI recommended (a) reporting *p* values and effect-size estimates, (b) never using the expression "accept the null hypothesis", and (c) including confidence intervals (Wilkinson & TFSI, 1999). The fifth edition of the APA *Publication Manual* (2001) does not dismiss the use of significance testing and following the guidelines of the TFSI report, recommends the reporting of *p* values versus the alpha level and advocates the reporting of effect sizes and confidence intervals.

The debate over statistical significance testing (SST) has been ongoing with some emphatically opposing SST (Carver, 1978). Researchers who support SST understand and acknowledge SST limitations. Therefore, recommendations to address these shortcomings

include gathering as much information as possible to allow the reader to make sound decisions (Abelson, 1997; Frick, 1996, Levin, 1993). In the present study, limitations of statistical significance testing were considered and investigations regarding the impact of sample size were investigated.

According to Thompson (1999), a consensus has been reached regarding the limitation of statistical significance testing. The three limitations are (a) " *p* values are not useful as indices of study effect sizes" (p. 167), (b) "*p* values do not evaluate result importance" (p. 168), and (c) "*p* calculated values are not informative regarding the likelihood of result replication in future samples" (p. 168). Considerations of these limitations were undergone during the reporting of the results.

According to Thompson (2000b), "all parametric statistical analyses are special cases within a single general linear model (GLM) family" (p. 262). Given the GLM, there are three commonalities across different analytic methods: (a) all of the methods use weights, (b) all of the methods focus on latent variables, and (c) and all methods are correlational in nature and yield variance-accounted-for effect sizes (Thompson, 2000b). According to Thompson (2000a), effect sizes have three important benefits:

First, reporting effects facilitates subsequent meta-analyses incorporating a given report. Second, effect size reporting creates a literature in which subsequent researchers can more easily formulate more specific study expectations by integrating the effects reported in related prior studies. Third, and perhaps most importantly, interpreting the effect sizes in a given study facilitates the evaluation of how a study's results fits into existing literature, the explicit assessment of how similar or dissimilar results are across related studies, and potentially informs judgment regarding what study features

contributed to similarities or differences in effects. (p. 1)

The TFSI recommended the reporting of confidence intervals for effect sizes involving principle outcomes, comparing confidence intervals to previous studies, and collecting interval estimates across studies. The fifth edition of the APA *Publication Manual* (2001) also advocates reporting more than *p* values and in particular, the reporting of confidence intervals. The fifth edition of the APA *Publication Manual* (2001) states:

The reporting of confidence intervals (for estimates of parameters, for functions of parameters such as differences in means, and for effect sizes) can be an extremely effective way of reporting results. Because confidence intervals combine information on location and precision and can often be directly used to infer significance levels, they are, in general, the best reporting strategy. The use of confidence interval is therefore strongly recommended. (p. 22)

According to Thompson (2001), CIs give a plausible range for parameters and a "graphical synthesis of results across studies" (p. 90). If a confidence interval in a study is compared to confidence intervals in previous studies, eventually the population parameter will be estimated. In a reference to Schmidt's work, Thompson (1999) stated

> Even if all the research in an area of inquiry was based on radically erroneous estimates of parameters (and even if these a priori estimates were used in specifying non-nil null hypotheses), the parameter would still emerge across studies as a series of overlapping confidence intervals converging on the same parameter. (p. 175)

According to Capraro (2001), "the correct use of CIs uses intervals to compare

results across prior studies, and of prior studies with current studies. Comparing current results to previous studies "helps focus attention on stability across studies" and "intervals across studies also helps in constructing plausible regions for population parameters" (Wilkinson & APA TFSI, 1999, p. 599). Confidence intervals can also aid in interpreting replicability by serving as a tool to synthesize information across studies.

Reporting of results in the present study adhered to recommendations by TFSI and the consensus reached by researchers. Reporting as much information possible allows the readers and the researcher to form sound decisions. According to Ernest and McLean (1998), conducting research is akin to detective work and researchers need as many clues as possible to make a decision. The emphasis should not be on banning statistical significance testing but on improving research practice (Thompson, 1999). Therefore, in the present study, *p* values, effect sizes, and confidence intervals for means were reported and replicability investigated.

CHAPTER IV

RESULTS

This chapter presents the results of the statistical analyses conducted on the data and is divided into three sections: (a) preliminary analyses, (b) analyses, and (c) ancillary analyses. The preliminary analyses examine the representativeness, validity, and reliability of the data. The analyses section consists of the results of the statistical analyses conducted on the data to answer the research questions identified in Chapter III. The ancillary analyses section consists of results from questions identified from the research to be of further interest.

Preliminary Analyses

Representativeness of the Sample. As researchers, we really want to know about the population, and we want to know if our results would replicate in future studies (Thompson 1998). To investigate if the sample was representative of the population, a comparison of the demographics between the sample and population of Texas teachers and a comparison of ATC teachers' last full-time profession of this sample were compared to last full-time profession of Humphrey and Wechsler's (2005) sample.

Distribution of gender for the population and within certification routes was reported and compared to the distribution of teachers initially certified in 2003 (Herbert, 2004). The percentage of female and male teachers entering the Texas teaching population has remained relatively the same over the last five years. Approximately 78% of the population was female and approximately 22% was male (Herbert, 2004). In this

sample, 956 (80%) were female and 239 (20%) were male. Comparisons between the sample and population are illustrated in Figure 3. Table 3 shows the comparison of gender within certification routes for the sample and population.

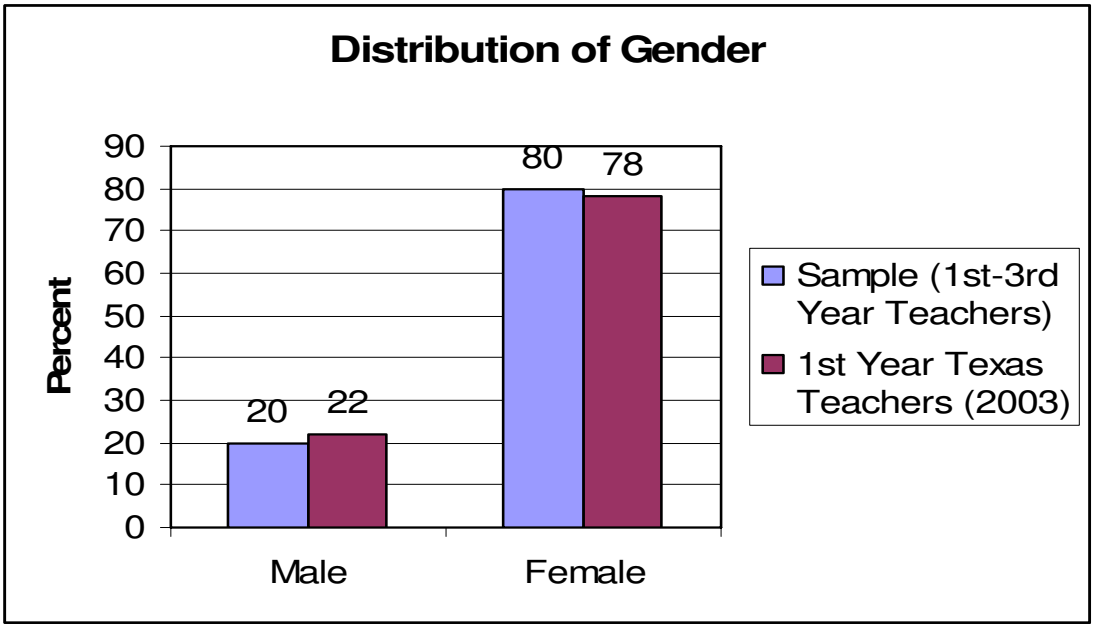

Figure 3. Distribution of Gender in Sample and for 2003 First Year Teachers.

Table 3

Distribution of Gender within Certification Route

	Traditional Certification		Post-baccalaureate		Alternative Certification	
Gender	Sample	Population	Sample	Population	Sample	Population
Male	11	17	24	30	25	28
Female	89	83	76	70	75	72

Distribution of ethnicity for the population and within certification route was reported and compared to the distribution of teachers initially certified in 2003 (Herbert, 2004). The majority of the Texas teaching population is White. In 2003, approximately 62% of initial Texas teachers were White, approximately 26% were Hispanic, and approximately 9% were African American (Herbert, 2004). In this sample, 767 (64%) were White, 26% were Hispanic, 61 (5%) were African American, 4% were Other and 19 (2 %) did not identify their ethnicity. Comparisons between the sample and population are illustrated in Figure 4. Figures 5, 6, and 7 illustrate the comparison of ethnicity within certification route for the sample and population. These comparisons suggest the data are representative of the population.

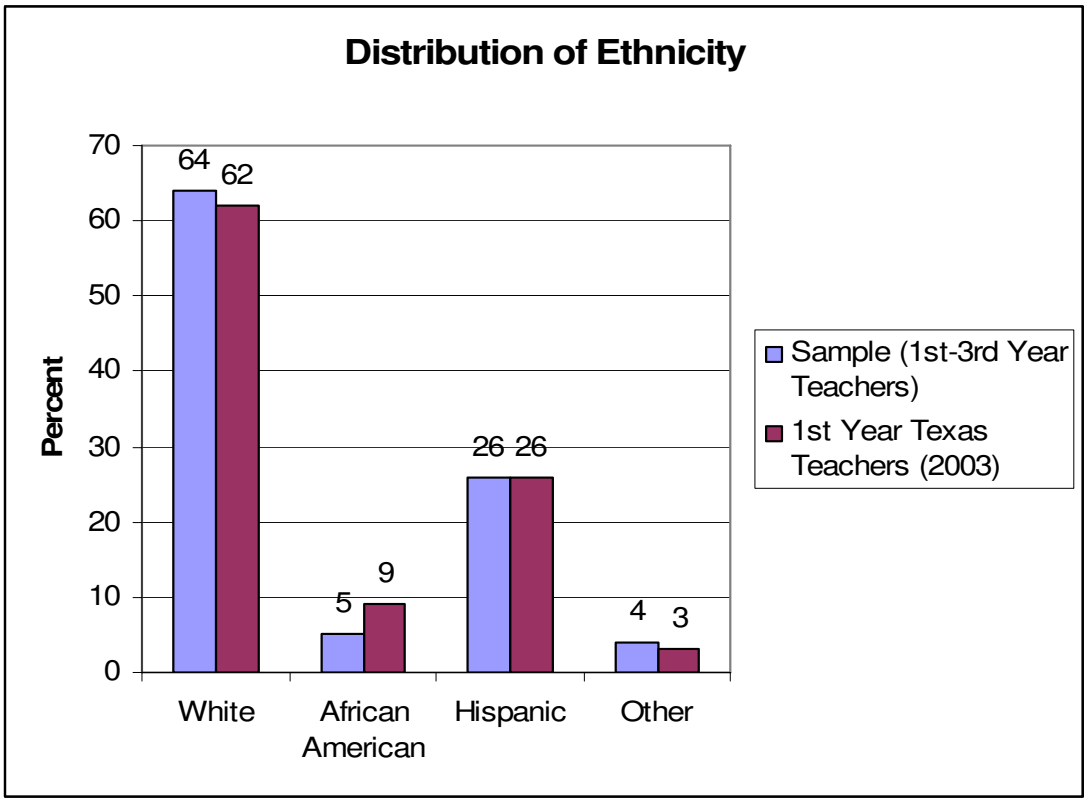

Figure 4. Comparison by Ethnicity Between Sample and 2003 1st Year Teachers.

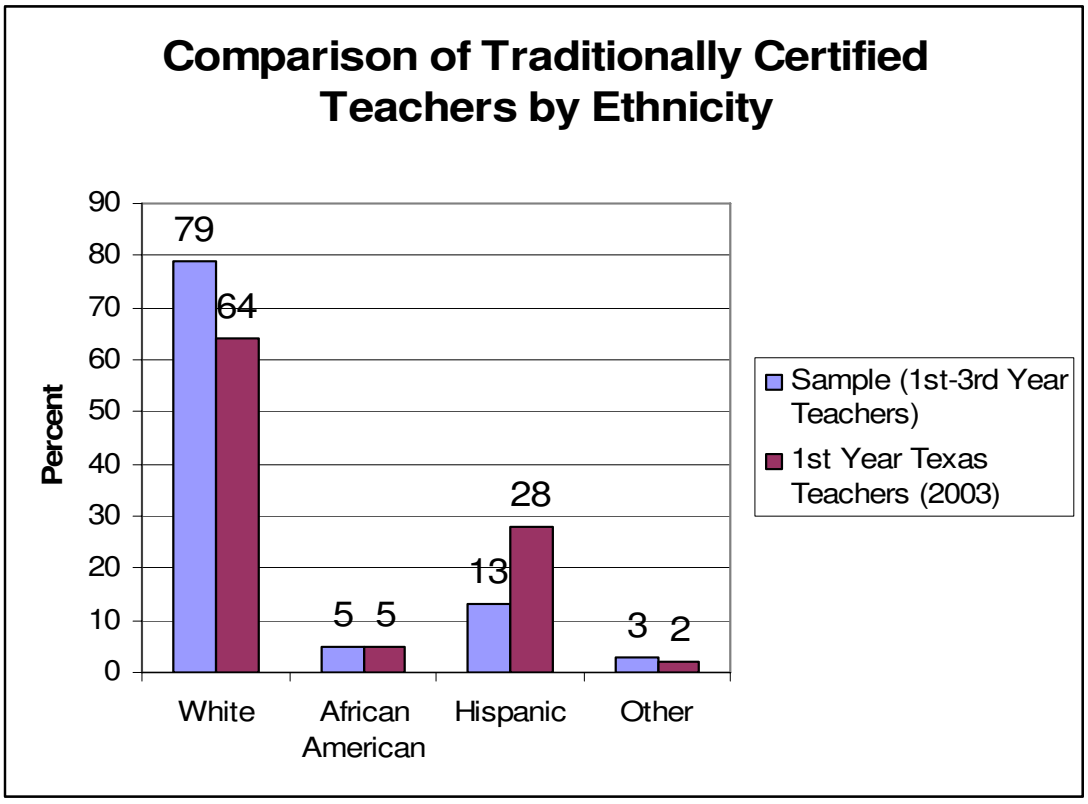

Figure 5. Comparison of Traditionally Certified Teachers by Ethnicity.

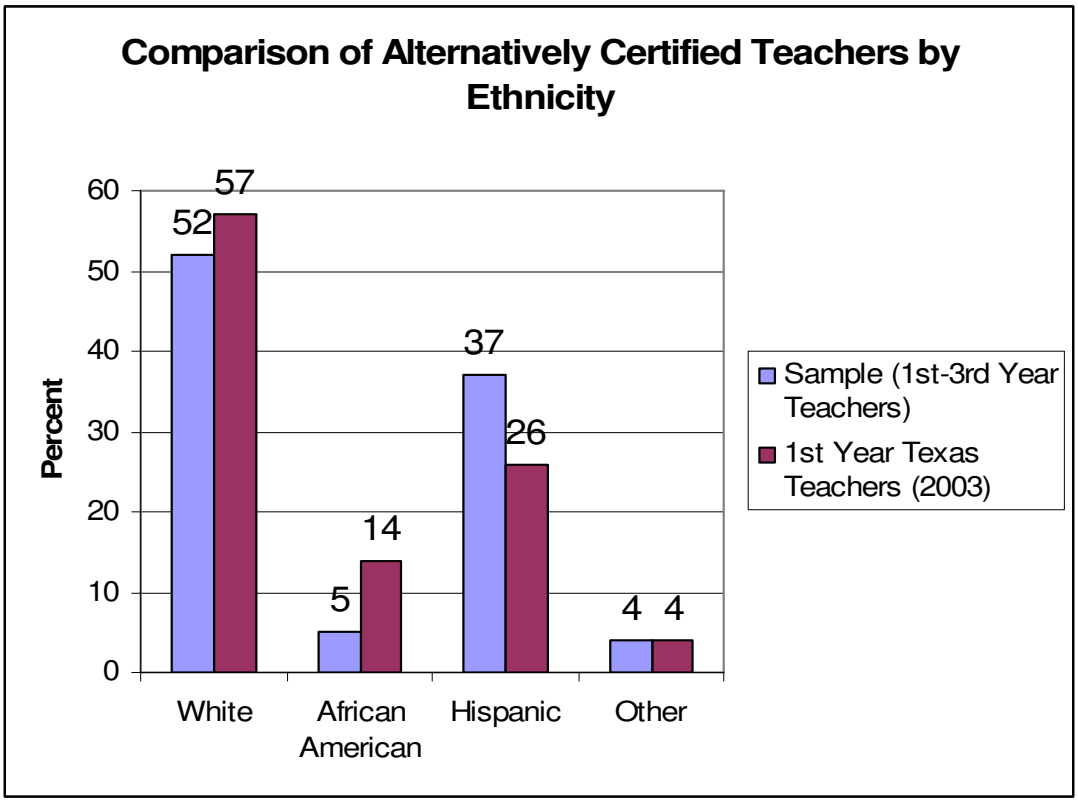

Figure 6. Comparison of Alternatively Certified Teachers by Ethnicity.

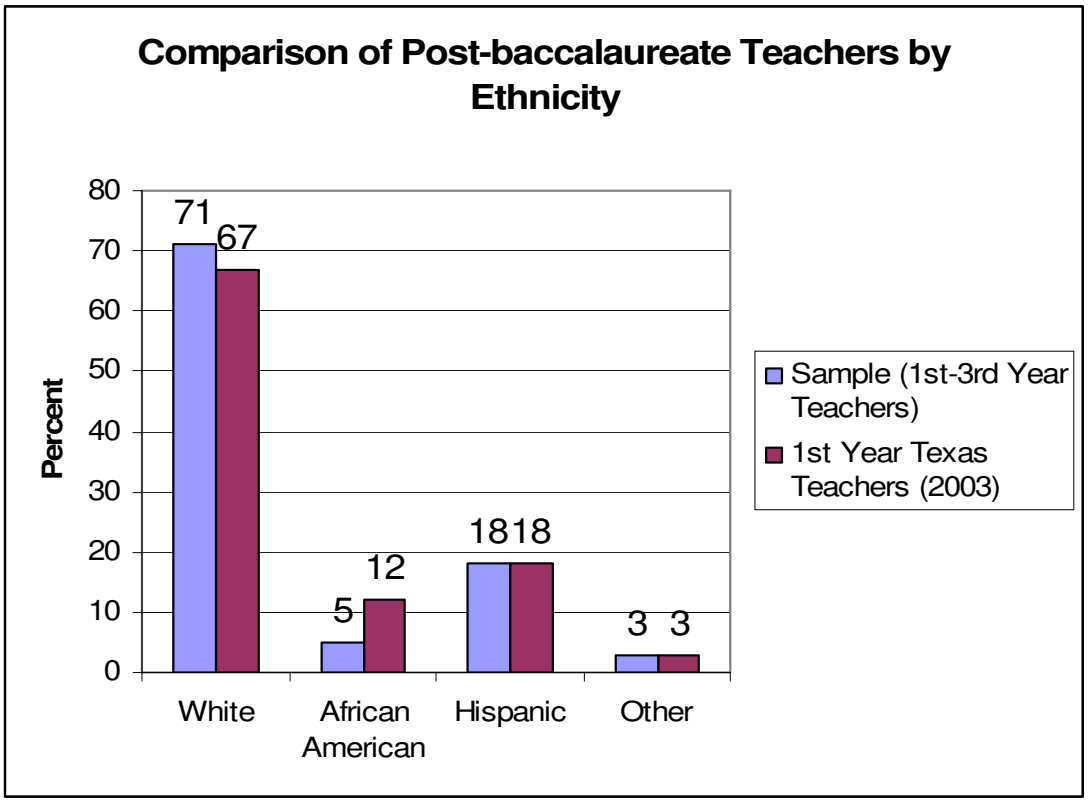

Figure 7. Comparison of Post-baccalaureate Teachers by Ethnicity.

Note. Four percent of post-baccalaureate teachers did not identify their ethnicity.

Humphrey and Wechsler (2005) coded last full-time profession on teachers from 7 ATC programs across the country. Last full-time profession for this sample is comparative to Humphrey's and Wechsler's sample on all categories with the exception of Other Educational Experience (see Figure 8).

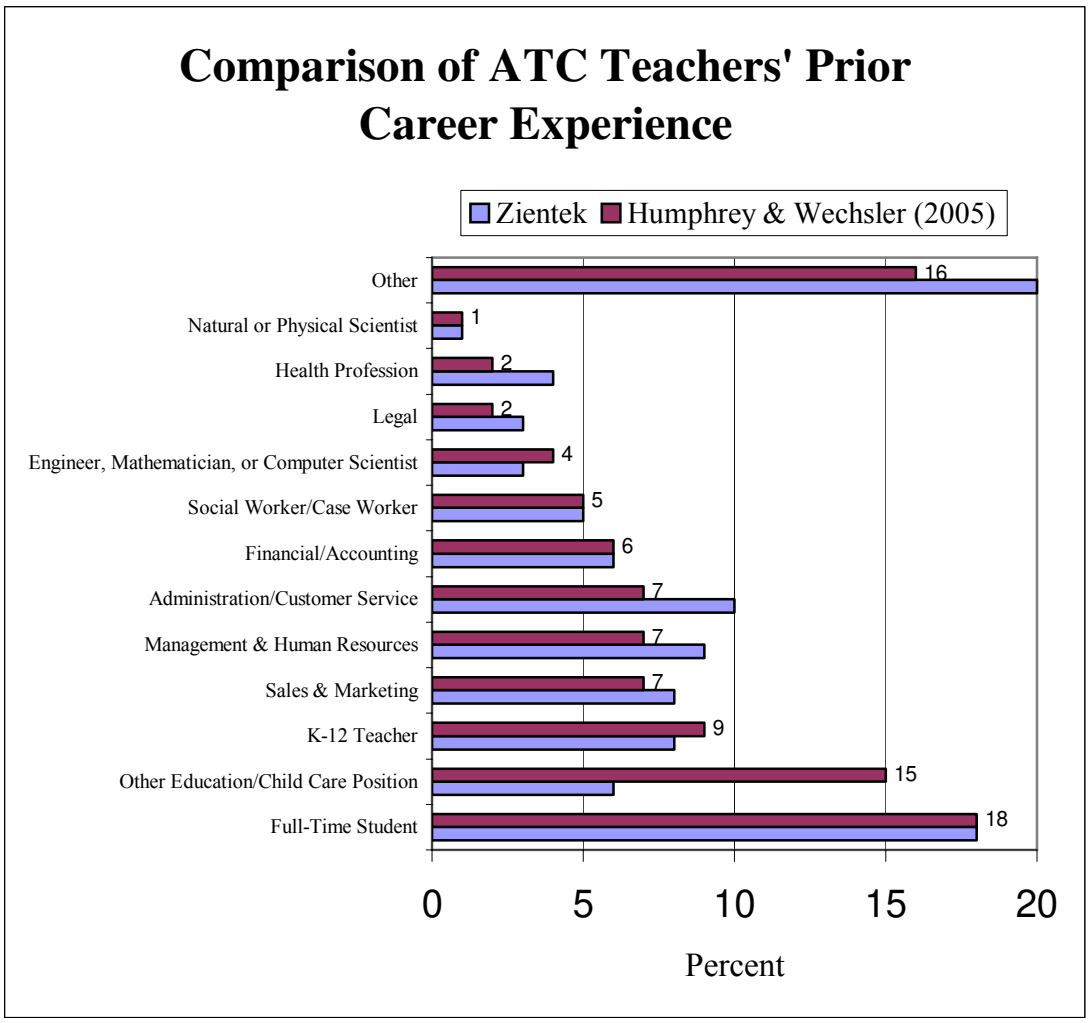

Figure 8. Comparison between Zientek and Humphrey & Wechsler's (2005) ATC Teachers' Prior Career Experience (Reprinted with permission from "Insights into alternative certification: Initial findings from a national study" by Humphrey, D. C., & Wechsler, M. E., 2005. *Teachers College Record.* Retrieved September 24, 2005 from http://www.tcrecord.org, ID No. 12145. Copyright 2005 by *Teachers College Record*).

Factor Analysis. An exploratory factor analysis with a principal component analysis and varimax-rotation was conducted on the 35 variables linked to the five factors identified by Darling-Hammond et al. (2002). Factor analysis enables researchers to investigate empirical relationships between latent and observed variables. Various methods exist for determining the number of factors to extract, which include but are not limited to the eigenvalue greater than one rule (K1-rule), scree test, and parallel analysis (Byrne, 1994; Gorsuch, 1983; Guttman, 1954; Horn, 1965; Thompson, 2004). The K1-rule and scree test can be determined by the SPSS output.

The scree plot, which contains the eigenvalues on the y-axis and the factors on the x-axis, was investigated. In this example, the eigenvalues taper off after the fourth factor. From the plot, the difference between the fourth and fifth factor is small and close to one (see Figure 9). The K1-rule was used to further investigate the data. The eigenvalue corresponding to the fifth factor was less than one suggesting four factors should be extracted (see Table 4). With four factors, the pattern/structure coefficients align the eight variables linked to Teach Critical Thinking and Social Development and the four variables linked to Develop Instruction Leadership in Darling-Hammond et al. (2002) study into one factor (see Table 5). The four factors defined for the present study are a) Promote Student Learning (13 Items labeled P1-P13), (b) Teach Critical Thinking and Social Development and Develop Instructional Leadership (12 Items labeled C1-C8 and I1-I4), (c) Use Technology (5 Items labeled T1-T5), and (d) Understand Learners (5 Items labeled U1-U5).

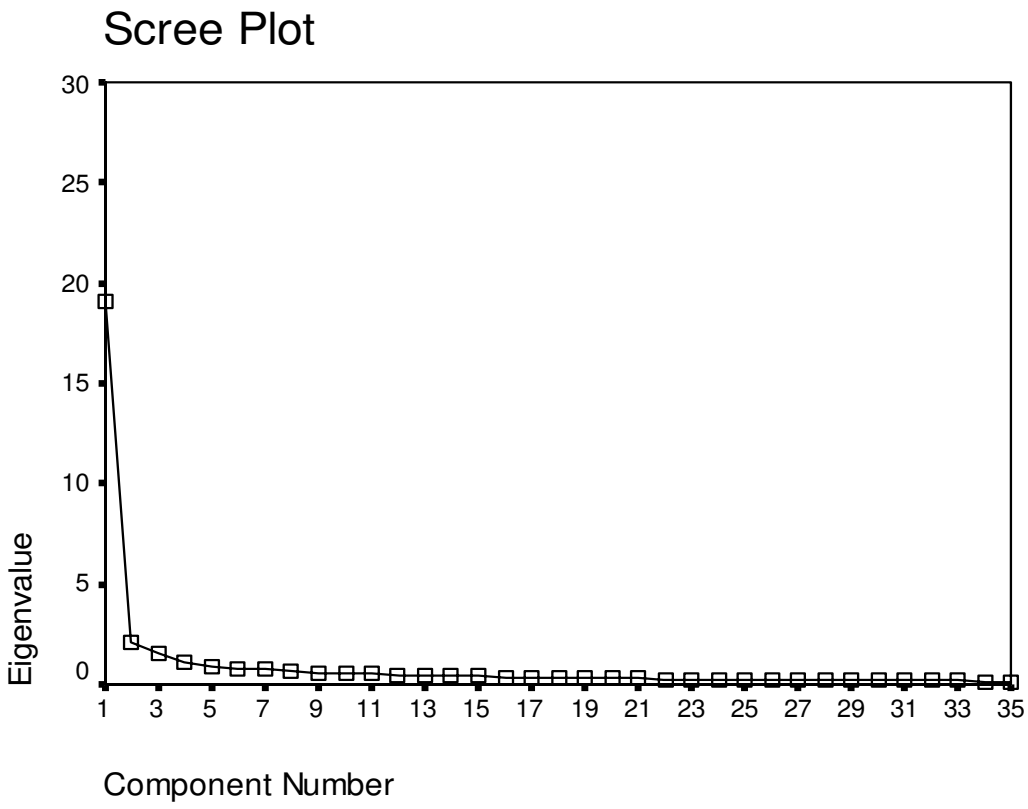

Figure 9. Sample Scree Plot Results for the 1197 Teachers.

Table 4

Explained Variance for First Seven Eigenvalues on Perceptions of Preparedness

Eigenvalue	Total Explained Variance	Percent of Variance
1	19.113	54.608
2	2.121	6.059
3	1.497	4.278
4	1.094	3.124
5	0.915	2.613
6	0.742	2.120
7	0.717	2.050

Note. Eigenvalues greater than one were used to determine the number of factors to extract.

Table 5

Sample Pattern/Structure Coefficients on Perceptions of Preparedness (Reprinted with permission from "Variation in teacher preparation: How well do different pathways prepare teachers to teach?" by Darling-Hammond, L., Chung, R., & Frelow, F., 2002. *Journal of Teacher Education, 53*, 286-302. Copyright 2002 by *Journal of Teacher Education.*)

Variables	Factor				
	1	2	3	4	*h*
P5 Develop curriculum that builds on students' experiences.	***.768***	.235	.199	.203	.726
P6 Evaluate curriculum materials.	***.746***	.233	.210	.169	.682
P4 Help all students achieve high academic standards.	***.726***	.329	.193	.178	.705
P3 Set challenging and appropriate expectations.	***.725***	.286	.193	.212	.690
P1 Teach subject matter concepts in ways that enable students to learn.	***.725***	.256	.216	.100	.648
P7 Create discipline-based and interdisciplinary curriculum.	***.697***	.313	.147	.178	.637
P2 Understand how different students in your classroom are learning.	***.694***	.206	.144	.366	.678
P9 Use instructional strategies that promote active student learning.	***.671***	.335	.232	.301	.708
P8 Identify and obtain materials to create a multicultural curriculum.	***.615***	.243	.237	.234	.548
P10 Choose teaching strategies to meet different student needs.	***.566***	.372	.176	.452	.693
P11 Plan instruction	***.533***	.480	.305	.257	.674
P13 Help students learn how to assess their own learning.	***.498***	.486	.258	.334	.662
P12 Use a variety of assessments.	***.475***	.428	.272	.404	.647
I2 Maintain an orderly and purposeful learning environment.	.267	***.682***	.229	.307	.683
C3 Develop students' questioning and discussion skills.	.453	***.670***	.156	.198	.717
C2 Develop an environment that promotes social development.	.395	***.649***	.170	.283	.685
C7 Help students learn to think critically and solve problems.	.505	***.633***	.242	.146	.735
I1 Resolve interpersonal conflict in the classroom.	.201	***.622***	.204	.395	.625
C5 Use effective communication strategies.	.431	***.619***	.200	.274	.684
C1 Help students become self-motivated and self-directed.	.432	***.615***	.160	.265	.661
C4 Engage students in cooperative group work and independent learning.	.456	***.604***	.212	.244	.678
C6 Use questions to stimulate different kinds of student Learning.	.494	***.603***	.236	.154	.688
I4 Assume leadership responsibilities in your school.	.177	***.583***	.398	.188	.565
C8 Encourage students to understand ideas from diverse perspectives.	.470	***.576***	.266	.226	.675
I3 Plan and solve problems with colleagues.	.094	***.546***	.420	.250	.545
T5 Enhance group collaboration and teamwork.	.246	.273	***.796***	.162	.795
T2 Support students' research and analysis.	.242	.183	***.796***	.136	.744
T1 Increase student interest and learning.	.307	.205	***.788***	.124	.772
T3 Assess and track student achievement.	.296	.231	***.768***	.098	.740
T4 Communicate with others.	.066	.162	***.739***	.211	.622
U2 Understand how students' cultural backgrounds influence learning.	.263	.247	.171	***.767***	.747
U4 Understand how students' environment influences learning.	.220	.370	.210	***.734***	.768
U5 Work with parents and families to understand students.	.244	.399	.230	***.636***	.676
U3 Identify and address special learning needs and/or difficulties.	.450	.271	.164	***.611***	.677
U1 Understand how students' development influences learning.	.508	.212	.186	***.555***	.645

Note. N equals 1197 and pattern/structure coefficients larger than.40 are bolded and italicized.

An exploratory factor analysis with a principal component analysis and varimax-rotation was conducted on the nine variables linked to self-efficacy. Scree plot results shown in Figure 10 linked the variables to two factors. Table 6 presents the variables linked to Factor I and identified as Personal Teaching Efficacy (5 variables labeled as SE1, SE2, SE5, SE6, and SE8) and variables linked to Factor II and identified as Teaching Efficacy (4 variables labeled as SE3, SE4, SE7, and SE9). Even though the pattern/structure coefficient for SE7 is larger than .4, the difference in magnitude on Factors I and II is not great indicating SE7 is not definitely linked to Factor I. After a qualitative analysis of the item, the decision was to leave SE7 on Factor II.

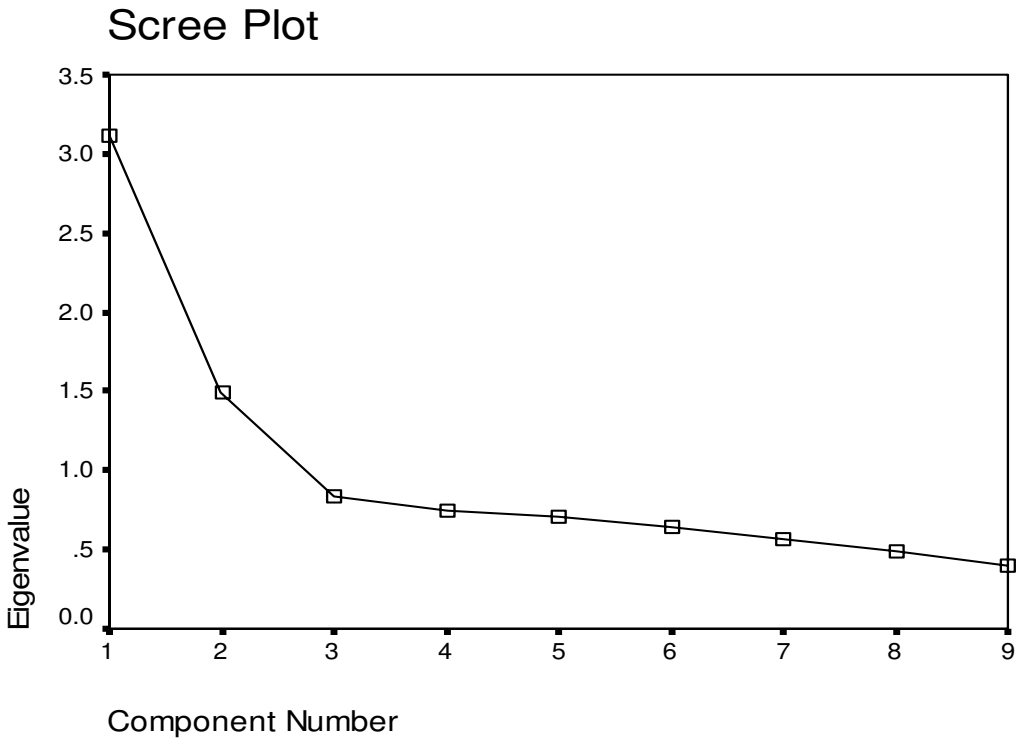

Figure 10. Scree Plot Results for Self-Efficacy.

Table 6

Sample Pattern/Structure Coefficients from the Varimax-Rotated Matrix on Self-efficacy

(Reprinted with permission from "Variation in teacher preparation: How well do different pathways prepare teachers to teach?" by Darling-Hammond, L., Chung, R., & Frelow, F., 2002. *Journal of Teacher Education, 53*, 286-302. Copyright 2002 by *Journal of Teacher Education.*)

	Factor		
Variable	1	2	h^2
SE5 I am confident in my ability to teach all students to high levels.	.**772**	-.027	.509
SE6 I am confident I am making a difference in the lives of my students.	.**750**	-.080	.571
SE2 I am confident in my ability to handle most discipline problems.	.**744**	-.134.	559
SE1 If I try hard I can get through to almost all of my students.	**.653**	-.290	.525
SE8 I am confident of my ability to integrate information technology.	.**638**	.159	.597
SE3 Students fail because they do not apply themselves.	.128	.**737**	.640
SE4 My student's peers have more influence than I do.	-.113	.**716**	.323
SE9 Teachers can have little influence.	-.179	.**649**	**.**423
SE7 I am uncertain how to teach some of my students.	-.374	.**427**	.454

Note. For this analysis, N equals 1183 and pattern/structure coefficients larger than.40 are italicized.

Bootstrap Factor Analysis. To examine invariance of factors and replicability, a bootstrap factor analysis (BFA) with a nonparametric approach was conducted. Bootstrapping is advantageous because it allows researchers to move beyond two limiting factors present in classical test theory: "the assumption that the data conform to a bell-shaped curve and the need to focus on statistical measures whose theoretical properties can be analyzed mathematically" (Diaconis & Efron, 1983, p. 116). Bootstrapping allows researchers to estimate any parameter of interest regardless of the shape of the distribution (Guthrie, 2001; Kline, 2005). While statistical significance has

historically been the method of choice in the social sciences, researchers are beginning to understand that statistical significance testing is dependent on sample size and that obtaining statistical significance does not suggest replicability (Smith & Henson, 2000; Thompson, 1994, 1995, 1998; Zientek & Thompson, 2006).

Bootstrapping, which can be conducted for both inferential and descriptive purposes, *empirically* estimates the sampling distribution. Applying the bootstrap to the multivariate case becomes problematic because factors may vary across resamples. As Thompson (1995) explained,

> The bootstrap must be applied such that each of the hundreds or thousands of resampling results are all located in a common factor space before the mean, SD, skewness and kurtosis are computed... If the analyst computed mean structure (or pattern) coefficients for the first variable on the first component across all the repeated samplings, the mean would be a nonsensical mess representing an average of some apples, some oranges, and perhaps some kiwi. The sampled solutions must be rotated to best-fit positions with a common target solution, prior to computing means and other statistics across the resamples, so that the results are reasonable. (pp. 88-89)

In the BFA program, variations across factors are corrected by creating a common factor space with a promax rotation in each resample and a corresponding target matrix. For the present study, the target matrix was created from the sample varimax-rotated matrix and consisted of ones or negative ones if the variable was linked to the factor and zeros elsewhere.

In the present study, 1000 resamples were drawn with replacement and each resample was the same size as the original sample (N = 1197) (Kline, 2005; Thompson, 1996). From the empirically estimated sampling distribution, parameter estimates were computed for the eigenvalues and the Procrustes-rotated pattern/structure coefficients. The parameter estimates, empirically estimated standard errors, and the ratio of the parameter estimate to the standard error were investigated for both inferential and descriptive purposes.

This ratio behaves like a *t* statistic (Thompson, 1996). We hope for the sample statistic and mean bootstrap results to be relatively close and the ratio of the mean parameter estimate and standard errors to be greater than two. If this ratio is greater than two then we can be confident the parameter estimate is not zero (Thompson, 1996).

Bootstrapped Eigenvalues. The mean eigenvalues and the empirically estimated standard errors of the repeated samples were computed for each factor (see Table 7). The standard deviations of the empirically estimated sampling distribution give estimates for the standard errors. The mean bootstrap results and the sample eigenvalues were comparatively close with small standard errors.

Plots of the empirically estimated sampling distributions for the eigenvalues are presented in Figure 11. Across the 1000 resamples the first eigenvalue ranged from 18.15 to 20.46. The second eigenvalue ranged from 1.91 to 2.62. Of particular interest are the ambiguous results from the exploratory factor analysis on the fourth and fifth eigenvalue. The fourth eigenvalue ranged from.94 to 1.33, and the fifth eigenvalue ranged from.77 to 1.06. Of the 1000 resampling results, 93% of the fifth eigenvalue were smaller than one.

Therefore, the BFA results indicate we are confident that the variables were linked to four factors and that our results were stable over the 1000 resamples.

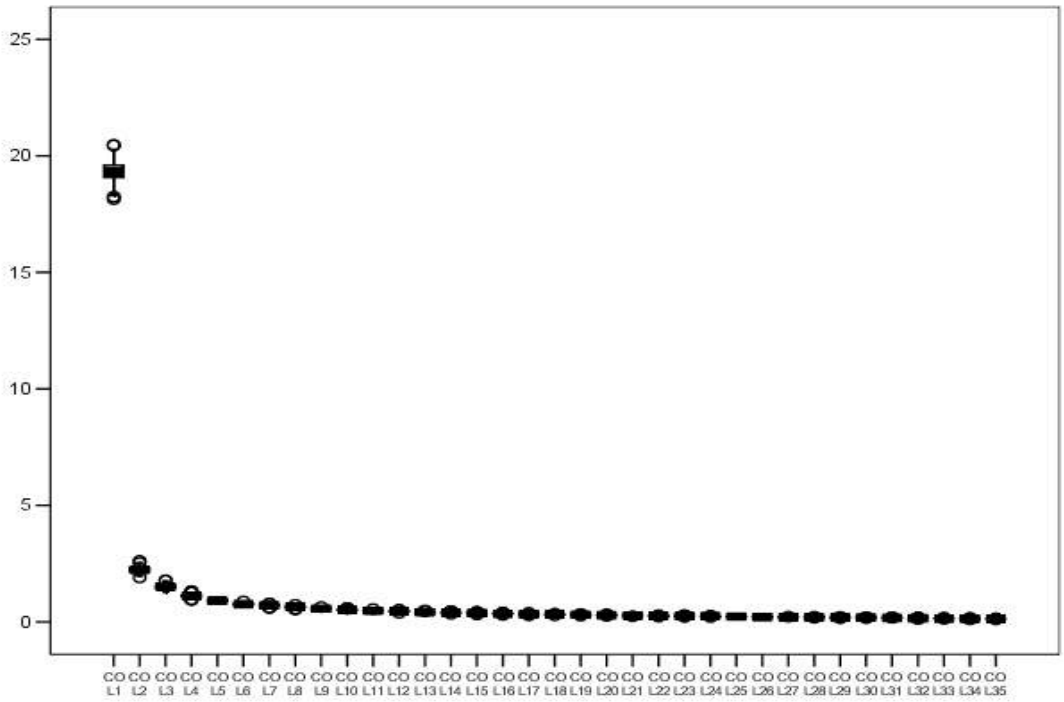

Figure 11. Empirically Estimated Sampling Distribution of the 35 Eigenvalues.

Table 7

Eigenvalues from Sample and Bootstrap Results Across 1000 Resamples

Sample	Eigenvalue	Mean bootstrap results	Standard error (SE)	Mean bootstrap results/SE
1	*19.11*	19.33	0.40	48.87
2	*2.12*	2.24	0.11	20.72
3	*1.50*	1.51	0.08	17.88
4	*1.10*	1.12	0.06	18.91
5	*.92*	0.92	0.05	16.87
6	*.74*	0.76	0.04	20.98
7	*.72*	0.70	0.03	22.83
8	*.65*	0.64	0.03	21.72
9	*.57*	0.57	0.02	22.71
10	*.52*	0.52	0.02	24.82
11	*.50*	0.48	0.02	24.93
12	*.46*	0.45	0.02	24.09
13	*.42*	0.42	0.02	24.89
14	*.40*	0.39	0.02	25.22
15	*.39*	0.37	0.01	25.66
16	*.36*	0.35	0.01	25.25
17	*.35*	0.33	0.01	25.67
18	*.33*	0.32	0.01	26.48
19	*.32*	0.30	0.01	27.00
20	*.30*	0.29	0.01	27.52
21	*.29*	0.27	0.01	26.96
22	*.27*	0.26	0.01	27.11
23	*.26*	0.25	0.01	26.49
24	*.26*	0.24	0.01	25.84
25	*.25*	0.23	0.01	25.91
26	*.23*	0.22	0.01	26.54
27	*.22*	0.21	0.01	27.06
28	*.22*	0.20	0.01	26.95
29	*.20*	0.19	0.01	25.94
30	*.20*	0.18	0.01	25.56
31	*.19*	0.17	0.01	25.01
32	*.18*	0.16	0.01	25.70
33	*.17*	0.15	0.01	24.78
34	*.16*	0.14	0.01	21.91
35	*.15*	0.13	0.01	19.60

Bootstrapped Pattern/Structure Coefficients. The average bootstrap results for the Procrustes-rotated pattern/structure coefficient across all 1000 resamples, the estimated standard errors (SEs), and the ratios of the average bootstrap results to the estimated standard errors are reported in Tables 8 and 9. Over each resample, factor analysis results will vary from the sample statistics. The stability of the parameter estimates addresses replicability. The more the resampling results deviate across the 1000 resamples, the less stable the parameter estimates. When testing for stability, we hope the mean bootstrap results and sample statistics will be relatively close with comparatively small estimated standard errors. As Guthrie (2001) noted, "If the sample statistic is relatively equal to the mean bootstrap estimate and SE is small in relation to the mean bootstrap estimate, then the sample statistic can be thought of as stable" (p. 12). On the contrary, if the mean bootstrap results and sample statistics are not close or the SEs are large in comparison to the mean bootstrap results, bias may be reflected and caution should be taken when interpreting the sample (Guthrie, 2001).

The SEs estimate stability with smaller SEs indicating parameter stability across the resamples. Pattern/structure coefficients with larger magnitudes tend to have smaller standard errors. The Procrustes-rotated pattern/structure coefficients were computed for the sample and compared to the parameter estimates. On all variables except P12 and P13, the sample and parameter estimates are close with relatively small estimated standard errors. The ratio of the mean bootstrap result and the standard error is greater than two for all variables. On variable P13, the parameter estimate was linked to Factor II, Teach Critical Thinking and Social Development and Develop Instructional

Leadership, whereas the sample statistic was linked to Factor I, Promote Student Learning. This suggests P13 may be variant and unstable across the resamples. Hence, not confident P13 would be replicable if a new sample was obtained.

Results suggest no bias is detected on the majority of the variables with the exception of P13. The ratio of the mean bootstrap results and the SE was greater than or equal to two for each of the factors indicating the parameter pattern/structure coefficients are not zero.

Figures 12, 13, 14, and 15 present plots of the pattern/structure coefficients for the 1000 resamples and illustrate the stability of the empirically estimated sampling distribution for the four factors. Variables linked to Use of Technology are the most stable across the 1000 resamples. Box plots illustrate that P10-P13 deviates more on Promote Student Learning than P1-P9. The mean bootstrap results of the empirically estimated sampling distribution for P13 link the variable to the second factor. Values for P13 on Promote Student Learning range from.54 to.75 over the 1000 resamples. Further investigations of the bootstrapping results show that P13 was linked to Promote Student Learning on 1483 (74%) of the 1000 resamples. Therefore, we can conclude P13 was linked to Promote Student Learning most of the time although we can not be confident our results would replicate for this variable if the study were conducted on a new sample of novice teachers.

Table 8

Sample and Bootstrap Results Across 1000 Resamples for Variables Linked to Factors I and II

	Factor I				Factor II			
Variable	Sample	Bootstrap	SE	MBR/ SE	Sample	Bootstrap	SE	MBR/ SE
P1	***.92***	**0.92**	0.02	52.37	*.35*	0.36	0.05	7.89
P2	***.89***	**0.90**	0.02	51.37	*.30*	0.31	0.04	7.27
P3	***.91***	**0.91**	0.02	53.53	*.39*	0.39	0.04	9.42
P4	***.89***	**0.89**	0.02	53.16	*.43*	0.43	0.04	11.18
P5	***.93***	**0.93**	0.01	70.47	*.32*	0.33	0.04	9.00
P6	***.93***	**0.93**	0.01	71.61	*.32*	0.31	0.04	7.79
P7	***.90***	**0.90**	0.02	44.02	*.43*	0.42	0.05	8.62
P8	***.88***	**0.87**	0.02	36.98	*.39*	0.38	0.06	6.46
P9	***.85***	**0.85**	0.02	45.03	*.46*	0.46	0.04	12.66
P10	***.74***	**0.71**	0.03	21.73	*.51*	0.54	0.05	10.49
P11	***.70***	**0.69**	0.03	20.78	*.65*	0.66	0.04	14.98
P12	***.66***	**0.65**	0.04	17.56	*.61*	0.62	0.05	12.27
P13	***.67***	**0.65**	0.03	19.35	***.66***	**0.68**	0.04	15.83
C1	*.57*	0.57	0.04	13.54	***.80***	**0.78**	0.04	18.11
C2	*.52*	0.51	0.04	12.04	***.83***	**0.81**	0.04	20.15
C3	*.56*	0.58	0.04	14.53	***.82***	**0.79**	0.04	20.69
C4	*.59*	0.60	0.04	13.70	***.78***	**0.77**	0.05	16.85
C5	*.56*	0.58	0.04	13.71	***.80***	**0.77**	0.05	17.19
C6	*.62*	0.64	0.04	14.78	***.77***	**0.75**	0.04	16.72
C7	*.61*	0.63	0.04	16.46	***.78***	**0.76**	0.04	19.72
C8	*.61*	0.61	0.03	20.16	***.76***	**0.76**	0.03	26.93
I1	*.32*	0.32	0.04	7.19	***.85***	**0.85**	0.04	20.12
I2	*.37*	0.37	0.04	10.49	***.88***	**0.88**	0.03	34.46
I3	*.20*	0.21	0.05	4.16	***.83***	**0.84**	0.06	14.00
I4	*.29*	0.27	0.05	4.94	***.85***	**0.87**	0.05	16.17

Note. Sample statistics are italicized and sample statistics and parameter estimates are bolded.

Table 9

Sample and Bootstrap Results Across 1000 Resamples for Variables Linked to Factors III and IV

	Factor III				Factor IV			
Variable	Sample	Bootstrap	SE	MB/ SE	Sample	Bootstrap	SE	MBR/ SE
U1	*.13*	0.11	0.0	2.99	***.59***	**0.59**	0.05	12.09
U2	*.11*	0.13	0.0	4.53	***.82***	**0.81**	0.04	20.40
U3	*.09*	0.1	0.0	2.85	***.65***	**0.64**	0.05	12.06
U4	*.14*	0.15	0.0	5.04	***.77***	**0.74**	0.03	21.52
U5	*.17*	0.18	0.0	5.21	***.69***	**0.68**	0.05	12.62
T1	***.82***	**0.82**	0.0	47.78	*.09*	0.09	0.04	2.24
T2	***.86***	**0.86**	0.0	57.57	*.11*	0.12	0.04	3.29
T3	***.82***	**0.83**	0.0	47.22	*.06*	0.09	0.04	2.56
T4.	***.89***	**0.89**	0.0	56.02	*.25*	0.22	0.06	3.84
T5	***.82***	**0.81**	0.0	50.02	*.13*	0.14	0.03	4.71

Note. Sample statistics are italicized and sample statistics and parameter estimates are bolded.

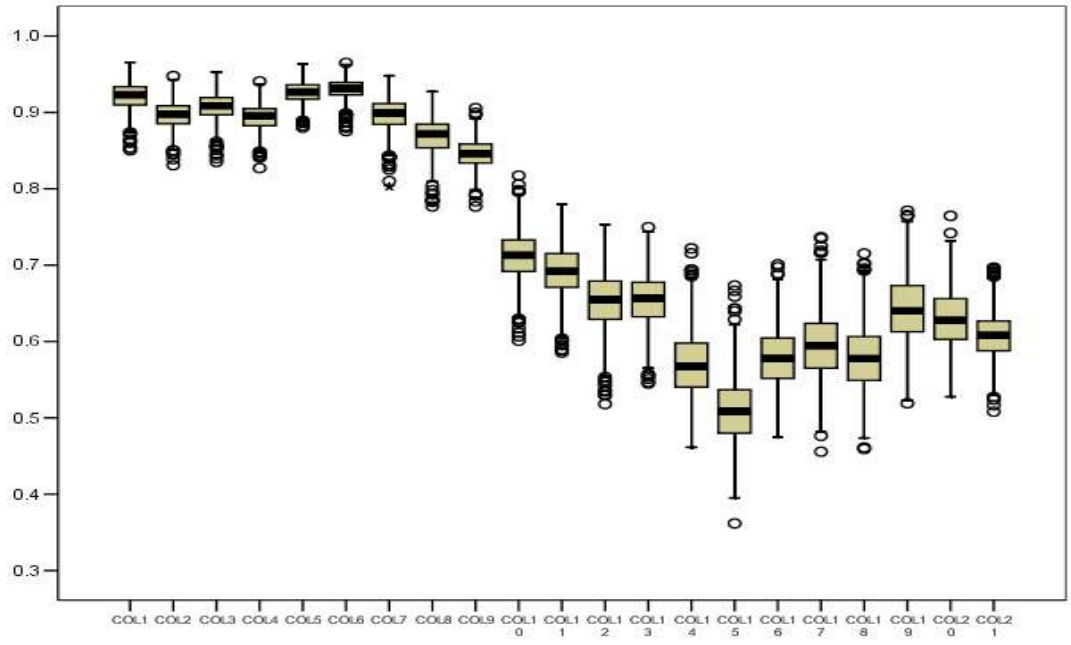

Figure 12. Empirically Estimated Sampling Distribution for Promote Student Learning.

Note. Variables linked to Promote Student Learning correspond to Col1 – Col13.

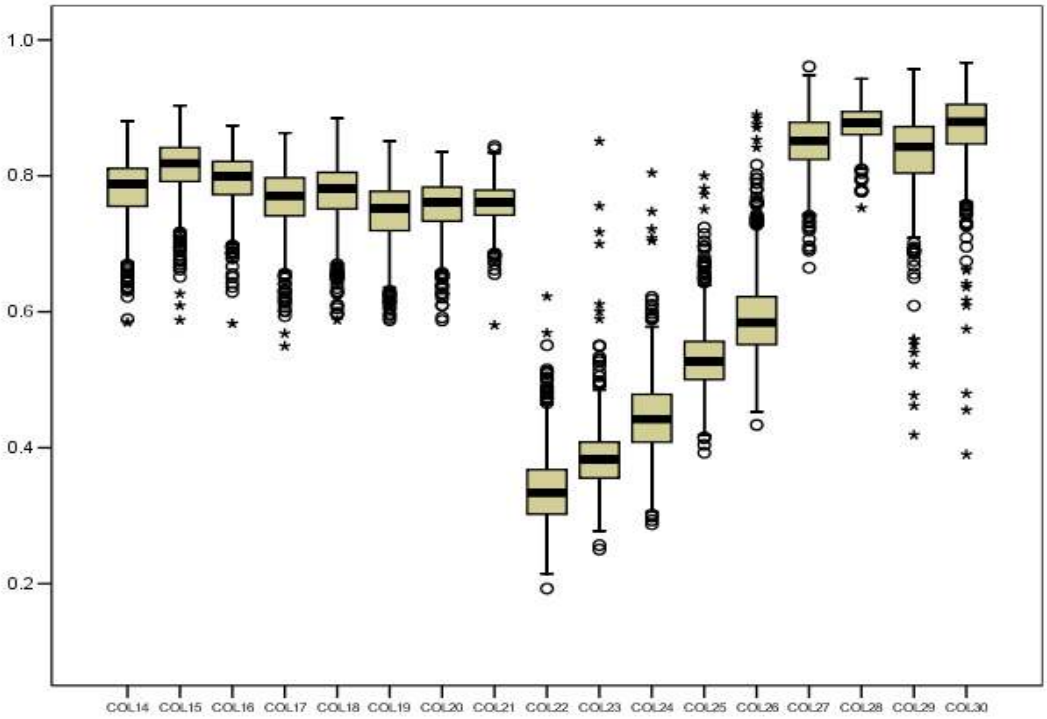

Figure 13. Empirically Estimated Sampling Distribution for Teach Critical Thinking and Social Development and Develop Instructional Leadership.

Note. Variables linked to the factor correspond to Col14 – Col21 and Col27-Col30.

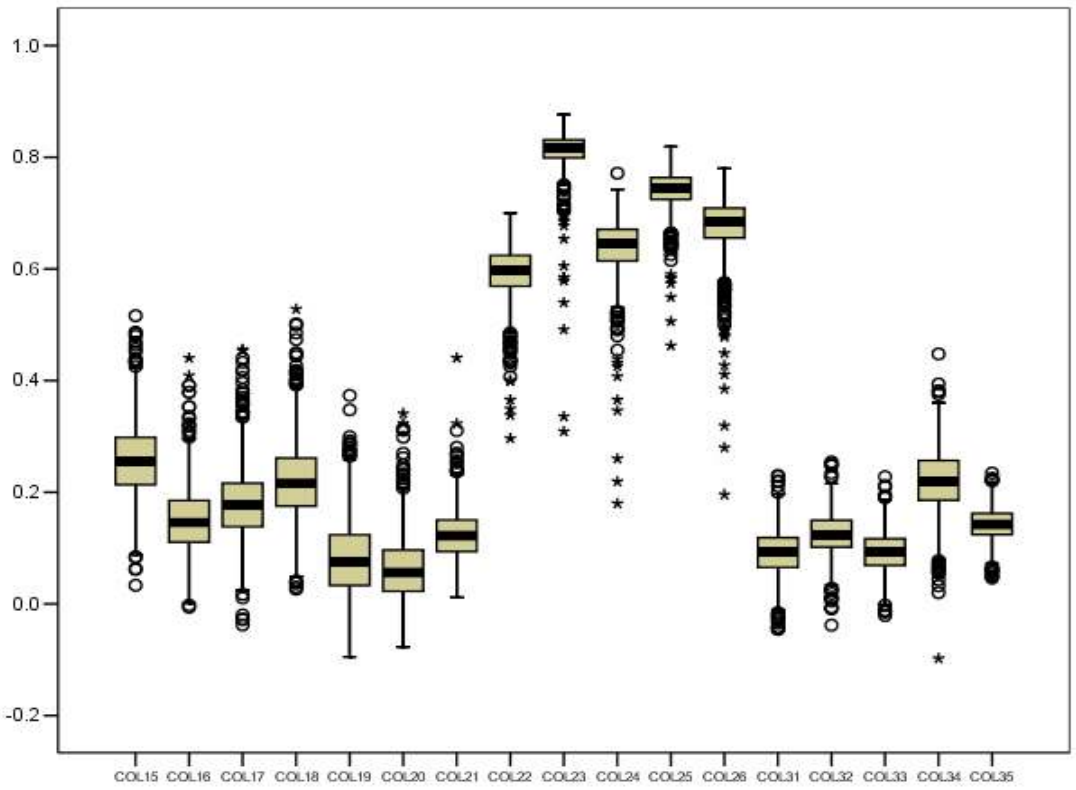

Figure 14. Empirically Estimated Sampling Distribution for Understanding Learners.

Note. Variables linked to Understanding Learners correspond to Col22 - Col26.

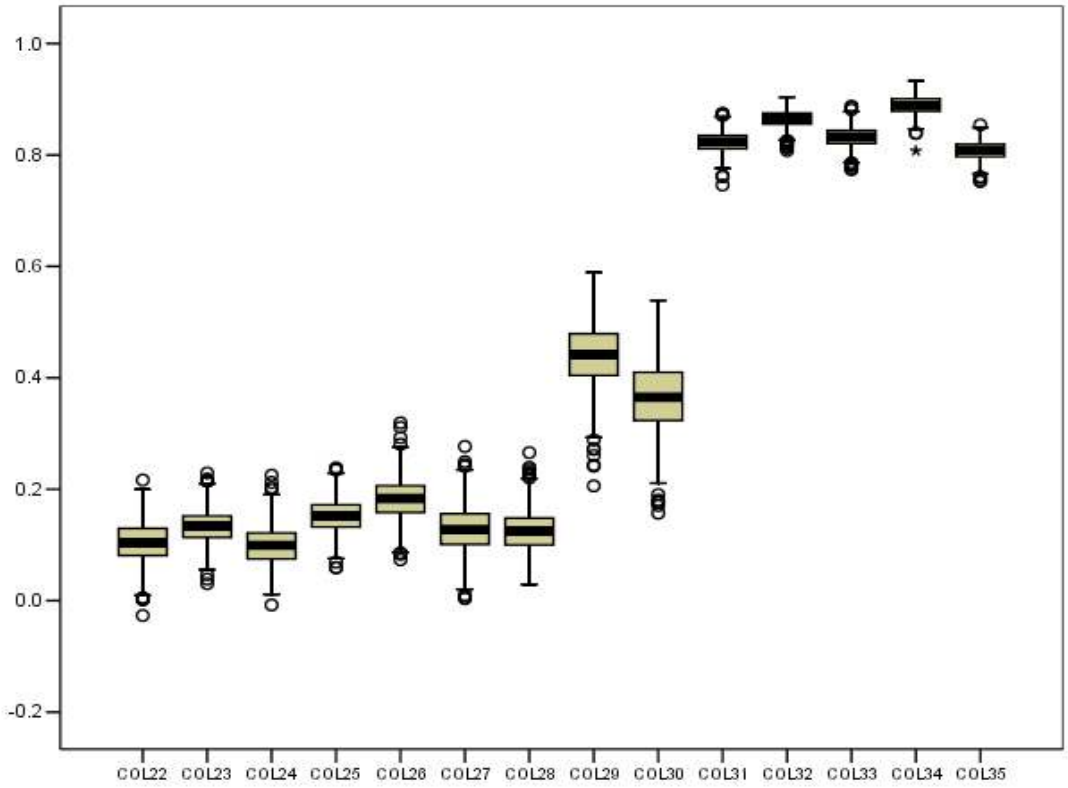

Figure 15. Empirically Estimated Sampling Distribution for Use of Technology.

Note. Variables linked to Use of Technology correspond to Col31-Col35.

Reliability. Analysts must answer two questions: "Do they have anything?" and "Where is it coming from?" (Thompson, 2000b). Reporting reliability of the data is important because "score reliability establishes a ceiling for substantive effect sizes" (Thompson, 1994, p. 7). Effect sizes are inherently important and cannot exceed the product of the reliability coefficients. According to Reinhardt (1991),

> [r]eliability is critical in detecting effects in substantive research. For example, if a dependent variable is measured such that it is perfectly unreliable, the effect

> size in the study will unavoidably be zero, and the results will not be statistically significant at any sample size, including an infinite one. (p. 1)

Failures to report reliability coefficients may lead to misinterpretations and studies may be conducted that cannot produce noteworthy effect sizes regardless of the sample size (Crocker & Algina, 1986; Thompson, 1994).

Reliability helps researchers understand relationships between variables and is a measure of internal consistency. According to Henson (2001), "Internal consistency estimates relate to item homogeneity, or the degree to which the items on a test jointly measure the same construct" (p. 3). Researchers must understand that reliability is not the reliability of the test but the reliability of scores. According to Reinhardt (1991), "reliability is a property of the scores on a test for a particular group of examinees" (p. 6). The same test administered over and over again may yield different reliability coefficients each time (Reinhardt, 1991).

The correlation between the item and the total composite score, a measure of internal consistency, and Cronbach's alpha score if item were deleted are reported for all items and for each subscale in Tables 10 through16. According to Thompson (2003), "alpha measures how internally consistent test scores are based on the degree to which the item scores measure the same construct" (p. 5). Item score correlations give the

degree of relationship between item scores and Coefficient Alpha. The internal consistency reliability for the entire survey was.975, for Promoting Student Learning was.945, for Teaching Critical Thinking and Social Development and Developing Instructional Leadership was.947, for Understanding Learners was.886, and for Use of Technology was.909. The internal consistency for Personal Teaching Efficacy was.794 and for Teaching Efficacy was.571. All of these except Teaching Efficacy are considered sufficient for further statistical analyses with Teaching Efficacy lower than desired (Thompson, 2003).

The higher the item-total correlations then the lower the Cronbach's alpha would be if the item were deleted. If the Cronbach's alpha score is lower if the item were deleted, then the item is considered a better item. On each sub-scale, Cronbach's alpha would be lower if the item were deleted except for variable T4 on Using Technology and for I3 on Teaching Critical Thinking and Social Development/Develop Instructional Leadership. This suggests T4 and I3 may not be good items.

Table 10

Relationship Diagnostics for Perceptions of Preparedness

	Item-Total Statistics	
Variables	Corrected Item-Total *r*	Cronbach's Alpha if Item Deleted
P1	.691	.974
P2	.723	.974
P3	.745	.974
P4	.757	.974
P5	.743	.974
P6	.718	.974
P7	.711	.974
P8	.680	.974
P9	.794	.974
P10	.785	.974
P11	.801	.974
P12	.781	.974
P13	.794	.974
C1	.755	.974
C2	.762	.974
C3	.769	.974
C4	.776	.974
C5	.776	.974
C6	.773	.974
C7	.795	.974
C8	.785	.974
I1	.687	.974
I2	.736	.974
I3	.608	.975
I4	.646	.974
U1	.705	.974
U2	.650	.974
U3	.715	.974
U4	.697	.974
U5	.697	.974
T1	.650	.974
T2	.604	.975
T3	.638	.975
T4	.491	.975
T5	.670	.974

Note. Alpha for the total scores on the 1197 participants on the 35 variables was.975.

Table 11

Reliability Diagnostics for the Factor Promoting Student Learning

	Item-Total Statistics	
Variables	Corrected Item-Total *r*	Cronbach's Alpha if Item Deleted
P1	.741	.952
P2	.758	.951
P3	.783	.950
P4	.789	.950
P5	.809	.950
P6	.777	.951
P7	.758	.951
P8	.698	.953
P9	.806	.950
P10	.763	.951
P11	.776	.951
P12	.750	.951
P13	.766	.951

Note. Alpha for the total scores on the 1197 participants on the 13 variables was.954.

Table 12

Reliability Diagnostics for the Factor Teaching Critical Thinking and Social Development and Developing Instructional Leadership

	Item-Total Statistics	
Variables	Corrected Item-Total *r*	Cronbach's Alpha if Item Deleted
C1	.765	.942
C2	.783	.942
C3	.801	.941
C4	.782	.942
C5	.791	.941
C6	.781	.942
C7	.809	.941
C8	.776	.942
I1	.708	.944
I2	.775	.942
I3	.613	.947
I4	.655	.946

Note. Alpha for the total scores on the 1197 participants on the 12 variables was.947.

Table 13

Reliability Diagnostics for the Factor Understanding Learners

	Item-Total Statistics	
Variables	Corrected Item-Total *r*	Cronbach's Alpha if Item Deleted
U1	.681	.872
U2	.766	.852
U3	.694	.869
U4	.780	.849
U5	.708	.866

Note. Alpha for the total scores on the 1197 participants on the 5 variables was.886.

Table 14

Reliability Diagnostics for the Factor Use of Technology

	Item-Total Statistics	
Variables	Corrected Item-Total *r*	Cronbach's Alpha if Item Deleted
T1	.815	.880
T2	.791	.885
T3	.781	.887
T4	.648	.913
T5	.820	.879

Note. Alpha for the total scores on the 1197 participants on the 5 variables was.909.

Table 15

Reliability Diagnostics for the Factor Personal Teaching Efficacy

	Item-Total Statistics	
Variables	Corrected Item-Total *r*	Cronbach's Alpha if Item Deleted
SE1	.527	.735
SE2	.588	.713
SE5	.586	.715
SE6	.647	. 696
SE8	.395	.783

Note. Alpha for the total scores on the 1197 participants on the 5 variables was.794.

Table 16

Reliability Diagnostics for Teaching Efficacy

	Item-Total Statistics	
Variables	Corrected Item-Total *r*	Cronbach's Alpha if Item Deleted
SE3	.339	.423
SE7	.437	.443
SE7	.299	.558
SE9	.375	.498

Note. Alpha for the total scores on the 1197 participants on the 5 variables was.578.

Analyses

Multivariate analysis simultaneously considers the relationships among variables. The use of multivariate methods is important because it limits the probability of making a Type I error. More importantly, "multivariate methods best honor the reality to which the researcher is purportedly trying to generalize" (Thompson, 1991, p. 80). Researchers can then investigate relationships among several variables at one time versus investigating the individual relationships between pair of variables.

Analysis of Variance (ANOVA) and multivariate analysis of variance (MANOVA) results can yield different results (Bray & Maxwell, 1985; Thompson, 1991). According to Thompson (2000b), "univariate tests cannot reasonably be used to investigate and understand the patterns first isolated in multivariate analyses; only a multivariate analysis can explore a multivariate effect" (p. 287). Therefore, MANOVAs were conducted on perceptions of preparedness defined by four factors: (a) Promoting Student Learning, (b) Teaching Critical Thinking and Social Development and Developing Instructional Leadership, (c) Understanding Learners, and (d) Using Technology, self-efficacy defined by two factors: Teaching Efficacy and Personal Teaching Efficacy, and mentoring defined by two factors: School District Mentoring and Program Mentoring Experience.

When computing MANOVA results a set of assumptions is made. Of particular importance are the assumptions of multivariate normality and homogeneity of covariance matrices (Bray & Maxwell, 1985). Prior to conducting multivariate analysis, the data were investigated for multivariate normality. The graph of the Mahalanobis D^2

vs. chi-square plots is presented in Figure 16. The graph is approximately linear with the exception of the largest chi-square values. This suggests the data is close to multivariate normal on measures of self-efficacy and perceptions of preparedness (Thompson, 1990). The small departure from multivariate normality is not of great concern because MANOVA tends to be robust within slight departures from multivariate normality (Bray & Maxwell, 1985).

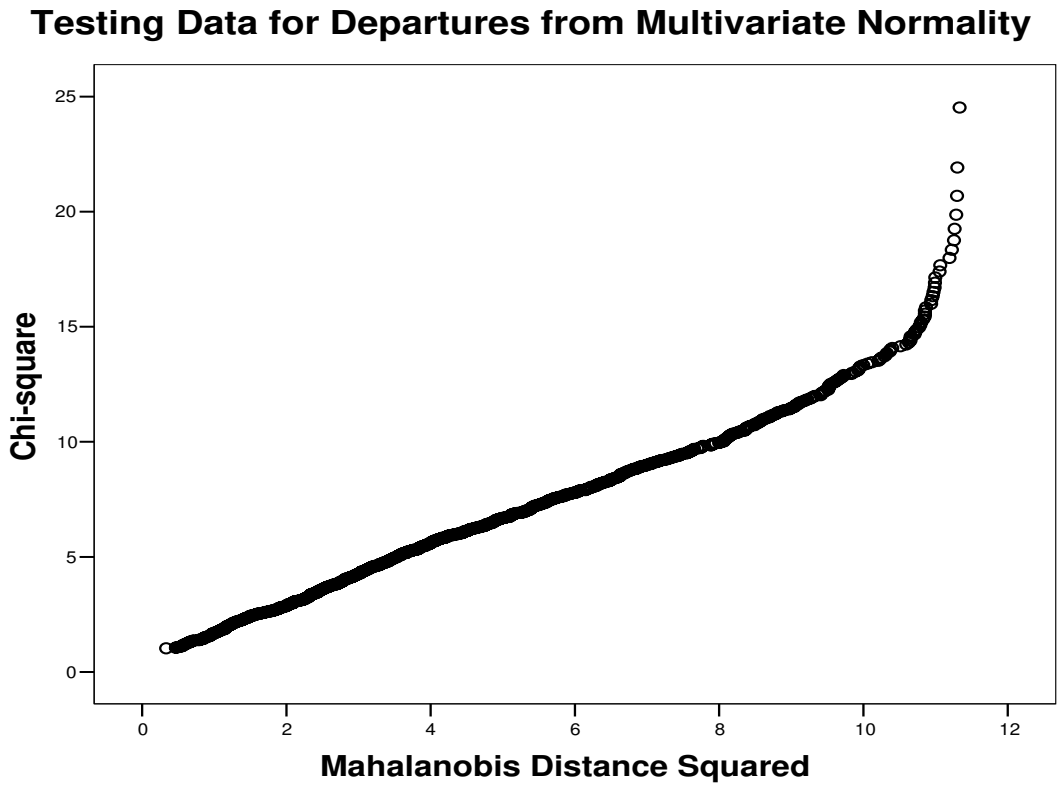

Figure 16. Investigations of Multivariate Normality for Perceptions of Preparedness and Self-efficacy.

For equal *n*s, the impact of violating the assumption of homogeneity of covariances is minimal. For unequal sample sizes, if the larger variance is in the larger group and statistical significance was obtained, then the results are a conservative test and more confidence can be vested in the results. On the other hand, if the variance is in the larger group and statistical significance was not obtained, then we would not be confident in our results. In reality, homogeneity of covariance matrices is unlikely to be satisfied, so further consideration needs to be made to determine the impact of violating the assumption. Box's M was used to test the assumption of homogeneity of covariances. Because Box's M is sensitive to departures from normality, the alpha level for this sample was chosen as $\alpha = .0001$ (Bray & Maxwell, 1985; Stevens, 2002). Descriptive statistics are reported in Table 17 on the six factors.

Table 17

Descriptive Statistics for Perceptions of Preparedness, Self-efficacy, and Overall Preparedness for Novice Teachers

				95% Confidence Interval for the Mean	
Perceptions	*n*	Mean	*SD*	Lower Bound	Upper Bound
Promote	1197	4.13	1.08	4.07	4.19
Critical Thinking	1197	4.38	1.02	4.32	4.44
Understand Learners	1197	4.36	1.08	4.30	4.42
Technology	1197	4.54	1.17	4.47	4.61
Teaching Efficacy	1183	3.01	.90	2.96	3.06
Personal Teaching Efficacy	1192	4.94	.80	4.90	4.99

Note. Overall Preparedness is measured by one variable and Teaching Efficacy is a negatively worded item.

Self-efficacy and Overall Preparedness. To establish the importance and credibility of the intervally-scaled variable Overall Preparedness in the analysis, a canonical correlation analysis was conducted with the factors linked to perceptions of preparedness and self-efficacy as the dependent variables. Correlations were conducted on the nine self-efficacy variables and Overall Preparedness and compared to Darling-Hammond et al. (2002) results. A canonical correlation analysis was conducted and compared to Darling-Hammond's et al. (2002) study to determine if factors such as age, teaching level, ethnicity, Overall Preparedness, or years of teaching were serving as mediator factors for self-efficacy.

The canonical analysis of the relationship between the mediating factors yielded a noteworthy canonical correlation for Function I of R_c = .443 (Wilks' lambda = .75, $F(16, 2336) = 22.69$, $p < .001$). Table 18 displays the canonical correlation coefficients, structure coefficients, squared structure coefficients, variate adequacy coefficients, weighted communality coefficients, and redundancy coefficients for the two statistically significant functions (Thompson, 1984). The squared canonical correlation coefficient indicates that 19.6% of the variance is linearly shared by the variable sets. The function coefficients and structure coefficients indicate that Overall Preparedness and teaching at the elementary level contributed most to Function I.

The canonical analysis of the relationship between perceptions of preparedness and self-efficacy yielded a noteworthy canonical correlation for Functions II of R_c = .261 (Wilks' lambda = .93, $F(7, 1169) = 12.22$, $p < .001$). Table 18 also displays the canonical correlation coefficients, structure coefficients, squared structure coefficients,

variate adequacy coefficients, weighted communality coefficients, and redundancy coefficients for these statistically significant functions. The squared canonical correlation coefficient indicates that 6.9% of the variance is shared on Function II coefficients and structure coefficients indicate the variables that contributed most to Function II were gender, teaching at the elementary level, and Overall Preparedness.

While Darling-Hammond et al. found self-efficacy to be influenced by ethnicity but not gender, results from this sample suggested that Personal Teaching Efficacy was influenced by gender but not ethnicity. Our results were consistent that self-efficacy was influenced by those teaching at the elementary level and by Overall Preparedness. Therefore, for both the present study and Darling-Hammond et al., Overall Preparedness was the strongest predictor of both Personal Teaching Efficacy and Teaching Efficacy. In addition, our results were consistent with Darling-Hammond et al. in that the higher a teacher's perceptions of Overall Preparedness, the longer they planned to remain in teaching ($r = -.167$, $p < .001$). Hence, Overall Preparedness and self-efficacy will be used as a proxy regarding a program's ability to produce effective teachers (Darling-Hammond et al., 2002). Table 19 contains the Spearman Rho correlations from Darling-Hammond et al. sample compared to the Pearson correlations of this sample. Items in Darling-Hammond et al. study were on an ordinal scale versus items being on an interval scale for the present study (Hinkle, Wiersma, & Jurs, 2003).

Table 18

Canonical Correlation Results for Self-efficacy and Mediating Factors

	Function I			Function II		
Variables	Funct..	r_s	r_s^2	Funct..	r_s	r_s^2
Personal Teaching Efficacy	-.382	-.640	40.96%	.984	.768	58.98%
Teaching Efficacy	.811	.932	86.86%	.676	.362	13.10%
Adequacy			63.91%			56.50%
Rd			12.53%			3.89%
Rc^2			19.60%			6.89%
Rd			3.09%			.98%
Adequacy			15.77%			14.23%
Age	-.169	-.058	0.34%	-.315	-.108	1.17%
Ethnicity	.079	.032	0.10%	.092	.068	0.46%
Gender	-.118	-.304	9.24%	-.465	-.501	25.10%
Years of Experience	-.068	-.078	0.61%	-.113	-.17	2.89%
Elementary	-.515	-.660	43.56%	-.354	-.496	24.60%
Middle School	.104	.122	1.49%	.171	.221	4.88%
High School	.243	.466	21.72%	.122	.332	11.02%
Overall Preparedness	-.686	-.701	49.14%	.688	.661	43.69%

Table 19

Relationship Between Overall Preparedness and Self-efficacy (N =1194) (Reprinted with permission from "Variation in teacher preparation: How well do different pathways prepare teachers to teach?" by Darling-Hammond, L., Chung, R., & Frelow, F., 2002. *Journal of Teacher Education, 53*, 286-302. Copyright 2002 by *Journal of Teacher Education.*)

Item	Correlations	
	Darling-Hammond et al. (2002)	Zientek
If I try hard I can get through to almost all of my students.	.170**	.193**
I am confident in my ability to handle most discipline problems.	.230**	.245**
Students fail because they do not apply themselves.	.039*	-.080*
My student's peers have more influence than I do.	-.083**	-.129**
I am confident in my ability to teach all students to high levels.	.297**	.277**
I am confident I am making a difference in the lives of my students.	.215**	.259**
I am uncertain how to teach some of my students.	-.286**	-.277**
I am confident of my ability to integrate information technology.	.315**	.250**
Teachers can have little influence.	-.067**	-.112**

Note. * $p < .05$. ** $p < .001$.

Research Question I

Do novice teachers differ by certification route in their sense of self-efficacy, perceptions of preparedness to teach, Overall Preparedness, mentoring experience, reasons for entering the classroom, plans to remain in teaching and classroom preparation?

Criticisms of previous studies include different definitions of certification routes (i.e., university versus non-university or alternative versus traditional) and aggregation of data within certification routes. Therefore, differences between traditional and non-traditional teachers; differences between non-university and university teachers; differences between alternative, traditional and post-baccalaureate; and differences by

where certificates were obtained were compared. Descriptive discriminant analyses were conducted on statistically significant factors where more than two groups were being investigated. An alpha level was set at.05 for all analyses.

Differences Between ATC and TTC Teachers. To determine if novice teachers differ by certification route in their sense of self-efficacy, perceptions of preparedness to teach, reasons for entering teaching, mentoring experience, overall preparedness, classroom preparation, and plans to remain in teaching, MANOVAs, ANOVAs, and crosstabs were conducted. For MANOVAs, eta-squared was found by computing 1-Wilks' lambda (Pedhazur, 1997).

Perceptions of Preparedness. A MANOVA was conducted to test differences between TCT (n = 415) and ATC (n = 782) teachers on perceptions of preparedness. Box's M test indicated the assumption of homogeneity of covariance matrices was met (p = .255). Statistically significant differences existed between TTC and ATC teachers on perceptions of preparedness (F(4, 1192) = 4.83, p = .001) with small effect sizes (η^2 = .02). Table 20 presents the descriptive statistics for ATC and TTC teachers on perceptions of preparedness.

The data were investigated to determine if the assumption of homogeneity of covariances was met on self-efficacy (i.e., Personal Teaching Efficacy and Teaching Efficacy). Box's M indicated the assumption was not violated (p = .210). No statistically significant differences existed between TTC (n = 414) and ATC (n = 769) teachers on self-efficacy (F(2, 1180) = 2.25, p = .102) with an effect size close to zero (η^2 = .01).

Levene's test indicated the homogeneity of variance assumption was met for

Overall Preparedness (p = .134). ANOVA results indicated statistically significant differences existed between TTC and ATC teachers on Overall Preparedness (F(1, 1195) = 12.74, p < .001) with a small effect size (η^2 = .01).

Mentoring. Homogeneity of covariance matrices with the independent variable certification route as defined by traditional and non-traditional and the dependent variables measuring mentoring experience was not met (p < .0001). The assumption of homogeneity of variances was violated (p < .001). The larger variance was associated with ATC teachers, the larger group, on school district mentoring and the smaller variance was associated with ATC teachers on program mentoring. According to Hinkle et al., (2003), this implies alpha will be conservative (i.e., α < .05 at the.05 level) for school district mentoring and liberal for program mentoring. Because of the violation of the homogeneity of variances, the ANOVAs were conducted with the Welch-James statistic (García-Granero, 2005). Statistically significant differences existed between TTC (n = 413) and ATC (n = 782) teachers on program mentoring experience (F(1, 967) = 308.78, p < .001) and school district mentoring experience (F(1, 702) = 44.91, p < .001) with a moderate effect size for program mentor (η^2 = .19) and small effect size for school district mentor (η^2 = .04). Traditional teachers experienced lower school district and program mentoring experiences than ATC teachers. Table 21 illustrates mentoring experience by certification route. A rating score of zero was given for teachers who did not have a mentor.

Table 20

Descriptive Statistics on Perceptions of Preparedness Between ATC and TTC Teachers

(Reprinted with permission from "Variation in teacher preparation: How well do different pathways prepare teachers to teach?" by Darling-Hammond, L., Chung, R., & Frelow, F., 2002. *Journal of Teacher Education, 53*, 286-302. Copyright 2002 by *Journal of Teacher Education.*)

				95% Confidence Interval for Mean	
Variable	Route	Mean	SD	Lower Bound	Upper Bound
P11 Teach subject matter concepts in ways that enable students to learn.	ATC	4.15	1.39	4.06	4.25
	TTC	4.37	1.33	4.24	4.50
P2 Understand how different students in your classroom are learning.	ATC	4.06	1.35	3.97	4.16
	TTC	4.24	1.30	4.11	4.36
P3 Set challenging and appropriate expectations.	ATC	4.21	1.31	4.12	4.20
	TTC	4.31	1.26	4.19	4.43
P4 Help all students achieve high academic standards.	ATC	4.19	1.28	4.10	4.28
	TTC	4.30	1.18	4.18	4.41
P5 Develop curriculum that builds on expectations.	ATC	4.00	1.41	3.90	4.10
	TTC	4.25	1.33	4.12	4.38
P6 Evaluate curriculum materials.	ATC	4.05	1.38	3.95	4.15
	TTC	4.15	1.35	4.02	4.28
P7 Create discipline-based and interdisciplinary curriculum.	ATC	3.93	1.35	3.83	4.02
	TTC	4.15	1.34	4.02	4.28
P8 Identify and obtain materials to create a multicultural curriculum.	ATC	3.86	1.39	3.76	3.96
	TTC	3.97	1.41	3.83	4.11
P9 Use instructional strategies that promote active student learning.	ATC	4.37	1.30	4.28	4.46
	TTC	4.65	1.19	4.25	4.76
P10 Choose teaching strategies to meet different student needs.	ATC	4.09	1.34	3.99	4.18
	TTC	4.31	1.23	4.19	4.43
P11 Plan instruction.	ATC	4.17	1.33	4.08	4.26
	TTC	4.45	1.21	4.33	4.56
P12 Use a variety of assessments.	ATC	4.10	1.40	4.00	4.20
	TTC	4.32	1.35	4.19	4.45
P13 Help students learn how to assess their own learning.	ATC	3.66	1.36	3.57	3.76
	TTC	3.89	1.32	3.76	4.02
U1 Understand how students' development influences learning.	ATC	4.48	1.33	4.39	4.58
	TTC	4.71	1.24	4.59	4.83
U2 Understand how students' cultural backgrounds influence learning.	ATC	4.59	1.27	4.50	4.67
	TTC	4.48	1.23	4.37	4.60
U3 Identify and address special learning needs and/or difficulties.	ATC	4.04	1.37	3.94	4.14
	TTC	4.08	1.33	3.96	4.21

Table 20 *(continued).*

Variable	Route	Mean	SD	95% Confidence Interval for Mean Lower Bound	Upper Bound
U4 Understand how students' environment influences learning.	ATC	4.47	1.28	4.38	4.56
	TTC	4.60	1.22	4.48	4.71
U5 Work with parents and families to understand students.	ATC	4.11	1.35	4.02	4.21
	TTC	4.10	1.37	3.97	4.24
C1 Help students become self-motivated and self-directed.	ATC	4.13	1.28	4.04	4.22
	TTC	4.15	1.28	4.02	4.27
C2 Develop an environment that promotes social development.	ATC	4.42	1.32	4.33	4.51
	TTC	4.58	1.25	4.46	4.70
C3 Develop students' questioning and discussion skills.	ATC	4.16	1.31	4.07	4.26
	TTC	4.28	1.27	4.16	4.41
C4 Engage students in cooperative group ATC work and independent learning.	4.40	1.28	4.31	4.49	
	TTC	4.63	1.25	4.51	4.75
C5 Use effective communication strategies.	ATC	4.54	1.23	4.46	4.63
	TTC	4.77	1.14	4.66	4.88
C6 Use questions to stimulate different kinds of student learning.	ATC	4.39	1.26	4.30	4.48
	TTC	4.59	1.15	4.47	4.70
C7 Help students learn to think critically and solve problems.	ATC	4.21	1.32	4.12	4.30
	TTC	4.44	1.20	4.33	4.56
C8 Encourage students to understand ideas from diverse perspectives.	ATC	4.16	1.29	4.07	4.24
	TTC	4.16	1.23	4.04	4.28
I1 Resolve interpersonal conflict in the classroom.	ATC	4.30	1.28	4.21	4.39
	TTC	4.25	1.29	4.13	4.38
I2 Maintain an orderly and purposeful learning environment.	ATC	4.49	1.26	4.40	4.58
	TTC	4.56	1.23	4.44	4.68
I3 Plan and solve problems with colleagues.	ATC	4.66	1.26	4.57	4.75
	TTC	4.58	1.31	4.46	4.71
I4 Assume leadership responsibilities in your school.	ATC	4.32	1.39	4.22	4.42
	TTC	4.29	1.40	4.16	4.43
T1 Increase student interest and learning.	ATC	4.44	1.34	4.35	4.54
	TTC	4.56	1.33	4.43	4.69
T2 Support students' research and analysis.	ATC	4.48	1.38	4.38	4.57
	TTC	4.38	1.42	4.24	4.52
T3 Assess and track student achievement.	ATC	4.43	1.42	4.33	4.53
	TTC	4.37	1.41	4.24	4.51
T4 Communicate with others.	ATC	4.81	1.28	4.72	4.90
	TTC	4.80	1.38	4.67	4.94
T5 Enhance group collaboration and teamwork.	ATC	4.55	1.34	4.42	4.69
	TTC	4.55	1.36	4.48	4.63

Note. There were 782 TTC teachers and 415 ATC teachers.

Table 21

Mentoring Experiences of ATC and TTC Teachers

	Percent			
Rating	School District Mentor TTC	ATC	Program Mentor TTC	ATC
0	18	5	77	26
1	11	8	2	5
2	8	7	1	5
3	7	8	3	5
4	9	11	4	9
5	13	17	4	15
6	34	45	11	35

Classroom Experience. Crosstabs were conducted to determine differences between ATC and TTC teachers on classroom experience prior to entering teaching. Statistically significant differences existed between groups on all variables except substitute teaching. Effect sizes were computed using the *w* index developed by Cohen (Sheskin, 2000). Although the following are arbitrarily defined by Cohen, they give guidance for interpreting effect sizes. Small effect sizes are considered to be greater than.1 but less than.3. Medium effect sizes are considered to be greater than or equal to.3 but less than.5. Large effect sizes are considered greater than.5 (Sheskin, 2000). Chi-square values, p-values, and effect sizes for each of the variables is presented in Table 22. Figure 17 illustrates the differences in experience by certification route. Overall, 8% of ATC teachers indicated having teaching experience, 2% work preparation experience, 2% tutoring experience, and 4% volunteer work; 17% indicated other classroom experience.

Table 22

Crosstab Results Between ATC and TTC Teachers on Prior Classroom Experience

Prior Classroom Experience	χ^2	*df*	*p*	*w*
None	87.16	1	1.00×10^{-20}	.27
Substitute Teaching	1.01	1	.413	.03
Teacher's Aid	5.16	1	.015	.07
Student Teaching	647.77	1	1.43×10^{-139}	.74
Field Based Experience	207.56	1	4.68×10^{-47}	.42

Reasons for Entering the Teaching Profession. Crosstabs were conducted to determine if differences existed between ATC (n = 782) and TTC (n = 415) teachers on reasons for entering the teaching profession and to determine if differences existed between ATC (n = 746) and TTC (n = 382) teachers' plans to remain in teaching as defined by Shen (1997). Table 23 and Figure 18 provide the results of the analysis. Statistically significant differences existed between groups on all variables associated with entering the teaching profession. Effect sizes were computed using the w index developed by Cohen.

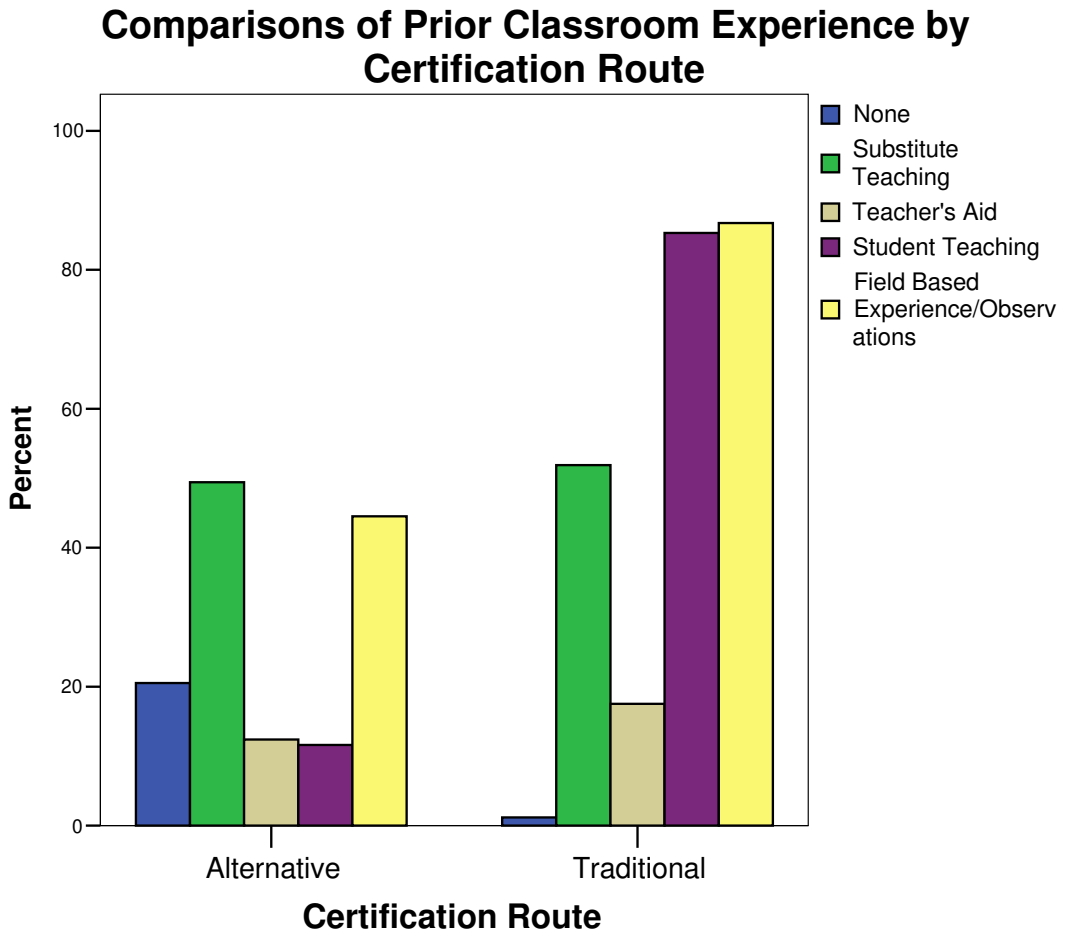

Figure 17. Comparisons of Prior Classroom Experience Between ATC and TTC Teachers.

Table 23

Crosstab Results Between ATC and TTC Teachers on Reasons for Entering Teaching

Prior Classroom Experience	χ^2	*df*	*p*	*w*
Desire to Work with Children	32.29	1	< .001	.16
Fulfill a Desire to Teach	21.42	1	< .001	.13
Retirement from Former Job	12.26	1	< .001	.10
Job Dissatisfaction	81.34	1	< .001	.26
Outsource or Company Reorganization	16.65	1	< .001	.13
Change in Marital Status	5.20	1	.018	.07
Other	14.03	1	< .001	.11

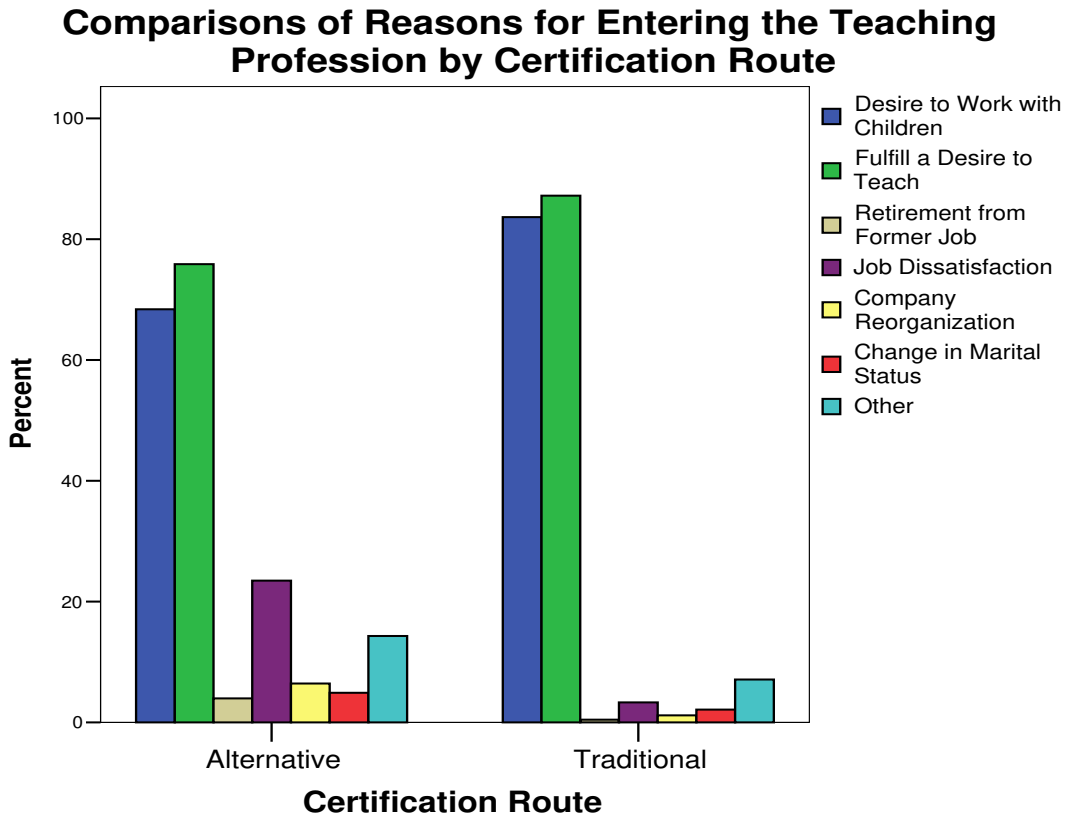

Figure 18. Comparisons Between ATC and TTC Teachers of Reasons for Entering the Teaching Profession by Certification Route.

Note. Teachers could choose more than one reason.

Plans to Remain in Teaching. Statistically significant differences existed between ATC and TTC teachers on plans to remain in teaching (χ^2 (4, N = 1128) = 17.80, p = .001) with a small effect size (w = .13). Table 24 illustrates similarities between both groups' plans to remain in teaching. Of the 4% of ATC teachers (n = 27) who marked other plans to remain in teaching, the majority remarked they would not remain in teaching long-term. Eleven were leaving once they obtained their masters degrees. Three were leaving once they obtained their doctoral degrees. Two planned to teach one more year. Two planned to teach until they could find a college or university position. Two planned to teach two to three years. One planned to teach four to five years. One was undecided on how long to remain in teaching and one planned to teach until finding another administrative position. Four teachers marked varying responses such as "depending upon my health" or "until I decide I want to quit". Further investigation of the data showed that all 27 teachers who marked answer *other* as their answer received their certification from the for-profit program. If these 27 teachers were removed, then no statistically significant differences existed between the ATC teachers certified through regional service centers, community colleges, and post-baccalaureate programs, and TTC teachers with regards to plans to remain in teaching (χ^2 (2, N = 1101) = 3.36, p = .34).

Table 24

Plans to Remain in Teaching

Plans to Remain in Teaching	Percent	
	Traditional	Alternative
As Long as I am Able to	61	65
Until I am Eligible for Retirement	12	11
Will probably continue unless something better comes along	17	13
Definitely plan to leave as soon as possible	3	3
Other	0	4
Missing	8	5

Note. There were 746 ATC teachers and 382 TTC teachers. Items on plans to remain in teaching were from Shen's (1997) article.

Differences Between University and Non-University. The assumption of homogeneity of covariance matrices was not met when comparing teachers certified through university (n = 597) and non-university (n = 597) programs on mentoring experience ($p < .0001$), but was met when comparing perceptions of preparedness (p = .182) and self-efficacy ($p = .139$). Because the sample sizes were close for both groups and MANOVAs tend to be robust on violations of homogeneity of covariance matrices when sample sizes are equal, the decision was made to conduct a MANOVA to determine differences in mentoring experience (Bray & Maxwell, 1985).

From MANOVA results, statistically significant differences existed between university and non-university teachers on perceptions of preparedness ($F(4, 1189) = 5.12$, $p < .001$) and self-efficacy ($F(2, 1177) = 4.37$, $p = .013$) with small effect sizes ($\eta^2 = .02$ and.01 respectively). Investigations of the descriptive statistics indicate university teachers ($M = 4.21$, $SD = 1.06$) felt better Promoting Student Learning than non-university teachers ($M = 4.05$, $SD = 1.08$). Non-university teachers ($M = 4.99$, $SD =$

.78) tended to feel slightly better than university teachers (M = 4.90, SD = .78) on Personal Teaching Efficacy although both groups rated themselves high on this factor. Statistically significant differences existed on mentoring experience with moderate effect sizes ($F(2, 1191) = 1615.07$, $p < .001$, $\eta^2 = .22$) with university teachers having better school district and program mentoring experiences. Statistically significant differences existed between non-university and university teachers on Overall Preparedness with a small effect size ($F(1, 1192) = 8.99$, $p < .003$, $\eta^2 = .01$)

Differences Between ATC, PB, and TTC Teachers. The assumption of homogeneity of covariance matrices was met when comparing ATC (n = 577), PB (n = 183), and TTC (n = 415) teachers on perceptions of preparedness (p = .001) and self-efficacy (p = .090) but not on mentoring experience ($p < .0001$). MANOVA results suggested statistically significant differences existed between ATC, PB, and TTC teachers on perceptions of preparedness ($F(8, 2378) = 3.02$, p = .002) with a small effect size (η^2 = .02). Statistically significant differences did not exist on self-efficacy ($F(4, 2354) = 2.34$, p = .053) with an effect size close to zero (η^2 = .09).

Descriptive discriminant analysis (DDA) was used to identify items that distinguish groups from each other. Standardized function coefficients, structure coefficients, and canonical correlations were reported for Function I. Standardized function coefficients are analogous to regression beta weights, and canonical correlation coefficients are analogous to eta-squared. (Heath, Cook, Kyrillidou, & Thompson, 2002; Huberty, 1994; Klecka, 1980). One DDA function best described group differences and accounted for approximately 84%of the explained variance. The canonical correlation

was.333 and was statistically significant at $\alpha = .0001$. Results presented in Table 25 suggest that ATC, PB, and TTC teachers differ on variables linked to Promote Student Learning, albeit the differences were small. The largest differences were associated with using instructional strategies that promote student learning, planning instruction, developing curriculum, and communicating effectively. Differences on using instructional strategies and promoting student learning are illustrated in Figure 19.

The homogeneity of variance assumption was met on Overall Preparedness. Statistically significant differences existed between ATC, PB, and TTC teachers on Overall Preparedness ($F(2, 1192) = 6.77$, $p = .001$) with a small effect size ($\eta^2 = .01$). The homogeneity of variance test was violated for mentoring experience on ATC, PB, and TTC certification graduates and the larger variance was not with the larger group. Therefore, the Welch-James statistic was reported. Statistically significant differences existed on school district mentoring experience (Welch-James $(2, 455.66) = 35.42$, $p < .001$) with moderate effect sizes ($\eta^2 = .06$, $p < .001$) and mentoring experience (Welch-James $(2, 478.46) = 195.04$, $p < .001$) with moderate effect sizes ($\eta^2 = .23$, $p < .001$) and are illustrated in Figure 20.

Table 25

Descriptive Discriminant Analysis Coefficients for Predicting Perceptions of Preparedness of (N = 1195) for Novice ATC, TTC, and PB Teachers (Reprinted with permission from "Variation in teacher preparation: How well do different pathways prepare teachers to teach?" by Darling-Hammond, L., Chung, R., & Frelow, F., 2002. *Journal of Teacher Education, 53*, 286-302. Copyright 2002 by *Journal of Teacher Education.*)

	Function I	
Variables	Func.	r_s
P1 Teach subject matter concepts in ways that enable students to learn.	-.058	-.223
P2 Understand how different students in your classroom are learning.	-.060	-.199
P3 Set challenging and appropriate expectations.	.245	-.109
P4 Help all students achieve high academic standards.	.088	-.120
P5 Develop curriculum that builds on students' experiences.	-.238	***-.253***
P6 Evaluate curriculum materials.	.394	-.100
P7 Create discipline-based and interdisciplinary curriculum.	-.248	-.232
P8 Identify and obtain materials to create a multicultural curriculum.	.037	-.109
P9 Use instructional strategies that promote active student learning.	-.073	***-.278***
P10 Choose teaching strategies to meet different student needs.	-.367	-.226
P11 Plan instruction by using knowledge of learning subject matter, curriculum, and student development.	-.522	***-.301***
P12 Use a variety of assessments to determine the strengths, needs, and programs.	.026	-.217
P13 Help students learn how to assess their own learning.	-.420	-.223
U1 Understand how students' development influences learning.	-.353	-.228
U2 Understand how students' cultural backgrounds influence learning.	.540	.118
U3 Identify and address special learning needs and/or difficulties.	.234	-.036
U4 Understand how students' environment influences learning.	-.335	-.111
U5 Work with parents and families to understand students.	.303	.046
C1 Help students become self-motivated and self-directed.	.568	.013
C2 Develop an environment that promotes social development.	-.182	-.169
C3 Develop students' questioning and discussion skills.	.049	-.125
C4 Engage students in cooperative group work and independent learning.	-.119	-.228
C5 Use effective communication strategies.	-.273	*-.270*
C6 Use questions to stimulate different kinds of student Learning.	.035	-.206
C7 Help students learn to think critically and solve problems.	-.442	-.247
C8 Encourage students to understand ideas from diverse perspectives.	.543	.015
I1 Resolve interpersonal conflict in the classroom.	.173	.025
I2 Maintain an orderly and purposeful learning environment.	-.117	-.102
I3 Plan and solve problems with colleagues.	.347	.122
I4 Assume leadership responsibilities in your school.	.050	.044
T1 Increase student interest and learning.	-.473	-.098
T2 Support students' research and analysis.	.418	.098
T3 Assess and track student achievement.	.271	.043
T4 Communicate with others.	-.101	.031
T5 Enhance group collaboration and teamwork.	.107	.032

Note. Structure coefficients greater than or equal to.250 are italicized.

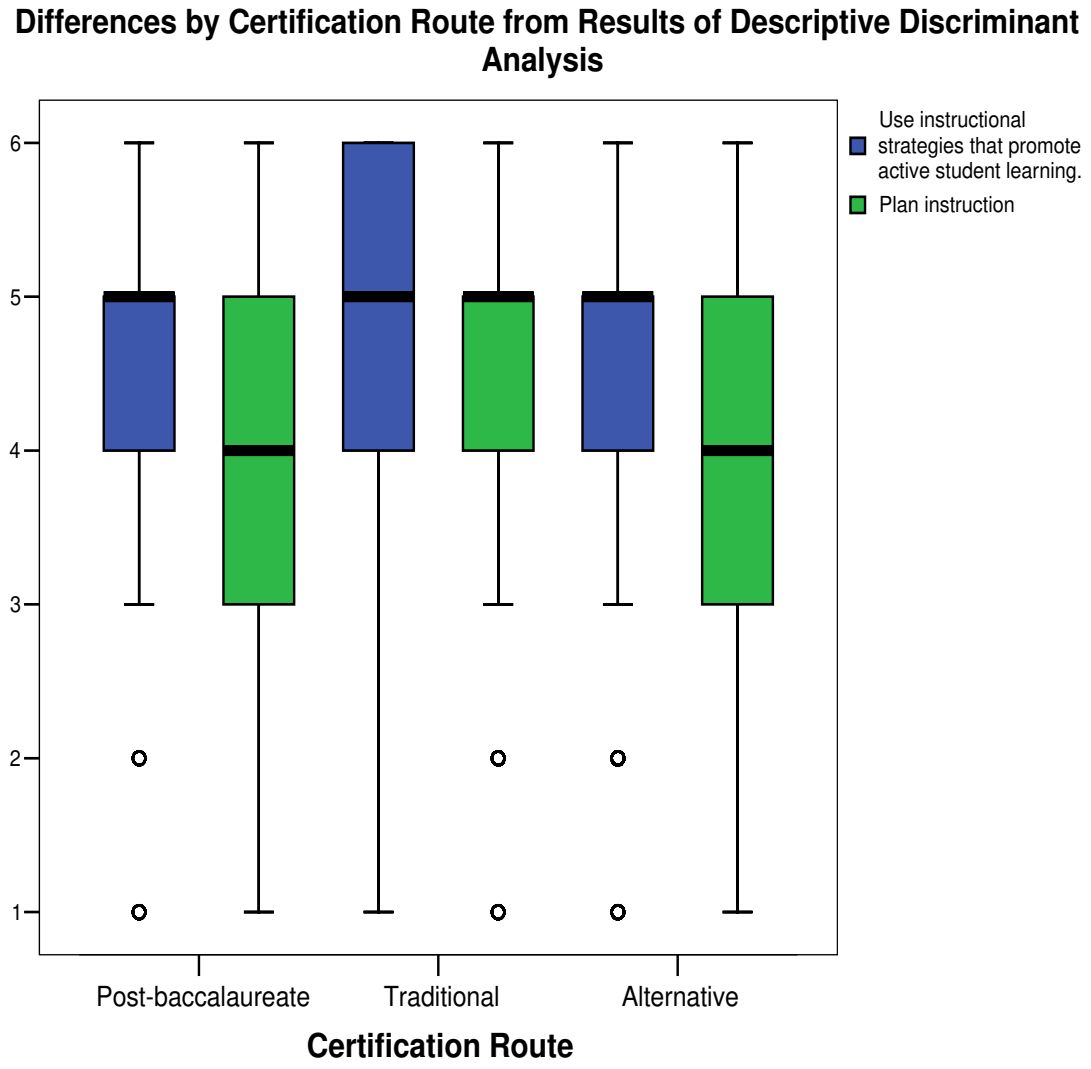

Figure 19. Boxplot Comparisons by Certification Route on Variables Resulting from the Descriptive Discriminant Analysis.

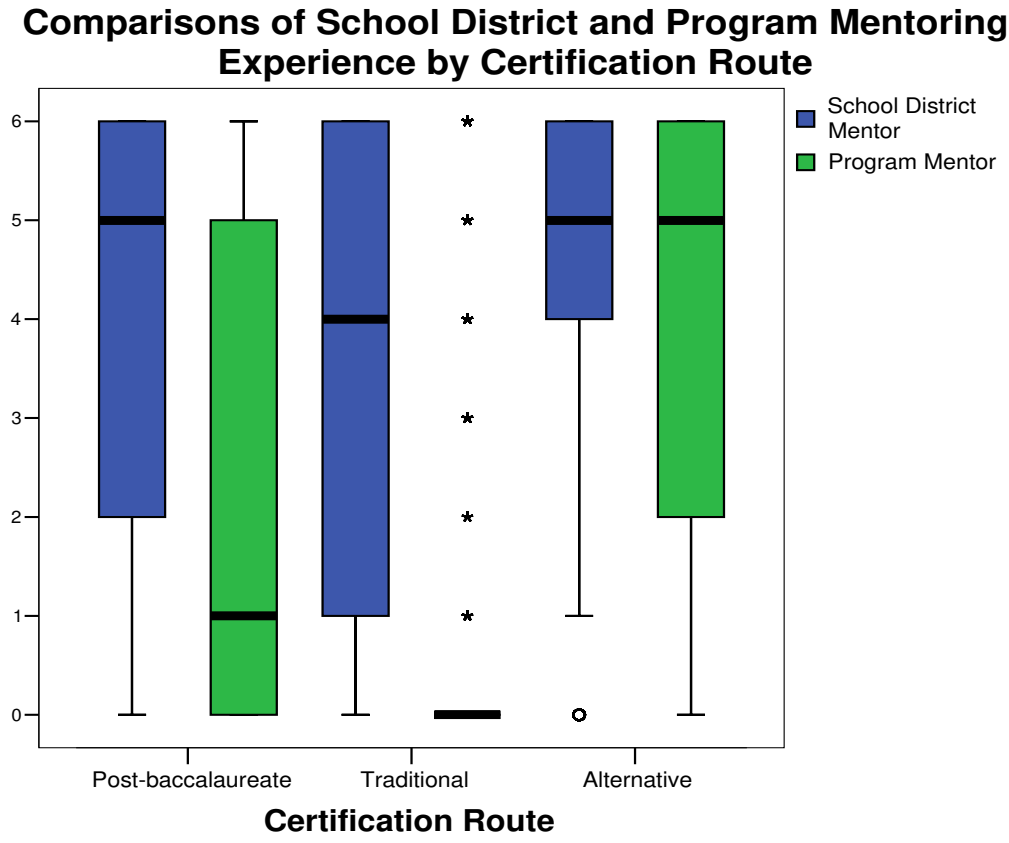

Figure 20. Boxplot Comparisons of Program and School District Mentoring Experience Between ATC, TTC, and PB Teachers.

Differences by Where Certification was Obtained. Next, differences were examined by where the certification was obtained as defined by university, school district, community college, region center, and for-profit organization. In general, precaution should be taken on information regarding school district certified teachers from this sample because only three school districts are represented and the sample of these teachers is small (n = 7). Caution is also warranted on for-profit certified teachers

from this sample since 95 % of the for-profit teachers (n = 211) were from the same program.

When comparing teachers according to where they obtained their teaching certificate, the assumption of homogeneity of covariance matrices was not met on mentoring experience ($p < .0001$) but was met when comparing perceptions of preparedness ($p = .001$) and self-efficacy ($p = .191$).

Mentoring. ANOVAs were conducted to test differences on mentoring experience. The homogeneity of variances was met for program mentoring experience ($p = .291$) but not for school district mentoring ($p < .001$). Statistically significant differences existed on program mentoring experience by where teachers obtained their certificate ($F(4, 1189) = 88.11$, $p < .001$) with a moderate effect size ($\eta^2 = .23$). The Welch-James statistic (4,44.75) = 85.33 suggested statistically significant differences existed on school district mentoring experience by where teachers obtained their certificate with a small effect size ($\eta^2 = .06$) (see Figure 21). Post hoc tests indicated that teachers certified through universities had statistically significantly different experiences in both school district and program mentoring experiences than community college, region center, and for-profit teachers. Community college, regional service centers, and school district certified teachers did not have a statistically significant different school district mentoring experiences.

Perceptions of Preparedness. An ANOVA was conducted to determine differences on the variable Overall Preparedness between teachers by where they obtained their teaching certificate. The homogeneity of variances was met ($p = .404$).

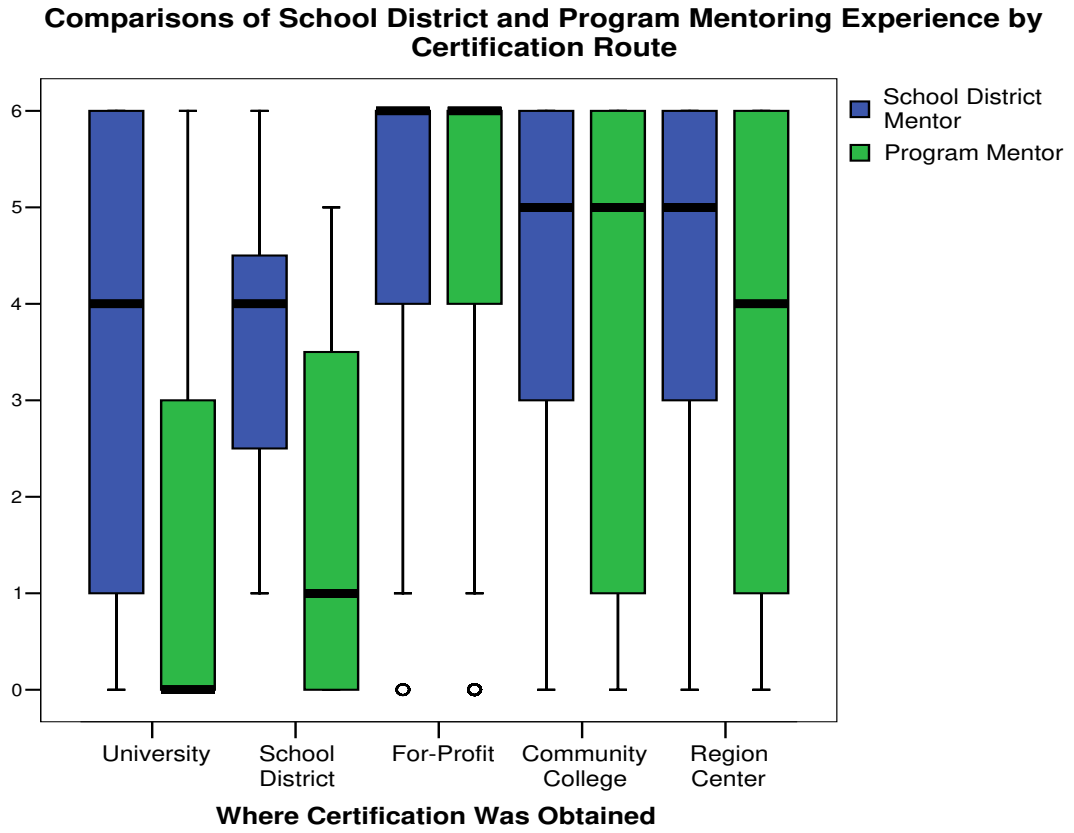

Figure 21. Boxplot Comparisons of Program and School District Mentoring Experience by Where Certification Was Obtained.

Statistically significant differences existed on Overall Preparedness by where teachers obtained their certificate ($F(4, 1189) = 5.23$, $p < .001$) with small effect sizes ($\eta^2 = .02$). MANOVA results indicated statistically significant differences existed between teachers certified from different educational entities on perceptions of preparedness ($F(16,3623.93) = 3.06$, $p < .001$) and self-efficacy ($F(8, 2348) = 5.31$, $p < .001$) with small effect sizes ($\eta^2 = .04$ and.04 respectively). Three DDA functions best described group differences on perceptions of preparedness and accounted for approximately 89%

of the explained variance. Canonical correlations for the three functions were.329, .286, and.204 and were statistically significant for Functions I and II at $\alpha < .001$ and at $\alpha < .05$ for Function III. Descriptive discriminant analysis results presented in Table 26 suggest differences exist on Promote Student Learning variables related to developing, creating, and planning curriculum and instruction and Understanding Learners on encouraging students to understand ideas from diverse perspectives. Descriptive statistics are presented in Table 27. Boxplot comparisons in Figure 22 illustrate variances on variables P5 and P11 between teachers from different certification program types.

Table 26

Descriptive Discriminant Analysis Coefficients for Predicting Perceptions of Preparedness of (N = 1194) Novice Teachers by Where Certificate was Obtained

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	Function					
	I		II		III	
Variables	Func.	r_s	Func.	r_s	Func.	r_s
P1 Teach subject matter concepts in ways that enable students to learn.	.038	-.056	-.126	***-.247***	-.003	.090
P2 Understand how different students in your classroom are learning.	-.358	-.187	.219	-.086	.248	.195
P3 Set challenging and appropriate expectations.	.281	.016	.037	-.157	.096	.094
P4 Help all students achieve high academic standards.	.052	.047	.045	-.205	-.085	-.027

Table 26 *(continued).*

	Function					
	I		II		III	
Variables	Func.	r_s	Func.	r_s	Func.	r_s
P5 Develop curriculum that builds on students' experiences.	.039	.000	-.397	***-.343***	-.002	.068
P6 Evaluate curriculum materials.	.084	.008	.475	-.125	.263	.119
P7 Create discipline-based and interdisciplinary curriculum.	-.001	-.013	-.347	***-.302***	-.577	-.224
P8 Identify and obtain materials to create a multicultural curriculum.	.065	.045	-.109	-.192	-.140	-.054
C1 Help students become self-motivated and self-directed.	.781	.234	.116	-.164	-.101	-.092
P9 Use instructional strategies that promote active student learning.	.040	-.109	.018	-.203	.029	.038
P10 Choose teaching strategies to meet different student needs.	-.469	-.199	.011	-.053	.089	.016
P11 Plan instruction	-.220	-.037	-.633	***-.370***	.428	.257
P12 Use a variety of assessments.	.015	-.082	.004	-.187	.125	.161
P13 Help students learn how to assess their own learning.	-.208	-.030	-.354	***-.250***	.032	.136
U1 Understand how students' development influences learning.	-.465	-.196	.060	-.065	.156	.153
U2 Understand how students' cultural backgrounds influence learning.	.595	.166	.000	.011	-.109	.098
U3 Identify and address special learning needs and/or difficulties.	-.146	-.126	.478	.132	-.182	.018
U4 Understand how students' environments influence learning.	-.065	.026	-.302	-.108	.526	***.288***
U5 Work with parents and families to understand students.	.026	.040	.544	.118	.047	.129
C1 Help students become self-motivated and self-directed.	.781	.234	.116	-.164	-.101	-.092
C2 Develop an environment that promotes social development.	-.435	-.059	.169	-.159	-.370	-.206
C3 Develop students' questioning and discussion skills.	.188	.033	-.213	-.190	.443	.017
C4 Engage students in cooperative work.	.057	-.031	-.074	-.212	-.568	-.161
C5 Use effective communication strategies.	-.184	-.130	-.301	-.236	.080	.043
C6 Use questions to stimulate different kinds of student Learning.	-.154	-.105	.315	-.121	-.257	.024
C7 Help students learn to think critically and solve problems.	-.496	-.080	-.150	-.225	-.039	.019

Table 26 *(continued).*

	Function					
	I		II		III	
Variables	Func.	r_s	Func.	r_s	Func.	r_s
C8 Encourage students to understand ideas from diverse perspectives.	.761	***.252***	.029	-.199	.184	.130
I1 Resolve interpersonal conflict in the classroom.	.205	.093	-.126	-.105	-.167	.168
I2 Maintain an orderly and purposeful learning environment.	-.310	-.049	.022	-.123	-.241	-.070
I3 Plan and solve problems with colleagues.	.190	.124	.434	.148	-.358	-.139
I4 Assume leadership responsibilities in your school.	.146	.175	-.094	-.076	.226	.123
T1 Increase student interest and learning.	.012	.053	-.574	-.138	-.384	.002
T2 Support students' research and analysis.	-.017	.049	.526	.109	-.251	.033
T3 Assess and track student achievement.	.161	.060	.079	-.002	.436	.245
T4 Communicate with others.	-.313	-.055	.211	.171	.196	.215
T5 Enhance group collaboration and teamwork.	.187	.106	.049	.015	.314	.167

Note. Structure coefficients linked to Functions I, II, or III with a magnitude greater than or equal to.247 are italicized.

Table 27

Descriptive Statistics on Perceptions of Preparedness, Self-efficacy, and Overall Preparedness by Where Certificate Was Obtained (Reprinted with permission from "Variation in teacher preparation: How well do different pathways prepare teachers to teach?" by Darling-Hammond, L., Chung, R., & Frelow, F., 2002. *Journal of Teacher Education, 53*, 286-302. Copyright 2002 by *Journal of Teacher Education.*)

					95% Confidence Interval for Mean	
Factors		*N*	Mean	*SD*	Lower Bound	Upper Bound
Promote Student Learning	University	597	4.21	1.08	4.12	4.29
	School District	7	3.36	.75	2.67	4.06
	For Profit Provider	223	4.12	1.07	3.98	4.26
	Community College	97	4.17	1.04	3.96	4.38
	Region Center	270	3.97	1.07	3.84	4.10
	Total	1194	4.13	1.07	4.07	4.19
Critical Thinking	University	597	4.41	1.02	4.32	4.49
	School District	7	3.36	.91	2.52	4.20
	For Profit Provider	223	4.44	1.00	4.31	4.57
	Community College	97	4.41	.98	4.22	4.61
	Region Center	270	4.28	1.03	4.15	4.40
	Total	1194	4.38	1.02	4.32	4.44
Understand Learners	University	597	4.36	1.07	4.27	4.45
	School District	7	3.80	1.03	2.85	4.75
	For Profit Provider	223	4.31	1.08	4.17	4.46
	Community College	97	4.54	1.01	4.34	4.75
	Region Center	270	4.33	1.13	4.20	4.47
	Total	1194	4.36	1.08	4.30	4.42
Technology	University	597	4.52	1.19	4.42	4.61
	School District	7	3.83	1.39	2.54	5.12
	For Profit Provider	223	4.55	1.09	4.41	4.69
	Community College	97	4.77	1.12	4.54	4.99
	Region Center	270	4.51	1.20	4.36	4.65
	Total	1194	4.54	1.17	4.47	4.60
Teaching Efficacy	University	595	2.97	.87	2.90	3.04
	School District	7	4.11	1.21	2.98	5.23
	For Profit Provider	213	3.11	.92	2.99	3.23
	Community College	97	3.22	.90	3.04	3.41
	Region Center	270	2.92	.88	2.81	3.02
	Total	1182	3.01	.89	2.96	3.06

Table 27 (*continued*).

Factors			Mean	*SD*	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Personal Teaching Efficacy	University	595	4.90	.82	4.83	4.97
	School District	7	4.17	.96	3.29	5.05
	For Profit Provider	220	5.09	.73	4.99	5.19
	Community College	97	4.99	.86	4.82	5.16
	Region Center	270	4.93	.76	4.83	5.02
	Total	1189	4.94	.80	4.90	4.99
Overall	University	597	4.09	1.27	3.99	4.19
	School District	7	2.43	1.27	1.25	3.61
	For Profit Provider	223	3.76	1.38	3.58	3.94
	Community College	97	3.95	1.34	3.68	4.22
	Region Center	270	3.96	1.27	3.81	4.11
	Total	1194	3.98	1.31	3.90	4.05

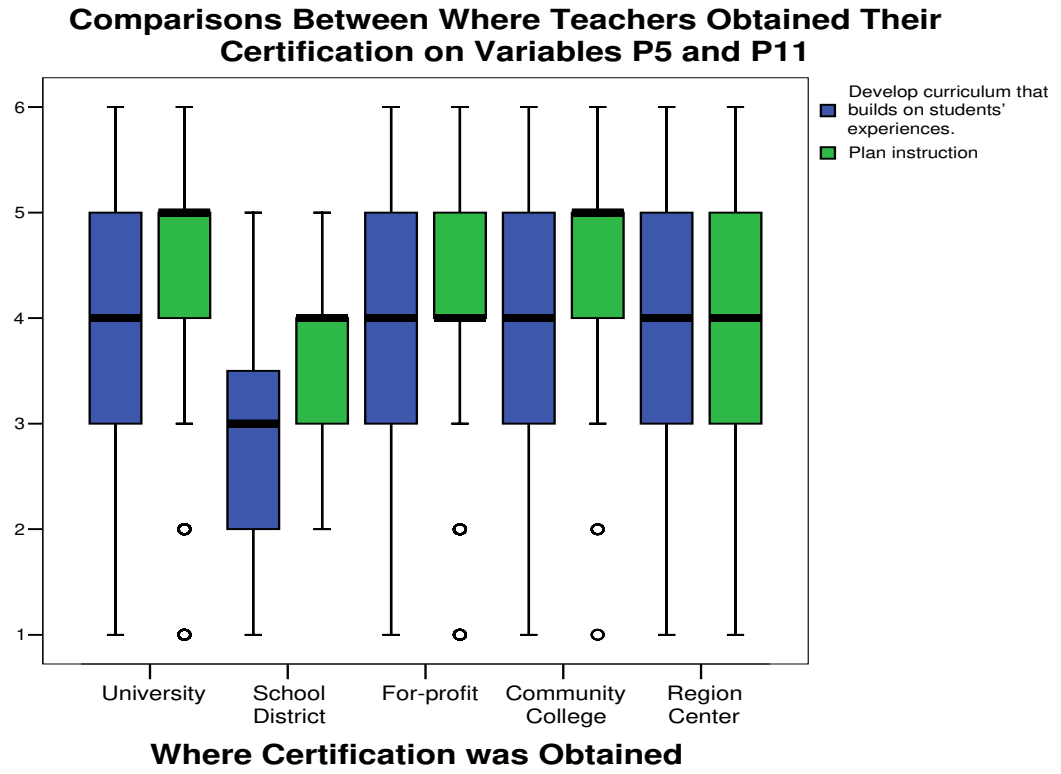

Figure 22. Boxplot Comparisons of Teachers by Where They Obtained Their Certification on Developing Curriculum (P5) and Planning Instruction (P11).

Differences Between TTC Teachers and Teachers Certified Through Regional Service Centers, Community Colleges, Post-baccalaureate and For-Profit Entities. Because of the small number of teachers certified by a school district (n = 7), further analysis was conducted with these teachers eliminated. To further differentiate teachers by program type, university certified teachers were segregated into traditional and post-baccalaureate teachers. The assumption of homogeneity of covariance matrices was violated for perceptions of preparedness, self-efficacy, and mentoring experience. The homogeneity of variances was met on perceptions of preparedness and self-efficacy but violated for mentoring experiences. Therefore, ANOVAs were conducted to determine differences between certification routes as shown in Table 28.

Table 28

Analysis of Variance Results on Teacher's Perceptions by Traditional and Non-Traditional Program Types

Perceptions	df_B	df_W	F	p	η^2
Promote	4	1183	3.06	.016	.01
Critical Thinking	4	1183	1.42	.224	< .01
Understand Learners	4	1183	1.19	.316	< .01
Technology	4	1183	1.07	.369	< .01
Teaching Efficacy	4	1171	3.28	.011	.01
Personal Teaching Efficacy	4	1178	2.43	.046	.01
Overall	4	1183	3.90	.004	.01
School District Mentor	4	1183	21.39	4.75×10^{-17}	.07
Program Mentor	4	1183	99.06	9.15×10^{-73}	.25

Table 29 contains the descriptive statistics by certification route. Statistically significant differences existed on Promote Student Learning, Personal Teaching Efficacy, Teaching Efficacy, and Overall Preparedness to Teach. Post-hoc tests indicated statistically significant differences in Overall Preparedness existed between teachers certified through for-profit agencies and TTC teachers. Statistically significant differences existed between TTC teachers and teachers certified through regional service centers on Promote Student Learning. Statistically significant differences existed between teachers certified through regional service centers and teachers certified through community colleges on Teaching Efficacy as illustrated in Figure 23 and between post-baccalaureate teachers, for-profit, and community college teachers on school district mentoring experience. On school district mentoring experience, TTC teachers showed statistically significant differences from all certification programs except PB teachers. Traditional and post-baccalaureate teachers differed from all alternative certification routes on program mentoring experience as illustrated in Figure 24.

Table 29

Descriptive Statistics on Perceptions of Preparedness, Self-Efficacy, and Overall Preparedness by Traditional and Non-Traditional Program Types

					95% Confidence Interval for Mean	
Factors		*N*	Mean	*SD*	Lower Bound	Upper Bound
Promote Student Learning	For Profit Provider	223	4.12	1.07	3.98	4.26
	Community College	97	4.17	1.04	3.96	4.38
	Region Center	270	3.97	1.07	3.84	4.10
	Traditional	415	4.26	1.03	4.16	4.36
	Post-baccalaureate	183	4.09	1.17	3.92	4.26
	Total	1188	4.13	1.07	4.07	4.20
Critical Thinking	For Profit Provider	223	4.44	1.00	4.31	4.57
	Community College	97	4.41	.98	4.22	4.61
	Region Center	270	4.28	1.03	4.15	4.40
	Traditional	415	4.44	.97	4.35	4.53
	Post-baccalaureate	183	4.33	1.11	4.17	4.49
	Total	1188	4.38	1.01	4.33	4.44
Understand Learners	For Profit Provider	223	4.31	1.08	4.17	4.46
	Community College	97	4.54	1.01	4.34	4.75
	Region Center	270	4.33	1.13	4.20	4.47
	Traditional	415	4.40	1.05	4.29	4.50
	Post-baccalaureate	183	4.28	1.13	4.12	4.45
	Total	1188	4.36	1.08	4.30	4.42
Technology	For Profit Provider	223	4.55	1.09	4.41	4.69
	Community College	97	4.77	1.12	4.54	4.99
	Region Center	270	4.51	1.20	4.36	4.65
	Traditional	415	4.53	1.18	4.42	4.65
	Post-baccalaureate	183	4.49	1.20	4.31	4.66
	Total	1188	4.54	1.17	4.48	4.61
Teaching Efficacy (negatively worded item)	For Profit Provider	213	3.11	.92	2.99	3.23
	Community College	97	3.22	.90	3.04	3.41
	Region Center	270	2.92	.88	2.81	3.02
	Traditional	414	2.98	.86	2.90	3.07
	Post-baccalaureate	182	2.93	.91	2.79	3.06
	Total	1176	3.00	.89	2.95	3.05
Personal Teaching Efficacy (PTE)	For Profit Provider	220	5.09	.73	4.99	5.19
	Community College	97	4.99	.86	4.82	5.16
	Region Center	270	4.93	.76	4.83	5.02
	Traditional	414	4.89	.83	4.81	4.97
	Region Center	182	4.92	.80	4.80	5.04

Table 29 (*continued*).

Factors		*N*	Mean	*SD*	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Personal Teaching Efficacy (PTE) Overall	Total	1183	4.95	.80	4.90	4.99
	For Profit Provider	223	3.76	1.38	3.58	3.94
	Community College	97	3.95	1.34	3.68	4.22
	Region Center	270	3.96	1.27	3.81	4.11
	Traditional	415	4.17	1.24	4.05	4.29
	Post-baccalaureate	183	3.92	1.33	3.73	4.12
	Total	1188	3.99	1.30	3.91	4.06

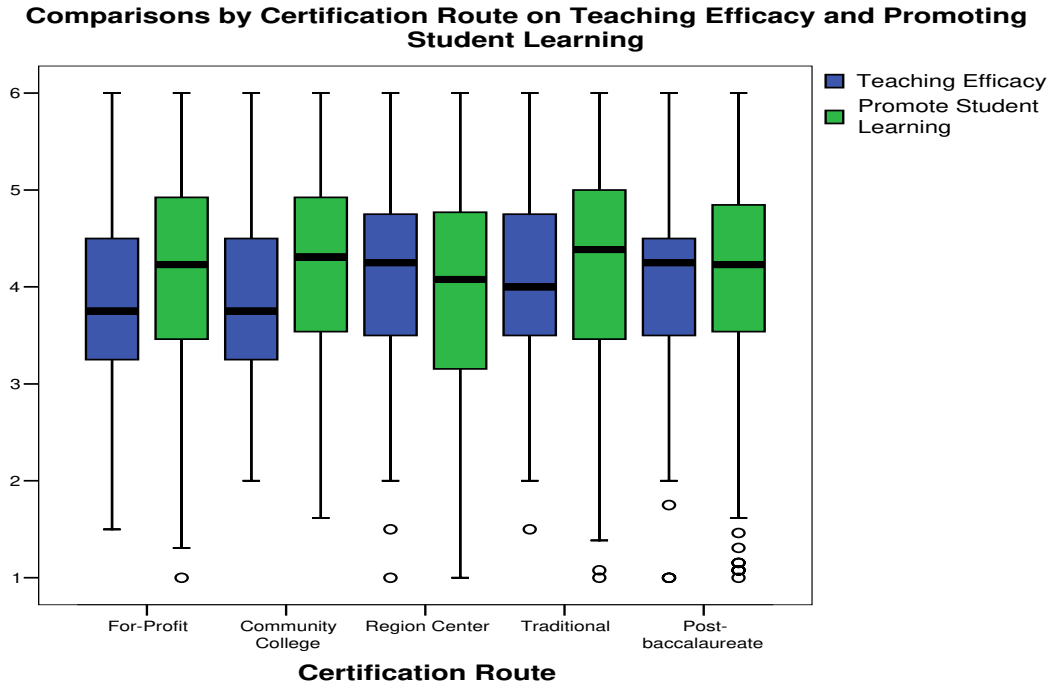

Figure 23. Boxplot Comparisons by Certification Route on Teaching Efficacy and Promoting Student Learning.

Note. For this plot, Teaching Efficacy was converted to a positively worded item.

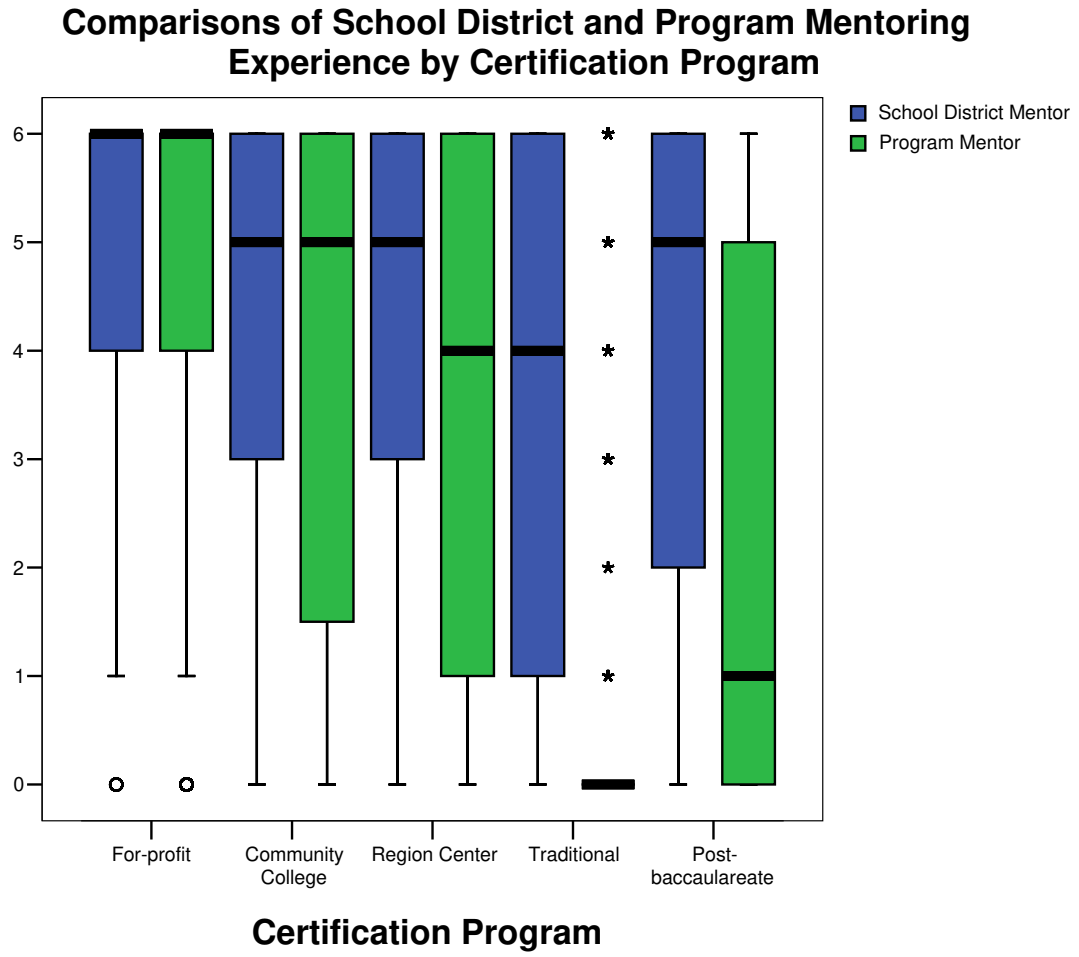

Figure 24. Boxplot Comparisons by Certification Route on Mentoring Experience.

Research Question II

Are alternative teacher certification (ATC) programs (a) diversifying the teacher population or (b) producing teachers with exceptional content knowledge?

Diversification by Age, Ethnicity, and Gender. Comparisons between ATC and TTC teachers were made on age. In this sample, the mean age of ATC teachers ($M = 34$, $SD = 9.82$) was higher than the mean age of TTC teachers ($M = 28$, $SD = 7.043$). The

median age of ATC teachers was 31 and the median age for TTC teachers was 25. The age range for ATC teachers was from 21 to 66 and the range for TTC teachers from 21 to 63.In this sample 5% of both the TTC and ATC teachers were African American, 37% of the ATC teachers were Hispanic, and 13% of the TTC teachers were Hispanic. The larger percentage of Hispanic teachers in this sample may be explained by the demographics of one area of the state that consisted of a large percent of Hispanics in the area. Regardless of route, plans to remain in teaching were virtually the same for ATC or TTC African American teachers and Hispanic teachers. Regardless of their certification route, the majority of African American teachers planned to stay in teaching for as long as possible or until eligible for retirement (89% for ATC and 91% for TTC). Hispanic teachers were relatively the same across ATC and TTC programs (69% and 71%, respectively) but indicated they did not plan to stay in teaching as long as the African American or White teachers. In this sample a larger percentage of males came from ATC programs. Of the 194 males that came from ATC programs, 77% indicated they would stay in teaching for as long as possible or until they were eligible for retirement compared to 54% of the TTC male teachers.

Differences Between Certification Route and Highest Degree. Highest degree obtained and undergraduate major were used as proxies for exceptional content knowledge. Choices for highest degree included bachelors, masters, doctorate, or other. Eight teachers (6 ATC and 2 TTC) marked other as their choice for highest degree. These eight responses were removed making highest degree an ordinally scaled item. To determine if ATC programs were diversifying the teacher population by producing

teachers with exceptional content knowledge, the Mann-Whitney test was conducted to determine if differences existed between ATC and TTC teachers on highest degree obtained.

For the 1187 teachers in the analysis, there were statistically significant differences between ATC (n = 774) and TTC (n = 413) teachers on highest degree obtained (Mann-Whitney U (1) = 142464.50, $p < .001$). For ATC teachers, 84% showed highest degree as a bachelor's degree, compared to 95 % for TTC teachers. No TTC teachers held a Ph.D compared to 2% (12) of the ATC teachers.

Differences Between Certification Route and Undergraduate Major. Crosstabs were conducted to determine if differences existed between certification route and major. Choices for degree included mathematics, language arts/social studies, science, or other. Because the majority of elementary level teachers (72%) marked their degree as other, teachers certified to teach only elementary levels were removed from the analysis and differences were tested for teachers certified to teach fourth through twelfth grade. Of the 513 teachers included in the analysis, there were statistically significant differences between ATC (n = 397) and TTC (n = 116) middle school and high school teachers by undergraduate major ($\chi^2(3, N = 513) = 32.85$, w = .253, $p < .001$) (see Figure 25). In this sample, mathematics majors were more likely to enter through traditional routes. The percentage of ATC teachers who were science majors was slightly higher than the percentage of TTC teachers who were science majors.

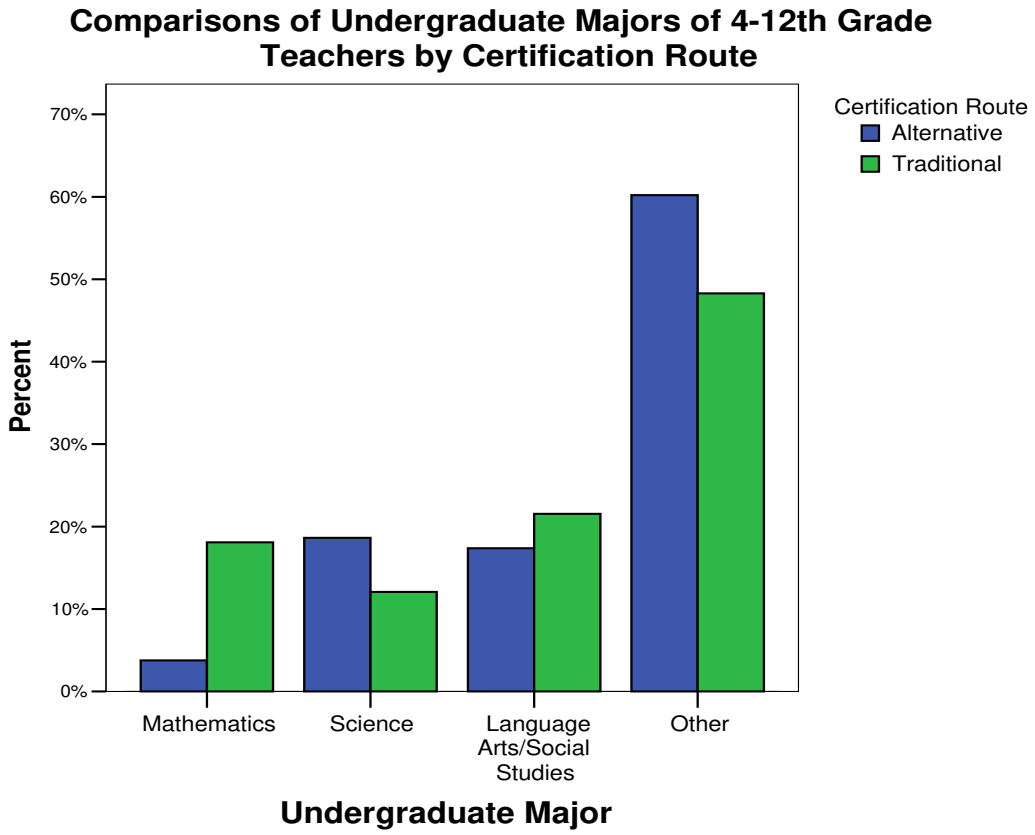

Figure 25. Comparisons of Undergraduate Majors of 4 – 12th Grade Teachers by Certification Route.

Research Question III

Do perceptions of preparedness and self-efficacy depend on classroom preparation, mentoring experience, prior classroom experience, or entrance and exit qualifications?

Research Results on Question III for All Teachers. A canonical correlation analysis was conducted to determine if perceptions of preparedness and self-efficacy

depended on components of the certification route (i.e., classroom preparation and entrance and exit requirements) or prior classroom experience. Canonical correlation analysis (CCA) is a method to investigate relationships when the independent and dependent sets each contain more than two variables. Variable deletion methods can be conducted using CCA results to develop a more parsimonious solution (Capraro & Capraro, 2001). According to Si (2001), "the simpler the explanation, the higher the probability of replicating the result and the more likely the explanation to be true" (p. 14). First, because of the large number of independent variables (n = 22) entered in the model, CCA was utilized to create a more parsimonious solution. Utilizing the weighted communalities, the following variables were eliminated from the model: other classroom experience, other program exit requirements, and online delivery of the course. When these variables were eliminated from the model, a change in the squared canonical correlation coefficient (R_c^2) was minimal (i.e., .150 to.143). Three functions were statistically significant at the.05 level with R_c^2 equal to.143, .056, and.037, respectively, with 1177 teachers in the analysis.

Six canonical functions were reported in the output. The first *F* statistic test reported is evaluating all six canonical correlations as a set. A pitfall in interpreting canonical results is to believe that each statistical test performed in a CCA produces a test statistic for the effect size of a single function. On the contrary, only the last test statistic is associated with a single function and only the first statistic tests the association of all canonical correlations (Thompson, 1991; 2000b). The first test then is a test that "all the R_c^2's are equal to zero" (Pedhazur, 1997, p. 940). Interpreting of

statistics should only be interpreted for R_c^2's that are found to be statistically significant. Also reported are canonical adequacy and redundancy coefficients. According to Thompson (2000b), "canonical adequacy coefficient indicates how adequately a given function, on average, reproduces the variance of a given set of measured variables" (p. 296). For the use of conventional CCA, redundancy coefficients are not interpreted.

The canonical analysis of the relationship between perceptions of preparedness and self-efficacy yielded a noteworthy canonical correlation for Function I of $R_c = .378$ (Wilks' lambda = .74, $F(114, 6627.86) = 3.15$, $p < .001$). Table 30 displays the canonical correlation coefficients, structure coefficients, squared structure coefficients, variate adequacy coefficients, weighted communality coefficients, and redundancy coefficients for the two statistically significant functions (Thompson, 1984). The squared canonical correlation coefficient indicates that 14.3% of the variance is linearly shared by the variable sets. The function coefficients and structure coefficients indicate that no prior classroom experience and the five components of the program contributed most to Function I: (a) curriculum design, (b) lessons, (c) evaluations and assessments, (d) TEKS, and (e) multi-diversity.

The canonical analysis of the relationship between perceptions of preparedness and self-efficacy yielded a noteworthy canonical correlation for Functions II of $R_c = .237$ (Wilks' lambda = .86, $F(90, 5588.33) = 1.93$, $p < .001$) and for Function III of $R_c = .192$ (Wilks' lambda = .91, $F(68, 4523.90) = 1.56$, $p = .002$). Presented in Table 30, the squared canonical correlation coefficient indicates that 5.6% of the variance is linearly shared by both variable sets on Function II and 3.7% is shared on Function III.

Table 30

Canonical Correlation Results for Question III on All Teachers

	Function I			Function II			Function III			Wt h^2
Variables	Funct.	r_s	r_s^2	Funct.	r_s	r_s^2	Funct.	r_s	r_s^2	
Promote Learning	-.796	-.983	96.63%	1.353	.063	0.40%	-.620	-.046	.21%	13.85%
Critical Thinking	.222	-.898	80.64%	.000	-.174	3.03%	1.588	.294	8.64%	12.02%
Understand Learners	.027	-.793	62.88%	-1.136	-.456	20.79%	-1.028	-.241	5.81%	10.37%
Technology	-.022	-.617	38.07%	-.284	-.312	9.73%	-.285	.029	.08%	5.99%
Personal Teaching Efficacy	.074	-.400	16.00%	-.439	-.520	27.04%	.569	.466	21.72%	4.61%
Teaching Efficacy	-.150	-.363	13.18%	-.216	-.368	13.54%	-.146	-.008	.01%	2.64%
Adequacy			51.23%			12.42%			6.08%	
Rd			7.33%			.69%			.22%	
Rc^2			14.30%			5.60%			3.70%	
Rd			2.01%			.377%			.19%	
Adequacy			14.08%			6.74%			5.19%	
School District	-.287	-.329	10.82%	.115	-.104	1.08%	.222	.314	9.86%	2.00%
Program	.007	-.052	0.27%	-.301	-.498	24.80%	.195	.297	8.82%	1.80%
No Prior Experience	.318	.451	20.34%	-.310	-.278	7.73%	-.127	.054	.29%	3.40%
Substitute	-.056	-.313	9.80%	-.172	-.087	0.76%	.295	.292	8.53%	1.80%
Teacher's Aid	-.163	-.289	8.35%	-.336	-.334	11.16%	-.107	-.086	.74%	1.80%
Student Teaching	-.198	-.237	5.62%	.218	.451	20.34%	.287	-.125	1.56%	2.00%
Field-based Experience	-.076	-.336	11.29%	-.063	.206	4.24%	-.687	-.584	34.11%	3.10%
Instruction Methods	.012	-.377	14.21%	.421	.189	3.57%	-.061	-.062	.38%	2.20%
Management	.064	-.316	9.99%	-.263	-.205	4.20%	.273	.182	3.31%	1.80%
Curriculum Design	-.274	-.579	33.52%	.297	.118	1.39%	.137	.084	.71%	4.90%
Multi-diversity	-.102	-.465	21.62%	-.235	-.256	6.55%	-.399	-.343	11.76%	3.90%
Evaluations	-.152	-0.54	29.16%	-.150	-.113	1.28%	-.161	-.129	1.66%	4.30%
Lessons	-.217	-.573	32.83%	.139	.036	.13%	.009	-.059	.35%	4.70%
Observations	-.034	-.410	16.81%	.074	-.003	.00%	.198	.109	1.19%	2.40%
PDAS	-.247	-.408	16.65%	.051	-.191	3.65%	.340	.327	10.69%	3.00%
TEKS	-.140	-.513	26.32%	-.359	-.377	14.21%	-.290	-.151	2.28%	4.60%
GPA	-.129	-.228	5.20%	.112	.081	.66%	-.088	-.138	1.90%	0.90%
GRE	-.103	-.208	4.33%	-.325	-.208	4.33%	.170	.052	0.27%	0.90%
Interview	-.01	-.014	0.02%	-.262	-.423	17.89%	-.040	.030	0.09%	1.00%

The function coefficients and structure coefficients indicate the variables that contributed most to Function II were student teaching, program mentoring experience, and interview entrance requirements. The variable that contributed most to Function III was teacher's field-based experience.

Research Results on Question III for ATC Teachers. Dependence of perceptions of preparedness and self-efficacy on program components and mentoring experience were further investigated on the sample of ATC teachers. The model included the items in the previous analysis as well the three additional items asked only of ATC teachers: length of program, completion requirements, and length of program prior to entering the classroom. The canonical multiple R_c^2 was.169.

The canonical analysis of the relationship between perceptions of preparedness and self-efficacy yielded a noteworthy canonical correlation for Function I of $R_c = .411$ (Wilks' lambda = .66, $F(168, 3909.54) = 1.66$, $p < .001$). Table 31 displays the canonical correlation coefficients, structure coefficients, squared structure coefficients, variate adequacy coefficients, weighted communality coefficients, and redundancy coefficients for the one statistically significant function. The squared canonical correlation coefficient indicates that 16.9% of the variance is linearly shared by the sets of variables. The majority of the variance is contributed by ATC teachers having no prior classroom experience, prior substituting experience, and four of the nine instructional components of the program: a) evaluations and assessments, b) lessons, c) Professional Development and Appraisal System (PDAS), and d) Texas Essential Knowledge and Skills (TEKS).

Table 31

Canonical Correlation Results for Research Question III on ATC Teachers

Variables	Function I			Weighted h^2
	Funct.	r_s	r_s^2	
Promote Student Learning	0.514	0.963	92.74%	15.12%
Critical Thinking	0.061	0.831	69.06%	11.26%
Understand Learners	0.415	0.948	89.87%	14.65%
Use Technology	0.100	0.683	46.65%	7.60%
Personal Teaching Efficacy	-0.098	0.456	20.80%	3.39%
Teaching Efficacy	-0.110	-0.331	10.96%	1.79%
Adequacy			55.01%	
Rd			8.97%	
Rc^2			16.9%	
Rd			1.99%	
Adequacy			12.21%	
School District Mentor	0.280	0.335	11.22%	1.83%
Program Mentor	0.051	0.153	2.34%	0.38%
No Prior Experience	-0.264	-0.493	24.30%	3.96%
Substitute	0.145	0.378	14.29%	2.33%
Teacher's Aid	0.063	0.177	3.13%	0.51%
Field-based Experience	0.074	0.262	6.86%	1.12%
Student Teaching	0.126	0.139	1.93%	0.31%
Other Experience	0.155	0.193	3.72%	0.61%
Instruction Methods	0.135	0.367	13.47%	2.20%
Classroom Management	-0.288	0.188	3.53%	0.58%
Curriculum Design	0.035	0.410	16.81%	2.74%
Multi-diversity	0.111	0.400	16.00%	2.61%
Evaluations	0.070	0.439	19.27%	3.14%
Lessons	0.284	0.551	30.36%	4.95%
Observations	0.132	0.378	14.29%	2.33%
PDAS	0.324	0.457	20.88%	3.40%
TEKS	0.004	0.436	19.01%	3.10%
Online	0.049	0.122	1.49%	0.24%
Program Length	-0.157	-0.045	0.20%	0.03%
Length Prior to Classroom	0.038	0.125	1.56%	0.25%
GPA Entrance	0.141	0.236	5.57%	0.91%
GRE Entrance	0.092	0.18	3.24%	0.53%
Other Entrance	0.093	0.189	3.57%	0.58%
Attend Requirements	-0.197	-0.095	0.90%	0.15%
Interview Entrance	0.020	0.112	.20%	1.25%
Exams	0.261	0.320	10.24%	1.67%
Papers	0.027	0.143	2.04%	0.33%

Research Question IV

Does overall preparedness depend on classroom preparation, components of the program, mentoring experience, entrance and exit qualifications, or practice teaching? Does overall preparedness depend on ATC teachers' prior career experience?

Regression Results on Research Question IV for All Teachers. A multiple regression analysis was conducted to assess the degree to which classroom preparation, components of the program, mentoring experience, entrance requirements, and practice teaching predicted a teacher's perception of overall preparedness for all certified teachers regardless of certification route. The multiple *R* for the independent variables and the criterion of Overall Preparedness was.385 (F (21, 1163) = 9.63, $p < .001$). The percent of variance in Overall Preparedness accounted for by the 21 independent variables was 14.8%, with an adjusted *r* square of.130.

The beta weights and structure coefficients are presented in Table 32. According to Thompson (1992), squared structure coefficients "inform the researcher regarding the proportion of $\hat{Y}$ (i.e., only the explained portion of Y) variance explained by the predictors" (p. 15). Reporting both beta weights and structure coefficients are important. If both are not reported, some variables may be denied credit for their explained variance (Courville & Thompson, 2001; Thompson & Borrello, 1985). No prior classroom experience and six of the nine program components contributed most to a teacher's perception of overall preparedness regardless of certification route. The program components include (a) curriculum design, (b) lessons, (c) evaluations and assessments, (d) TEKS, (e) multi-diversity, and (f) classroom management.

Table 32

Beta Weights and Structure Coefficients for the Multiple Regression Analysis Using Overall Preparedness as the Dependent Variable and Including All Teachers (N =1184)

Variables	Beta Weights	Structure Coefficients
Curriculum Design	.096	.532
Lessons	.060	.515
Evaluations & Assessments	.060	.504
TEKS	.047	.454
No Prior Classroom Experience	-.085	-.433
Multi-Diversity	.028	.433
Classroom Management	.056	.414
Classroom Observations	.017	.391
School District Mentoring	.146	.384
Substitute Teaching	.058	.377
Field-Based Experience	.037	.360
Teacher's Aid	.077	.326
Instruction Methods	-.036	.319
Student Teaching	.092	.293
GRE Entrance Requirement	.078	.280
PDAS	.037	.273
Online	.025	.161
GPA	.025	.160
Interview Entrance Requirement	.027	-.023
Other Entrance Requirements	.001	-.022
Program Mentoring Experience	-.030	.005

Note. The 21 independent variables have been sorted by the absolute values of the structure coefficients.

Regression Results on Research Question IV for ATC Teachers. A multiple regression analysis was conducted to assess the degree to which classroom preparation, components of the program, mentoring experience, entrance and exit requirements, and practice teaching predicted a teacher's perception of overall preparedness for ATC teachers. Exit requirements were asked only of ATC teachers. The multiple *R* for the independent variables and the criterion of Overall Preparedness was.387 (F (25, 742) = 5.23, $p < .001$). The percent of variance in Overall Preparedness accounted for by the 25

independent variables was 15%, with an adjusted *r* square of.121. The beta weights and structure coefficients are presented in Table 33.

When limited to ATC teachers, no prior classroom experience, substitute teaching, observations, school district mentoring experience as well as programs instruction on (a) lessons, (b) curriculum design, and (c) evaluations and assessments contributed most to predicting ATC teachers' sense of overall preparedness.

Table 33

Beta Weights and Structure Coefficients for the Multiple Regression Analysis Using Overall Preparedness as the Dependent Variable for the Sample of ATC Teachers

Variables	Beta Weights	Structure Coefficients
No Prior Classroom Experience	-.094	-.497
Lessons	.074	.486
Substitute Teaching	.093	.478
Curriculum Design	.074	.471
School District Mentoring	.164	.455
Evaluations & Assessments	.023	.443
Classroom Observations	.070	.429
Multi-Diversity	.036	.386
TEKS	-.033	.365
PDAS	.053	.346
Classroom Management	-.015	.338
Instruction Methods	-.001	.336
Teacher's Aid	.064	.303
Field-Based Experience	.035	.289
Exam Exit Requirement	.050	.259
GRE Entrance Requirement	.077	.256
Other Entrance Requirements	.051	.242
Student Teaching	.063	.212
GPA	.027	.170
Interview Entrance Requirement	.018	.158
Online	.029	.137
Program Mentoring Experience	-.013	.133
Attend Exit Requirement	.007	.117
Paper Exit Requirement	-.031	.109
Other Exit Requirement	.011	.073

Note. The 25 independent variables have been sorted by the absolute values of the structure coefficients. There were 774 ATC teachers in this analysis.

Overall Preparedness and ATC Teachers' Prior Career Experience. An ANOVA was conducted to determine if differences existed in Overall Preparedness by prior career experience. Levene's test indicated the homogeneity of variances was met (p = .195). There were no statistically significant differences in Overall Preparedness by prior career ($F(12, 769) = 1.33$, p = .195).

Research Question V

Does a teacher's commitment to teaching as defined by their plans to remain in teaching depend on certification route or prior classroom preparation? Does a teacher's commitment to teaching depend on classroom preparation (i.e., experience with lesson plans, pedagogical preparation, and field experience)?

When independent and dependent variables are categorical, loglinear analysis is conducted. Loglinear analysis involves "fitting a series of models to the data" (Stevens, 2002, p. 56) by testing all possible main effects and interaction effects in a given model. Contrary to other statistical tests such as ANOVAs and MANOVAs, we hope that our results are not significant and that the null hypothesis, *There is no difference in the models,* is not rejected. Examples of the procedure of loglinear analysis can be found in an article by Rice (1992) or in books by Stevens (2002) and Thompson (in press). Research question V was broken into two parts. Because 27 of the teachers chose choice five, *other,* as their reasons for staying in teaching and because almost all of them indicated they would be leaving as soon as possible which was choice four for the item, they were removed from the analysis.

Part I. Does a teacher's commitment to teaching as defined by his/her plans to remain in teaching depend on certification route or prior classroom preparation? First, we need to determine if the model selection can be reduced. We first fit k-factor marginals and keep the smallest k-factors that do not obtain statistical significance. Because of the large number of models, marginals were computed for the first, second, and third class models. The most complex models of the third class contain possible interactions between two variables (χ^2 (94, N =1181) = 105.55, p = .195). Statistical significance was not obtained for the third class so it is assumed that third, fourth, fifth, or sixth order terms will not be needed. Further inspections then were considered on the main effects and interaction effects (Rice, 1992).

In this model, plans to remain in teaching is a polytomous outcome variable (i.e., more than two categories). Investigations of the partial and marginal associations followed by a backward selection technique led to a more parsimonious model. The model contained the main effects plus the following interactions (a) plans to remain in teaching by substitute experience, (b) student teaching by field-based experience, (c) substitute experience by field-based experience and (d) interactions of the main effects by no previous experience (χ^2 (136, N = 1181) = 138.23, p = .431).

SPSS output prints log odd ratios, standard errors, statistical significance and confidence intervals of the log odd ratios (Ψ). According to Rice (1992), "If an odds ratio equals one, there is no difference between the two patterns of predictors in their impact on the outcome" (p. 27). Furthermore, confidence intervals help determine if "the impact of one pattern of predictors differs from that of the other pattern on the outcome"

(Rice, p. 27). If they do differ, the confidence interval will not contain one.

A review of both confidence intervals and log odd ratios suggest that plans to remain in teaching were not related to prior classroom experience. While statistical significance was obtained for each choice for intent, all of these confidence intervals contained the value one. There was a statistically significant relationship with student teaching and field-based experience. Teachers who had participated in student teaching were more likely to have field-based experience.

Part II. Does a teacher's commitment to teaching as defined by their plans to remain in teaching depend on the nine program components asked of the sample? The model with all two-way interactions yielded a *p*-value close to one variables (χ^2 (1972, N =1101) = 624.42, p = 1.00). The marginal and partial associations were statistically significant for all interactions. Statistically significant relationships existed on several interactions involving plans to remain in teaching but the confidence interval around the log odd ratios contained one. Hence, we cannot conclude course content indicates a teacher's plans to remain in teaching. Statistically significant relationships existed between curriculum design and evaluations (Ψ = 1.714) with a confidence interval not subsuming one (1.097, 2.331), curriculum design and PDAS (Ψ = .570) with a confidence interval not subsuming one (.207, .933), and TEKS and PDAS (Ψ = 1.668) with a confidence interval not subsuming one (1.331, 2.030). If a teacher entered a program that covered curriculum design, they were more likely to have been exposed to evaluations and assessments and PDAS than someone who had entered a program that did not cover curriculum design. If a teacher entered a program that TEKS, they were

more likely to have had PDAS than someone who had not been exposed to curriculum design.

Research Question VI

Do differences exist between teachers with different degrees and between teachers who teach at different grade bands? Different teaching fields and ages of students further complicate comparing certification routes. Therefore, differences regardless of route were examined between undergraduate major and teaching level.

Differences Between Undergraduate Majors. Differences were examined between teachers who held either a major in mathematics (n = 57), language arts/social studies (n = 159), science (n = 126), or other fields (n = 763) on Overall Preparedness, perceptions of preparedness, and self-efficacy. Levene's test indicated the homogeneity of variance assumption was met for Overall Preparedness (p = .619). ANOVA results indicated statistically significant differences did not exist between teachers with different undergraduate majors on Overall Preparedness (F(1, 1195) = .60, p = .583) with an effect size close to zero (η^2 = .001).

A MANOVA was conducted to determine differences between perceptions of preparedness and self-efficacy for teachers who obtained different undergraduate majors. Homogeneity of covariance matrices was met (p = .036) and results indicated statistically significant differences existed by major (F(18, 3100.44) = 1.62, p = .047) with a small effect size (η^2 = .03).

A descriptive discriminant analysis was used to identify items that distinguish groups from each other. Standardized function coefficients, structure coefficients, and

canonical correlations were reported for Function I. One DDA function best described group differences and accounted for approximately 39.7% of the explained variance. The canonical correlation was.246 and was statistically significant at $p = .013$. Results presented in Table 34 suggest that teachers with different majors differ on variables linked to (a) planning and developing curriculum, (b) using effective communication, (c) encouraging and engaging students in different learning environments, (d) identifying materials that create a multicultural curriculum, and (e) understanding influences of cultural backgrounds. Figures 26, 27, and 28 illustrate variances in these variables by undergraduate majors.

Table 34

Descriptive Discriminant Analysis Coefficients for Predicting Perceptions of Preparedness of (N = 1105) Novice Teachers by Degree (Reprinted with permission from "Variation in teacher preparation: How well do different pathways prepare teachers to teach?" by Darling-Hammond, L., Chung, R., & Frelow, F., 2002. *Journal of Teacher Education, 53*, 286-302. Copyright 2002 by *Journal of Teacher Education.*)

	Function I	
Variables	Func.	r_s
P1 Teach subject matter concepts in ways that enable students to learn.	-.323	-.020
P2 Understand how different students in your classroom are learning.	-.417	.023
P3 Set challenging and appropriate expectations.	.204	.196
P4 Help all students achieve high academic standards.	-.095	.218
P5 Develop curriculum that builds on students' experiences.	.467	***.345***
P6 Evaluate curriculum materials.	.126	.247
P7 Create discipline-based and interdisciplinary curriculum.	-.242	.181
P8 Identify and obtain materials to create a multicultural curriculum.	.341	***.356***

Table 34 (*continued*).

Variables	Function I	
	Func.	r_s
P9 Use instructional strategies that promote active student learning.	.237	.293
P10 Choose teaching strategies to meet different student needs.	-.261	.111
P11 Plan instruction	-.371	.120
P12 Use a variety of assessments.	.012	.190
P13 Help students learn how to assess their own learning.	.078	.221
U1 Understand how students' development influences learning.	-.156	.179
U2 Understand how students' cultural backgrounds influence learning.	.228	***.345***
U3 Identify and address special learning needs and/or difficulties.	-.222	.107
U4 Understand how students' environments influence learning.	.009	.244
U5 Work with parents and families to understand students.	212	.291
C1 Help students become self-motivated and self-directed.	-.082	.215
C2 Develop an environment that promotes social development.	-.050	.280
C3 Develop students' questioning and discussion skills.	.020	.265
C4 Engage students in cooperative group work and independent learning.	.196	***.343***
I2 Maintain an orderly and purposeful learning environment.	.079	.246
I3 Plan and solve problems with colleagues.	-.411	-.065
I4 Assume leadership responsibilities in your school.	-.051	.083
T1 Increase student interest and learning.	-.062	.046
T2 Support students' research and analysis.	.183	.085
T3 Assess and track student achievement.	-.318	-.050
T4 Communicate with others.	-.223	-.057
T5 Enhance group collaboration and teamwork.	.204	.121
SE1 If I try hard I can get through to almost all of my students.	.018	.136
SE2 I am confident in my ability to handle most discipline problems.	.054	.180
SE3 Students fail because they do not apply themselves.	-.242	-.222
SE4 My student's peers have more influence than I do.	.188	.067
SE5 I am confident in my ability to teach all students to high levels.	-.015	.076
SE6 I am confident I am making a difference in the lives of my students.	.185	.232
SE7 I am uncertain how to teach some of my students.	.198	.135
SE8 I am confident of my ability to integrate information technology.	-.129	.036
SE9 Teachers can have little influence.	.039	-.082

Note. Structure coefficients greater than.330 are bold and italicized.

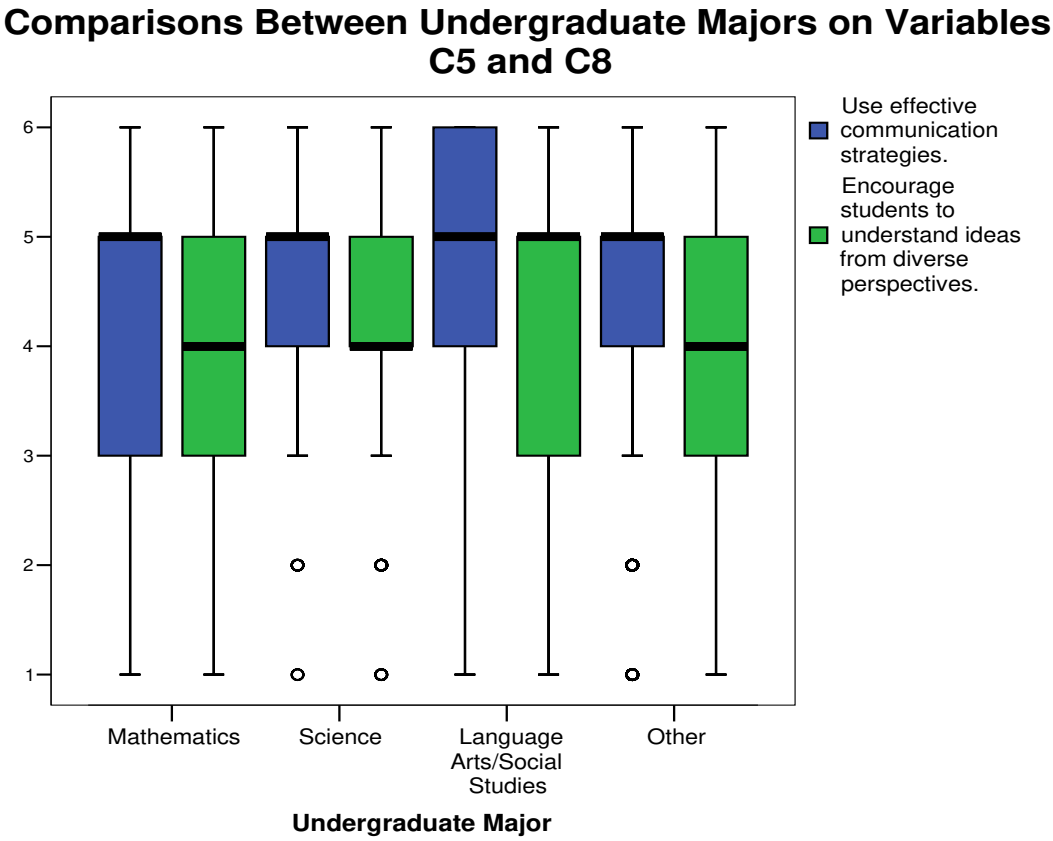

Figure 26. Boxplot Comparisons Between Undergraduate Major on Variables on Effective Communication and Understanding Diverse Perspectives.

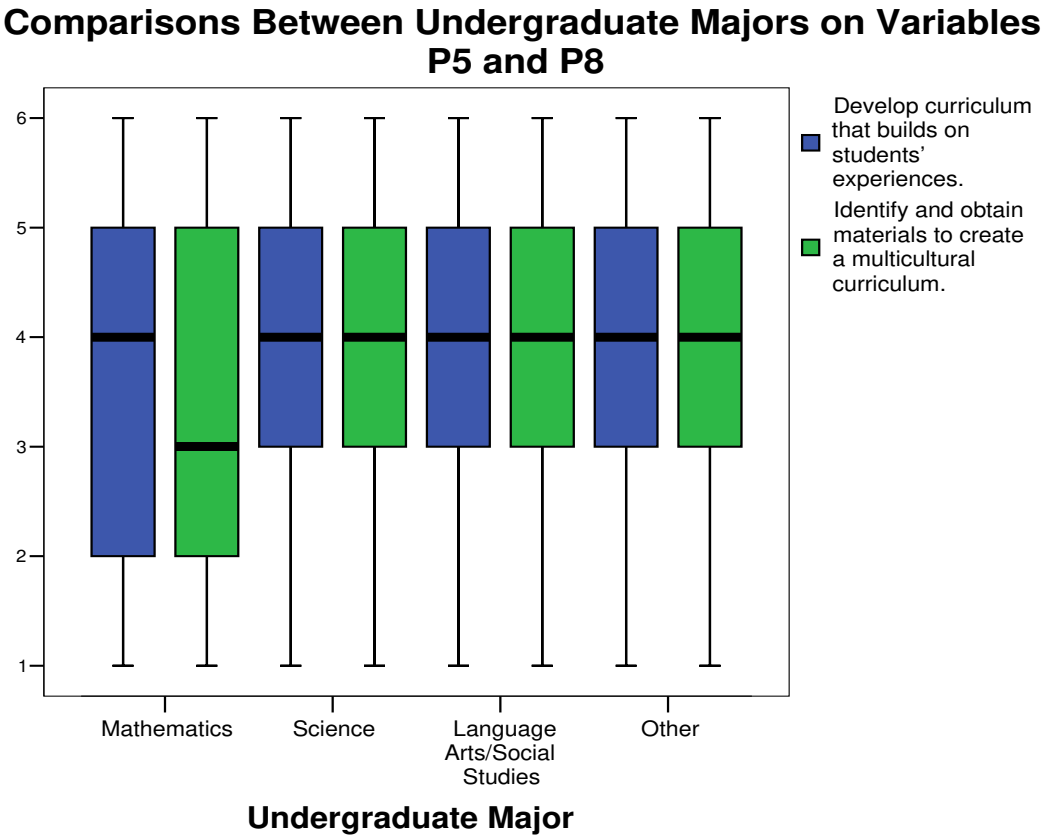

Figure 27. Boxplot Comparisons Between Undergraduate Major on Variables P5 Developing Curriculum and P8 Creating a Multicultural Curriculum.

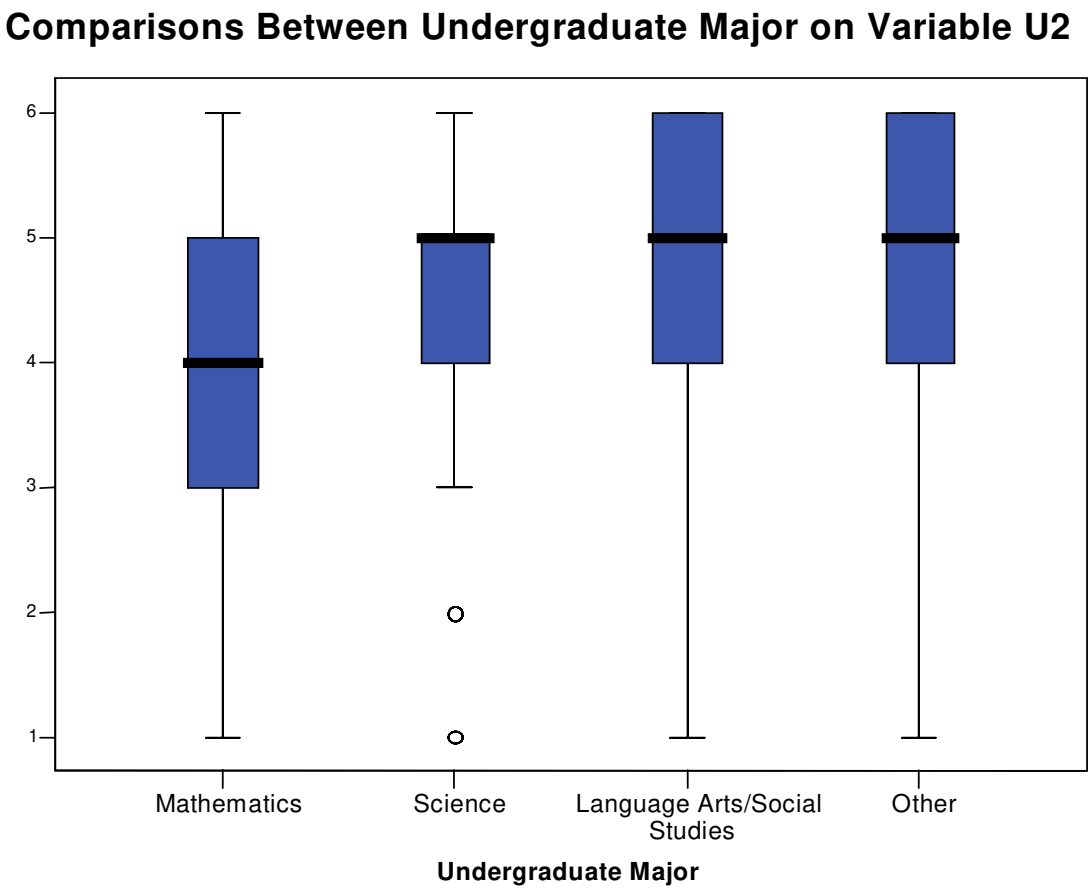

Figure 28. Boxplot Comparisons Between Undergraduate Major on Variable U2: Understanding How Students' Cultural Backgrounds Influence Learning.

Figure 29 presents boxplot comparisons illustrating the variance between teachers with different undergraduate majors on their reasons for entering the teaching profession. Crosstab results indicated statistically significant differences existed between teachers who held either an undergraduate major in mathematics, science, or language arts on who entered teaching because of previous job dissatisfaction (χ^2 (2, N = 343) = 8.32, p = .016). On prior classroom experience, the only statistically significant

differences from crosstab results were on student teaching. Teachers in this sample with undergraduate degrees in mathematics were more likely to have had student teaching (57%) than teachers with an undergraduate degree in science (29%) with the majority of science majors (77%) in this sample enrolled in an ATC program.

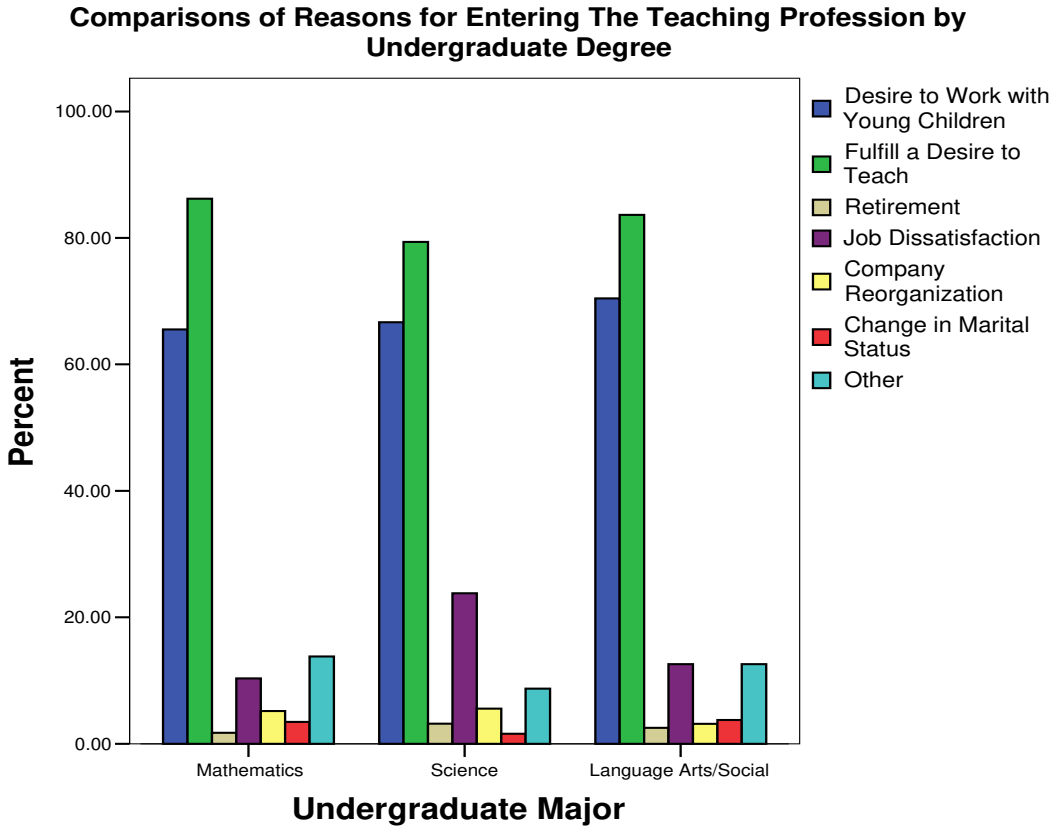

Figure 29. Boxplot Comparisons of Reasons for Entering the Teaching Profession by Undergraduate Major.

Differences Between Teaching Levels. Differences were examined between teachers who held elementary (n = 449), middle school (n = 175), secondary (n = 312), elementary and middle school (n = 88), middle school and high school (n = 38) and all level (n = 124) teaching credentials on Overall Preparedness. Because of the small sample of teachers certified at both the middle and high school level and because Levene's test for homogeneity of variance was violated (p = .025) with them in the analysis, they were removed. Levene's test indicated the homogeneity of variance assumption was met for Overall Preparedness (p = .544). ANOVA results indicated statistically significant differences did not exist between teachers certified at different levels on Overall Preparedness ($F(4, 1181) = 1.43$, p = .220) with an effect size close to zero effect size (η = .07).

A MANOVA was conducted to determine differences between perceptions of preparedness and self-efficacy by teaching level. There were not enough teachers certified at the middle and high school level to retain in the analysis. Homogeneity of covariance matrices was met (p = .087) and results indicated statistically significant differences existed by teaching level ($F(24, 4054.94) = 7.98$, $p < .001$) with a moderate effect size (η^2 = .15).

Two DDA functions best described group differences and accounted for approximately 83.4% of the explained variance. Canonical correlations for the two functions were.500 and.279 and were statistically significant for Functions I and $\alpha <$ .001 at α = .001 for Function II. Descriptive discriminant analysis results presented in Table 35 suggest differences exist on variables linked to Teaching Efficacy and variables

linked to Personal Teaching Efficacy that relate to the teacher's ability to teach all students. Differences are also suggested on variables linked to Understanding Learners and Promote Student Learning that relate to understanding different learners and addressing these learners' needs. Figure 30 presents boxplot comparisons illustrating differences in variances on variables SE3 and SE4 for different teaching levels. Investigations of the data suggest that differences in variables U3 and P10 can be attributed to teachers certified at all levels who appear to feel better prepared to meet different student needs and address special learning needs.

Table 35

Descriptive Discriminant Analysis Coefficients for Predicting Perceptions of Preparedness and Self-efficacy of (N = 1172) Novice Teachers by Teaching Level

(Reprinted with permission from "Variation in teacher preparation: How well do different pathways prepare teachers to teach?" by Darling-Hammond, L., Chung, R., & Frelow, F., 2002. Journal of Teacher Education, 53, 286-302. Copyright 2002 by *Journal of Teacher Education*.)

	Function			
	I		I	
Variables	Func.	r_s	Func.	r_s
P1 Teach subject matter concepts in ways that enable students to learn.	.272	.113	-.133	.122
P2 **Understand how different students in your classroom are learning.**	.053	-.033	.189	***.306***
P3 Set challenging and appropriate expectations.	-.043	-.014	.212	.297
P4 Help all students achieve high academic standards.	.049	-.044	-.029	.229
P5 Develop curriculum that builds on students' experiences.	.000	-.053	.265	.231
P6 Evaluate curriculum materials.	.204	.013	.041	.181
P7 Create discipline-based and interdisciplinary curriculum.	-.403	-.202	-.350	.052
P8 Identify and obtain materials to create a multicultural curriculum.	-.021	-.118	.113	.164
P9 Use instructional strategies that promote active student learning.	.042	-.095	-.237	.129

Table 35 *(continued).*

	Function			
	I		I	
Variables	Func.	r_s	Func.	r_s
P10 **Choose teaching strategies to meet different student needs**.	.078	-.104	-.071	***.360***
P11 Plan instruction	.076	.007	-.061	.226
P12 Use a variety of assessments.	.075	-.050	-.156	.164
P13 Help students learn how to assess their own learning. -	.012	-.027	-.195	.183
U1 Understand how students' development influences learning.	-.161	-.138	-.120	.110
U2 Understand how students' cultural backgrounds influence learning.	-.119	-.191	-.320	.144
U3 **Identify & address special learning needs and/or difficulties**	.131	-.099	.978	***.569***
U4 Understand how students' environments influence learning.	.020	-.160	-.111	.147
U5 **Work with parents and families to understand students.**	-.182	-.213	.469	***.316***
C1 Help students become self-motivated and self-directed.	-.076	-.170	-.024	.157
C2 Develop an environment that promotes social development.	-.105	-.208	.105	.058
C3 Develop students' questioning and discussion skills.	.117	-.084	.317	.046
C4 Engage students in cooperative group work and independent learning.	-.085	-.119	.135	.187
C5 Use effective communication strategies.	.048	-.125	.186	.222
C6 Use questions to stimulate different kinds of student learning.	-.219	-.065	-.195	.168
C7 Help students learn to think critically and solve problems.	.222	.002	-.188	.128
C8 Encourage students to understand ideas from diverse perspectives.	.109	.003	.414	.272
I1 Resolve interpersonal conflict in the classroom.	-.065	-.121	-.562	-.055
I2 Maintain an orderly and purposeful learning environment.	-.122	-.176	.279	.155
I3 Plan and solve problems with colleagues.	.018	-.039	-.304	.050
I4 Assume leadership responsibilities in your school.	.113	-.004	.125	.106
T1 Increase student interest and learning.	-.454	-.081	.076	.222
T2 Support students' research and analysis.	.224	.066	.060	.207
T3 Assess and track student achievement.	.313	.065	.059	.223
T4 Communicate with others.	.081	-.003	.104	.204
T5 Enhance group collaboration and teamwork. -	.165	-.036	.078	.233
SE1 **If I try hard I can get through to almost all of my students.**	-.240	***-.308***	.110	.112
SE2 I am confident in my ability to handle most discipline problems.	.160	-.109	.064	.067
SE3 **Students fail because they do not apply themselves.**	.553	***.652***	-.114	-.135
SE4 **My student's peers have more influence than I do.**	.360	***.532***	.019	-.062
SE5 I am confident in my ability to teach all students to high levels.	.163	-.004	.188	.133
SE6 **I am confident I am making a difference in the lives of my students.**	-.223	***-.308***	-.215	.015
SE7 I am uncertain how to teach some of my students.	.099	.222	.120	-.007
SE8 I am confident of my ability to integrate information technology.	.105	.067	-.204	.000
SE9 Teachers can have little influence.	-.104	.229	.086	.035

Note. Structure coefficients greater than.300 in absolute value are bolded and italicized.

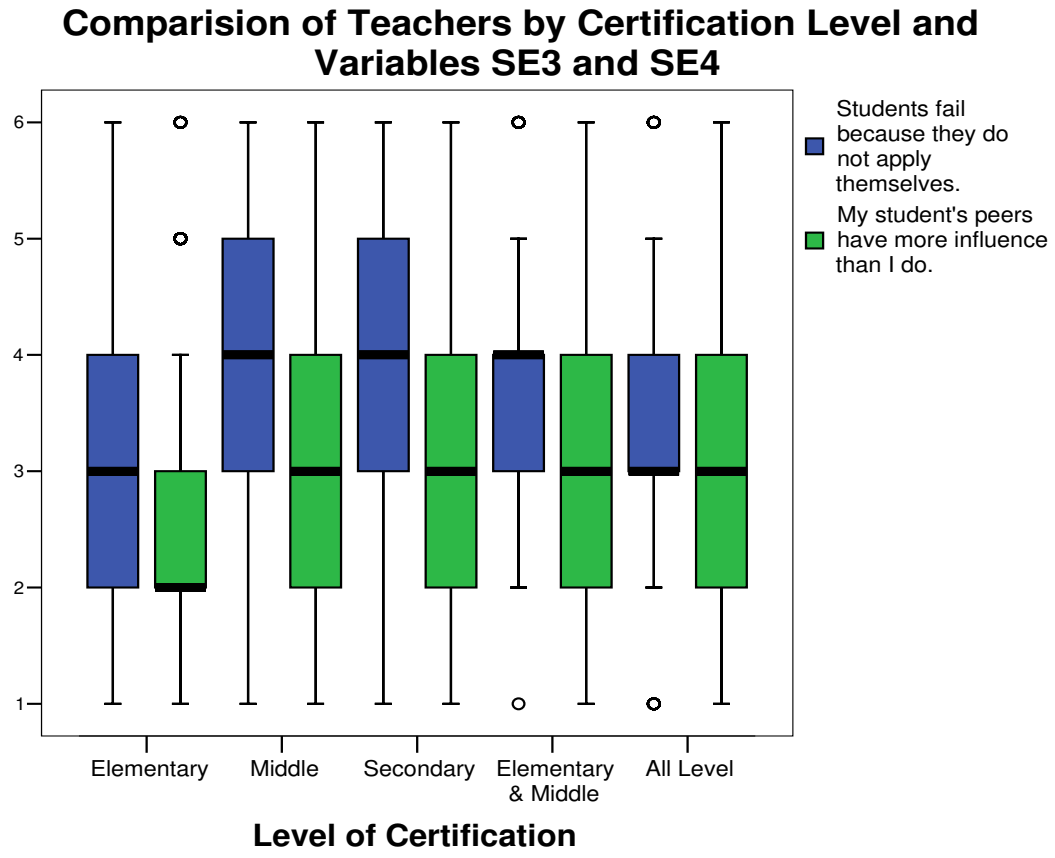

Figure 30. Boxplot Comparisons Between Teacher Certification Level and Self-efficacy Variables SE3 and SE4.

Ancillary

This ancillary section contains questions that were found to be of further interest. In particular, items of interest included the role age plays in perceptions of preparedness and further differences between teachers teaching at different grade levels.

Is There a Relationship Between Overall Preparedness, Prior Career, and Age of ATC Teachers? No statistically significant relationship existed by prior career experience and perceptions of preparedness. Because longevity in a career was not obtained, the decision was made to investigate the role of age on perceptions of preparedness. A Pearson correlation was conducted to test relationship between age and Overall Preparedness for 1193 teachers. No statistically significant relationship existed ($r = .039$, $p = .182$). A statistically significant relationship between age and Overall Preparedness for the 779 ATC teachers ($r = .109$, $p = .002$). The data were qualitatively analyzed by investigating boxplots and frequency tables of preparedness according to age of ATC teachers. These investigations suggested older teachers felt better prepared. Age of ATC teachers was then categorized as 25 or younger, 25 up to 30, 30 up to 35, 35 up to 40 and older than 40. The assumption of homogeneity of variances was met ($p = .363$). ANOVA results found statistically significant differences on Overall Preparedness by these age categories for ATC teachers ($F(4,774) = 3.70$, $p = .005$). Post hoc tests indicated differences existed between teachers who were 25 or younger and teachers who were over 40 and again between teachers who were 25 to 30 and teachers who were over 40. As presented in Table 36, the majority of the ATC teachers over the age of 40 obtained their certification through regional service centers. The majority of ATC teachers under the age of 30 in this sample were certified by for-profit organizations. To eliminate the ambiguity of whether these differences were attributed by the regional service centers or by age, an ANOVA was conducted to test differences in Overall Preparedness by where certification was obtained on ATC teachers over 40. The homogeneity of variances was

met (p = .583) and no statistically significant differences existed by origin of certification (F(3,191) = 1.22, p = .304).

Table 36

Where ATC Teachers Over 40 Obtained Their Certification

Program	Frequency	Percent
University	39	20
School District	2	1
For-Profit Provider	24	12
Community College	34	17
Regional Service Center	98	49

When restricted to ATC teachers 40 or older, statistically significant differences existed by prior career experience on Overall Preparedness and Technology (F(11, 204) = 2.08, p = .023). Former administrators, customer service employees, and scientists felt the best prepared to use technology with all groups feeling above average.

Does Dependence of Mentoring Experience for Overall Preparedness Differ by Grade Level? Because teaching at the elementary level contributed to Overall Preparedness and since differences in perceptions of preparedness and self-efficacy existed by teaching level, further analysis was conducted to determine what other differences existed by grade level. Regressions were conducted on Overall Preparedness and school district and program mentoring experience for elementary teachers, middle school teachers, and high school teachers. Because there was no way to determine which grade band the 88 teachers holding certification in elementary and middle school and the162 teachers certified at all three levels were teaching, they were eliminated from the

analysis. Of the 449 elementary teachers in this sample, 43% (191) were certified through TTC programs, 57% (257) through ATC programs, and only one teacher did not indicate his/her certification route. Of the elementary teachers, 21% (95) were certified through for-profit organizations, 15% (3) were certified through community colleges, 20% (89) were certified through regional service centers, and 13% (58) were certified through post-baccalaureate programs. Of the 175 middle school teachers in this sample, 23% (41) were certified through TTC programs and 77% (134) through ATC programs. Of the middle school teachers, 21% (37) were certified through for-profit organizations, 14% (25) were certified through community colleges, 30% (52) were certified through regional service centers, and 11% (20) were certified through post-baccalaureate programs. Of the 312 high school teachers in this sample, 22% (69) were certified through TTC programs, 76% (236) through ATC programs, and 2% (7) did not indicate their certification route. Of the high school teachers, 20% (63) were certified through for-profit organizations, 13% (40) were certified through community colleges, 21% (65) were certified through regional service centers, and 22% (68) were certified through post-baccalaureate programs.

First, a multiple regression was conducted for all teachers to determine if mentoring experience contributed to predicting Overall Preparedness. The multiple *R* for the independent variables and the criterion of Overall Preparedness was.167 (F (2, 933) = 13.33, $p < .001$). The percent of variance in Overall Preparedness accounted for by the two independent variables was 2.4%. This suggests that mentoring experience does contribute to predicting Overall Preparedness.

Elementary Teachers. There were 449 elementary teachers. In this analysis, with respect to gender, 7% were male and 93% were female and, with respect to race, 5% were African American, 34% were Hispanic, 58% were White, and 3% were other. Forty-three percent were certified in a traditional program. A multiple regression analysis was conducted to assess the degree to which school district and program mentoring predicted an elementary school teacher's perception of Overall Preparedness. The multiple *R* for the independent variables and the criterion of Overall Preparedness was.169 (F (2, 446) = 6.53, p = .002). The percent of variance in Overall Preparedness accounted for by the two independent variables was 2.8%, with an adjusted r square of.024. The beta weights and structure coefficients are presented in Table 37. Both school district and program mentoring experience contributed to predicting Overall Preparedness of elementary school teachers.

Table 37

Beta Weights and Structure Coefficients for the Multiple Regression Analysis Using Overall Preparedness as the Dependent Variable for Elementary Teachers on Mentoring Experience

	Beta Weights	Structure Coefficients (r_s)	r_s^2
School District	.164	.661	.437
Program	-.147	-.441	.194

Middle School Teachers. There were 175 middle school teachers. In this analysis, with respect to gender, 33% were male and 67% were female and, with respect to race, 5% were African American, 18% were Hispanic, 68% were White, 6% were other, and 3% did not identify. Twenty-three percent were certified in a traditional program. A multiple regression analysis was conducted to assess the degree to which school district and program mentoring predicted a middle school teacher's perception of Overall Preparedness. The multiple *R* for the independent variables and the criterion of Overall Preparedness was.132 (F (2, 172) = 1.52, p = .223). The percent of variance in Overall Preparedness accounted for by the two independent variables was 1.7%, with an adjusted *r* square of .006. These results suggest mentoring experience did not make a statistically significant contribution to predicting a middle school teacher's perceptions of Overall Preparedness.

High School Teachers. There were 312 high school teachers. In this analysis, with respect to gender, 33% were male and 66% were female and, with respect to race, 5% were African American, 25% were Hispanic, 63% were White, 3% were other, and 4% did not identify. Twenty-two percent were certified in a traditional program. A multiple regression analysis was conducted to assess the degree to which school district and program mentoring predicted an elementary school teacher's perception of Overall Preparedness. The multiple *R* for the independent variables and the criterion of Overall Preparedness was.239 (F (2, 309) = 9.33, p < .001). The percent of variance in Overall Preparedness accounted for by the two independent variables was 5.7%, with an adjusted *r* square of.051. The beta weights and structure coefficients are presented in Table 38.

Figure 31 presents box plot comparisons of Overall Preparedness and school district mentoring experience for middle school and high school teachers.

Table 38

Beta Weights and Structure Coefficients for the Multiple Regression Analysis Using Overall Preparedness as the Dependent Variable for High School Teachers on Mentoring Experience

	Beta Weights	Structure Coefficients (r_s)	r_s^2
School District	.234	.999	.998
Program	.013	.375	.141

Does Dependence of Program Components for Overall Preparedness Differ by Grade Level? Regressions were conducted on the dependent variable Overall Preparedness and independent variables program components and prior classroom experience for elementary teachers, middle school teachers, and high school teachers. The 88 teachers holding certification in both elementary and middle school and the162 teachers' certified at all three levels were not included in the analysis.

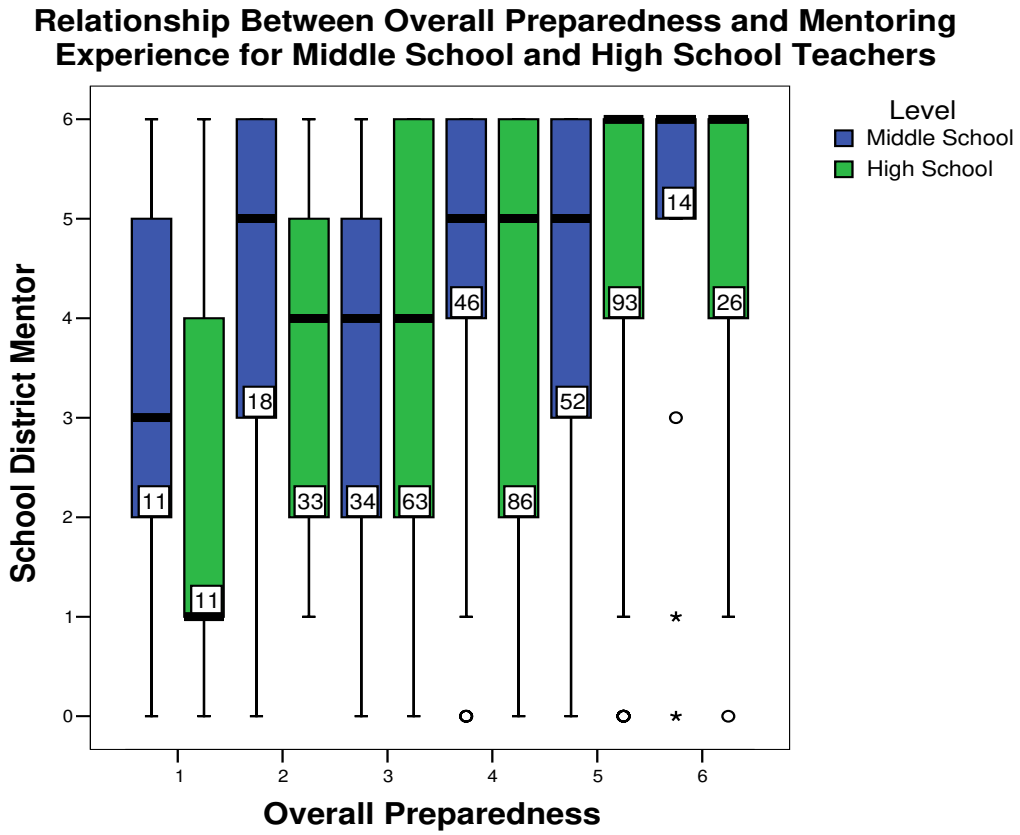

Figure 31. Relationship Between Overall Preparedness and Mentoring Experience for Middle School and High School Teachers.

Elementary Teachers. The multiple *R* for the independent variables and the criterion of Overall Preparedness for elementary teachers was.451 (F (17, 429) = 6.43, p < .001). The percent of variance in Overall Preparedness accounted for by the 17 independent variables was 20.3%, with an adjusted r square of.171. The beta weights and structure coefficients are presented in Table 39. When limited to elementary

teachers, program instruction on lessons, evaluations and assessments, curriculum design, and TEKS as well as no prior classroom experience contributed most to predicting elementary teachers' sense of Overall Preparedness.

Middle School Teachers. The multiple *R* for the independent variables and the criterion of Overall Preparedness for elementary teachers was.502 (F (17, 155) = 3.07, p < .001). The percent of variance in Overall Preparedness accounted for by the 17 independent variables was 18.3%, with an adjusted *r* square of .170. The beta weights and structure coefficients are presented in Table 40. When limited to middle school teachers, program instruction on multidiversity, evaluations and assessments, and curriculum design as well as no prior classroom, experience contributed most to predicting middle school teachers' sense of Overall Preparedness.

High School Teachers. The multiple *R* for the independent variables and the criterion of Overall Preparedness for high school teachers was.401 (F (17, 294) = 3.32, p < .001). The percent of variance in Overall Preparedness accounted for by the 17 independent variables was 16.1%, with an adjusted *r* square of.113. The beta weights and structure coefficients are presented in Table 41. When limited to high school teachers, program instruction on lessons, curriculum design, classroom management, evaluations and assessments, and TEKS, as well as no prior classroom experience, field base experience, and substitute experience, contributed most to predicting high school teachers' sense of Overall Preparedness.

Table 39

Beta Weights and Structure Coefficients for the Multiple Regression Analysis Using Overall Preparedness as the Dependent Variable for Elementary Teachers

Variables	Beta Weights	Structure Coefficients
Lessons	.114	.567
Evaluations & Assessments	.081	.526
Curriculum Design	.142	.523
TEKS	.130	.513
No Prior Classroom Experience	-.152	-.452
Multi-Diversity	.021	.382
Student Teaching	.190	.368
Teacher's Aid	.106	.351
Substitute Teaching	.037	.337
Classroom Management	.032	.309
GRE Entrance Requirement	.110	.299
Classroom Observations	-.017	.291
Instruction Methods	-.065	.283
Field-Based Experience	-.091	.241
PDAS	.047	.218
Interview Entrance Requirement	.011	-.133
GPA	-.050	.011

Note. The variables have been sorted by the absolute values of the structure coefficients.

Table 40

Beta Weights and Structure Coefficients for the Multiple Regression Analysis Using Overall Preparedness as the Dependent Variable for Middle School Teachers

Variables	Beta Weights	Structure Coefficients
Multi-Diversity	.270	.516
No Prior Classroom Experience	-.134	-.392
Evaluations & Assessments	.084	.366
Curriculum Design	.077	.366
TEKS	.059	.351
PDAS	.135	.338
Substitute Teaching	.024	.324
Interview Entrance Requirement	.202	.324
Classroom Management	.058	.308
Student Teaching	.196	.379
Classroom Observations	-.016	.283
GPA	.166	.273
Teacher's Aid	.089	.208
Field-Based Experience	-.029	.191
Instruction Methods	-.065	.119
GRE Entrance Requirement	.099	.124
Lessons	-.164	.039

Note. The 17 independent variables have been sorted by the absolute values of the structure coefficients.

Table 41

Beta Weights and Structure Coefficients for the Multiple Regression Analysis Using Overall Preparedness as the Dependent Variable for High School Teachers

Variables	Beta Weights	Structure Coefficients
Lessons	.089	.590
Curriculum Design	.097	.533
Classroom Management	.114	.520
Classroom Observations	.062	.499
Evaluations & Assessments	.043	.498
No Prior Classroom Experience	-.071	-.427
TEKS	.025	.420
Field-Based Experience	.115	.416
Substitute Teaching	.092	.407
Instruction Methods	.039	.379
Multi-Diversity	-.009	.336
PDAS	.017	.329
Teacher's Aid	.100	.273
GRE Entrance Requirement	.069	.232
GPA	.011	.137
Student Teaching	-.056	.048
Interview Entrance Requirement	-.050	.007

Note. The 17 independent variables have been sorted by the absolute values of the structure coefficients.

Do Variations Exist Across Programs within Certification Routes?

Differences between programs with more than 20 graduates, the same number chosen in Darling-Hammond et al.'s (2002) study, were examined on the four factors linked to perceptions of preparedness, the two factors linked to self-efficacy and the variable Overall Preparedness. Across traditional programs, four programs were compared. ANOVA results found statistically significant differences between the four programs on Promote Student learning ($F(2, 202) = 2.81$, $\eta^2 = .20$, $p = .041$), Understanding Learners ($F(2, 202) = 3.30$, $\eta^2 = .22$, $p = .022$), and Overall Preparedness ($F(2, 202) = 4.21$, $\eta^2 = .24$, $p = .006$) as presented in Figure 32. No statistically

significant differences were found between the three region centers and between the two community colleges that had a sufficient sample size.

Next, these nine programs along with one post-baccalaureate program and one for-profit program were tested for differences. Statistically significant differences existed between programs on Promoting Student learning ($F(10, 820) = 2.02$, $\eta^2 = .16$, $p = .029$), Teaching Critical Thinkers and Social Development and Developing Instructional Leadership ($F(10, 820) = 1.96$, $\eta^2 = .15$, $p = .035$), Teaching Efficacy ($F(10, 810) = 2.11$, $\eta^2 = .16$, $p = .021$), and Personal Teaching Efficacy and Overall Preparedness ($F(10, 817) = 2.67$, $\eta^2 = .15$, $p = .041$). These differences are illustrated in Figures 33 through 36. Post-hoc tests indicated one traditional program one differed from one of the three regional service centers on Teaching Critical Thinking and Social Development and Developing Instructional Leadership, differed from one of the post-baccalaureate programs on Overall Preparedness and differed from one of the for-profit programs on Overall Preparedness at the.05 level.

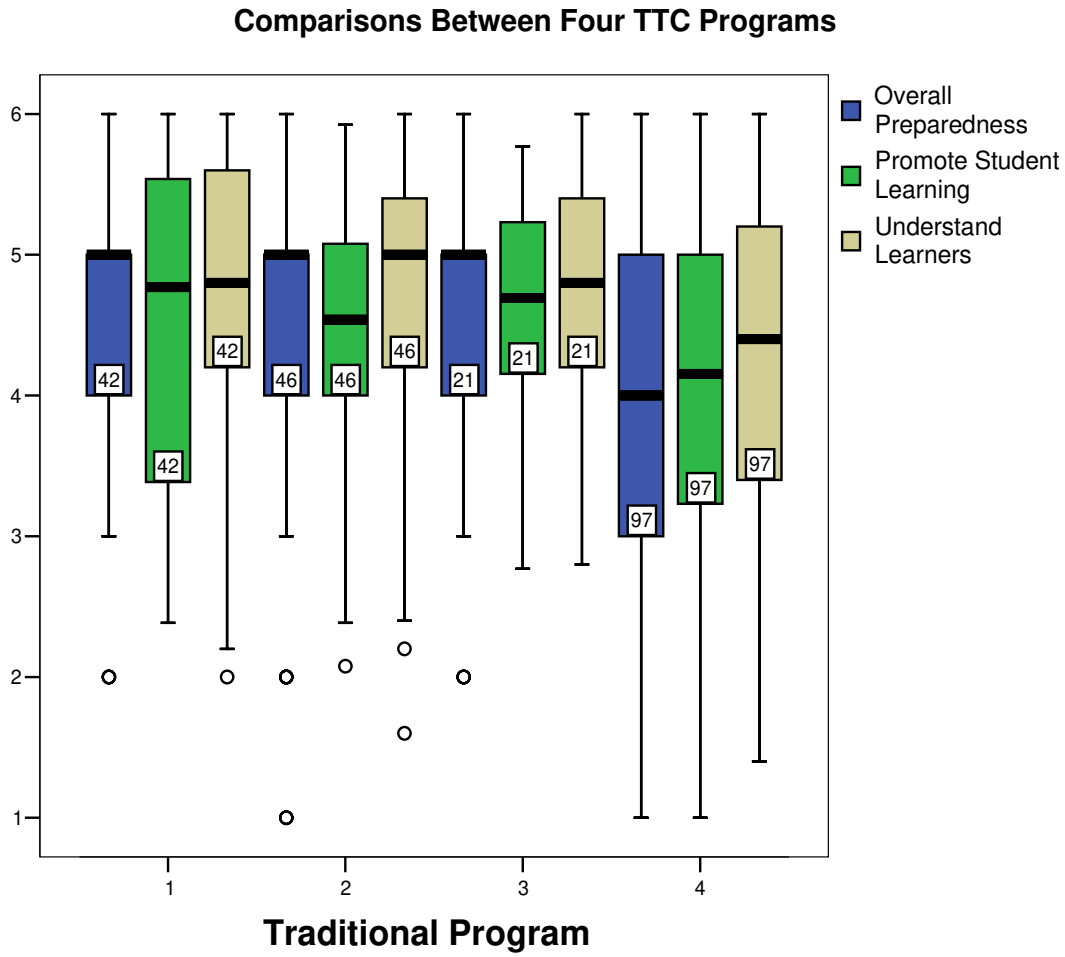

Figure 32. Boxplot Comparisons Between Four Traditional Programs.

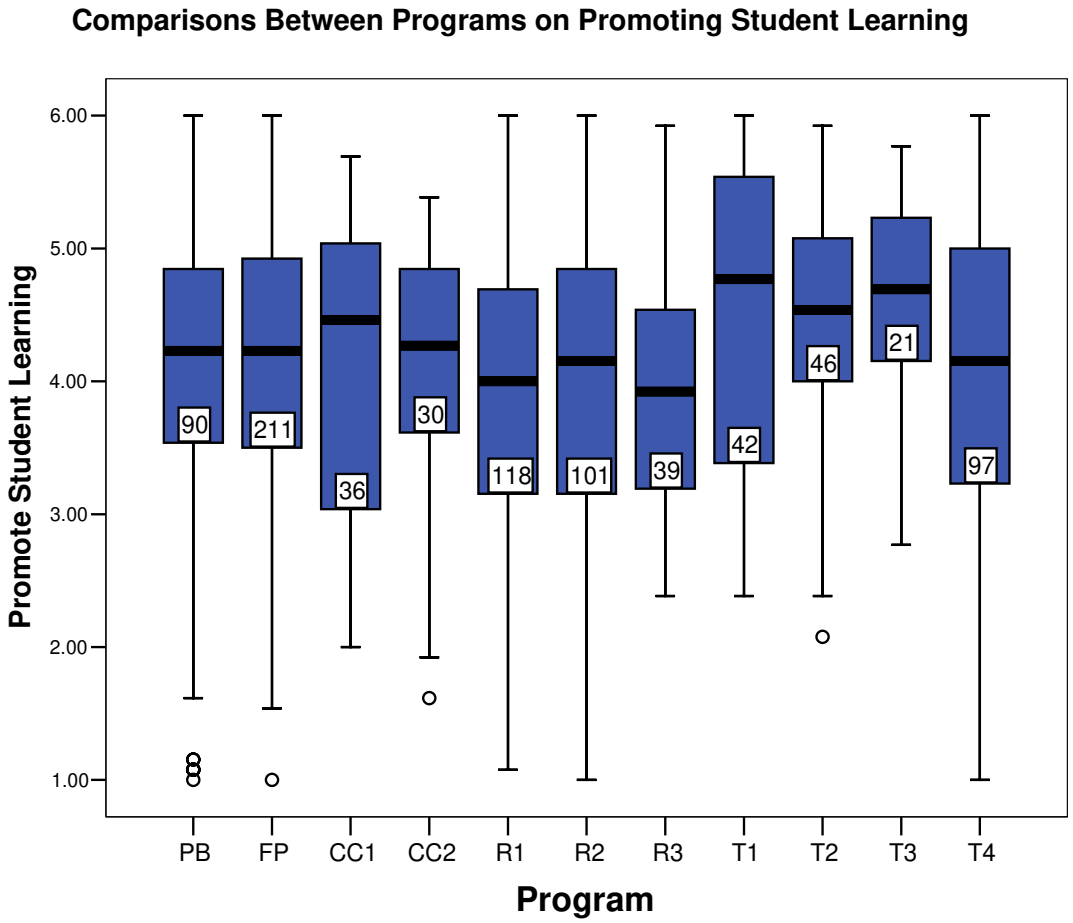

Figure 33. Boxplot Comparisons Between Programs on Promoting Student Learning.

Note. Variables beginning with R are regional service centers; variables beginning with CC are community college programs; variables beginning with TR are traditional programs; the variable beginning with PB is a post-baccalaureate program; and the variable beginning with FP is a for-profit program.

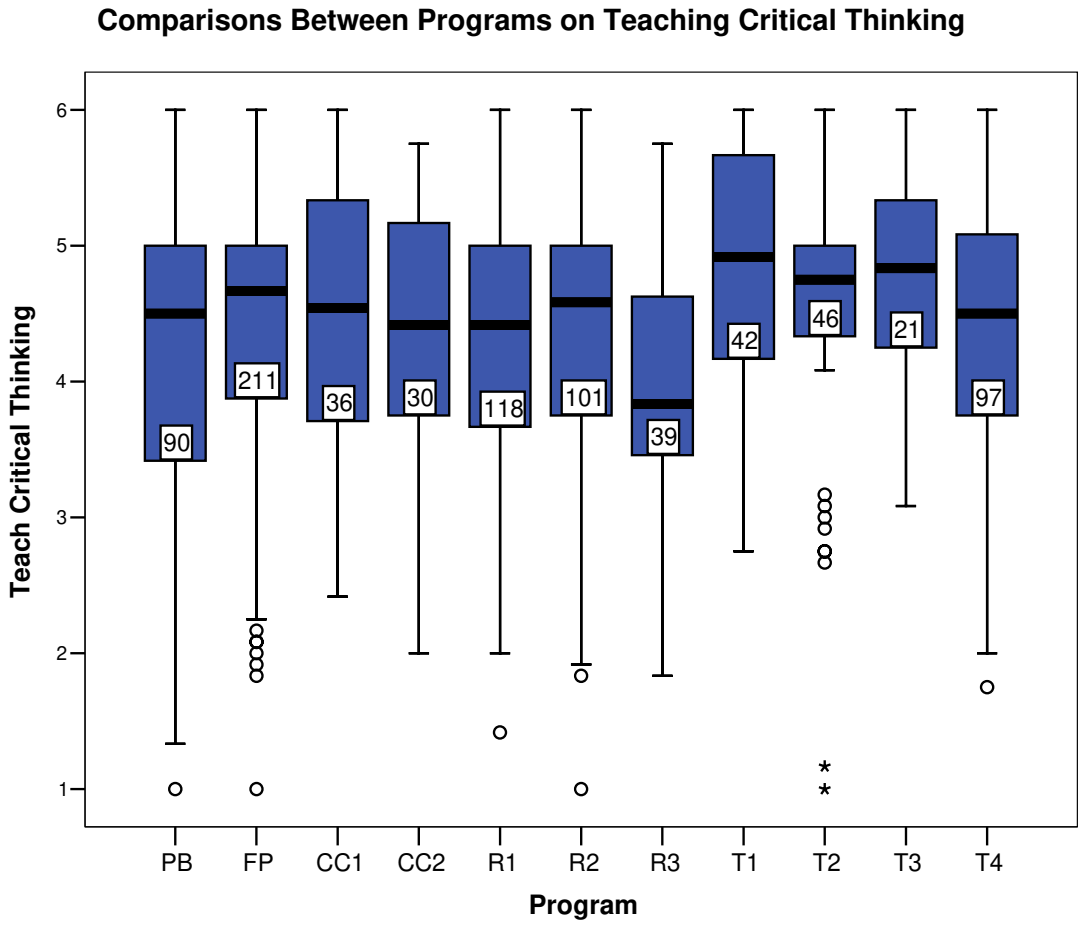

Figure 34. Boxplot Comparisons Between Programs on Teaching Critical Thinking.

Note. Variables beginning with R are regional service centers; variables beginning with CC are community college programs; variables beginning with TR are traditional programs; the variable beginning with PB is a post-baccalaureate program; and the variable beginning with FP is a for-profit program.

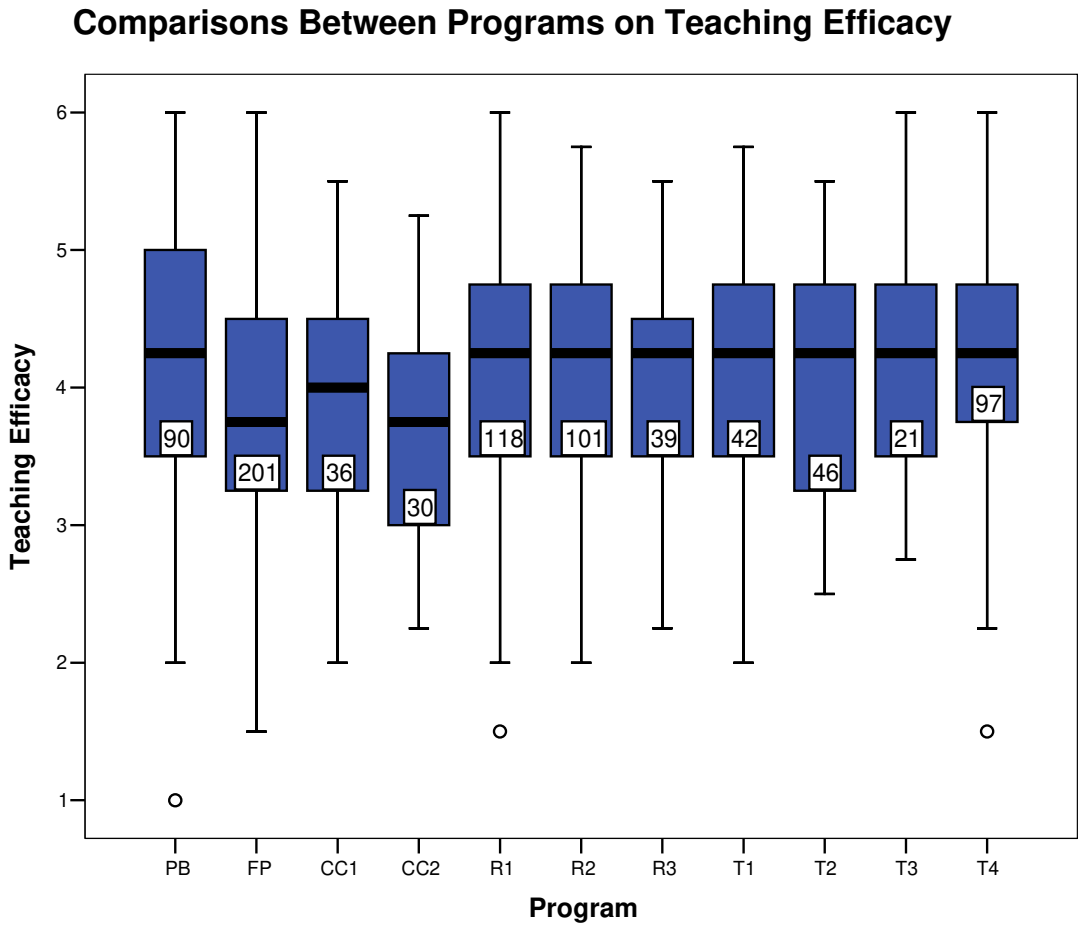

Figure 35. Boxplot Comparisons Between Programs on Teaching Efficacy.

Note. Variables beginning with R are regional service centers; variables beginning with CC are community college programs; variables beginning with TR are traditional programs; the variable beginning with PB is a post-baccalaureate program; and the variable beginning with FP is a for-profit program. Teaching Efficacy was converted to a positively worded item for this graph.

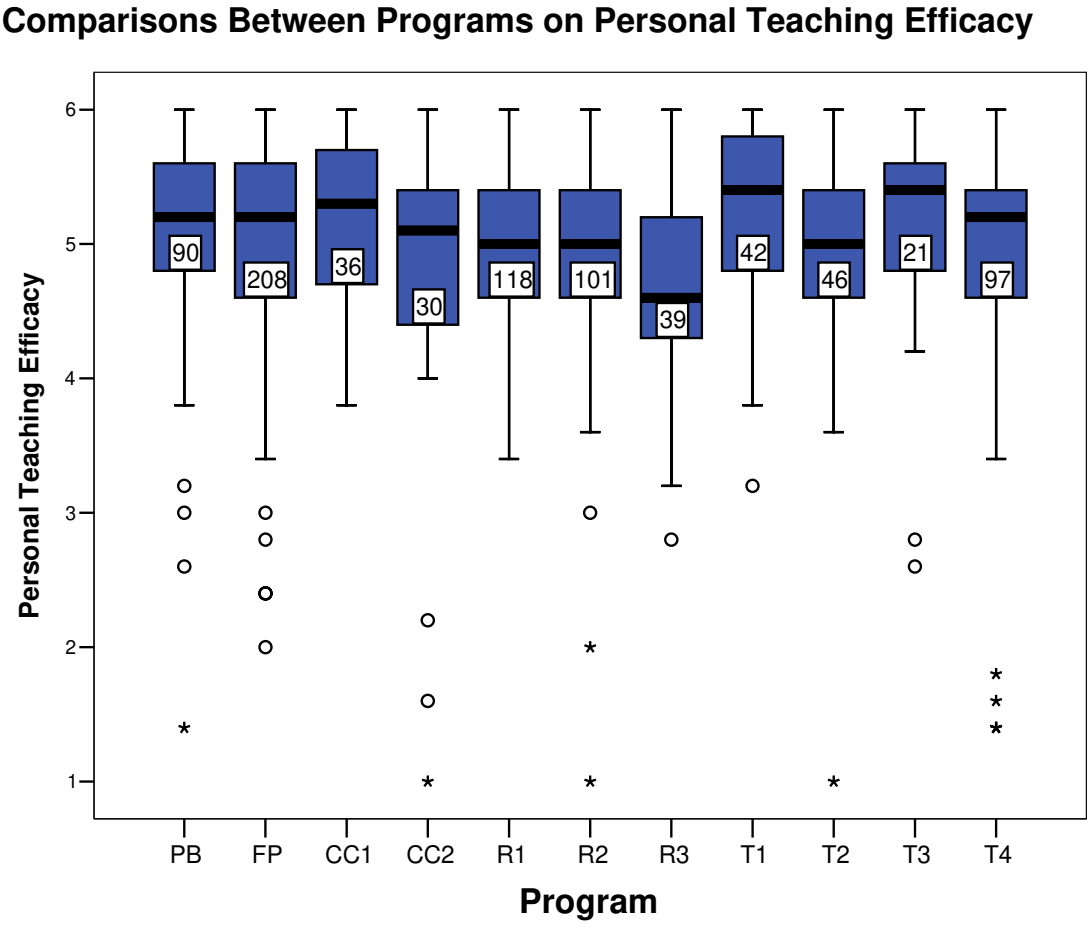

Figure 36. Boxplot Comparisons Between Programs on Personal Teaching Efficacy.

Note. Variables beginning with R are regional service centers; variables beginning with CC are community college programs; variables beginning with TR are traditional programs; the variable beginning with PB is a post-baccalaureate program; and the variable beginning with FP is a for-profit program.

CHAPTER V

CONCLUSIONS

Compared to previous empirical research studies conducted in the area of certification routes, the present study addresses aggregation of data within ATC programs and small sample sizes. Several unique contributions are made by this study:

1. *Large Sample Size*. An advantage to the present study is the large sample size ($N = 1197$) collected from a number of programs and school districts. Sample size is a factor that affects power. According to Hinkle et al. (2002), "[p]ower is defined as the probability of rejecting the null hypothesis when it is false" (p. 299). Increases in sample size result in smaller standard errors and more powerful tests. With the exception of studies conducted by Humphrey and Wechsler (2005) and Darling-Hammond et al. (2002), most studies investigating certification routes had small sample sizes from a small number of programs (Wilson et al., 2002).

2. *Representativeness of the Sample*. Demographics of the sample were compared to the general population and prior career experiences were compared to Humphrey and Wechsler (2005). With the exception of Humphrey and Wechsler (2005) and Darling-Hammond et al. (2002) who reported response rates, other studies did not compare the population with the sample.

3. *Reliability, Validity, and Replicability*. For the present study, reliability scores and pattern/structure coefficients were reported and replicability investigated. Reliability analyses were conducted on the variables linked to perceptions of preparedness and self-

efficacy. Reliability refers to the reliability of the scores and not of the test. The same test administered to a new sample will have different reliability scores. Failures to report reliability coefficients may lead to misinterpretations and may result in studies that cannot produce noteworthy effect sizes regardless of the sample size (Thompson, 1994). Furthermore, factor analysis was conducted to determine validity of the criterion measure (Gorsuch, 1983), and a bootstrap factor analysis was conducted to investigate stability of eigenvalues and pattern/structure coefficients (Zientek & Thompson, 2006).

4. *Multivariate Analysis*. A strength of the present study is the use of Multivariate Analysis of Variance (MANOVA). Multivariate analysis simultaneously considers the relationships between variables and allows researchers the ability to investigate relationships among two or more variables at one time versus investigating relationships one at a time (Bray & Maxwell, 1985; Thompson, 1991). This honors the reality of the data and controls the alpha level.

5. *Disaggregation.* A criticism of previous studies is the aggregation of data and the varying categorizations of certification routes. The present study sought to address these issues by investigating differences among certification routes by disaggregating the data into a variety of categories.

Discussion

The purpose of this study was to explore the quality of teacher preparation and differences by certification type and program characteristics based on novice teachers' demographics, educational attainment, sense of self-efficacy, and sense of preparedness to enter the classroom. Comparisons of the sample to the population of initially certified

Texas Teachers, as presented in Figures 1 – 7 and Table 3, suggests the sample is representative of the population. A factor analysis was conducted on the Darling-Hammond et al. (2002) instrument, which asked teachers how well prepared they felt on selected items. As presented in Tables 4 and 5 and Figure 9, four factors on teacher's perceptions of preparedness for the present study were identified: (a) Promoting Student Learning, (b) Teaching Critical Thinking and Social Development/Developing Instructional Leadership, (c) Understanding Learners, and (d) Using Technology. These are consistent with Darling-Hammond et al. results with the exception of the factor Teaching Critical Thinking and Social Development and the factor Developing Instructional Leadership comprising one factor for the present study. As presented in Table 6 and Figure 10, two factors were identified in the present study on self-efficacy: (a) Personal Teaching Efficacy and (b) Teaching Efficacy.

The pattern/structure coefficients were investigated for replicability across the resamples. Results of the bootstrap factor analysis presented in Tables 8 and 9 and Figures 11 – 15 suggest that the results are stable across the resamples for all variables except P13, which asks teachers if they know how to help students assess their own learning (Darling-Hammond et al., 2002). Therefore, confidence was not obtained that if the study was conducted on a new sample, P13 would be linked to Promoting Student Learning.

To establish the validity of utilizing Overall Preparedness as a proxy for teacher effectiveness, the relationship between Overall Preparedness and self-efficacy was investigated. Overall Preparedness was the strongest predictor of self-efficacy and was

correlated on all 9 self-efficacy variables, which is consistent with the results of Darling-Hammond et al. (2002). Both studies support the notion that a program's ability to produce teachers who feel prepared is related to a program's ability to produce teachers who possess high self-efficacy. Therefore, a teacher's sense of self-efficacy and Overall Preparedness was used as a proxy for student achievement, a teacher's commitment to teaching, and teacher retention (Wheatley, 2002).

Research Question I

Do novice teachers differ by certification route in their sense of self-efficacy, perceptions of preparedness to teach, Overall Preparedness, mentoring experience, reasons for entering the classroom, plans to remain in teaching and classroom preparation?

For each factor, differences were explored by disaggregating certification route into varying categories. Table 42 contains differences in certification route for perceptions of preparedness, overall preparedness, and self-efficacy.

Self-efficacy. Two factors were linked to self-efficacy: Teaching Efficacy and Personal Teaching Efficacy. Teaching Efficacy refers to how a teacher believes he/she can influence student achievement regardless of influences such as socioeconomic level, family, friends, and school. Personal Teaching Efficacy refers to how a teacher believes in his/her own abilities to make a difference in the classroom (Gordon, 2001). In this sample, statistically significant differences did not exist between traditional certified (TC) teachers and alternatively certified (AC) teachers or between teachers certified through alternative teacher certification (ATC) programs, post-baccalaureate (PB)

programs, and traditional teacher certification (TTC) programs. Statistically significant differences did exist between university and non-university teachers on self-efficacy, although the differences were small with certification route accounting for only 1% of the variance. As presented in Table 27, these results suggest that PB programs produce teachers whose self-efficacy is more comparable to traditionally certified teachers versus teachers certified through alternative routes.

Table 42

Statistically Significant Differences by Certification Route

Certification Routes	Self-efficacy	Perceptions of Preparedness	Mentoring	Overall Preparedness
1. TTC/ATC	--	X	X **	X**
2. University/Non-university	X	X	X	X**
3. TTC/ATC/PB	--	X	X**	X**
4. University/Region/Community College/PB/For-profit/School District	X	X	X	X**
5. Traditional/Region/Community College/PB/For-profit	X	X**	X	X**

Note. **ANOVAs were conducted to test differences on category five. Statistically significant differences on perceptions of preparedness existed on Promoting Student Learning.

When ATC certification was disaggregated by the type of entity granting certification and compared to university certified teachers (item four in Table 42), statistically significant differences existed with certification route accounting for 4% of the variance. Statistically significant differences existed on self-efficacy when disaggregating certification routes into the following categories: (a) TTC, (b) PB, (c) Regional Service Centers, (d) Community College, and (f) For-profit graduates. On Teaching Efficacy, post-hoc tests indicated statistically significant differences between

teachers certified through regional service centers and community colleges as illustrated in Figure 23. Teachers certified through regional service centers felt better than teachers certified through community colleges but rated themselves comparable to teachers certified through PB or traditional programs.

On Personal Teaching Efficacy, teachers certified through non-university programs felt slightly better than university certified teachers. Descriptive statistics in Table 29 suggests teachers in this sample from for-profit providers felt, on average, slightly better on Personal Teaching Efficacy than teachers certified from programs that were not from for-profit providers. Novice teachers, regardless of certification route or program type, appeared to have high Personal Teaching Efficacy with mean scores ranging from 4.89 to 5.09 and small variations within groups.

Perceptions of Preparedness. In the present study on the instrument administered by Darling-Hammond et al. (2002), four factors were linked to perceptions of preparedness: (a) Promoting Student Learning, (b) Teaching Critical Thinking and Social Development and Developing Instructional Leadership, (c) Understanding Learners, and (d) Using Technology. In this sample, statistically significant differences existed between TC and AC teachers on perceptions of preparedness regardless of how ATC routes were disaggregated. When comparing AC and TC teachers, certification route accounted for about 2% of the variance of perceptions of preparedness. On a scale from one to six, the mean scores were 4.0 or higher on most items. For AC teachers, eight of the 13 variables linked to Promoting Student Learning had 95% confidence intervals around the means that contained values smaller than 4.0. As presented in Table

20, neither AC nor TC teachers felt prepared to *obtain information to create a multicultural curriculum* (*M* = 3.86, *SD* = 1.39 and *M* = 3.97*, SD* = 1.41) or to *help students learn how to assess their own learning* (*M* = 3.66, *SD* = 1.36 and *M* = 3.89*, SD* = 1.32). Both ATC and TTC teachers appeared to feel prepared to use technology with mean scores on these five variables ranging from 4.38 to 4.81.

Statistically significant differences existed between university and non-university teachers and between ATC, TTC, and PB teachers on perceptions of preparedness with certification route accounting for 2% of the variance. Descriptive discriminant analysis results presented in Table 25 suggest that ATC, PB, and TTC teachers differed, albeit the differences were small, on variables linked to Promoting Student Learning. University teachers (*M* = 4.21, *SD* = 1.06) felt better prepared in relation to Promoting Student Learning than non-university teachers (*M* = 4.05, *SD* = 1.08). The largest differences were associated with (a) using instructional strategies that promote student learning, (b) planning instruction, developing curriculum, and (c) communicating effectively. As illustrated in Figure 20, TTC teachers felt better prepared on these items than teachers certified through PB or ATC programs.

When ATC certification was disaggregated by the type of entity granting certification and compared to university certified teachers (item four in Table 42), statistically significant differences existed on perceptions of preparedness. There were only seven teachers in this sample who obtained their certification from a school district, and 95% of the for-profit certified teachers obtained their certification from the same program. Therefore, caution should be warranted for results on these program types.

Descriptive discriminant analysis results presented in Table 26 suggest differences exist on variables related to developing, creating, and planning curriculum and instruction and encouraging students to understand ideas from diverse perspectives. As illustrated in Figure 22, teachers certified through universities and community colleges in this sample felt they were better prepared than teachers certified from other entities on planning instruction. Teachers certified through school districts in this sample felt the least prepared on developing curriculum that builds on students' experiences.

Due to the small sample of teachers certified through school districts, this group was removed and the remaining university certified teachers were disaggregated into TC and PB teachers. Statistically significant differences existed on perceptions of preparedness with certification route accounting for 1% of the variance in perceptions of preparedness. As presented in Table 29, teachers certified by regional service centers felt the least prepared to Promote Student Learning with post-hoc tests indicating statistically significant differences between teachers certified through TTC programs (M = 4.26, SD = 1.03) and those through regional service centers (M = 3.97, SD = 1.07).

To complicate the task of determining differences among certification routes, differences existed between programs within certification routes. As presented in Figures 32 and 33, statistically significant differences were found between 11 programs from various certification routes on Promoting Student Learning, Teaching Critical Thinking and Social Development/ Developing Instructional Leadership, and Overall Preparedness. Statistical analyses also found differences between four TTC programs on the preceding items plus Understanding Learners. This result illustrates the complexity

of comparing across certification routes when differences exist within certification routes.

While Darling-Hammond et al. (2002) identified statistically significant differences on more items than suggested by the present study, the same underlying theme resounded in both studies: Although differences were small, traditionally certified teachers felt better prepared than non-traditionally certified teachers. In particular, traditionally certified teachers felt better prepared to (a) plan instruction by using knowledge of learning subject matter, curriculum, and student development; (b) encourage students to understand ideas from diverse perspectives; (c) teach subject matter concepts in ways that enable students to learn; and (d) develop curriculum that builds on students' experiences

Overall Preparedness. In this sample, statistically significant differences existed between TC and AC teachers on the variable Overall Preparedness regardless of how certification routes were categorized. When ATC certification was disaggregated by the type of entity granting certification and compared to university certified teachers (item four in Table 42), certification route accounted for 2% of the variance. For all other categorizations, certification route accounted for 1% of the variance. Tables 27 and 29 present these differences. Excluding teachers certified through school districts, teachers certified through for-profit organizations had the lowest mean score (M = 3.76, SD = 1.38) on Overall Preparedness; teachers certified through traditional programs had the highest mean score (M = 4.17, SD = 1.24) on Overall Preparedness; and teachers certified through community colleges, regional service centers, and post-baccalaureate

programs had close to the same mean score ranging from 3.92 to 3.96. Overall Preparedness is important because the better prepared a teacher feels, the higher his or her self-efficacy and the longer the plan to continue teaching. Self-efficacy has been traced to teacher effectiveness; hence, the data supports the notion that traditionally certified novice teachers were more apt to be effective teachers who were committed to teaching (Wheatley, 2002). These results are consistent with results from Darling-Hammond et al. (2002).

Mentoring Experience. Regardless of how alternatively certified teachers were categorized, statistically significant differences existed between TC and AC teachers on program mentoring experience with moderate to large effect sizes and school district mentoring experience with small effect sizes. Traditionally certified teachers experienced lower school district and program mentoring experiences than alternatively certified teachers. Figures 19, 21, and 24 give boxplot comparisons of variances in mentoring experience, and Table 21 reports mentoring experience between alternatively and traditionally certified teachers. Of the TC teachers, 18% did not have a school district mentor compared to 5% of the AC teachers. Overall, TC teachers and PB teachers did not have as positive a mentoring experience as teachers certified through community colleges, for-profit agencies, and regional service centers. Teachers certified through for-profit agencies had the most positive school district mentoring experiences.

Prior Classroom Experience. As presented in Table 22 and illustrated in Figure 17, statistically significant differences existed between AC and TC teachers on prior classroom experience. Despite these differences, results were consistent with Humphrey

and Wechsler (2005) suggesting that a large percentage of AC teachers have had some form of prior classroom experience. While this conclusion is encouraging, results also suggest that ATC programs are allowing some teachers to enter the classroom with no prior experience. In this sample, a disturbing 21% of ATC teachers had no prior classroom experience before entering the classroom to teach.

Reasons for Entering and Plans to Remain. Statistically significant differences existed between AC and TC teachers on reasons why they entered the teaching profession as presented in Table 23 and illustrated in Figure 18. Although a large percentage of AC teachers did enter as a result of a desire to work with children or to fulfill a desire to teach, they were more apt to enter teaching because of retirement, job dissatisfaction, company reorganization, change in marital status, or reasons other than those of graduates of traditional teacher programs.

Both AC and TC teachers appeared to be committed to teaching. While statistically significant differences existed between AC and TC teachers on their plans to remain in teaching as presented in Table 24, these differences can possibly be explained by the group of alternatively certified teachers from a for-profit certification program that planned to leave once they furthered their education.

Research Question II

Are alternative teacher certification (ATC) programs (a) diversifying the teacher population or (b) producing teachers with exceptional content knowledge?

Diversification of Teaching Population. In this sample, the average age of TC teachers was 28 years old. The average age of AC teachers was 34, which was slightly higher than Humphrey and Wechsler's (2005) results of 32, but slightly lower than a national estimate of 36. The range in age for both certification routes was about the same. In this sample, the age of 45% of AC teachers was less than 30 compared to 33% of Shen's (1997) results, and 25% of them were 40 or older compared to 27% of Shen's results. These results, coupled with previous reports (e.g., Shen, 1997), suggest that ATC programs are bringing slightly older individuals into the teaching field while at the same time allowing large percentages of young teachers to forgo the traditional route.

For this sample, ATC programs brought in a larger percentage of Hispanic teachers than did TTC programs. The larger percentage of Hispanic teachers may be explained by the demographics of where the sample was obtained. These results would be consistent with those presented by Humphrey and Wechsler (2005) who found that the ethnic diversity of certification programs mirrored the ethnic diversity of the population.

Even so, state reports suggest ATC programs may be bringing in more minorities (Herbert, 2004). This conclusion contradicts Humphrey and Wechsler's (2005) results of seven large ATC programs across various states. In Texas, with the increase in enrollment in ATC programs and the fact that the percentages of minority enrollments

have remained relatively stable over the past several years, a conclusion can be made that alternative certification programs are bringing more African Americans and Hispanics into the teaching field. The number of Texas teachers entering through ATC programs from 1999 to 2003 increased from 2661 to 7113. Approximately 14% of the ATC population was African American, and approximately 26% of the ATC population was Hispanic over this time span. From 1999 to 2003, the African American population entering ATC and PB programs increased from 577 to 1450 and the Hispanic population increased from 1064 to 2570. From 1999 to 2003, the African American population entering through TTC programs increased minimally from 447 to 501 and the Hispanic population increased from 2352 to 2682 (Herbert, 2004). In addition, this study suggests that a teacher's commitment to teaching was the same within ethnic groups across certification routes. The majority of African American teachers (approximately 90%) planned to stay in teaching as long as possible or until they were eligible to retire compared to 82% of White teachers and approximately 71% of Hispanic teachers. Therefore, the conclusion can be made that ATC programs are successful in recruiting more minorities into the teaching profession who are committed to teaching.

Previous research results have concluded that ATC programs were not attracting more males into the teaching profession (Humphrey & Wechsler, 2005; Shen, 1997). Results from Texas reports suggest ATC programs are not bringing in more males. Instead, the males appear to be shifting from the TTC route to the ATC route. In this sample, approximately 81% of males came from ATC programs with 25% of the ATC teachers being male, which is comparable to Shen's report of 24% of alternatively

certified teachers being male and 29% of 2003 Texas AC teachers being male. In Texas in 2003, TTC programs certified 34% (*n* =1502) of male teachers, PB programs certified 25% (*n* = 1140) of male teachers, and ATC programs certified 41% (*n* = 1827) of male teachers. The percentage of males certified in traditional programs decreased from 54% in 2001 to 34% in 2003 with the numbers remaining relatively the same (i.e., 1577 to 1502 from 2001 to 2003). During this time frame, male teachers certified through PB and ATC programs increased from 46% in 2001 to 66% in 2003 and changed from 1322 to 2967 (Herbert, 2004). While the number of male teachers entering teaching increased, the percentage of male teachers entering the teaching profession did not change (21% in 2002 and 22% in 2003) and the number of females entering through alternative programs remained about three times as large as the number of males entering through ATC programs (i.e., 3,659 in 2001 to 8,144 in 2003). Therefore, there appears to be a shift from males choosing to enter through ATC programs versus TTC programs.

While the data do not support that ATC programs are attracting a significant increase in males into the teaching profession, the data do support the notion that ATC programs may be recruiting more males who are more committed to teaching than traditionally certified males. Of the 194 AC males in this study, 77% indicated they would stay in teaching for as long as possible or until they were eligible for retirement compared to 54% of the traditionally certified males.

Highest Degree and Undergraduate Major. The data suggest that alternative teacher certification programs may be recruiting more people who hold a master's degree. Statistically significant differences existed between certification routes, with

AC teachers more apt to hold a master's degree. Only 2% of AC teachers (n = 12) held a Ph.D., with no TC teachers holding a Ph.D. Of the AC teachers holding a master's degree, 62% planned to stay in as long as they were able to, a number that was proportionally equivalent to the 60% of the traditionally certified teachers who held a master's degree. Of the AC teachers holding a doctorate, 67% planned to remain in teaching as long as possible. Therefore, the data support the assertion that ATC programs are bringing in more people with higher educational attainment who are committed to teaching.

Statistically significant differences existed between TTC and ATC programs in their production of undergraduate majors for teachers teaching Grades 4 - 12. As illustrated in Figure 25, for this sample TTC programs were more likely than ATC programs to bring in Grade 4-12 teachers with an undergraduate degree in mathematics or language arts/social studies degrees whereas ATC programs were more likely than TTC programs to bring in teachers who held a science degree.

Prior Career Experience. Results from this study is consistent with previous results that ATC programs are bringing in more teachers experienced in mathematics and science (Humphrey & Wechsler, 2005). On the contrary, the data as presented in Figures 8 and 25 suggest that ATC programs are not bringing in experienced mathematicians and scientists. Only 1% of both Humphrey and Wechsler's sample and this sample were former scientists. Only 3% to 4% of both samples were former engineers, mathematicians, or computer scientists. In both samples, alternatively certified teachers were more likely to have been full-time students or marked *other* as

their last full-time profession.

Research Question III

Do perceptions of preparedness and self-efficacy depend on classroom preparation, mentoring experience, prior classroom experience, or entrance and exit qualifications?

The four factors linked to perceptions of preparedness and the two factors linked to self-efficacy were used as dependent variables to determine if teachers' preparedness depended upon (a) classroom preparation, (b) mentoring experience and (c) entrance qualifications. The analysis for the question was conducted with the inclusion of all teachers and then conducted on only alternatively certified teachers.

Question III for All Teachers. For initially certified teachers, canonical correlation results presented in Table 30 show results for the three functions found to be statistically significant. The results of Function I indicate that the factors Promoting Student Learning, Teaching Critical Thinking, and Understanding Learners are related most strongly to novice teachers having no prior classroom experience and five of the nine program components: (a) curriculum design, (b) lessons, (c) evaluations and assessments, (d) multi-diversity, and (e) TEKS. These variables share 14.30% of the variance in Function I. The factors that share the majority of the variance in Function I are Promoting Student Learning, which shares 96.63% of the variance; Teaching Critical Thinking and Social Development/Developing Instructional Leadership, which shares 80.64% of the variance; and Understanding Learners, which shares 62.88% of the variance. Therefore, no prior classroom experience and the five program components

mentioned above are most predictive in a novice teacher's perceptions of preparedness on (a) Promoting Student Learning, (b) Teaching Critical Thinking and Social Development/Developing Instructional Leadership, and (c) Understanding Learners.

The results of Function II indicate that the factors of Personal Teaching Efficacy and Understanding Learners are related most strongly to program mentoring experience and student teaching. These two variables share 5.60% of the variance in Function II. The factors that share the majority of the variance in Function II are Personal Teaching Efficacy, which shares 27.04% of the variance; and Understanding Learners, which shares 20.79% of the variance of Function II. Therefore, program mentoring experience and student teaching are most predictive of a teacher's Personal Teaching Efficacy and his or her ability to understand learners.

Field-based experience shares 3.70% of the variance in Function III. The factor that shares the majority of the variance in Function III is the Personal Teaching Efficacy, which shares 21.72% of the variance. Therefore, field-based experience is predictive of a teacher's Personal Teaching Efficacy regardless of certification route.

Question III for ATC Teachers. Canonical correlation results presented in Table 31 show results for the function that was found to be significant. The perceptions of preparedness factors that share the majority of the variance in Function I are Promoting Student Learning, which shares 92.74% of the variance; Understanding Learners, which shares 89.87% of the variance; and Teaching Critical Thinking and Social Development/Developing Instructional Leadership, which shares 69.06% of the variance. Therefore, when limited to alternatively certified teachers, Promoting Student

Learning, Teaching Critical Thinking and Social Development/Developing Instructional Leadership, and Understanding Learners were best predicted by having no prior classroom experience and by four of the nine instructional components of the program: a) evaluations and assessments, b) lessons, c) Professional Development and Appraisal System (PDAS), and d) Texas Essential Knowledge and Skills (TEKS). Multi-diversity and curriculum design contributed to these factors, but not as much as the previous four instructional components.

Regardless of route, Promoting Student Learning, Critical Thinking and Understanding Learners were most predicted by having no prior classroom experience and by whether or not their programs covered (a) curriculum design, (b) multi-diversity, (c) lessons, (d) evaluations and assessments, and (e) TEKS. Alternatively certified teachers also tended to need their program to include PDAS training. For all teachers, Personal Teaching Efficacy and Understanding Learners were most strongly related to program mentoring experience and student teaching. Because the majority of TC teachers received no program mentoring experience and AC teachers received no student teaching, this result suggests that program mentoring is helping AC teachers feel better about their own ability to make a difference in the classroom and teaching them to feel better prepared to understand learners, while traditionally certified teachers are obtaining these skills during their student teaching.

Research Question IV

Does Overall Preparedness depend on classroom preparation, components of the program, mentoring experience, entrance and exit qualifications, or practice teaching?

Does Overall Preparedness depend on ATC teachers' prior career experience?

Fifteen percent of variance in overall preparedness was predicted by the 21 independent variables used in the present study. Results presented in Table 32 suggest that the likelihood a teacher would feel prepared was predicted most by having prior classroom experience or by participating in a program that contained the following components: (a) curriculum design, (b) lessons, (c) evaluations and assessments, (d) TEKS, (e) multi-diversity, and (f) classroom management. The following variables had structure coefficients ranging from .360 to .391 suggesting they contributed to a teacher's Overall Preparedness: (a) classroom observations, (b) school district mentoring, (c) substitute teaching experience, and (d) field-based experience.

When limited to alternatively certified teachers, 15% of variance in Overall Preparedness of AC teachers was predicted by the 25 independent variables used in the present study. Results presented in Table 33 suggest the likelihood an AC teacher would feel prepared was predicted most by their school district mentoring experience and whether or not they had substituted and conducted observations prior to entering the classroom as well as by the following program components: (a) lessons (b) curriculum design, and (c) evaluations and assessments. All nine of the instruction components had structure coefficients greater than .335.

Comparisons between all teachers and AC teachers are presented in Table 43. Compared to TC teachers, prior classroom experience, classroom observations, and school district mentoring experience were more important in predicting AC teachers' perceptions of overall preparedness. Regardless of certification route, prior classroom

experience and course instruction contributed to a teacher's perception of overall preparedness.

Table 43

Variables Contributing Most to Overall Preparedness by Certification

Variables	ATC Teachers R^2 =15.0%		All Teachers R^2 = 14.8%
School District Mentor	X**		X*
Program Mentor			
No Prior Experience	X**		X*
Substitute	X**		
Teacher's Aid			
Student Teaching			X*
Field-Based Experience			X*
Instruction Methods			
Classroom Management			X**
Curriculum Design	X**		X***
Multi-diversity		X*	X**
Evaluations & Assessments	X**		X***
Lessons	X**		X***
Observations	X**		X*
PDAS			
TEKS	X*		X**

Note. **X*** indicates structure coefficients were greater than .50, **X**** indicates structure coefficients were greater than .40, and **X*** indicates structure coefficients were greater than .35.

Research Question V

Does a teacher's commitment to teaching depend on classroom preparation (i.e., experience with lesson plans, pedagogical preparation, and field experience)?

Results from this study suggest that a teacher's commitment to teaching did not pertain to prior classroom experience or components of a program.

Research Question VI

Do differences exist between teachers with different degrees or between teachers who teach at different grade bands?

Comparing certification routes is further complicated by varying content and student ages. Teachers may require different training needs and experiences according to the specific needs of a teaching field and level. Therefore, differences regardless of route were examined between undergraduate majors and between teaching levels.

Differences Between Undergraduate Majors. Statistically significant differences existed on Overall Preparedness and on perceptions of preparedness by undergraduate major as presented in Table 34 and Figures 26, 27, and 28. Descriptive discriminant analysis results presented in Table 34 suggest differences existed on variables linked to (a) developing curriculum that builds on students' experiences, (b) creating a multicultural curriculum, (c) understanding how cultural backgrounds influence learning, (d) engaging students in group work, (e) using effective communication strategies, and (e) encouraging students to understand ideas from diverse prospectives. Language arts/social science majors felt better prepared than other majors at using effective communication. Science majors, followed by language arts/social studies

majors, felt best prepared to encourage and engage students in different learning environments. Mathematics majors felt the least prepared to use effective communication, to plan and develop curriculum, and to understand influences of cultural backgrounds.

Figure 29 presents boxplot comparisons illustrating the variance between teachers with different undergraduate majors differing on their reasons for entering the teaching profession. The data suggest that science majors were more likely than other undergraduate majors to enter teaching because of job dissatisfaction. Statistically significant differences in undergraduate majors also existed on the amount of student teaching, with mathematics majors more likely than science majors to have experienced student teaching. Differences in science majors might be explained by the high percentage of science majors (77%) in this sample who entered through ATC programs.

Differences Between Teaching Levels. In this sample, statistically significant differences did not exist on Overall Preparedness among elementary, middle school, or high school teachers, but statistically significant differences did exist on perceptions of preparedness and self-efficacy with moderate effect sizes. Descriptive discriminant analysis results presented in Table 35 suggest differences existed on variables linked to (a) understanding how different students in your classroom are learning, (b) choosing teaching strategies to meet different student needs, and (c) identifying and addressing special learning needs and/or difficulties. Differences in teachers' perceptions of their abilities to meet different student needs and address special learning appear to be attributed to teachers certified at all levels. Because most teachers who teach at all levels

tend to be certified in kinesiology, special education, bilingual education, music, or art, these results were not surprising.

Table 35 presents differences that exist on variables linked to Teaching Efficacy and variables linked to Personal Teaching Efficacy that relate to the teacher's ability to teach all students. Figure 30 illustrates how middle school and high school teachers were more apt to believe students fail because they do not apply themselves. Elementary school teachers were the least likely to believe students' peers had more influence than the teacher did.

Ancillary Questions

Relationship Between Overall Preparedness and Age of AC Teachers. Proponents of alternative certification believe ATC programs bring in more mature individuals with prior work experience. If this is so, work experience should contribute to their classroom expertise and these programs should be successful for mature individuals. No statistically significant relationship existed for alternatively certified teachers on Overall Preparedness and prior career experience. One explanation may be that some novice teachers may have been employed in their previous career for a short length of time. Because longevity in prior career experience was not obtained, the relationship between age and preparedness was investigated. In this sample, statistically significant differences existed between Overall Preparedness and age of ATC teachers. Post-hoc tests indicated differences between teachers younger than 30 and teachers older than 40 with the more mature teachers feeling better prepared. This suggests that age and possibly prior career experience, when longevity is considered, are determining variables

in ATC teachers' sense of Overall Preparedness.

When restricted to ATC teachers 40 or older, statistically significant differences existed by prior career experience on Overall Preparedness and Technology. Former administrators, customer service employees, and scientists felt best prepared to use technology, with all groups feeling above average. These results suggest that if teachers are in a prior career long enough to master their field of expertise, prior career experience may play a role in Overall Preparedness and their ability to use technology.

Relationship of Mentoring Experience to Overall Preparedness by Grade Level. Regression results suggest that the role mentoring plays in overall effectiveness may differ by teaching grade bands. Results suggest that school district mentoring is more of a predictor for Overall Preparedness for high school teachers than for elementary or middle school teachers. While mentoring did contribute to Overall Preparedness for elementary and high school teachers, mentoring did not contribute a statistically significant amount to middle school teachers' preparedness as illustrated in Tables 37 – 38 and Figure 31. Therefore, unlike middle school teachers, the likelihood that a high school or elementary teacher would feel prepared was predicted most by school district mentoring experience.

Relationship of Program Components to Overall Preparedness by Grade Level. To determine if other mediating factors were playing a role in Overall Preparedness by grade bands, regressions were conducted by grade level for program components. Table 44 presents variables contributing to Overall Preparedness by certification route. Teachers certified at multiple levels were removed from the analysis. Of the 449

elementary teachers in this sample, 43% (191) were certified through TTC programs, 57% (257) through ATC programs. Of the 175 middle school teachers in this sample, 23% (41) were certified through TTC programs and 77% (134) through ATC programs. Of the 312 high school teachers in this sample, 22% (69) were certified through TTC programs, 76% (226) through ATC programs, and 2% (7) did not indicate their certification route.

Elementary Teachers. Program components predicted 20% of the variance in Overall Preparedness of elementary teachers. Results presented in Table 39 suggest that elementary teachers who had prior classroom experience had a better sense of Overall Preparedness than teachers with no prior classroom experience. Also, elementary school teachers who participated in programs that included instruction on lessons, evaluations and assessments, curriculum design, and TEKS felt better prepared than teachers who were not exposed to these topics.

Middle School Teachers. Program components predicted 18% of the variance in Overall Preparedness of middle school teachers. Results presented in Table 40 suggest that middle school teachers who had prior classroom experience had a better sense of overall preparedness than teachers with no prior classroom experience. Also, middle school teachers who participated in programs that included instruction on multi-diversity, evaluations and assessments, and curriculum design felt better prepared than teachers who were not exposed to these topics.

High School Teachers. Program components and prior classroom experience predicted 16% of the variance in overall preparedness of high school teachers. Results

presented in Table 41 suggest that high school teachers who had prior classroom experience, especially in the form of field-based or substitute experience, had a better sense of overall preparedness than teachers with no prior classroom experience. Also, high school teachers who participated in a program that included instruction on lessons, curriculum design, classroom management, evaluations and assessments, and TEKS felt better prepared than teachers who were not exposed to these topics.

Table 44

Variables Contributing Most to Overall Preparedness by Certification Level

Variables	Elementary R^2 = 20.0%	Middle R^2 = 18.3%	High School R^2 = 16.0%
No Prior Experience	X**	X*	X**
Substitute			X**
Teacher's Aid	X*		
Student Teaching	X*		
Field-Based Experience			X**
Instruction Methods			X*
Classroom Management			X***
Curriculum Design	X***	X*	X***
Multi-diversity	X*	X***	
Evaluations & Assessments	X***	X*	X**
Lessons	X***		X***
Observations			X**
PDAS			
TEKS	X***	X*	X**

Note. **X*** indicates structure coefficients were greater than .50, **X**** indicates structure coefficients were greater than .40, and **X*** indicates structure coefficients were greater than .35.

Summary

Results from this study suggest that ATC programs are somewhat diversifying the teaching population by bringing in more African Americans, older teachers, and more science majors, while at the same time allowing younger individuals to forgo the

traditional route. Alternative certification programs do appear to be bringing in only slightly more males but do appear to be bringing in males who are more committed to teaching than are males entering through traditional programs (i.e., retaining more males in the teaching profession).

Many believe ATC programs are an avenue to alleviate teacher shortages and bring in people with real-world experience (Cox, Matthews, & Assoc, 2001; Hallinan & Khmelkov, 2001). Results from this study suggest ATC programs are succeeding at neither of these goals. In reality, while the number of teachers certified through ATC programs has increased, the teacher shortage has not been alleviated. After evaluating all of the evidence, Fuller (2002) hypothesized an approximate teacher shortage of 45,000 for the 2001-2002 academic years, which was approximately a 5,000 increase over the previous year. Despite the increase in ATC teachers, the growth is not keeping up with the increased need of teachers. From 2002 to 2004, approximately the same number of Texas teaching certificates was issued with an increase of 4,500 of these certificates being issued by alternative teacher certification programs. Even though the number of certificates remained close to the same, the number of beginning Texas teachers increased from 17,550 in 2002 to 20,528 in 2003 with the number of TC teachers remaining relatively constant from 2002 – 2003 and more likely AC teachers to obtain multiple certificates (Herbert, 2004). These state reports suggest that alternative certification programs may be deterring teaching candidates from entering traditional programs.

Results from the present study suggest that a higher percentage of teachers

graduating from ATC programs imply a higher percentage of possibly less effective novice teachers placed into classrooms. Therefore, ATC programs are helping alleviate the teacher shortage but only minimally and possibly hindering the growth in TTC programs whose numbers have remained relatively constant. In 2002, only 290,000 of the 420,000 Texas individuals holding teaching certificates were employed in Texas public schools (Herbert & Ramsay, 2004). Therefore instead of creating more avenues for teachers to enter teaching, the real solution to alleviating teacher shortages may be determining how to encourage the existing teaching pool to enter the teaching field and how to retain the current teaching population.

In addition, the results from the present study support previous research and conclude ATC programs are not bringing into the classroom experienced scientists, mathematicians, or engineers with real-world experience (Humphrey & Wechsler, 2005). In Humphrey and Wechsler only 1% of ATC teachers had been scientists and 4% had been mathematicians, engineers, or computer scientists compared to 1% and 3% in this study. In both studies, 18% of AC teachers were students.

At first, prior career experience did not seem to play a role in overall preparedness, but further investigations suggest that the age of the teacher and the length of his or her former job may be a determining factor in an alternatively certified teacher's sense of preparedness. Regardless of previous career experience, AC teachers over 40 felt better prepared than teachers younger than 30 and teachers over 40 who came from specific professions felt more prepared to use technology. These results suggest that more mature teachers were able to contribute life experiences and that

scientists, administrators, and customer service employees were able to contribute expertise from their field experience to the classroom.

Regardless of certification route, differences existed between majors. Science majors differed from other majors in that, even though the primary reason for entering for the majority of science majors was to fulfill a desire to teach or work with children, science majors were more likely than other majors to enter teaching because of job dissatisfaction (24%). A perplexing observation was that, regardless of certification route, mathematics majors felt less prepared than other majors on several variables. This result is even more puzzling when considering that the majority of the mathematics majors in this sample (60%) entered through traditional routes. Mathematics majors felt the least prepared to use effective communication, to plan and develop curriculum, and to understand influences of cultural backgrounds. Therefore, the concern becomes not only how to address the preparedness of mathematics majors entering through alternative routes, but also how better to prepare mathematics majors regardless of route.

Prior classroom experience contributed to a teacher's perception of preparedness and self-efficacy. The fact that 21% of TC teachers in this sample indicated they had no prior classroom experience is disturbing. Regardless of certification route, science majors fared worse than other majors with 18% indicating no prior classroom experience. This result can be explained by the large percentage of science majors in this sample who entered through alternative programs.

Various factors have been attributed to improving student achievement (Darling-Hammond, 2000; Goldhaber, 2002). While teacher certification programs can not

address variables such as class size and staff to teacher ratios, they can address teachers' content knowledge, pedagogical background, mentoring experience, and teaching efficacy. A circular dependence of these variables with classroom management and field experience reinforces the importance of assessing all of these components when evaluating novice teachers' perceptions of preparedness (Gordon, 2001; Ross, 1995).

In the present study, instructional components and mentoring experience predicted a teacher's perceptions of preparedness and self-efficacy. The necessity of these components and experiences differed by grade bands and certification route. As was *not* anticipated, AC teachers received a more positive school district mentoring experience than TC teachers. These differences warrant further examination. Reasons for these differences might be attributed to mismatches between the mentor and mentee in teaching methods, content knowledge, or teaching level. Another explanation may be that school districts anticipate TC teachers to be more self-sufficient than AC teachers. Regardless of route, research has shown that mentoring is important and educators have advocated the tool of mentoring for over a 100 years (Holloway, 2003; McCord & Bowden, 2003; NEA, 1983; Wilson, et al., 2001).

While mentoring is important, mentoring is not a "fix all" solution. The mentoring component needs to be established so that the mentor is not a person of authority for the novice teacher (i.e., their supervisor). The mentor and mentee must also be placed so that they can meet when the need arises (Ganser, 1999). While research has indicated that ATC programs understand the value of mentoring, results have also suggested that ATC programs have exerted little effort in controlling their teacher's

mentoring experience (Humphrey & Wechsler, 2005). While this study did indicate that teachers from the majority of ATC entities (i.e., regional service centers, for-profit agencies, etc.) received positive mentoring experiences, further research needs to be conducted to determine if these mentoring experiences were uniform within programs.

The data support the conclusions by Darling-Hammond that TC teachers feel better prepared than AC teachers, although these differences were small and on a select number of items. These differences might be explained by positive mentoring experiences of AC teachers, as was suggested by Pituch and Miller (1999). The largest differences were on (a) planning instruction by using knowledge of learning subject matter, curriculum, and student development, (b) encouraging students to understand ideas from diverse perspectives, (c) teaching subject matter concepts in ways that enable students to learn, and (d) developing curriculum that builds on students' experiences. Differences also existed between certification routes on reasons for entering the teaching profession. While a high percentage of both groups entered based on a desire to work with children or to fulfill a desire to teach, alternatively certified teachers were more likely than traditionally certified teachers to enter teaching because of retirement, job dissatisfaction, company reorganization, change in marital status, or other reasons.

In addition, the data support the notion that not only do the needs of AC teachers vary from those of TC teachers, but also the needs of teachers vary across grade bands and teaching fields regardless of certification route. While school district mentoring did not contribute much to Overall Preparedness for middle school teachers, mentoring experiences did contribute to elementary and high school teachers with high school

teachers requiring more prior experience in the classroom than middle school teachers. These differences by grade bands occurred despite the fact that a large percentage of both middle and high school teachers were certified through ATC programs.

The discussion of whether or not ATC programs should exist should now be replaced with a discussion of how to ensure that these programs produce better teachers and improve student learning. If learning to teach with a variety of learning styles is not addressed during all types of teacher preparation, as well as through continued mentoring and professional growth, teachers will continue to teach in the manner in which they were taught and teacher certification programs will not fulfill their goal of creating effective teachers who give all students the opportunity to learn.

The underlying theme from the present study was that, in order to feel prepared and have high self-efficacy, novice teachers needed instruction in the majority of the components identified by research and by the National Commission on Teaching and America's Future (1996), including positive mentoring experiences, field based experiences, and curriculum based on child development, learning theory, cognition, motivation, and subject matter pedagogy. Results from the present study support the assertion that teacher preparation programs, mentoring experiences, and field-based experiences do impact teacher effectiveness in the classroom.

Future Research

Based on findings from the present study, the role effective mentoring plays in teachers' overall preparedness should be examined further. Investigations should focus on determining why traditionally certified teachers are having less positive mentoring

experiences than alternatively certified teachers are having.

The present study suggests that teachers from various certification routes and different programs teaching various subjects at different grade bands require varying modes of preparation and levels of preparation. Further research should be conducted on the different needs of these teachers on these factors by grade level, by teaching field, and by certification route.

Results of the present study also supported the notion that variations exist between programs. Future research should build upon previous research findings from Darling-Hammond et al. (2002) and NCTAF (1996) to determine program characteristics that produce teachers who are highly qualified.

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APPENDIX A

As a teacher within your first three years of teaching, you have been selected to participate in a research study. The research study has been approved by the Name Independent School District.

The study is designed to investigate (1) teacher's beliefs on how his/her efforts have a positive impact on student achievement and (2) teacher's level of preparedness by certification route. Participation involves completing an online survey. The survey is anonymous, voluntary, and will only take about 20 minutes.

To participate, type the following link in the web address box and complete the online survey.

http://mathed.tamu.edu/districtsurvey

Your participation is greatly appreciated.

Linda Zientek

APPENDIX B
Teacher's Informed Consent Form for Administering Instrument

Developing an Assessment Instrument to measure
Characteristics of Alternative and Traditional Certification Candidates.

The purpose of the study:
I understand that the purpose of the study is to compare and contrast beginner teacher's sense of self-efficacy and how well prepared they feel to enter the classroom by various certification pathways and program characteristics. I agree to participate as a beginner teacher, in the following activity during the spring and summer of 2005 by completing an online survey. The survey will take approximately 20 minutes and approximately 5,000 teachers are being requested to participate.

I understand that:

1. My participation is strictly voluntary. I have the right to refuse to answer any questions that make me feel uncomfortable.
2. Texas A&M researchers will not evaluate or supervise me while I am participating in this study. The information gathered will not affect my job performance, evaluation, or any other aspect of employment.
3. The information gathered will be anonymous and no information will be gathered about me. My name, the name of the school, and other identifying factors will not appear in reports or any publication of the data or results.
4. I may opt out of the project at any time and for any reason I deem necessary with no repercussions.

"This research study has been reviewed and approved by the Institutional Review Board-Human Subject in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, the Institutional Review Board may be contacted through Ms. Angelia M. Raines, Director of Research Compliance, Office of Vice President for Research, araines@vprmail.tamu.edu at (979) 845-4067."

I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study. I have been given a copy of this consent form.

I ____ do/ ____ do not agree to participate. (Please, return to survey page and check one.)

If you have any questions or concerns, please contact:

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APPENDIX C

School District Information

N Teachers Completed the Survey

Check **ALL** the following topics **INCLUDED** in your **Certification Program:**

_% Instruction Methods
_% Classroom Management
_% Curriculum Design
_% Multicultural/Diversity
_% Evaluation and Assessment
_% Developing Lessons Plans
_% Classroom Observations
_% PDAS
_% TEKS

Mentor Effectiveness Mean SD

Teacher Rating	Frequency	Percent
1		
2		
3		
4		
5		
6		

The following results are on a scale from 1-6

PART II.

Self-Efficacy	**All Teachers**	
	Mean	**SD**
If I try hard I can get through to almost all of my students.		
I am confident in my ability to handle most discipline problems that may arise in my classroom.		
Students fail because they do not apply themselves.		
My students' peers have more influence on motivation and performance than I do.		
I am confident in my ability to teach all students to high levels.		
I am confident I am making a difference in the lives of my students.		
I am uncertain how to teach some of my students.		
I am confident of my ability to integrate information technology into my students' learning.		
Most of a student's experience depends on the home environment, so teachers can have little influence.		

PART III. PROFESSIONAL KNOWLEDGE & SKILLS.

When you first started teaching, how well prepared did you feel to do the following:

	All Teachers (N=)		Traditionally Certified Teachers (N=)		Alternatively Certified Teachers (N=)	
	Mean	SD	Mean	SD	Mean	SD
Promote Student Learning						
Teach subject matter concepts, knowledge, and skills in ways that enable students to learn.						
Understand how different students in your classroom are learning.						
Set challenging and appropriate expectations of learning and performance for students.						
Help all students achieve high academic standards.						
Develop curriculum that builds on students' experiences, interests, and abilities.						
Evaluate curriculum materials for their usefulness and appropriateness for your students.						
Create discipline-based and interdisciplinary curriculum.						
Identify and obtain materials and use community resources to create a multicultural curriculum.						
Use instructional strategies that promote active student learning.						
Choose teaching strategies to meet different student needs.						
Plan instruction by using knowledge of learning subject matter, curriculum, and student development						
Use a variety of assessments (e.g., observation, portfolios, tests, performance tasks, anecdotal records) to determine students' strengths, needs, and programs.						
Help students learn how to assess their own learning.						

	All Teachers (N=)		Traditionally Certified Teachers (N=)		Alternatively Certified Teachers (N=)	
	Mean	SD	Mean	SD	Mean	SD
Understand Learners						
Understand how students' social, emotional, physical, and cognitive development influences learning.						
Understand how students' family and cultural backgrounds may influence learning.						
Identify and address special learning needs and/or difficulties.						
Understand how factors in the students' environment outside of school may influence their life and learning.						
Work with parents and families to better understand students and to support their learning.						
Critical Thinking						
Help students become self-motivated and self-directed.						
Develop a classroom environment that promotes social development and group responsibility.						
Develop students' questioning and discussion skills.						
Engage students in cooperative group work as well as independent learning.						
Use effective verbal and nonverbal communication strategies to guide student learning and behavior.						
Use questions to stimulate different kinds of student learning.						
Help students learn to think critically and solve problems.						
Encourage students to see, question, and interpret ideas from diverse perspectives.						
Instructional Leadership						
Resolve interpersonal conflict in the classroom.						
Maintain an orderly and purposeful learning environment.						

	All Teachers (N=)		Traditionally Certified Teachers (N=)		Alternatively Certified Teachers (N=)	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Plan and solve problems with colleagues.						
Assume leadership responsibilities in your school.						
How well prepared did you feel you were to use TECHNOLOGY to do the following:						
Increase student interest and learning.						
Support students' research and analysis (i.e., accessing the Internet).						
Assess and track student achievement.						
Communicate with others (in school, city, state, country, and world).						
Enhance group collaboration and teamwork.						
Overall, how well prepared did you feel when you first started teaching?						

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APPENDIX D

Characteristics of Teacher Candidates

Thank you for participating in the survey. The survey contains three parts.

PART I. PLEASE TELL US SOME THINGS ABOUT YOURSELF AND YOUR TEACHING EXPERIENCE

Age_____ **Ethnicity**_____

Last full-time profession

_____

Gender

☐ Female ☐ Male

Are you teaching in your teaching field (i.e., area of certification)? (Y or N)
What subjects are you teaching?

Number of years teaching:

☐One ☐ Two ☐ Three ☐ Four ☐ Five or more

Highest Degree Obtained:

☐Bachelors ☐ Masters ☐ Doctorate ☐ Other

Undergraduate Major:

☐ Mathematics ☐ Science ☐ Language Arts & Social ☐ Other_____

Level of Certification:

☐ Elementary/Early Childhood ☐ Middle ☐ Secondary

Estimate number of **university credit hours** in **teaching field**_____

Information about your Program:

Did you **earn** your **certification** as part of an **undergraduate degree?**

☐ Yes ☐ No

Where was your **certification** obtained?

☐ University ☐ School District ☐ For Profit Provider

☐ Community College ☐ Other, please specify_____

The **name** of the **Program** through which you received your **certification:**

_____

Estimated **Length** of **Certification Program**

Start Date _____ End Date_____

Check **ALL Course Completion Requirements** required to **Successfully Complete** the **Certification Program:**

☐ Attendance ☐ Exams ☐ Papers ☐ Other, please explain_____

How much of the program was completed PRIOR to taking classroom teaching responsibility?

☐ 0-2 weeks ☐ 3 –4 weeks ☐ 5 – 8 weeks ☐ 3 months ☐ 4-6 months ☐ 6-9 months ☐ 9-12 months ☐ >1 year

What **portion** of your **COURSES** in your **Certification Program** were offered **ONLINE?**

☐ None ☐ Part ☐ All

Check **ALL** the **PREREQUISITES** to **enter** your **Certification Program**

☐ Interview ☐ GPA ☐ GRE/SAT ☐ Other: Please specify_____

Check **ALL** the following topics **INCLUDED** in your **Certification Program:**

☐ Instruction Methods ☐ Classroom Management ☐ Curriculum Design

☐ Multicultural/Diversity ☐ Evaluation and Assessment ☐ Developing Lessons Plans

☐ Classroom Observations ☐ PDAS ☐ TEKS

Name of your **School District**________

During your FIRST YEAR of teaching, did you have a MENTOR at YOUR SCHOOL DISTRICT?

☐ Yes ☐ No

IF YES, answer 1-6

1. Estimate **how often** you met with your mentor during the **first semester**:

☐ None ☐ Daily ☐ Weekly ☐ Three ☐ Monthly

2. Estimated **length** of meetings:

☐ 1/2 hour ☐ 1-hour ☐ 2 hours

3. Was the mentor in your **teaching field**?

☐ Yes ☐ No

4. Has your mentor observed you in the classroom?

☐ Yes ☐ No

5. Have you observed fellow teachers in the classroom during your first year of teaching?

☐Yes ☐ No

6. Did you find your **mentor relationship** to be **effective**?

Not Effective 1 2 3 4 5 6 Effective

During your FIRST YEAR of teaching, did you have a MENTOR from YOUR CERTIFICATION PROGRAM?

☐ Yes ☐ No

IF YES, answer 1-4:

1. Estimate how many **times** per **semester** you met with your **mentor**:

☐ None ☐ Once ☐ Twice ☐ Three ☐ Four ☐ Five or more

2. Was the **mentor** in your **content area**?

☐ Yes ☐ No

3. What **portion** of the time did you meet with your mentor **ONLINE**?

☐None ☐ Part ☐ All

4. Did you find your **mentor relationship** to be **effective**?

Not Effective 1 2 3 4 5 6 Effective

Prior to entering **teaching**, check **ALL** your **experiences** in the **classroom:**

☐ None ☐ substitute teaching ☐teacher's aid ☐Student Teaching
☐field-based experience ☐ other_____

Items on plans to remain in teaching were from Shen's (1997) article.
I plan to teach:
☐ As long as I am able to
☐ Until I am eligible for retirement
☐ Will probably continue unless something better comes
☐ Definitely plan to leave teaching as soon as I can
☐ Other-

Please mark **ALL** the **reasons** you **entered** the **teaching profession.**

☐ Desire to work with K-12 children ☐ Fulfilling a desire to teach
☐ Retirement from former job ☐ Job Dissatisfaction
☐ Outsource or company reorganization ☐ Change in Marital Status
☐ Other,_____

PART II.

REFLECTING ON YOUR CLASSROOM EXPERIENCES, PLEASE GIVE US YOUR VIEWS

ON THE FOLLOWING: Circle the **number** that **best** represents your response.

1. If I try hard I can get through to almost all of my students.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree
2. I am confident in my ability to handle most discipline problems that may arise in my classroom.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree
3. Students fail because they do not apply themselves.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree
4. My students' peers have more influence on motivation and performance than I do.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree

5. I am confident in my ability to teach all students to high levels.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree
6. I am confident I am making a difference in the lives of my students.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree
7. I am uncertain how to teach some of my students.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree
8. I am confident of my ability to integrate information technology into my students' learning.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree
9. Most of a student's experience depends on the home environment, so teachers can have little influence.
Strongly Disagree 1 2 3 4 5 6 Strongly Agree

PART III. PROFESSIONAL KNOWLEDGE & SKILLS.
When you first started teaching, how well prepared did you feel to do the following:
1. Teach subject matter concepts, knowledge, and skills in ways that enable students to learn.
Unprepared 1 2 3 4 5 6 Prepared
2. Understand how different students in your classroom are learning.
Unprepared 1 2 3 4 5 6 Prepared
3. Set challenging and appropriate expectations of learning and performance for students.
Unprepared 1 2 3 4 5 6 Prepared
4. Help all students achieve high academic standards.
Unprepared 1 2 3 4 5 6 Prepared
5. Develop curriculum that builds on students' experiences, interests, and abilities.
Unprepared 1 2 3 4 5 6 Prepared
6. Evaluate curriculum materials for their usefulness and appropriateness for your students.
Unprepared 1 2 3 4 5 6 Prepared
7. Create discipline-based and interdisciplinary curriculum.
Unprepared 1 2 3 4 5 6 Prepared
8. Identify and obtain materials and use community resources to create a multicultural curriculum.
Unprepared 1 2 3 4 5 6 Prepared
9. Use instructional strategies that promote active student learning.
Unprepared 1 2 3 4 5 6 Prepared
10. Understand how students' social, emotional, physical, and cognitive development influences learning.
Unprepared 1 2 3 4 5 6 Prepared
11. Understand how students' family and cultural backgrounds may influence learning.
Unprepared 1 2 3 4 5 6 Prepared

12. Identify and address special learning needs and/or difficulties.
Unprepared 1 2 3 4 5 6 Prepared
13. Choose teaching strategies to meet different student needs.
Unprepared 1 2 3 4 5 6 Prepared
14. Help students become self-motivated and self-directed.
Unprepared 1 2 3 4 5 6 Prepared
15. Develop a classroom environment that promotes social development and group responsibility.
Unprepared 1 2 3 4 5 6 Prepared
16. Develop students' questioning and discussion skills.
Unprepared 1 2 3 4 5 6 Prepared
17. Engage students in cooperative group work as well as independent learning.
Unprepared 1 2 3 4 5 6 Prepared
18. Use effective verbal and nonverbal communication strategies to guide student learning and behavior.
Unprepared 1 2 3 4 5 6 Prepared
19. Use questions to stimulate different kinds of student learning.
Unprepared 1 2 3 4 5 6 Prepared
20. Help students learn to think critically and solve problems.
Unprepared 1 2 3 4 5 6 Prepared
21. Encourage students to see, question, and interpret ideas from diverse perspectives.
Unprepared 1 2 3 4 5 6 Prepared
22. Plan instruction by using knowledge of learning subject matter, curriculum, and student development.
Unprepared 1 2 3 4 5 6 Prepared
23. Understand how factors in the students' environment outside of school may influence their life and learning.
Unprepared 1 2 3 4 5 6 Prepared
24. Work with parents and families to better understand students and to support their learning.
Unprepared 1 2 3 4 5 6 Prepared
25. Use a variety of assessments (e.g., observation, portfolios, tests, performance tasks, anecdotal records) to determine students strengths, needs, and programs.
Unprepared 1 2 3 4 5 6 Prepared
26. Help students learn how to assess their own learning.
Unprepared 1 2 3 4 5 6 Prepared
27. Resolve interpersonal conflict in the classroom.
Unprepared 1 2 3 4 5 6 Prepared

28. Maintain an orderly and purposeful learning environment.
Unprepared 1 2 3 4 5 6 Prepared
29. Plan and solve problems with colleagues.
Unprepared 1 2 3 4 5 6 Prepared

30. Assume leadership responsibilities in your school.
Unprepared 1 2 3 4 5 6 Prepared

How well prepared did you feel you were to use TECHNOLOGY to do the following:

31. Increase student interest and learning.
Unprepared 1 2 3 4 5 6 Prepared
32. Support students' research and analysis (i.e., accessing the Internet).
Unprepared 1 2 3 4 5 6 Prepared
33. Assess and track student achievement.
Unprepared 1 2 3 4 5 6 Prepared
34. Communicate with others (in school, city, state, country, and world).
Unprepared 1 2 3 4 5 6 Prepared
35. Enhance group collaboration and teamwork.
Unprepared 1 2 3 4 5 6 Prepared
36. Overall, how well prepared did you feel when you first started teaching?
Unprepared 1 2 3 4 5 6 Prepared

Thank you for participating in the survey.

VITA

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EDUCATION

Ph.D., **Texas A&M University**, 2006 - College Station, Texas
Curriculum and Instruction
M.S., **Sam Houston State University**, 1997
Mathematics
B.S., **Sam Houston State University**, 1995
Mathematics

EXPERIENCE

1997 – 2006 Mathematics Instructor, **Blinn College,** Brenham, Texas
1996 – 1997 Teaching Assistant, **Sam Houston State University**, Huntsville, Texas

SELECTED PUBLICATIONS

Zientek, L. R., Kadhi, T. G., & Capraro, R. M. (2005). Alternative certification programs analysis. *Academic Exchange Quarterly*, *9*, 121-125.

Zientek, L. R., & Thompson, B. (in press). Applying the bootstrap to the multivariate case: Bootstrap factor analysis. *Behavior Research Methods.*

SELECTED PAPERS SUBMITTED FOR PUBLICATION

Zientek, L. R., & Thompson, B. (2006). Commonality analysis: Partitioning variance to facilitate better understanding of data. Paper presented at the annual meeting of the Southwest Educational Research Association, Dallas, TX.

Carter, T. A., Zientek, L. R., & Capraro, R. M. (2006). Preservice Teachers' Understanding of Probability and Statistics.

SELECTED PRESENTATIONS

Zientek, L. R., Capraro, R. M., & Capraro, M. M. (2006, April) How Do New Teachers Differ on Self-efficacy and Level of Preparedness by Certification Route? In L. R. Zientek (Chair), *Research Findings and Issues for Alternative Certification Routes and Influences of Recent Federal Legislation.* Symposium to be conducted at the annual meeting of the American Educational Research Association, San Francisco, CA.

Zientek, L. R., Kadhi, T. G., & Capraro, R. M. (2003, February). *Community college's expanding role in teacher preparation*. Paper presented at the annual meeting of the Association of Mathematics Teacher Educators, Atlanta GA.

Zientek, L. R. (2005) Bootstrap Factor Analysis. One-hour training session presented at the annual meeting of the Southwest Educational Research Association, New Orleans, LA.