EVALUATION OF THE IMPACT OF PARTICIPATION IN THE T.E.S.T. EXAMINATION PREPARATION PROGRAM ON ELEMENTARY EDUCATION TEACHER CANDIDATE C-BASE AND PRAXIS-II PERFORMANCE

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Doctor of Education

By

TIMOTHY J. WALL

Dr. Phillip E. Messner & Dr. Joyce A. Piveral, Dissertation Supervisors

AUGUST, 2008
The undersigned, appointed by the Dean of the Graduate School, have examined the dissertation entitled

EVALUATION OF THE IMPACT OF PARTICIPATION IN THE T.E.S.T. EXAMINATION PREPARATION PROGRAM ON ELEMENTARY EDUCATION TEACHER CANDIDATE C-BASE AND PRAXIS-II PERFORMANCE

Presented by Timothy J. Wall

A candidate for the degree of Doctor of Education

And hereby certify that in their opinion it is worthy of acceptance.

____________________________________
Dr. Phillip E. Messner, Chair

____________________________________
Dr. Joyce A. Piveral, Chair

____________________________________
Dr. Virgil L. Freeman, Member

____________________________________
Dr. Carolyn McCall, Member

____________________________________
Dr. David C. Oehler, Member
Dedication

This work is dedicated to two exceptional groups of people. First, I dedicate this work to my parents, Thomas Patrick Wall and Barbara Ann Wall. Their unswerving love and support has enabled me to recognize and (finally) begin to tap into and develop the reservoir of strength, talent, and perseverance that The Man Upstairs bestowed upon me. Mom and dad, I would not have completed this project without all your sacrifices, patience, and unconditional love. You provided me with more than any child could ever deserve, and I have become who I am because of your commitment. Pun not intended. I appreciate what you have done for me more than words can express.

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everything she attempts while developing the talents of those around her. Her
unparalleled work ethic is matched only by her knowledge and commitment to making
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thanks for all the support and prayers from Meg Han and Ben. Grandma Bella, you have
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EVALUATION OF THE IMPACT OF PARTICIPATION IN THE T.E.S.T. EXAMINATION PREPARATION PROGRAM ON ELEMENTARY EDUCATION TEACHER CANDIDATE C-BASE AND PRAXIS-II PERFORMANCE

Timothy J. Wall

Dr. Phillip E. Messner, Dr. Joyce A. Piveral, Dissertation Supervisors

Abstract

The purpose of this study was to evaluate the impact of participation in an examination preparation program for elementary education teacher candidates attempting to earn teacher licensure by passing the C-BASE and PRAXIS-II examinations. The measurements used in the study included teacher candidate initial scores on three exams, the ACT, C-BASE, and PRAXIS-II. The institution studied was a four-year, regional, public institution in Missouri with a large elementary education teacher education program. A research methodology employing quantitative statistical analysis, Correlation analysis and Multivariate Analysis of Covariance (MANCOVA) was utilized to investigate the impact of participation level in the T.E.S.T. (translate, eliminate, solve, avoid tricks) examination preparation program and qualification status for admittance to teacher education on C-BASE and PRAXIS-II scores.

Three independent variables were examined in this study: (a) participation level in T.E.S.T. examination preparation program, (b) teacher candidate qualification status for admittance to the education program, and (c) composite ACT scores, the covariate. The dependent variables in this study were C-BASE and PRAXIS-II scores, acquired from the archival teacher education data files at the institution studied.

Descriptive statistical analysis and MANCOVA revealed that teacher candidates who qualified for admittance to the teacher education program significantly outscored
non-qualifiers on the ACT, C-BASE and PRAXIS-II. PRAXIS-II scores for elementary
teacher candidates at the institution studied improved considerably from 1996-2007, but
MANCOVA analysis determined that participation in the *T.E.S.T.* examination
preparation program, although statistically significant, had low practicality and effect
size. Utilizing MANCOVA with ACT as a covariate, analyses determined the main
effects for independent variables were statistically significant and power was revealed to
be high. Effect size was minimal for main effects, and practicality was low. Very strong
correlations were found between and among ACT, C-BASE, and PRAXIS-II. There were
no significant interaction effects. This study found that at the institution studied from
1995-2007, elementary education teacher candidates participating in the *T.E.S.T.*
examination preparation program did not outperform non-participants on the C-BASE
and PRAXIS-II examinations when utilizing ACT scores as a covariate to hold constant
for time-bound teacher candidate population change in test score performance.
Chapter One: Introduction To The Study

This chapter will provide background information, clarify the rationale, briefly examine the conceptual underpinnings guiding the research, identify the problem statement and research questions, list the research hypotheses and limitations of the study, and define key terms to be utilized in this study.

The following study evaluated a standardized examination preparation intervention model designed to improve Elementary Education teacher candidate performance on two examinations, the C-BASE (College Basic Academic Subject Examination) and PRAXIS-II teacher knowledge licensure examination. The examination preparation model developed (the Translate, Eliminate, Solve, avoid Tricks T.E.S.T. model) is used to assist elementary education teacher candidates by improving their content knowledge, test-taking techniques, and self-confidence. This examination preparation model is offered to teacher candidates without cost at obligatory seminars at the institution studied. The T.E.S.T. model is offered in two distinct seminars, initial (Seminar II) and advanced (Seminar III). These seminars occur a few weeks to one month before teacher candidates usually attempt the C-BASE and PRAXIS-II during their sophomore and senior years, respectively.

Background

Consider the following scenario, which recounted an experience with a teacher candidate demonstrating the phenomenon of test anxiety, a common attribute of teacher
candidates at the institution studied. This conversation may represent a common occurrence for educational testing center directors and/or student services directors at teacher education programs in the United States, especially during student PRAXIS-II registration deadlines:

In March of 2001, a young man about twenty-one years old, John, entered the office of educational advisement and education testing. He was preparing to sign up for the PRAXIS-II, which evaluates content knowledge in his major, Elementary Education. I had seen him before. I recognized the student as a gregarious, ebullient young man who has many friends and normally exuded confidence and a sterling sense of humor. He acted much differently that day. Universally well-liked by teachers and teacher candidates at the institution, and perceived as a diligent and hard-working student who earns top grades in all his courses, John is visibly shaken as he approached the office to ask me a question. He resembled someone who just emerged from a car collision. John spoke so quietly that it was nearly impossible to hear his question, and when asked to repeat it he stammered uneasily and was unable to maintain eye contact. The student needed help filling out the standardized test packet, which contained dozens of questions that had to be filled out on several paper-and-number-2-pencil-only forms. The student was completely unable to focus on the litany of autobiographical questions about major selection and test numbers and prices. I asked him, “What’s on your mind today, you seem pretty stressed?” and he blurted out, “I guess today’s the last day to sign up for the next PRAXIS. I shouldn’t have waited so long but I hate how I feel about these things. I’ve always been terrible at standardized tests, and I just know I’m going to fail the PRAXIS. I have to pass it and I know it or I can’t get my certification (licensure) and I won’t teach. That pressure gets to me. I know if I don’t pass, I’ll never get a job, and all this work will amount to nothing.” I was surprised. Many students had taken and passed the PRAXIS-II before at our institution, and few, if any, were considered to be students as talented and bright as John. None had the innate, natural teaching ability and motivational skills that he did. Simply put, students in John’s practicum classes listened to him and learned from him. He was one of the best prospective teachers we had. It was unthinkable that he felt so down about his chances on a test. I tried to help him calm his nerves for a few minutes by boosting his confidence and recalling all his academic successes. After a few moments John successfully refocused on the registration questions (he knew the answers once he relaxed a bit and could think through them logically), he thanked me and reformulated into his usual self, ready to resume his smiling, effervescent personality. – 2001 Conversation with elementary education teacher candidate “John” (name changed for privacy).
The aforementioned student exhibited frustration and essentially resigned himself to failure on his licensure examination. I made a note to myself to remember the student’s name, as I did with five other students who exhibited symptoms of emotionality (Stober, 2004) and confusion similar to Csikszentmihalyi’s (1990) discussion of disorder or “psychic entropy” (p. 36). When the institution studied received the PRAXIS-II scores, all six students I had made note of had failed to earn the necessary score to earn licensure, despite success in their academic classes.

Upon reflection, the student demonstrated the physical and psychological symptoms of test anxiety (Spielberger & Vagg, 1995) and low self-efficacy (Bandura, 1997). John exhibited a strong negative reaction to test anxiety. Even in the relatively simple act of registering for the PRAXIS-II, John seemed trapped in an attitude of negativity, defined by an inability to invest the attention and strong focus required by high-stakes tests (Csikszentmihalyi, 1990). John’s personal history of prolonged negative experiences with standardized tests led to the physical and psychological trauma which he manifests as failure. Repeated test failures had created a situation in his mind resembling the classical definitions of test anxiety (Spielberger & Vagg, 1995). This mirrors Csikszentmihalyi’s (1990) description of a self that has “weakened the self to the point where it can no longer invest attention and pursue its goals,” or the condition known as psychic entropy (p. 36).

Emotionality and Examinations

John evidently dreaded taking high-stakes tests so much that he was unable to believe that his own knowledge and skills, despite academic success, were sufficient to pass a test that lesser students, as determined by grades and/or teaching performance,
could somehow pass. This is a classic manifestation of uncontrolled emotionality during evaluation or test anxiety, which can lead to behaviors like self-handicapping (Dweck & Eliot, 2005; Supon, 2004). The result of John’s emotionality and self-defeating behavior is the development of learned helplessness and poor attribution of success (Cohen & Spacapan, 1978; Dweck & Eliot, 2005). John believed that his repeated history of prior test failures would again determine the outcome of his PRAXIS-II examination, almost resigning himself to defeat by giving up mental control of his testing outcome similar to an athlete “psyching himself out,” resulting in negative thoughts and dread.

John’s procrastination, as evinced by registering for the exam on the final date, mirrors the “failure-avoidance” commonly associated with low-self efficacy (Bandura, 1994; Dweck & Eliot, 2005, p. 145). This study sought to evaluate a program whose goal is to improve teacher candidate performance on two stressful high-stakes examinations, the PRAXIS-II and the C-BASE. Both exams are required to earn licensure, and many students view them as hurdles and obstacles that intimidate instead of tasks that are able to be overcome through skill, preparation and study.

An Addendum to the introductory story: by 2002 students at the institution studied were required to attend test-preparation sessions to prepare for their C-BASE and PRAXIS-II licensure examinations. The mandatory sessions were tied to courses required in the elementary education major, and teacher candidates were required to attend the T.E.S.T. C-BASE and PRAXIS-II examination preparation seminars prior to taking the exams to receive credit for a portion of a grade in the courses.

However, despite anecdotal evidence and numerous very positive comments and thank-you letters from teacher candidates about the helpfulness of the T.E.S.T.
examination preparation sessions, the *T.E.S.T.* examination preparation program had not been formally evaluated since initiated. The *T.E.S.T.* program was developed as part of a support system approved by the teacher education program through the chief institutional policymaking body (Council on Teacher Education, 2001). This study evaluated the examination preparation program by comparing teacher candidate performance between and among participants and non-participants in the *T.E.S.T.* preparation model for the elementary education teacher candidates attempting the C-BASE and PRAXIS-II examinations.

*Conceptual Underpinnings for the Study*

The conceptual underpinnings for this study utilize research commonalities and threads based in key theories pertaining to research and practice. The study was informed by research from the literature pertaining to Csikszentmihalyi’s (1990) description of optimal experience and Bandura’s (1997) research on self-efficacy. Teacher candidates who lack self-efficacy do not exhibit the traits that allow them to perform at their best or “find their flow” and have “optimal experiences” (Bandura, 1997; Csikszentmihalyi, 1996). The *T.E.S.T.* examination preparation program evaluated in this study was designed to offer teacher candidates the content knowledge, test-wise strategies and confidence to improve self-efficacy and reduce test anxious symptoms in order to perform at their best, or “optimally” (Csikszentmihalyi, 1990, p. 3). The proposed research will also consider the phenomenon of optimal experience in conjunction with the historical background and contemporary setting of educational accountability and its’ accompanying phenomenon, high stakes testing. Using research on test-wise strategies and effectively designed and implemented exam-preparation models will allow the
researcher to evaluate the T.E.S.T. examination preparation program. The following figure reveals the alignment between the T.E.S.T. examination preparation program and essential frameworks and best practices in examination preparation.
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*Figure 1.* A table showing alignment and comparison of the initial and advanced *T.E.S.T.* model with components of valid and effective test preparation programs.
This study approaches the converging themes of the effects of examination preparation on Elementary Education teacher candidate licensure examinations and increasing accountability. This topic was originally studied by Taylor (1992) in his work on the effectiveness of an examination-preparation program and its effect upon Elementary Education National Teacher Examination (NTE) performance, ETS’ precursor to the Praxis-II Elementary Education: Curriculum, Instruction, and Assessment licensure examination used at the institution studied. While Taylor’s research was helpful in deciphering the phenomena of standardized test performance in teacher candidates, it was insufficient in terms of its conceptual underpinnings, as merely discussing accountability and increased required teacher licensure examinations does not account for the phenomena of teacher candidate performance, anxiety, and the proclivity of a particular segment of the population of teacher candidates who fail to perform at their best on licensure examinations such as C-BASE and PRAXIS-II.

Wakefield’s (2003) research on the effects of high-stakes standardized examination upon at-risk teacher candidates bridges the gap between Taylor’s (1992) research and the previously mentioned phenomenon. Furthermore, findings by Kohn (2000), Popham (2000), Perreault (2000) and Jones, Jones and Hargrove (2003) chronicle the existence of unintended consequences wrought by high-stakes standardized examinations and their consequences for teacher education. However, these do not account for the sense of terror and anxiety that Spielberger and Vagg (1995) describe in their research on test anxiety.

This study is informed by research on accountability to give context for the political environment leading to examinations, and is also informed by studies...
chronicling the adverse effects of low self-efficacy and anxiety on certain teacher candidates. The study undeniably benefits from research on the components of effective examination preparation programs and test-wiseness techniques and strategies, but these constructs are insufficient to fully explain the phenomenon of examination performance of teacher candidates on licensure examinations like the C-BASE and ACT. What ties these disparate constructs together is Csikszentmihalyi’s (1996) description of the construct of the Optimal Experience, of “finding flow,” which offers insight into the relationship between self-efficacy, content knowledge, skill and anxiety as a means to account for some variance in the performance of teacher candidates on the C-BASE and PRAXIS-II examinations. The construct of Optimal Experience from Csikszentmihalyi (1990) best addresses how teacher candidates can benefit from well-constructed examination preparation programs to attempt to increase their performance on licensure examinations.

Figures 2 and 3 are graphical representations that explain the phenomenon of interaction between test-taking ability, skill, and anxiety. The T.E.S.T. examination preparation program is built upon research revealing the presence of three important components within a successful test-taker: (a) strong content knowledge, (b) test-wiseness, and (c) self-efficacy and positive attitude. When taking an exam such as the ACT, C-BASE, or PRAXIS-II, optimal performance occurs at the intersection of these three crucial factors, when test takers possess high levels of knowledge, skill, and confidence. A teacher candidate who exhibits symptoms of anxiety, stress, and low confidence, or lacks skill or knowledge, is like the athlete who chokes under pressure and underperforms their actual ability. Presence of these factors may account for some of the
variance in performance of elementary education teacher candidates on the C-BASE and PRAXIS-II examinations.

Figure 2. Optimal experiences occur when skills and challenges are both high.
Note. Adapted from Csikszentmihalyi 1990.

Figure 3. A visual representation of the basis for the T.E.S.T. exam preparation program, where optimal performance occurs when all three variables are very high.
This study evaluated an examination preparation program designed to increase teacher candidate content knowledge, test-taking skill, and self-efficacy in order to improve performance on the C-BASE and PRAXIS-II examinations.

Rationale for the Study

Many educational researchers have noted the need for more research to evaluate the effect of examination preparation programs on teacher candidate licensure examination test performance. These include Taylor (1992), Bryant (2002), Parham (1996), and Green (1989). Research produced by Education Testing Service (ETS), the corporation who developed the most widely used teacher knowledge licensure tests, the PRAXIS-II series, indicates that standardized examination preparation programs can impact teacher candidate performance, but the degree is unclear (ETS, 1998). More research on the relationship between attending a preparation seminar and performance on the examinations would enable both teacher candidates and administrators of teacher education programs to determine how attending a standardized examination preparation program impacts test performance.

Statement of the Problem

Although several researchers have noted an increase in high-stakes testing for teacher licensure, there is a lack of information about the effect of a standardized examination preparation program that may assist elementary education teacher candidates in preparing for the C-BASE and PRAXIS-II. Despite awareness of the phenomena of high-stakes examinations, which cause some elementary education teacher candidates to exhibit symptoms of test anxiety and limit their ability to perform up to the level of their true capability, little research exists about preferred or highly effective models of test
preparation for the C-BASE or PRAXIS-II examinations. This study sought to determine if participation in an examination preparation program based on best practices can assist teacher candidates to move into the optimal experience and improve performance on teacher education licensure examinations (Csikszentmihalyi, 1996).

Despite offering the T.E.S.T. examination preparation program since 2001, no research has been conducted about the relationships between participating in the T.E.S.T. examination preparation program and performance on either of the licensure examinations required to earn admittance into and completion of the elementary education teacher education program. There is a lack of information about the effectiveness of the initial and advanced versions of the T.E.S.T. exam preparation program on teacher candidate success on the C-BASE and Elementary Education PRAXIS-II examinations. This study sought to gauge the effect of participation in the initial and advanced T.E.S.T. examination preparation program.

To determine if participation in the examination preparation program impacts teacher candidate exam performance, the researcher determined the main effects and interaction effects between candidate C-BASE and PRAXIS-II performance when considering participation level in the initial and advanced T.E.S.T. examination preparation program and qualification status. This research is necessary because the relationship between teacher candidate participation level (full participant, transition participant, non-participant) in the initial and advanced T.E.S.T. exam-preparation programs and their subsequent performance on the C-BASE and PRAXIS-II is unclear. There is also a lack of information about the effect of a teacher candidate meeting all qualifying requirements (qualifying or not qualifying) on teacher candidate performance
on the C-BASE and PRAXIS-II licensure examination. Additionally, there is no research about the impact of an examination preparation program designed specifically to improve performance on the C-BASE and PRAXIS-II examinations when using prior test score performance (ACT and C-BASE) as a covariate. This study fills that gap in the knowledge.

Standardized Examinations Used in the Study

ACT. The American College Testing exam assesses high school students’ general educational development and their ability to complete college-level work (ACT, 2007a; ACT, 2007b). The ACT is a widely used college entrance examination comprised of 205 standardized multiple choice examination questions covering content knowledge in English, Mathematics, Reading Comprehension, and Science Reasoning. A composite score is also given. Each section is scored on a scale of 1-36, with sub-scores in the four aforementioned areas ranging from 1-18.

First, a passing ACT score (dependent on other factors including other test scores earned) is required by the teacher education program studied as one of two standardized-test based admission criteria method to screen potential teachers. The composite ACT score assists in determining qualification status at the institution studied. Additionally, the study used ACT composite scores as covariates for C-BASE and PRAXIS-II examination performance. Taylor (1992) utilized ACT composite as a covariate for NTE, the precursor to the PRAXIS-II.

C-BASE. The C-BASE (College Basic Academic Subjects Examination), produced by Assessment Resource Center, is a test of general knowledge comprised of writing prompt and 188 multiple choice examination questions covering sophomore-
college level knowledge related to the disciplines of Writing, English, Mathematics, Science and the Social Sciences (Assessment Resource Center, 2007). The score range is 80-540 points, with 540 as the best possible score. Minimum state-level C-BASE scores are 235 for each of the aforementioned subject sub-scores. The institution studied has a sliding scale of minimum C-BASE scores for teacher candidates, ranging from 235 during 1996-2000 to 265 or higher on three of five sections and 235 or higher on the other two during 2002-2006 (Assessment Resource Center, 2007).

*PRAXIS-II.* The Praxis-II, produced by Educational Testing Service (ETS), is a battery of more than 140 standardized, paper-and-pencil examinations utilized to screen teacher candidate content knowledge in prospective teaching areas. The Elementary Education: Curriculum, Instruction, and Assessment PRAXIS-II examination (10011) is a two-hour test comprised of 110 multiple-choice questions. Questions cover the content of curriculum, instruction, and assessment required from kindergarten through 6th grade in elementary language arts, mathematics, science, art, physical education, social studies, and reading (ETS, 2007a).

Possible teacher candidate scores range from 100-200, with 164 as the minimum score set by the department of education in the state in which the study was conducted (Missouri Department of Elementary and Secondary Education, 2008). The test-maker has recommended that teacher education programs and state departments of education refrain from using any PRAXIS-II examination as a sole determinant of teacher licensure (ETS, 1998). Despite this warning, candidates who do not pass the PRAXIS-II satisfactorily are not issued teacher credentials. PRAXIS-II examinations are psychometrically valid and reliable (ETS, 2007b).
**T.E.S.T Model-Initial and Advanced**

*T.E.S.T* is the acronym for the examination-preparation model (in the initial and advanced versions) evaluated in this study. *T.E.S.T*, which stands for Translate, Eliminate, Solve, and avoid Tricks, is a set of strategies to decode and translate the language of testing so that elementary education teacher candidates at this institution would increase their performance on the C-BASE and Elementary Education PRAXIS-II examination in order to achieve passing scores and earn licensure as certified teachers upon completion of their teacher education program. The initial *T.E.S.T.* model is presented to students at the sophomore level in a seminar forum. The advanced *T.E.S.T.* model was made available to study participants through their senior-level Elementary Education capstone course. The components of the initial *T.E.S.T.* model are found in Appendix A.

**Purpose of the Study**

The purpose of the study was to determine the main effects and interaction effects between candidate C-BASE and PRAXIS-II performance when considering teacher candidate participation level for initial and advanced *T.E.S.T.* examination preparation program and their qualification status. A secondary purpose was to determine the relationship between and among the ACT, C-BASE, and PRAXIS-II examinations. There are four main proposed questions to be addressed in this study:

**Research Questions and Hypotheses**

The following research questions and null hypotheses were developed to guide the study.
Research Question 1

What are the descriptive statistics for teacher candidate performance on the Elementary Education C-BASE and PRAXIS-II examinations, broken out by the following sub-groups?

By participation level:

a. Full, Transition, and Non-participants in the initial T.E.S.T. standardized examination preparation program.

b. Full, Transition, and Non-participants in the advanced T.E.S.T. standardized examination preparation program.

By qualification status:

c. Qualifiers and Non-qualifiers, for both initial and advanced T.E.S.T. examination preparation program.

With Covariate (ACT for C-BASE)

d. Teacher candidate performance on the C-BASE examination when using composite ACT score as a covariate.

e. Teacher candidate performance on the PRAXIS-II examination when using composite ACT score as a covariate.

H01: There is no difference in descriptive statistics of teacher candidates' performance on the C-BASE examination and sub-scores and Praxis-II examination and sub-scores when considering participation status (non-participant, transition participant, and full participant) and Qualification status (non-qualifier and qualifier).
Research Question 2

What is the relationship between elementary education teacher candidate performance on the ACT, C-BASE and PRAXIS-II examinations?

$H_{02}$: There is no relationship between elementary education teacher candidate performance in the ACT, C-BASE and PRAXIS-II.

Research Question 3

When using ACT as covariate, is there a significant difference in main effects and interaction effects between elementary education teacher candidate C-BASE examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status?

$H_{03}$: There is no difference in main effects and interaction effects between elementary education teacher candidate C-BASE examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status.

Research Question 4

When using ACT as covariate, is there a difference in main effects and interaction effects between elementary education teacher candidate PRAXIS-II examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status?

$H_{04}$: There is no difference in main effects and interaction effects between elementary education teacher candidate PRAXIS-II examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status.
Limitations of the Study

This study is limited in several ways. First, this study included only candidates admitted to the college of education from one moderately selective Midwestern teacher training institution. During the time in which the study took place (1995-2007), the college of education experimented with different minimum scores on standardized tests for teacher candidates seeking entrance into the College of Education. Study Group 1 (1995-2000) thus contains students who may not have earned the minimum composite ACT score sufficient to gain acceptance into the College of Education from 2002-2006, likely excluding them from earning admittance to the college of education.

A second limitation is that the T.E.S.T. examination program is a tool, not a protocol, and considering that T.E.S.T. examination preparation included audience participation and question-and-answer sessions which may have taken time away from content to be delivered, it is not possible to ensure that the program was presented in precisely the same manner each time it was presented to elementary education C-BASE and PRAXIS-II test takers. Thus, there may be minor variance between the T.E.S.T. examination preparation program between 2002 and 2007. This study does not seek to control for the level of engagement, participation, and effort displayed by T.E.S.T. program participants. Similarly, there may be variance in the number of test-taking strategies taught to teacher candidates and the degree to which these strategies were utilized on the PRAXIS-II since the program was improved and bolstered over time.

Another study limitation is that participants may have undergone alternative test preparation in addition to the T.E.S.T., model, which may confound the results. Similarly, the program of study completed for the elementary education degree at the institution
studied varied slightly over the time continuum (C. McCall, personal communication, 2006; N. Riley, personal communication, 2006). Thus, the elementary education content knowledge varied between and among teacher candidates due to changes and improvements in both content knowledge provided in the program and the specific teaching methodologies and instructional techniques utilized. Another possible limitation is that area teachers may have been trained, possibly by the researcher, in test-wiseness strategies that may have affected ACT score performance in high school students.

The final limitation of this study is that results of this study describes only the population of elementary education teacher candidates at the institution during the time in which data were collected and may not be suggestive of teacher candidates at other teacher training institutions. If candidate performance data would have been collected from institutions with the same C-BASE examination preparation programs, holding constant for ACT or other predictors of success, research findings may yield a greater statistical value and perhaps would or will be more able to be generalized to a wider population of Elementary-Education PRAXIS-II test-takers.

Definition of Key Terms

This study will require the use of a specific vocabulary. In order to assist the reader by clarifying terminology, the following terms are defined based upon their meaning and application to the study.

ACT. The ACT Assessment is a widely used college entrance examination that assesses high school students’ general educational development and their ability to complete college-level work (ACT 2008a, ACT, 2008b).
**C-BASE.** The C-BASE (College Basic Academic Subjects Examination) is a test of general knowledge for sophomore-college level students (Assessment Resource Center, 2007).

*Examination preparation program.* Examination preparation programs are programs which assist teacher candidates with content knowledge, test-taking strategies, and anxiety-deduction techniques to prepare for licensure examinations.

*Full participants.* Full Participants are defined as those teacher candidates studied who, from 2002-2007, participated in both the initial and advanced *T.E.S.T* elementary education C-BASE and PRAXIS-II exam preparation model.

*High-stakes tests.* In this study, high-stakes tests are standardized examinations which have “serious consequences” for teacher candidates and teacher education programs, including licensure and accreditation decisions for candidates and programs, respectively (Jones, Jones, & Hargrove, 2003, p. 3).

*Non-participant.* Non-participants are defined as those teacher candidates studied who, from 1995-1999, who did not participate in either the initial and advanced *T.E.S.T* elementary education PRAXIS-II exam preparation program.

*Non-qualifier.* Non-qualifiers are teacher candidates whose scores on the ACT and/or C-BASE did not meet minimum college of education entrance requirements at the time in which they sought admission to the college of education in order to continue progress toward teacher licensure at the institution studied. Non-qualifiers may have had an ACT or C-BASE score below the program requirement (see table 1), on their initial attempt on those examinations.
**PRAXIS-II.** The PRAXIS-II, produced by Educational Testing Service (ETS), is a battery of more than 140 standardized, paper-and-pencil examinations, one of which is the Elementary Education: Curriculum, Instruction, and Assessment PRAXIS-II examination, utilized to screen teacher candidate content knowledge in prospective teaching areas (ETS, 2007a; ETS, 2007b).

**Qualifier.** Qualifiers are teacher candidates who meet or exceed all minimum teacher education program entrance requirements when they sought admission to the college of at the institution studied. They met all minimum teacher education standardized test requirements for the ACT and C-BASE and minimum grade point averages and core curriculum competencies.

**Teacher candidate.** Teacher candidates are individuals following an approved course of study within a teacher education program that will enable them to meet all requirements to earn teaching licensure at the conclusion of the program and passage of mid-point assessments (ACT and C-BASE) and the exit assessment, in this case the PRAXIS-II.

**Teacher education program.** Teacher education programs are state-board approved, state and/or nationally-accredited institutions of higher education responsible for developing teacher candidate knowledge and providing them with necessary skills and experiences to earn licensure at the completion of particular programs of study.

**Test anxiety.** Test anxiety refers to nervousness, anxious behavior, prevalence to distraction, and low or reduced self-efficacy for candidates attempting standardized examinations. Chittooran and Miles (2001) reported that test anxiety negatively influences test performance and can make the difference between high and low test
scores, while Spielberger and Vagg (1995) defined test anxiety as the combination of testing fear and the expectation of poor test performance accompanied with deleterious physical symptoms and emotionality.

*T.E.S.T Model-initial and advanced.* T.E.S.T is the acronym for the test-preparation model (in the initial and advanced versions) evaluated in this study. T.E.S.T, which stands for Translate, Eliminate, Solve, and avoid Tricks, is a set of strategies to decode and translate the language of testing. The initial T.E.S.T. model is presented to students at the sophomore level in a seminar forum and attempts to prepare them for the C-BASE examination. The advanced T.E.S.T model was made available to study participants through their senior-level Elementary Education capstone course and attempts to prepare them for the PRAXIS-II examination.

*Test-wiseness.* Test-wiseness is the ability to utilize the characteristics and format of a test, and/or the test-taking situation, to improve one’s score on a test (Chittooran & Miles, 2001). Test-wiseness refers to the use of test-preparation skills to increase candidate performance on standardized examinations (Flippo, 1988; Taylor, 1992). Chittooran and Miles (2001) noted that test formats attempt to evaluate recognition of information, not recall, and require speed and accuracy, and are “generally composed of a stem and four or five options, of which three or four are intended to be distractors” (p. 12). Attributes of test-wise students including: familiarization with test content, rules, and time constraints; adequate preparation with test formats; and use of deductive reasoning or logical elimination. The T.E.S.T model utilizes test-wiseness strategies including focused test-question reading instruction to efficiently decode text and translate...
the language of testing into words more familiar to teacher candidates than those utilized on the C-BASE and PRAXIS-II.

*Transition participant.* Transition participants are defined as those teacher candidates studied who, from 2000-2002, may or may not have participated in emerging C-BASE and PRAXIS-II preparation workshops that would later become the initial and advanced *T.E.S.T* elementary education C-BASE and PRAXIS-II exam preparation model. They were not required at the institution but were an option freely available to elementary education teacher candidates at that time.

*Summary*

This chapter has provided an illustration of how a teacher candidate perceives the anxiety of a standardized licensure examination to conceptualize the background for the study. This chapter also introduced the rationale, or compelling need, to evaluate the effect of participation in the Initial and Advanced *T.E.S.T.* examination preparation program at the institution studied. Additionally, this chapter has defined the conceptual underpinnings for the study, including the importance of decreasing test anxiety and boosting teacher candidate self-efficacy by offering test-wiseness techniques in an effective examination preparation program designed to get students into “the flow” (Csikszentmihalyi, 1990) and assist teacher candidates to have the optimal experience during the C-BASE and PRAXIS-II examinations.

Chapter one also discussed the key prior research findings, described the extant research on the qualities of effective standardized examination preparation programs, and defined the principal components of the initial and advanced *T.E.S.T.* examination preparation programs. This chapter also listed the research questions and hypotheses. The
next chapter will elaborate on the conceptual underpinnings for the study and review relevant literature to inform the study.
Chapter Two: Review of Related Literature

This chapter will synthesize the research on the key components related to the phenomenon of teacher candidate performance on standardized examinations such as C-BASE and the PRAXIS-II. It also explores the research on accountability and high-stakes licensure examinations and requirements and their unintended consequences, best practices in effective examination preparation programs, the components of test-wiseness and test anxiety, and the role of self-efficacy upon examination performance (Bandura, 1997; Blue, Newell, O'Grady & Toro, 2002; Jones, Jones & Hargrove, 2003; Miyasaka, 2000; Spielberger & Vagg, 1995; Supon, 2004; Wakefield, 2002). Additionally, the T.E.S.T. examination preparation program will be explained, as will the best practices in design and evaluation of examination preparation programs (Chittooran & Miles, 2001; Gulek, 2003; McCabe, 2003). This chapter will also detail the impact of Csikszentmihalyi’s (1996) research on Optimal Experience or “finding flow” (p. 71) and psychic entropy.

Background

Many elementary education teacher candidates experience stress and anxiety before taking standardized examinations such as the C-BASE and PRAXIS-II. This is related to increasing accountability from state and national stakeholders and increased use of high stakes examinations to determine and evaluate quality teaching and teacher education programs. Although examinations are a pervasive component of teacher education licensure, there are few examples of well-designed, effective examination preparation programs that offer teacher candidates the combination of content
knowledge, test-taking strategies, and stress-reduction techniques that Miyasaka (2000) defined as components of effective examination preparation programs.

Those few examination preparation programs that have been evaluated do show an increase in student performance after attending examination preparation sessions (Mee, 2000; Taylor, 1992). However, Bryant (2002) notes that few teacher education programs offer examination preparation programs designed to prepare teacher candidates for licensure examinations. The following chapter will review and synthesize the literature pertaining to educational accountability, high-stakes testing, test anxiety, test-wisness and the components of effective examination preparation programs. This chapter will also present the T.E.S.T. examination preparation program. The T.E.S.T. program is designed to prepare teacher candidates for the C-BASE and PRAXIS-II examinations by offering strategies, skills, and attitudes conducive to increase student knowledge and self efficacy (Bandura, 1997). The goal of the T.E.S.T. program is to move teacher candidates into what Csikszentmihalyi (1990) calls “the flow”, (p. 71) so they perform optimally (p. 72) and improve performance on the C-BASE and PRAXIS-II examinations. The next section discusses literature pertaining to state and national trends related to educational accountability and high-stakes examinations, which provide a backdrop for viewing the issue of student performance on standardized education licensure examinations.

Statement of the Problem

Although several researchers have noted an increase in high-stakes testing for teacher licensure, there is a lack of information about the effect of a standardized examination preparation program that may assist teacher candidates in preparing for the
C-BASE and PRAXIS-II. Despite awareness of the high-stakes examinations phenomena, which cause some elementary education teacher candidates to exhibit symptoms of test anxiety and limit their ability to perform up to the level of their capability, little research exists about preferred or highly effective models of test preparation for the C-BASE or PRAXIS-II examinations. This study sought to use an institution which educates teacher candidates to determine if participation in an examination preparation program based on best practices in examination preparation can enable teacher candidates into the optimal experience and improve performance on teacher education licensure examinations (Csikszentmihalyi, 1996).

Despite offering the T.E.S.T. examination preparation program since 2001, no research has been conducted about the relationships between participating in the T.E.S.T. examination preparation program and performance on either of the licensure examinations required to earn admittance into and completion from the elementary education teacher education program. There is a lack of information about the effectiveness of the initial and advanced versions T.E.S.T. exam preparation program on teacher candidate success on the C-BASE and Elementary Education PRAXIS-II examinations. This study seeks to gauge the effect of participation in the initial and advanced T.E.S.T. examination preparation program.

To determine if participation in the examination preparation program, the researcher determined the main effects and interaction effects between candidate C-BASE and PRAXIS-II performance when considering participation in the initial and advanced T.E.S.T. examination preparation program and participation level and qualification status. This research was necessary because the relationship between teacher
candidate participation level (full participant, transition participant, non-participant) in the initial and advanced T.E.S.T. exam-preparation programs and their subsequent performance on the C-BASE and PRAXIS-II is unclear. There is also a lack of information about the effect of a teacher candidate meeting all qualifying requirements (qualifying or not qualifying) on teacher candidate performance on the C-BASE and PRAXIS-II licensure examination. Additionally, there is no research about the impact of an examination preparation program designed specifically to improve performance on the C-BASE and PRAXIS-II examinations when using prior test score performance (ACT) as a covariate.

**Standardized Testing Trends and Increasing Accountability**

Standardized testing for teacher candidates has become a topic of discussion in higher education. Teacher quality and teacher knowledge have been dominant issues in American society since the 1983 U.S. Education report, *A nation at risk*, and have informed decision making and educational policy through the current political environment (National Commission on Excellence, 1983). Some examples of the impact of educational accountability include federal legislation designed to increase teacher quality and teacher education program quality, including No Child Left Behind and recertification of Title II Programs (United States Department of Education, 2007). There are critics of teacher education that call it a broken system which needs to have its monopoly on the production and licensure of certified teachers removed (Ballou & Podgursky, 1998; Hess, 2002).

Some of teacher education’s most vociferous critics are within the current administration, as two large federal grants totaling more than forty million dollars have
been passed since 2001. These grants have resulted in the development of the ABCTE (American Board for Certification of Teacher Excellence), which awards a teaching credential to any individual with any four-year college or university degree and the ability to pass two tests, one a basic standardized knowledge examination similar to the ACT and SAT college entrance examinations, the other a test of pedagogical knowledge (ABCTE, 2006). Such initiatives seek to remove the right to select teachers from individual teacher education programs, reinforcing the importance of testing in teacher education. Accountability is most often accomplished through the development and implementation of standardized tests of knowledge for teacher candidates. There are increasingly more voices against this practice, which is a controversial and divisive force in higher education (Darling-Hammond & Youngs, 2002; Johnson & Johnson, 2002; Kohn & Shannon, 2002; Orfield, Marin & Horn, eds., 2005).

Others critics of teacher education call for raising the bar by heightening minimum competencies for prospective teachers and enabling a free-market, economic basis for selecting the highest quality teachers (Archer, 1998; Ballou & Podgursky, 1998; Hanushek, Kain, O’Brien & Rivkin, 2005). However, because of the absence of adequate, inexpensive, and widely-agreed upon methods to show a teacher candidate’s ability to improve P-12 student learning, teacher education programs rely upon standardized knowledge examinations as a proxy for quality.

Many American higher educational institutions, including the institution studied, have responded to external stakeholder pressure by raising entrance requirements for prospective teachers (ETS, 1998; Darling-Hammond, Klein & Wise, 1999; Kohn, 2000), often with unintended consequences (Jones, Jones & Hargrove, 2003; Wakefield, 2003).
Education accountability has become synonymous with increasing the frequency of standardized tests of knowledge in teacher education programs (Darling-Hammond, 2004; Graves, 2002; Horn, 2003; Johnson & Johnson, 2002; Kohn, 2000; National Commission on Excellence, 1983; Taylor, 1992; Wakefield, 2003; Wall, 2001). Thus teacher education programs gauge teacher candidate performance of entrance, mid-program, and exit knowledge assessments, which include standardized tests of knowledge (NCATE, 2002). As noted in a research report by Wenglinsky (2000) standardized tests are more prominent in the contemporary educational discussion pertaining to federal accountability, although research has cast a shadow of doubt about the emphasis on testing in lieu of more learner-centered teaching practices (Darling-Hammond, Griffin & Wise, 1992).

Realistically, PRAXIS-II examination results are one of the only common ranking and sorting measures available to decision makers at the state and national level, and their use in comparing teacher education programs, despite the suggestion of those who created the examinations (ETS, 1998). This trend will likely continue as long as federal Title-II reports require that teacher candidate licensure examination results, usually PRAXIS-II scores, are publicly reported (ETS, 1998). This study utilizes ACT, C-BASE, and PRAXIS-II test scores required at the institution studied as entrance, mid-program and exit requirements, respectively. Utilizing several tests to demonstrate quality in teacher education is indicative of a larger national trend toward greater accountability for educators and schools.
In many states, teacher education programs are compared on the percent of their program completers who pass licensure examinations. These states publish annual data, aggregated for all prospective teachers and also disaggregated by the subject the teacher candidates either majored in or plan to teach (United States Department of Education Title II, 2007). Teacher education program administrators, program coordinators, and advisors are all affected by low passing rates on the PRAXIS-II for their teacher candidates, as the perception is that either the program lacks credibility or content knowledge (or both), or the admittance requirements for teacher candidates are insufficient. The general public equates passage of PRAXIS-II examination, which is reported in state and federal agencies as the de-facto assessment of teacher competence, as the equivalent of the minimum teacher quality required of a beginning teacher (Nweke and Hall, 1999; Wakefield, 2003). Historically, school administrators such as principals or college and university education deans have been charged with the responsibility to define educational accountability measures that ensure the development of high quality teachers. Accountability though standardized testing has removed an element of local control from teacher education program administrators and transferred it to national educational policymakers and external stakeholders (Piveral & Ruhl, 2002).

Due to the aforementioned pressure from external stakeholders to increase the level of minimum teacher competency, many teacher training institutions have significantly increased minimum PRAXIS-II scores. State or federal pressure to demonstrate results during an era of increasing accountability has resulted in more and more high-stakes testing (Darling-Hammond, 2004; Kohn, 2000; Nweke & Hall, 1999;
The effects on these changes are unknown, but emerging research indicates that traditionally lower-performing teacher candidates, including minority and low-income teacher candidates, are increasingly at-risk of passing standardized licensure examinations (Wakefield, 2003; Orfield, Marin & Horn, 2005).

This is of special interest at the institution studied, where many teacher candidates are first-generation college students and receive financial assistance due to low socioeconomic status. Both of these factors may contribute to increased risk of achieving passing scores on standardized examinations (Wakefield, 2003). These are certainly compelling factors in the need for the design, delivery, and evaluation of an examination preparation program at the institution studied, which may increase teacher candidate performance on the C-BASE and the PRAXIS-II examinations.

At the state level, the C-BASE examination is required for all teacher education programs in the state where this study took place, and comparisons between and among programs can be made by accrediting teams, citizens, and the state board of education since all teacher candidates attempt the same mid-program examination. Thus, increased accountability affects teacher education programs. This study, which determined the effectiveness of an examination preparation program for elementary education teacher candidates, will be a benefit to the discipline for teacher candidates and teacher education program administrators.

Teacher education programs have developed many responses to external pressure to ensure high-scoring test takers. These include the development of duplicate degree programs in educational services (not including licensure but requiring identical
coursework) at some institutions. Other institutions changed teacher education program requirements to ensure that all teacher candidates were required to pass licensure examinations such as PRAXIS-II before participating in the culminating student teaching field experience. The two previous examples of responses to external pressure are related to the prevalence and importance of standardized examinations in contemporary society.

When an institution requires juniors to pass licensure examinations before even completing program requirements (student teaching internships, for example), the institution essentially guarantees that it will have 100% pass rates on federal Title-II program completer data. This example shows that teacher education program administrators fear the publication of low pass rates on licensure examinations. In the case of the institution studied, the development of examination preparation program was preferred to disingenuously designed educational services degrees that do not lead to teacher certification yet require the completion of identical classes and educational experiences. Additionally, despite the possibility that program completers might fail the licensure examination, the institution studied did not require passage of the PRAXIS-II before student teaching or as a graduation requirement in order to ensure 100% pass rates on program completion (Council on Teacher Education, 2002). Instead, the institution studied developed and implemented an examination preparation program, T.E.S.T., to support teacher candidates attempting the midpoint and end-of-program knowledge assessments (Council on Teacher Education, 2002).

_Increased Licensure Requirements at the Institution Studied_

For some teacher education programs, publishing the PRAXIS-II pass rates has caused embarrassment and fear, and many institutions have responded to such criticism
by raising minimum competencies. This includes mandating increased test scores on other standardized examinations used to screen candidates (Wakefield, 2002). Certain degree programs within a teacher training institution, such as elementary education, are further at-risk, then, as research shows that these candidates lag behind other majors in average test scores on ACT examination composite test scores. For teacher candidates at the institution studied, The ACT composite score has been found to be a predictor of success on other standardized examination (Kiger, 2003, Poore, 2005; Wall, 2001).

Another test required to matriculate through a teacher education program is the College Basic Academic Subjects Examination, which is also strongly correlated with the ACT and the PRAXIS-II for certain groups of teacher candidates at the institution studied (Dickkut, 2000; Kiger, 2003; Poore, 2005; Wall, 2001). Despite increasing evidence of the correlation between and among standardized tests used as minimum criteria for assessing minimum beginning teacher content knowledge competencies, few teacher training institutions have developed intervention programs to support teacher candidates who may be at risk of failing their licensure examinations (Bryant, 2002).

Unintended Consequences of Accountability for Teacher Education Programs

Opponents of the increased use of standardized examinations view this as an affront to notions of equity. They cite the research on the unintended consequences of high-stakes tests that indicates that many potentially competent low-income and/or minority teacher candidates are removed from teacher education programs because they do not perform well on standardized tests. Despite the fact that these disadvantaged teacher candidates may possess other qualities that may be related to effective teaching, if
they do not pass the standardized examinations they are excluded from the teaching profession (Jones, Jones & Hargrove, 2003; Wakefield, 2002).

Darling-Hammond’s (2004) contribution to the literature includes discussion of the relationship of standardized examinations to access to higher education and meritocracy. Wakefield (2003), Horn (2003) and Natriello & Pallas (2001) addressed the impact of high-stakes examinations upon marginalized populations in teacher training institutions. Similarly, Nweke & Hall’s (1999) research chronicles the deleterious effects of sole reliance on high-stakes licensure examinations to base acceptance into the education field. Chittooran & Miles (2001) discussion of test-wiseness informs the study as an underlying body of knowledge on increasing student performance on standardized tests of knowledge by increasing candidate competence in testing.

The federal government has required states to comply with increased standardized testing regimens for prospective teachers in order to receive full federal funding. Accountability is thus reflective of political changes requiring more standardized examinations to assure teacher quality. Since high pass rates reflect positively upon their training, administrators of teacher education programs have sought more information about the relationship between standardized knowledge examinations and pass rates for teacher candidates on licensure examinations (Dickkut, 2000; Kiger, 2003; Poore, 2005; Wall, 2001). Teacher education programs are subject to transparent public scrutiny over their program graduates’ test scores, particularly on the PRAXIS-II licensure examinations, which are publicly reported annually (United States Department of Education, 2007).
Despite the fact that standardized testing for prospective teachers in the U.S. is now a burgeoning, lucrative multi-million dollar industry (Kohn & Shannon, 2002), there is a lack of research about examination preparation programs that would assist teacher candidates in passing licensure examinations such as the C-BASE or PRAXIS-II content knowledge examinations. Prospective teachers seeking to become state-licensed teachers must go through several steps in order to become eligible to earn licensure and teach.

These include: (a) earning acceptance to a state or nationally accredited teacher education programs (b) completing all coursework in a four or five year program (c) successfully demonstrating the teaching skills required of beginning teachers through field experiences and (d) passing through several gateways at which they might be removed if deemed unfit to continue due to deficiencies in content knowledge, grade point average, or challenges related to dispositional issues when relating to students or peers in the school settings. Yet the most common obstacle preventing prospective teachers from becoming licensed is unsatisfactory performance on a battery of standardized tests administered at the beginning and middle of their program of study (Wakefield, 2002).

However, even if teacher candidates successfully complete all of the aforementioned requirements, they will not earn licensure and become a certified teacher until they pass the PRAXIS-II examination, a two-hour, multiple-choice, paper and pencil examination. For many teacher candidates, this creates great stress during examinations.

With the widespread use of high-stakes examination as a means to demonstrate teacher candidate quality, accountability can be defined as external to stakeholders demanding increased evidence of teacher quality through performance on licensure
examinations (Ballou & Podgursky, 1998; Hess, 2002; Janesick, 2001; Temes, 2001). While standardized tests have been the measuring stick for teacher quality for many decades, high-stakes teacher licensure examinations have markedly increased without a careful analysis of the unintended consequences of the widespread use of such examinations as effective screening devices to ensure teacher candidate quality (Darling-Hammond & Youngs, 2002; Horn, 2005a; Jones, Jones & Hargrove, 2003; Kohn & Shannon, 2002; Kornhaber & Orfield, 2001).

It is clear that state and federal accountability demands have yielded consistent increases in required examination scores at teacher education institutions. Yet accountability, without a defined safety net of support systems for teacher candidates, can create bias for certain groups of teacher candidates who routinely struggle on standardized licensure examinations (Wakefield, 2003). State-level accountability systems use rudimentary calculations of the number of teacher candidates who take and pass examinations like the C-BASE and PRAXIS-II, instead of focusing on the ability of teacher education programs to prepare educators who can reach and improve learning for all students. Standardized examinations offer assurance of minimum knowledge competencies for a given subject area at a particular moment in a teacher candidate’s career. In essence, these examinations demonstrate that a beginning teacher has minimum knowledge to do no harm to the students they will work with. Yet, teacher education programs, despite national accreditation agency requirements and pressure from external stakeholder groups such as the National Council of Accreditation of Teacher Education Programs (NCATE) and the American Association of State Colleges and Universities (AASCU), have yet to design assessment systems with the power to tie teacher
preparation programs to increased learning of public school students. This leads to the use of standardized examinations to define teacher quality in the state where this study took place.

Proactive Advisement using Assessment

Few teacher education programs have intervention programs to support teacher candidates at risk of failing licensure exams (Bryant, 2002), however even fewer teacher education programs have developed proactive assessment and advisement systems to offer teacher candidates, advisors, and program administrators a way to gauge the likelihood of a particular teacher candidate of passing or failing the C-BASE or PRAXIS-II examinations. The development of a program to assist teacher candidates in passing licensure examinations would assist elementary education teacher candidates and the teacher education program they attend in determining how to best prepare for and pass their licensing examination. For candidates, this would support them and may positively impact passing rates. Teacher education programs must respond to waves of state and national criticism about low teacher quality and a lack of public accountability by increasing minimum competencies for educator certification.

An effective examination preparation program would yield data and information on the likelihood of a particular candidate, based on their prior testing ability, to supply the information teacher education administrators need to develop improved assessment systems for candidates and unit operations. This would likely increase test performance, while providing the impetus to develop examination-preparation programs designed to ensure that all candidates have the support they require. Such a program may reduce some of the unintended consequences Wakefield (2003) and Fairtest (2002a; 2002b;
2002c; 2002d) addressed in relation to the disproportionate, iniquitous effects of examinations like C-BASE and PRAXIS-II on at-risk teacher candidates. The following section provides an overview and reviews and synthesizes the literature relating to licensure examinations.

High Stakes for Teacher Candidates

Each time a candidate attempts the PRAXIS-II, they must risk failure, and the consequence of failure has high stakes. For teacher candidates, the stakes are extraordinarily high, and several hundred thousand students per year struggle with the PRAXIS-II. Tens of thousands must retake the examination until achieving a passing score. This can be costly both in terms of testing fees and the opportunity cost of being unable to secure a teaching position without a teaching certificate or license. This evaluative anxiety (Spielberger & Vagg, 1995) pressure can cause effects leading to low self-efficacy (Bandura, 1994, 1997) and decreased motivation and test performance (Stober, 2004). Candidates also endure some stress and shame of receiving a failing score on a high-stakes examination which determines their ability to earn licensure and begin professional practice. There is a lack of information about both predictors of success for PRAXIS-II passing scores and intervention programs that would assist prospective teachers and increase their performance on the exam (Education Testing Service, 2007b).

This lack of information is counter-intuitive, since the PRAXIS-II is, for the education profession, an examination comparable to the Law School Admissions Examination (LSAT) or Medical College Admission Test (MCAT) for the law and medical professions, respectively.
The prevalence of high-stakes to screen out and quantify the quality of prospective teacher candidates has also raised the stakes for the teacher training institutions responsible for teacher candidate performance on standardized tests, such as the PRAXIS-II. Exams such as PRAXIS-II are used to compare content knowledge levels of potential teachers (Wakefield, 2003) despite warning labels from the test-makers themselves advocating a wide array of measures of both candidate and program quality (ETS, 1998).

*High Stakes for Examinees at the Institution Studied*

As the institution studied increased minimum C-BASE scores required for all teacher candidates, an already-present atmosphere of high-stakes was raised even higher (Council on Teacher Education, 2001, 2002). In the state where this study took place, institutions may choose minimum required C-BASE scores higher than the state mandates. Administrators in the teacher education program used research conducted at the institution studied to require higher minimum C-BASE scores for its teacher candidates and to offer a standardized examination preparation program (*T.E.S.T.*) in order to assist teacher candidates (Council on Teacher Education, 2001; Kiger, 2003; Wall, 2001). Increased minimum scores on standardized examinations at the institution studied have created a high-stakes atmosphere for teacher candidates. One reason for added pressure is that teacher candidates who do not earn passing scores will not earn state licensure and therefore will not be able to accept an official teaching position in a public school until they meet the minimum C-BASE or PRAXIS-II scores (Missouri Department of Elementary and Secondary Education, 2008).
At the institution studied, teacher candidates who do not earn a minimum score must retest or change their major. Program administrators at the institution studied have a vested interest in improving candidate examination performance on the C-BASE and PRAXIS-II licensure examinations, as do teacher candidates. Mandatory examination preparation seminars were developed and implemented in 2001 and have been offered as a required part of the curriculum since then. The goal of this study was to determine what, if any, impact the T.E.S.T. initial and advanced standardized examination preparation program has on teacher candidate performance.

Test Anxiety and Education Testing

Test anxiety is a byproduct of physiological and psychological responses to evaluation pressure. Such manifestations include psychic entropy, learned helplessness, and test anxiety (Dweck, 1999; Dweck & Eliot, 2005; Csikszentmihalyi, 1990; Spielberger & Vagg, 1995). Test anxiety occurs in teacher candidates and has increased as more standardized examinations are required of teacher candidates. Because teacher candidates must pass their licensure examination, the PRAXIS-II essentially functions like the Medical Boards for physicians or Bar Exam for attorneys. The C-BASE and PRAXIS-II examinations have become a screen to weed low-performing candidates from the group of potential teachers (Wakefield, 2003).

Yet many teacher candidates experience strongly negative physical and emotional reactions during testing situations, a phenomenon addressed in literature as test anxiety (Eliot & Dweck, 2005; Spielberger & Vagg, 1995). Test anxiety results in lower performance on standardized examinations (Blue et al., 2002). This belies a teacher candidate’s actual teaching ability and results in lower performance on standardized
examinations, such as the C-BASE and the PRAXIS-II. Blue et al. (2002) notes that the policy of relying on standardized examinations to determine admittance to teacher education programs leads to the screening out of some potentially high-quality teachers who excel at other important attributes as teacher candidates.

These may include excellent grades and high-quality instructional performance and student teaching performance ratings. In other words, good teachers who reach students but fail licensure examinations such as the C-BASE and PRAXIS-II are eliminated from the certified teaching pool (Blue et al., 2002). As shown in the introductory story at the beginning of chapter one, teacher candidates may feel more anxious knowing that the results of a given examination on a given day have more impact upon their future licensure than their actual ability to reach, inspire, and improve learning. Csikszentmihalyi (1990) shows that test anxiety takes students out of the optimal experience and into a negative spiral of self-doubt, nervous tension and reduced performance.

*Effective Examination Preparation Program Frameworks*

Several educational researchers have suggested that examination preparation for high-stakes education tests may produce significant benefits for students and administrators of educational organizations such as schools, colleges, and universities. Effective examination preparation programs can be conceived, designed and implemented if the programs possess required characteristics and components that increase test-wiseness and decrease nervousness and test anxiety (Miyasaka, 2000). These are necessary to improve the teacher candidate’s ability to have optimal experiences during high-stakes examinations (Csikszentmihalyi, 1996).
Miyasaka (2000) also noted that if an examination preparation program is comprised of five crucial components and was carried out ethically and responsibly, both students and administrators would receive significant benefits. These components include: (a) curriculum and test content, (b) approaches and test formats, (c) test-taking strategies, (d) timing of test-preparation and (e) student motivational techniques. Other studies indicate that examination preparation programs can assist students and improve their performance on standardized examinations.

Effective examination preparation programs must contain content knowledge, test-taking strategies, and examples of relatively easy questions (Miyasaka, 2000). Furthermore, Bryant (2002) and Taylor (1992) have successfully demonstrated a correlation between prior standardized test scores and teacher candidate performance on licensure examinations, thus enabling teacher educators to assess the level of risk of their teacher candidates. This information can assist educators at colleges and universities who are tasked with developing examination preparation programs designed to remediate at-risk teacher candidates as they take mid-point and end-of-program standardized exams.

Similarly, a research study compiled by the Long Beach, California High School District (2001) indicated that test preparation via well-designed examination preparation programs can boost candidate performance on standardized tests. Other authors, including McCabe (2003), suggested that evaluation of examination preparation programs would be a benefit to the discipline. Several researchers have focused on the best practices for what should comprise effective examination preparation for students.

Mee (2000) and Taylor (1992) were able to conceive and implement effective programs to preparing teacher candidates for content knowledge licensure examinations,
while Parham (1996) and Gulek (2003) have determined that test-taking practices positively impact teacher candidate performance when effectively designed. Blue, Newell, O’Grady & Toro (2002) noted that elementary education teacher candidates are comparatively much worse than other teacher candidate majors when taking licensure examinations, noting a need to design intervention strategies to support and remediate such candidates (Blue et. al, 2002). Therefore, the elementary education teacher candidates at the institution studied would likely benefit considerably from a well-designed examination preparation program.

The aforementioned researchers support the use of a covariant prior standardized test score, such as ACT composite, when evaluating the effectiveness of an examination preparation program (Taylor, 1992; Mee, 2000). Researchers agree that certain elements must be present in effective examination preparation programs. However, there is a lack of information about the quality of the Initial and Advanced versions of the T.E.S.T. examination preparation program and its’ impact on teacher candidate examination performance at the institution studied.

Best Practices in Examination Preparation Programs

Several researchers have suggested that examination preparation programs must contain specific strategies in order to constitute best practice. Chittooran and Miles (2001) stated that any effective test preparation program begins with key skills, techniques, and strategies that effective or test-wise students must possess. Test-wiseness can help test-takers “master some critical test-taking behaviors that make the difference between an excellent score and a poor one,” (Chittooran and Miles, 2001, p. 12). Gulek (2003) states that the five most important parts of a framework for an effective
examination preparation program include: deep content knowledge, varied formats and assessments, time management strategies, student motivation, and test anxiety reduction. Effective examination preparation programs assist students in acknowledging their level of test anxiety and preparing students how to proactively manage anxiety and minimize its harmful effects (Chittooran & Miles, 2001). Several authors recommend that programs should contain metacognitive strategies that increase self-efficacy, specifically by thinking about how to deal with the anxiety many students feel during standardized testing situations (Chittooran & Miles, 2001; Gulek, 2003; McCabe, 2003; Spielberger & Vagg, 1995; Supon, 2004).

A best practice in effective examination preparation is to equip students with specific skills, strategies and techniques to attack multiple choice questions by looking for errors in test construction, outliers, incorrect or ridiculous answers, and assorted methods to find and eliminate wrong choices (Chittooran and Miles, 2001). Minimizing the pool of possible choices assists a student in selecting correct responses, even if while simply guessing. This set of techniques should be accompanied by a strong mental approach and a positive attitude that increases self-efficacy (McCabe, 2003). The prevention of test anxiety, according to Chittooran and Miles (2001), is preferable to its management. The following figure chronicles the research-based components of effective test preparation programs and explores the Initial and Advanced T.E.S.T. examination preparation program developed by the researcher and utilized at the institution studied:
<table>
<thead>
<tr>
<th>Framework for effective exam preparation programs</th>
<th>Best practices in exam preparation programs</th>
<th>Initial: components used in <em>T.E.S.T</em> Model C-BASE Exam preparation program</th>
<th>Advanced: components used in <em>T.E.S.T</em> Model PRAXIS-II Exam preparation program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum and Test Content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test-wiseness based Strategies, not content</td>
<td>Practice Writing Prompts, Social Studies and Math content knowledge; Act Science; ACT science questions</td>
<td>Elementary Education Content knowledge; Sample questions; group processing</td>
<td></td>
</tr>
<tr>
<td>Approaches and Test Formats</td>
<td>Skills, techniques and strategies</td>
<td>Roman numeral questions, reasoning through graphs, charts, and figures; positive reinforcement</td>
<td>Roman numeral questions, reasoning through graphs, charts, and figures; positive reinforcement</td>
</tr>
<tr>
<td>Test-taking Strategies</td>
<td>Efficiency and test-wiseness; prevention of test anxiety</td>
<td>Reasoning, elimination, translation strategies, trick avoidance; stem cues; test-anxiety reduction strategies; awareness of attitude</td>
<td>Reasoning, elimination, translation strategies, trick avoidance; stem cues; test-anxiety reduction strategies; awareness of attitude</td>
</tr>
<tr>
<td>Timing of Test-Preparation</td>
<td>Time management</td>
<td>Sample questions are timed; emphasis on completion and error avoidance</td>
<td>Sample questions are timed; emphasis on completion and error avoidance</td>
</tr>
<tr>
<td>Student Motivation</td>
<td>Practices must motivate and reach students</td>
<td>Motivation via guidance through C-BASE challenge; self-efficacy enhancement; course/program requirement</td>
<td>Motivation via guidance through PRAXIS-II challenge; self-efficacy enhancement; course/program requirement</td>
</tr>
</tbody>
</table>

*Figure 1.* A table showing alignment and comparison of the initial and advanced *T.E.S.T.* model with components of valid and effective test preparation programs.
The preceding figure details the components of effective examination programs and defines the principal components of the T.E.S.T. examination preparation program. One of the most significant pieces of any good examination preparation program must include material that allows students to self-diagnose, acknowledge, and control the negative effects of test anxiety before the symptoms overwhelm a test-taker (Chittooran & Miles, 2001). Controlling anxiety allows test takers to utilize and maximize test-wiseness, which can increase score. The following section details the impact of test wisdom for standardized test-takers.

Test-Wiseness

The following paragraphs will define and outline practices that increase teacher candidate test in the context of the current wave of educational accountability and high-stakes testing. Test-wiseness is the ability to utilize the characteristics and format of a test and/or the test-taking situation to improve one’s score on a test (Chittooran & Miles, 2001). Test-wise individuals use a combination of related skills, strategies, techniques, and mental approaches in order to eliminate incorrect answers whenever possible (Flippo, 1988). Test-wiseness and test anxiety can affect standardized test-takers (Chittooran & Miles, 2001). Possessing strong test-taking skills and test-wiseness can make the difference between a high and low score on a test (Chittooran & Miles, 2001), while test anxiety and its associated nervousness, impaired concentration, and decreased self-efficacy can have deleterious effects upon test-takers. These effects can include limiting a test-taker’s ability to effectively display their knowledge on a standardized, paper-and-pencil examination (Gulek, 2003).
Parham (1996) and Green (1989) stated that an intervention model containing strategies known to be effective in boosting testing skills, or test-wise strategies, would likely improve performance in standardized testing situations. Educational institutions have attempted to devise and implement methods to offer skill-based remediation and support for standardized examinations (Parham, 1996). These include teaching effective test-taking strategies or test-wiseness skills, especially for students exhibiting decreased confidence and low performance on standardized examinations (Parham, 1996).

Supplying nervous teacher candidates with improved test-taking strategies and improved problem-solving abilities, according to Chittooran & Miles (2001), and Gulek (2003), can increase performance on standardized tests. Taylor (1992) indicates that teaching test-wise strategies to elementary education teacher candidates can increase licensure examination performance as well, especially for at-risk candidates.

An evaluation of a case study led by Mee (2000) found that an examination preparation study program was a significantly helpful factor in student success on the PRAXIS-II certification examinations. The author found that participants in the examination preparation program fared better than non-participants. Furthermore, PRAXIS-II performance for the eighty teacher candidates taking the physical education PRAXIS-II at Connecticut State University increased considerably. Mee (2000) concluded that examination preparation programs can be effective for the PRAXIS-II and recommended further research be carried out to determine if other examination preparation programs for other PRAXIS-II examinations might also yield a positive impact (Mee, 2000).
Test-wise strategies have been shown to be effective for teacher education students preparing to take licensure examinations (Green, 1989; Bryant, 2002; Taylor, 1992). Green (1989) noted that decreasing variance in academic ability, such as constructing a study with a college entrance examination score (SAT) as a delimitation, would be a benefit to an evaluation of a test preparation model designed to assist teacher candidates. Furthermore, Green (1989) suggested that further studies should explore the establishment of a correlation between test scores and performance between and among two or more groups of potential test takers, including at-risk teacher candidates. Finally, Green (1989) recommended larger sample sizes.

This study, based on evaluating the impact of the T.E.S.T. examination preparation program, increases the sample sizes utilized in examination preparation evaluations conducted by Bryant (2002), Green (1989), Mee (2000), and Taylor (1992), while holding constant for prior teacher candidate testing ability, as demonstrated by ACT composite score. Like the ACT, the SAT is often utilized by teacher preparation programs to screen candidate knowledge (Wakefield, 2003). The study assigns a category of qualification status, an indication of a prospective teacher candidate’s initial ability to meet all professional education entrance requirements. These include grade point averages in key education and major courses, minimum passing scores on ACT and C-BASE examinations, successful performance in an education practicum and observation course and other requirements. Non-qualifiers are teacher candidates who do not initially meet one or more of these requirements (often test score minimums).

At the institution studied, teacher candidates are at risk of not earning admittance if they do not meet all professional education entrance requirements by the time they
wish to enroll in upper level (junior and senior) coursework. If they do not pass the C-BASE examination within the first three tries, they are not allowed to continue in the education program and must select another major. For these students, there is great motivation to develop or augment skills related to standardized examinations, test-taking, and test-wiseness. The following section defines the characteristics researchers propose for an effective examination preparation program.

Self-Efficacy and Optimal Experience

Some teacher education candidates demonstrate strong symptoms of test anxiety and the presence of low self-efficacy. They do not believe, whether true or not, that they possess ample capabilities to successfully accomplish a particular task (Bandura, 1994, 1997). Another way to describe self-efficacy is to say, “whether you think that you can or you can’t, you’re right.” Students lacking confidence in their abilities are demonstrably less likely to perform at their best, denying them from what Csikszentmihalyi (1990) refers to as the optimal experience, commonly associated with the sports-related phrase, “being in the zone.” Moreover, the symptoms of test anxiety can be pernicious (Spielberger & Vagg, 1995), including intense psychological (and often physiological) trauma, such as shaking, nervousness, sweating, and, as seen in the actions of the prospective test-taker in the introduction, an acute inability to focus on and concentrate on a particular task (Csikszentmihalyi, 1990). These symptoms can be associated with high stakes testing, a byproduct of increasing educational accountability.

Csikszentmihalyi (1990) defines the combination of unrelenting anxiety and inability to focus on a particular task as “psychic entropy” (p. 36), which can paralyze thought and action and make effective task concentration nearly impossible. This can be a
terribly hurtful condition for teacher candidates who fear examinations such as the C-
BASE and PRAXIS-II, and may account for less than optimal performance of certain
teacher candidates. For instance, several teacher candidates with adequate or even
superior classroom teaching and skills and good grades do not realize this potential on the
C-BASE and PRAXIS-II examinations. An effective examination preparation program
may assist these teacher candidates and allow them to earn licensure despite test anxiety
and psychic entropy (Csikszentmihalyi, 1990, 1996).

Focus and Attention during Standardized Examinations

For students attempting to pass the high-stakes C-BASE and PRAXIS-II
examinations, being unable to focus attention (a symptom of test anxiety) is a by-product
of low self-efficacy (Bandura, 1994). Lack of focus is based partially on the
psychological phenomenon of learned helplessness (Bandura, 1994; Dweck & Eliot,
2005). The compelling need to determine the effectiveness of the T.E.S.T. examination
preparation program is that it may offer several components that are research-based better
practices that have been determined to increase student performance on high-stakes
examinations (Chittooran & Miles, 2001; McCabe, 2003; Bryant, 2002; Long Beach,
2001). These include: (a) content knowledge information, (b) a toolbox of test-taking
skills based on test-wise strategies and practices associated with excellent test-takers, and
(c) psychologically-based strategies to calm teacher candidates experiencing psychic
entropy (Csikszentmihalyi, 1990). There is a lack of information about the effects of test
preparation programs designed to boost teacher candidate preparedness on the elementary
education PRAXIS-II examination (Bryant, 2002; Taylor, 1992).
Educational researchers decry the widespread use of high-stakes assessments of content knowledge as the preeminent screening measure for teacher candidate fitness (Kohn, 2000; Wakefield, 2003). An examination preparation program was developed based on several components related to recommendations suggested by McCabe (2003) and Chittooran and Miles (2001) pertaining to high-stakes test preparation programs that increase content knowledge, decrease test anxiety, and boost test-taker self-efficacy. Although such a program, the T.E.S.T examination preparation program, has been developed and implemented, the impact of the program on participating elementary education teacher candidates attempting the C-BASE and PRAXIS-II performance is unclear. Researchers such as Bryant (2002) conclude that such a program evaluation would be of great benefit to the literature, while Parham (1996) notes a lack of research on the types and kinds of test-taking strategies offered in test-preparation programs. This study contributed to the literature in order to try to meet both needs.

Much of the writing on teacher candidate performance on high-stakes tests emphasizes the dearth of standardized test preparation programs. This is especially true for programs designed to assist teacher candidates and to augment content knowledge, decrease test anxiety and increase test-wiseness, or the set of skills possessed by gifted test takers (Bryant, 2002; Chittooran & Miles, 2001; Wakefield, 2003). The following pages detail the principal components of the Initial and Advanced T.E.S.T. examination preparation program written and developed by the author at the institution studied.
**T.E.S.T Model-initial and advanced**

*T.E.S.T* is the acronym for the test-preparation model (in the initial and advanced versions) evaluated in this study. *T.E.S.T*, which stands for Translate, Eliminate, Solve, and avoid Tricks, is a set of strategies to decode and translate the language of testing so that elementary education teacher candidates at the institution studied would increase their performance on the C-BASE and Elementary Education Praxis-II examination in order to achieve passing scores and earn licensure as certified teachers upon completion of their teacher education program. The initial *T.E.S.T.* model is presented to students at the sophomore level in a seminar forum. The advanced *T.E.S.T.* model was made available to study participants through their senior-level Elementary Education capstone course.

As the initial and advanced *T.E.S.T.* model has been developed and implemented at the institution studied, there has been an increase in interest in evaluating the effectiveness of the program. The institution studied would potentially benefit from a careful appraisal of the merit of obligatory participation in the examination preparation program. The following section expands on the importance of using evaluation of examination preparation programs to proactively support teacher candidates who may need assistance in passing a content knowledge examination.

**Supporting Teacher Candidates through Licensure**

Bryant (2002) strongly recommended the development, implementation, and evaluation of examination preparation programs constructed by teacher educators to assist teacher candidates in earning licensure. She recommends that a support system (including examination preparation programs) must be put in place and given adequate
resources to help teacher candidates pass PRAXIS-II examinations. This would limit the impact of high-stakes testing on teacher candidates: “in response to this need, teacher preparation programs should show an interest in helping prospective teachers prepare for the test” (p. 73). The author also notes that “little research has been done,” to evaluate test preparation materials and models for teacher licensure examinations (Bryant, 2002, p. 73).

With the exception of Mee’s (2000) assessment of an examination preparation model for physical education teacher candidates, there are few extant examples of PRAXIS-II examination preparation models. Interestingly, researchers including Bryant (2002), Miyasaka (2000), McCabe (2003) and Mee (2000) have recommended the need to both develop and evaluate such examination preparation programs. There are relatively few studies which have gauged the impact of an examination preparation program designed to improve test performance for elementary education teacher candidates. Only Taylor (1992) looked at the impact of participation in an examination preparation program. Unfortunately, the examination in that study was the National Teacher’s Examination (NTE), which was replaced by the PRAXIS-II as the culminating content knowledge licensure examination in the mid 1990’s. Thus, researchers have noted a compelling need to evaluate examination preparation programs for this licensure examination (Bryant, 2002). The following section includes a review of the literature related to the evaluation of examination preparation programs.

Evaluation of Examination Preparation Programs

An examination preparation program for teacher candidates preparing for a content knowledge licensure examination was developed and evaluated by Taylor (1992).
Although the examination preparation program was effective for teacher candidates preparing to take the National Teacher’s Examination (NTE), this examination has subsequently been discontinued. It was replaced by a system of more than 140 subject matter content knowledge examination prepared by the Educational Testing Service (ETS), including the PRAXIS-II Elementary Education: Curriculum, Instruction, and Assessment (PRAXIS-II 10011) test, which are required at the institution studied and is mandated by the state.

At this time, the elementary education PRAXIS-II is the most widely used elementary education licensure examination in the United States and is also the lone content knowledge qualifying exam for prospective teachers in the state where the study will take place (ETS, 2005; ETS, 2007a; ETS, 2007b; Missouri Department of Elementary and Secondary Education, 2008). Taylor’s examination preparation program utilized teacher candidate test scores on the ACT to predict performance on the end-of-program licensure examination, and found that test preparation improves performance (Taylor, 1992). One notable weakness of Taylor’s model is that the sample size was very small. However, Taylor’s intervention model introduced and defined an independent variable of “riskness” into his study, which separated teacher candidates by their ACT scores and divided them into categories of likelihood of passing, at-risk and not at-risk of passing teacher examinations (Taylor, 1992).

This proposed study would also use qualifying status as a proxy for riskiness. Researchers including Bryant (2002), McCabe (2003), Mee (2000), and Wakefield (2002) have suggested that teacher educators should develop methods to research and investigate the phenomenon of low-passing scores for teacher candidates on licensure
examinations. Such research should determine if examination preparation programs can be effective and increase teacher candidate performance on examinations such as PRAXIS-II, as well as mid-program knowledge assessments such as C-BASE.

*Evaluating the Initial and Advanced T.E.S.T. Examination Program*

Evaluating the Initial and Advanced *T.E.S.T.* model used to prepare teacher candidates for the C-BASE general knowledge examination and the PRAXIS-II Elementary Examination would be a great benefit to the institution studied. In the 1990’s, the PRAXIS-II examination replaced the National Teacher Examination (NTE) at the institution studied. However there is a lack of information about the Initial and Advanced *T.E.S.T.* model and the effect that participation in the examination program might have on elementary teacher candidate examination performance on the C-BASE and PRAXIS-II. This study evaluated the exam preparation program and gauged its impact on teacher candidate C-BASE and PRAXIS-II performance while substantially increasing the sample size from previous studies of exam preparation models conducted by Taylor (1992), Green (1989), and Mee (2000).

The study is an evaluation of a research-based examination preparation model that meets the compelling need for test preparation models for teacher candidate licensure examinations. These include the research-based strategies previously suggested by several researchers, including Taylor (1992), Green (1989) and Mee (2000) as reliable methodologies to measure the effect on examination performance as a function of participating in a test preparation program.
Summary

The need for further research concerning the effectiveness of examination programs for Elementary Education teacher candidates taking the C-BASE and PRAXIS-II is clear. Several researchers describe the pervasive nature of increasing use of standardized examinations during an era of educational accountability and high-stakes testing (Darling-Hammond, 2004; ETS, 1998; Kohn, 2000). This has a profound negative impact on certain at-risk groups of teacher candidates (Blue et al., 2002; Wakefield, 2003). Blue et al. (2002, p.8) notes that, “Many members of the lower groups have shown clearly that they can exceed expectations if given the opportunity. Yet, in these groups are the students who are often denied the opportunity to enroll in and/or complete a certification program because of new and ever-increasing standards.”

Teacher education programs have also been affected by an increase in teacher education examinations. C-BASE and PRAXIS-II examination scores are utilized by accrediting agencies to determine program effectiveness, while the results of teacher candidate performance are publicly shared with stakeholders (NCATE, 2008; DESE, 2008).

Many researchers, including Bryant (2002) suggest that evaluation of teacher education examination preparation programs should be carried out with all deliberate speed. Examination preparation programs for teacher candidates have been conducted by Taylor (1992) and Mee (2000) and both yielded improvement for elementary education candidates (Taylor, 1992) on the PRAXIS-II (Mee, 2000), respectively. However, there is a lack of information about the effect of participation by elementary education teacher candidates in the T.E.S.T. examination preparation program developed and utilized at the institution studied. The fact remains that the use of standardized examinations to screen
teacher candidates limits access for disadvantaged and underrepresented groups, including students from lower socioeconomic levels, to teacher training programs specifically and the education profession in general (Blue et al., 2002; Wakefield, 2003). Still other researchers, such as Darling-Hammond (2004) cite the need to preserve access to higher education (Nweke and Hall, 1999; Wakefield; 2003; Wall, 2001).

This chapter has synthesized the research on the key components related to the phenomenon of teacher candidate performance on standardized examinations such as C-BASE and the PRAXIS-II. This chapter explored the research on accountability and high-stakes licensure examinations and requirements and their unintended consequences, best practices in effective examination preparation programs, the components of test-wiseness and test anxiety, and the role of self-efficacy upon examination performance (Bandura, 1997; Blue et al., 2002; Jones, Jones & Hargrove, 2003; Miyasaka, 2000; Spielberger & Vagg, 1995; Supon, 2004; Wakefield, 2002).

Additionally, the T.E.S.T. examination preparation program was defined, as were the best practices in design and evaluation of examination preparation programs (Chittooran & Miles, 2001; Gulek, 2003; McCabe, 2003). This chapter also detailed the impact of Csikszentmihalyi’s (1996) research on Optimal Experience or “finding flow” (p. 71) and psychic entropy. Next, chapter three will identify the methodology, describe the variables under examination, and provide the proposed research design and data analysis techniques to be utilized in the study.
Chapter Three: Research Design and Methodology

This chapter will be divided into subsections. First, the background, rationale and potential benefits are discussed. Second, the purpose statement is described. Next, the research questions and hypothesis is provided. Fourth, the population and sample is presented. Fifth, the research design, instrumentation, and data collection and analysis are discussed. Finally, a chapter summary is provided.

Background and Study Rationale

Teacher candidates must take and pass several content knowledge examinations in order to earn licensure. For teacher candidates, these examinations are often perceived as high stakes examinations, as the consequences of failing the tests are severe: they will not be able to earn a teaching certificate until they pass the exam (Archer, 1998; Wakefield, 2003). Although standardized examinations are used to weed out potential teachers who do not earn minimum scores (Wakefield, 2003), little is known about the effectiveness of examination preparation programs which may enable teacher candidates to improve their performance (Bryant, 2002; Nweke & Hall, 1999).

Potential Benefits from the Study

This study determined the impact of teacher candidate participation in an examination preparation program designed to improve performance on the C-BASE and PRAXIS-II standardized examinations. Potential beneficiaries of this research include: teacher candidates who are preparing to take the C-BASE and PRAXIS-II, faculty who provide test-preparation, and deans and administrators of teacher education programs.
Significance of Licensure Examinations

Teacher educators, deans, and administrators of teacher preparation programs are held accountable for licensure test scores through title-II such as the C-BASE and PRAXIS-II reports (U.S. Department of Education Title II Report, 2007). Programs with poor pass rates face state and federal sanctions for poor performance (Jones, Jones & Hargrove, 2003; Paris & Urdan, 2000). Teacher candidates and teacher educators share an interest in adequate preparation for high-stakes examinations. Yet, according to Bryant (2002), while many examinees would benefit from a preparation program for teacher licensure testing, few teacher education programs offer preparation assistance. Unlike the fields of medicine and law, which offer licensure examinations (Bar Examination or the Medical Boards), many teacher candidates simply show up for their licensure examination with minimal preparation and hope for the best. There is a need to determine if an examination preparation program would benefit teacher candidates by improving their performance on the C-BASE and/or PRAXIS-II examinations.

Validity of PRAXIS-II Teacher Licensure Examinations

The PRAXIS-II, by Educational Testing Service of Princeton, New Jersey, is a series of content knowledge examinations used by most states as licensure examinations to merit a teacher candidate’s matriculation through a teacher education program (ETS, 2007a; ETS, 2007b). The PRAXIS-II examinations, according to ETS, are validated through a process of matching up required content knowledge of subject area teachers via job analysis, use of test development committees of experts in content knowledge required of teachers, and alignment of test content with “knowledge or skills judged important for entry-level practice” (ETS, 2005, p.3).
Test items are written, reviewed and revised to maintain quality control. Standards are set utilizing “widely accepted standard-setting procedures” (ETS, 2005, p.4). Individual state licensing committees determine cut scores for each assessment. ETS annually chronicles all PRAXIS-II performance data and disaggregates the information on teacher candidate performance. ETS calculates and reports the standard error of measurement, scoring, average performance range, median, number of examinees, and other relevant data (ETS, 2007a; ETS 2007b). Like the PRAXIS-II examinations, the ACT and C-BASE exams are subject to rigorous test item development and rigor.

Description of ACT and Validation

The ACT examination is comprised of 215 multiple-choice items divided into four main subject areas: English, Mathematics, Reading Comprehension and Science Reasoning (ACT, 2008a). Students often take the examination to assist entrance into a college or university, and it is most often attempted by third or fourth year high school students. Teacher education students at the institution studied must earn at least a 20 composite score on the ACT. In 2006 the national ACT average composite score was 21.1 (ACT, 2008b). ACT is, like ETS, a large testing company with an emphasis on psychometric assessment and research (ACT, 2008b). According to the 2007 ACT Technical Manual, the ACT is administered to prospective college students and is scored on a scale of 1-36. Research indicates that higher ACT scores are positively correlated with success in the first semester of college study (ACT, 2008b, p. 94). The ACT utilizes similar test item construction and analysis as the PRAXIS-II series from ETS, and conducts ongoing psychometric evaluation to maintain reliability and validity (ACT, 2008b).
Research on ACT

Research indicates that the ACT standards and benchmarks are significantly correlated with high school classroom performance and first-semester college success (ACT, 2008b). Student performance on both the ACT and the C-BASE is utilized as a measure of content knowledge by the teacher training institution studied.

Description of C-BASE Examination and Validation

The Assessment Resource Center (ARC), housed on the campus of the University of Missouri – Columbia, produces a standardized multiple-choice content knowledge examination called C-BASE. Comprised of four sections, English/Writing, Mathematics, Science, Social Studies, the exam contains approximately 188 total multiple choice items and a writing prompt about a college policy issue (Assessment Resource Center, 2007). Like ETS and ACT, the ARC tests for validity and reliability for the C-BASE examination using item analysis, item-skill congruence and “canonical correlations with the criteria of GPA, ACT scores, and SAT Quantitative and Verbal Scores” (Assessment Resource Center, 2007, p.10). All three examinations (ACT, C-BASE and PRAXIS-II) are used at the institution studied, but there is scant information concerning research on effective preparation programs to benefit teacher candidates seeking to prepare for the C-BASE and the PRAXIS-II.

Description of T.E.S.T. Model

T.E.S.T is the acronym for the test-preparation model (in the initial and advanced versions) evaluated in this study. T.E.S.T, which stands for Translate, Eliminate, Solve, and avoid Tricks, is a set of strategies to decode and translate the language of testing so that elementary education teacher candidates in this study would increase their
performance on the C-BASE and Elementary Education PRAXIS-II examination in order to achieve passing scores and earn licensure as certified teachers upon completion of their teacher education program. The initial T.E.S.T. model is presented to students at the sophomore level in a seminar forum. The advanced T.E.S.T model was made available to study participants through their senior-level Elementary Education capstone course. See full description of the T.E.S.T. program in Appendix A.

Research on Teacher Licensure Examination Preparation Programs

The research is limited about the effect of participating in teacher licensure examination preparation programs (Green, 1989; Mee, 2000; Taylor, 1992). Several researchers, including Mee (2000) and Green (1989), have investigated components of effective test preparation programs, and others have gauged the impact of teacher candidate participation in a test-preparation program, including Taylor (1992).

Gaps and Limitations in Teacher Licensure Examination Research

Bryant (2002) noted a gap in the research about the effect of participation of an examination preparation program for teacher licensure examinations, and Taylor (1992) found that a gap exists for elementary education teacher candidates and how they perform on licensure examinations after preparation programs. Taylor utilized group comparison and a regression model to predict teacher candidate performance on the National Teacher’s Examination (NTE) (Taylor, 1992). The NTE, the precursor to the PRAXIS-II Series for teacher licensure certification, was also written by Educational Testing Service, ETS. Taylor found that elementary education teacher candidates can improve after participating in examination preparation programs. However, his study is limited by the fact that the results may not be generalizable to other groups of teacher candidates, and
his sample size was limited. Additionally, Taylor evaluated the effect of participating in preparation programs for a test, NTE, which is no longer offered, as it has been replaced by the Elementary Education PRAXIS-II examination.

Rationale for this Study

To improve upon prior research on the topic of teacher licensure examination and examination preparation programs, this study suggests methodological improvements from Taylor’s (1992) and Mee’s (2000) studies. This study determined the effect of participation in the initial (program for C-BASE preparation) and advanced (program for PRAXIS-II) T.E.S.T. examination preparation models. Other considerations informing the study include taking into account testing ability by utilizing ACT composite and C-BASE composite scores as covariates. This study also considered qualification status for the teacher education program in the research design. Finally, this research utilized the widely-known PRAXIS-II licensure examination, updating the National Teacher’s Examination from Taylor’s (1992) study of the effect of examination preparation upon elementary teacher candidate performance.

Timeline for Initial and Advanced T.E.S.T. Models

Teacher candidates in the study participated in the initial T.E.S.T. model before their late-sophomore or early-junior attempt on the C-BASE examination. The initial T.E.S.T. model is offered to teacher candidates at the halfway point of their education program, prior to qualification for automatic acceptance into the teacher education program. The advanced T.E.S.T. model, conversely, is a program to prepare teacher candidates for their exit licensure examination, occurring as part of Elementary Education senior capstone course.
Statement of the Problem

There is a lack of information about the effect of teacher candidate participation in the C-BASE and PRAXIS-II examination programs offered at the institution studied. Despite offering the T.E.S.T. examination preparation program since 2002, no research has been conducted about the relationships between participating in the T.E.S.T. examination preparation program and performance on either of the licensure examinations required to earn admittance into and completion of the elementary education teacher education program. This study attempted to gauge the effect of participation in the initial and advanced T.E.S.T. examination preparation program.

To determine if participation in the examination preparation program, the researcher determined the main effects and interaction effects between candidate C-BASE and PRAXIS-II performance when considering participation in the initial and advanced T.E.S.T. examination preparation program and participation level and qualification status. This research is necessary because the relationship between teacher candidate participation level (full participant, transition participant, non-participant) in the initial and advanced T.E.S.T. exam-preparation models and their subsequent performance on the C-BASE and PRAXIS-II is unclear. There is also a lack of information about the effect of a teacher candidate meeting all qualifying requirements (qualifying or not qualifying) on teacher candidate performance on the C-BASE and PRAXIS-II licensure examination. There is a lack of information about the impact of using prior test score performance (ACT and C-BASE) as a covariate.
Purpose of the Study

One purpose of the study is to determine how participating in the initial and advanced T.E.S.T. impacts performance on two key teacher licensure examination, the C-BASE and the PRAXIS-II for Elementary Education majors. A secondary purpose of the study was to determine the main effects and interaction effects between candidate C-BASE and PRAXIS-II performance when considering teacher candidate participation level for initial and advanced T.E.S.T. examination preparation program and their qualification status while using ACT as a covariate.

Research Questions and Hypotheses

The following research questions and null hypotheses were developed to guide the study.

Research Question 1

What are the descriptive statistics for teacher candidate performance on the Elementary Education C-BASE and PRAXIS-II examinations, broken out by the following sub-groups?

By participation level:

f. Full, Transition, and Non-participants in the initial T.E.S.T. standardized examination preparation program.

g. Full, Transition, and Non-participants in the advanced T.E.S.T. standardized examination preparation program.

By qualification status:

h. Qualifiers and Non-qualifiers, for both initial and advanced T.E.S.T. examination preparation program.
With Covariate (ACT for C-BASE)

i. Teacher candidate performance on the C-BASE examination when using composite ACT score as a covariate.

j. Teacher candidate performance on the PRAXIS-II examination when using composite ACT score as a covariate.

Research Question 2

What is the relationship between elementary education teacher candidate performance on the ACT, C-BASE and PRAXIS-II examinations?

$H_{0,2}$: There is no relationship between elementary education teacher candidate performance in the ACT, C-BASE and PRAXIS-II.

Research Question 3

When using ACT as covariate, is there a significant difference in main effects and interaction effects between elementary education teacher candidate C-BASE examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status?

$H_{0,3}$: There is no difference in main effects and interaction effects between elementary education teacher candidate C-BASE examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status.

Research Question 4

When using ACT as covariate, is there a difference in main effects and interaction effects between elementary education teacher candidate PRAXIS-II examination
performance when considering initial and advanced T.E.S.T. program participation level and qualification status?

$H_0$: There is no difference in main effects and interaction effects between elementary education teacher candidate PRAXIS-II examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status.

**Methodology**

This study used the following research design, study groups, data collection strategies, and data analysis techniques to carry out research in order to answer the research questions.

*Research design.*

This study used a static-group comparison design (Fraenkel & Wallen, 2003, p. 273) for the research design. The study will utilize two-way Multivariate Analysis of Covariance (MANCOVA) to evaluate differences among group means. The study will also use multivariate statistical analysis techniques on independent and dependent variables. Mertler and Vannatta (2004) and Field (2005, p. 309) suggest the use of 2-way multiple analysis of covariance (MANCOVA) tests to determine the significance of group differences. This study will utilize MANCOVA to test for significance in group mean differences, and 2-way MANCOVA to determine main effect and interaction effect differences between and among group means by participation status and qualification status while holding constant for a highly correlated examination score, ACT composite.

The researcher established the p-value at .10 and rejected the null hypothesis if the p-value was smaller than or equal to .10. If the p-value was rejected, then post-hoc
tests for main effect and interaction effects were pursued by the researcher and the results were displayed and analyzed. The analysis utilized Pearson’s-r product moment coefficient of correlation, measures of centrality, standard deviations, graphs, figures and scatter plots to present the findings and facilitate the analysis of the results.

**Measurements in the study.**

The measurements used in the study included teacher candidate performance data for their initial attempts on three standardized tests: (a) the American College Test (ACT) (b) the College Basic Academic Subjects Examination (C-BASE) and (c) the PRAXIS-II: Elementary Education: Curriculum, Instruction, and Assessment (PRAXIS-II 10011)

**Independent variables in the study.**

Three independent variables or factors were examined in this study: (a) Participation in the initial T.E.S.T. examination preparation program. The three possible teacher candidate participation states are full-participant, transition participant, and non-participant. (b) Teacher candidate qualification status: Qualified and non-qualified (c) Composite ACT scores.

**Dependent variables in the study.**

There were two dependent variables in the study. They were the initial C-BASE composite score (and subscores) and initial Praxis-II scores earned by the teacher candidate. The following table lists the dependent and independent variables in the study.
Table 1

Independent and Dependent Variables Explored in the Study by Data Type

<table>
<thead>
<tr>
<th>Independent Variables (Factors)</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Participation in the initial (C-BASE) and advanced (PRAXIS-II) T.E.S.T. exam preparation program for C-BASE and/or PRAXIS-II</td>
<td></td>
</tr>
<tr>
<td>a. Full Participant</td>
<td></td>
</tr>
<tr>
<td>b. Transition Participant</td>
<td></td>
</tr>
<tr>
<td>c. Non-Participant</td>
<td>Nominal</td>
</tr>
<tr>
<td>2. Qualification status</td>
<td>Nominal</td>
</tr>
<tr>
<td>A. Qualifier</td>
<td></td>
</tr>
<tr>
<td>B. Non-qualifier</td>
<td></td>
</tr>
<tr>
<td>3. ACT composite scores</td>
<td>Interval</td>
</tr>
</tbody>
</table>

Dependent Variables (Measurements)

<table>
<thead>
<tr>
<th></th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elementary Education C-BASE examination scores and subscores</td>
<td>Interval</td>
</tr>
<tr>
<td>2. Elementary Education PRAXIS-II examination score</td>
<td>Interval</td>
</tr>
</tbody>
</table>

Study group.

The subjects included in this study are limited to Senior Elementary Education Majors who completed a teacher education program at the institution studied. These teacher candidates attempted three standardized examinations, the ACT, C-BASE, and PRAXIS-II, between 1995 and 2007. Approximately 100 teacher candidates attempt the required elementary education PRAXIS-II examination (10011) annually, but not all teacher candidates completed the program or took each examination. These teacher candidates were thus be excluded from the study, as they lack one or more of the required standardized tests or they did not fully complete the same program of study as the sample group. Some teacher candidates transferred in with C-BASE scores from another higher education institution. They are also excluded, as they did not participate in either the Initial or Advanced T.E.S.T. model.
Seven hundred ninety-six (796) elementary education teacher candidates completed the program at the institution studied between 1995 and 2007. The teacher candidates had varying levels of participation in the initial and advanced T.E.S.T. standardized examination program. Teacher candidates who attended the institution studied from 1995-2001, completed the program, took the required examinations, but did not participate in the T.E.S.T. standardized examination were considered Non-participants. Their standardized examination scores provided insight into a baseline of performance. When analyzed with the benefit of a covariate, performance on the ACT, Non-participant performance on the ACT, C-BASE, and PRAXIS-II yielded insight into how participation in the Initial and Advanced T.E.S.T. models affects performance on standardized examinations in the study and within the study population.

Changes in test score requirements at the institution studied.

The institution studied underwent several significant changes to the minimum standardized examination scores required of elementary education teacher candidates from 1995-2007. Thus, not all teacher candidates were subject to identical minimum standardized test score requirements. As minimum score requirements on content knowledge examinations increased, the Initial and Advanced T.E.S.T. standardized examination preparation programs were developed and implemented to assist teacher candidates in preparing for high-stakes examinations and, hopefully, to improve performance. The following table presents the minimum licensure test scores required at the institution studied, throughout the timeline of the data collected and analyzed in the study.
Table 2  
*Licensure Testing Minimum Requirements by Study Groups, 1995-2007*

<table>
<thead>
<tr>
<th>Years</th>
<th>ACT Requirement</th>
<th>C-BASE Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Participant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995-1997</td>
<td>No Minimum</td>
<td>235 on each section</td>
</tr>
<tr>
<td>1997-1998</td>
<td>No Minimum</td>
<td>235 on each section</td>
</tr>
<tr>
<td>1998-1999</td>
<td>No Minimum</td>
<td>235 on each section</td>
</tr>
<tr>
<td>1999-2000</td>
<td>No Minimum</td>
<td>235 on each section</td>
</tr>
<tr>
<td>Transition Participant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000-2001a</td>
<td>21 if 235 or higher on all C-BASE sections</td>
<td>265 each section or 21 composite ACT; 235 minimum if 20 or below</td>
</tr>
<tr>
<td>2001-2002b</td>
<td>21 ACT and minimum 265 score on each C-BASE OR 22 ACT and minimum 235 on each C-BASE</td>
<td>21 ACT and minimum 265 score on each C-BASE OR 22 ACT and minimum 235 on each C-BASE</td>
</tr>
<tr>
<td>Full Participant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002-2007</td>
<td>20 ACT and minimum 265 score on three sections of C-BASE AND at least 235 score on other two C-BASE sections OR</td>
<td>20 ACT and minimum 265 score on three sections of C-BASE AND at least 235 score on other two C-BASE sections OR</td>
</tr>
<tr>
<td></td>
<td>21 ACT and minimum 235 on each C-BASE</td>
<td>21 ACT and minimum 235 on each C-BASE</td>
</tr>
</tbody>
</table>

*Grouping factors in the study.*

The teacher candidates in this study were divided into two grouping factors, (a) Participation status for the initial and advanced *T.E.S.T.*, C-BASE and PRAXIS-II examination preparation program (participant, transition participant or non-participant) and (b) qualification status for automatic admittance to the teacher education level (qualifier or non-qualifier). Please refer to the Definition of Key Terms in Chapter 1 for more descriptive explanations of these grouping factors.
Independent and dependent variables.

Teacher candidate standardized test performance data was collected. Several independent variables were used. (a) Participation status: full participant, transition participant, non-participant. (b) Qualification status: qualifier or non-qualifier. (c) ACT composite scores. The dependent variables were (a) C-BASE composite scores and (b) Elementary education PRAXIS-II composite score. Table 3 indicates the analysis strategies utilized to answer the research questions offered.

Table 3
Summary of Analyses Used by Research Questions

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data Type</th>
<th>Analysis Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. descriptive statistics</td>
<td>interval, nominal,</td>
<td>Mean, median, mode, standard deviation</td>
</tr>
<tr>
<td>2. relationship between variables</td>
<td>interval, nominal</td>
<td>Pearson Product-Moment Correlation, p-value (if significant, then post-hoc analysis)</td>
</tr>
<tr>
<td>3. difference, interaction C-BASE</td>
<td>interval, nominal</td>
<td>2-WAY MANCOVA; main effect, interaction effect</td>
</tr>
<tr>
<td>4. difference, interaction PRAXIS-II</td>
<td>interval, nominal</td>
<td>2-WAY MANCOVA; main effect, interaction effect</td>
</tr>
</tbody>
</table>

Data collection and data gathering.

Archival data has been identified to facilitate this study. Data was collected to answer the research questions posed in this study. Teacher candidate test score data, program completion records, and qualification status for automatic admittance into the professional education program was necessary to complete the research. To determine which records are necessary for the study, permission was obtained from Institutional Review Board and the custodian of records, Office of Data Management, and Dean of the College of Education and Human Services (See Appendices B, C and D). Once a list of
students who completed the teacher education program and attempted the ACT, C-BASE, and PRAXIS-II was obtained, this information was provided to a research assistant who added participation level and qualification status to the data set. The research assistant ensured that all individually identifiable information was removed from the data set prior to providing it the researcher.

Teacher candidate record confidentiality.

Privacy of the teacher candidate data records was ensured. First, after test scores were located and matched to appropriate teacher candidates, all names were removed by the research assistant prior to delivery of the data set to the researcher. The research assistant removed all unique individual markers that could indicate the name or identity of a particular teacher candidate.

The researcher determined participation status in the Advanced T.E.S.T. PRAXIS-II standardized examination preparation program by querying the data files in the Unit Assessment System. These data are archived as historical records in the computer and paper files of the office of Teacher Education Student Services at the institution studied. Institutional Review Board approval was obtained from the Chair of the IRB committee at the institution studied prior to accessing records from the office of Teacher Education Student Services. Additionally, permission in the form of an official letter was sought by the researcher prior to beginning any research (See Appendices B, C, D). This permission specified that the researcher is given the authority to utilize the data set contained in the archives. It also affirmed that the Chief Academic Office of the Education and Human Services Department at the institution studied granted permission for the researcher to
utilize the data required to complete the study. See figure 1 for a descriptive plan for the process of gathering data.

- After determining variables to be requested, determined three locations of data
- Data stored in University Records system (ACT, C-BASE, PRAXIS-II)
- Data stored in TESS database (ACT, C-BASE, PRAXIS-II, Microsoft Excel Spreadsheets)
- Data stored in University Data Management (list of all students who took the Elementary Education capstone course from 1995-2007
  1. Teacher Education Student Services Office permission required
     a. Internal Review Board exempt archival data set requested
        i. Institution Studied – IRB Chair
        ii. University of Missouri-Columbia – closely follow required IRB approval process
  2. Data Processing permission required.
     i. Data Processing Supervisor
  3. Permission acquired through custodians of student records
     a. CEHS Dean, Supervisor of Teacher Education Archives
     b. Data Processing – Information Technology Archival Data
  4. Data screened by hired research assistant who removed all identifying information for individual students to ensure confidentiality
  5. Data screened to utilize only the first test score or sub-test score for each examination utilized (ACT, C-BASE, PRAXIS-II).
  6. Study Groups were assigned based on criteria specified in methodology
  7. Data provided to researcher by hired research assistant in Microsoft Excel spreadsheets for uploading into SPSS software.
  8. Data set divided into three groups, including admissions requirements to determine qualification status:
     a. Non-participants (1995-2000; 5 years)
     b. Transition Participants (2000-2002; 2 years)
     c. Full Participants (2002-2007; 5 years)

Figure 1. An outline of the data gathering for the study.

Data analysis.

Statistical analyses for this study were conducted using SPSS® statistical analysis software and Microsoft Excel® spreadsheet software. The intent of the analyses carried out for this study was to answer the three research questions outlined earlier in this chapter. Analyses conducted included Pearson r Product Moment Coefficient of Correlation, 2-Way Analysis of Covariance (MANCOVA), measures of centrality, effect
size, and graphs and charts chronicling teacher candidate performance on the ACT, C-BASE and PRAXIS-II standardized examinations with and without utilizing a covariate, and with and without consideration of qualification status for automatic acceptance into the college of education and level of participation in the study.

Summary

This chapter on research methodology was divided into subsections. First, the problem statement was offered. Second, the purpose statement was described. Next, the research questions and hypothesis were provided. Fourth, the population and sample were presented. Fifth, the research design, variables, grouping factors, instrumentation, privacy and security measures, data collection and data analysis were discussed.
Chapter Four: Presentation and Analysis of Data

This chapter provides the presentation and analyses of those data collected to test the research hypotheses outlined in the study. The data were collected from the archives of the teacher education program at the institution studied. The institution studied is a regional, public university in Missouri with a large teacher education program that produces approximately 250 licensed teachers annually. Data utilized to answer the research questions included the initial ACT, C-BASE, and PRAXIS-II test scores for elementary education teacher candidates, qualification status for admittance into a teacher preparation program, and teacher candidate participation level in the initial and advanced T.E.S.T. examination preparation program.

The narrative to follow includes sections that review the problem and purpose of the study, the study group, and research design. The research questions will be answered in additional sections in this chapter, using descriptive analysis, correlation, and multivariate analysis of covariance (MANCOVA). The study utilizes a factorial design with two independent variables, a covariate, and two dependent variables. This chapter concludes with a summary of the findings and a brief interpretation.

Problem and Purpose Overview

This research study was designed to examine the impact of participation in a standardized examination preparation program for elementary education teacher candidates at a regional, public University in the Midwestern United States. The results of this study may benefit the institution’s elementary education teacher candidates seeking preparation assistance for the C-BASE and PRAXIS-II examinations.
Additionally, the results of this study may benefit the elementary education faculty and educational administration officers at the institution where the study took place.

_Examination preparation literature support._

Although researchers have identified the need to develop and implement examination preparation programs for teacher candidates attempting high-stakes licensure examinations including the PRAXIS-II examination (Bryant, 2002; Taylor, 1992), there is a lack of research about effective examination preparation programs that assist elementary education teacher candidates with licensure examinations. At the institution studied, this need led to the development of an examination preparation program designed using best practices for effective examination preparation programs suggested by Mee (2000), Miyasaka (2000) and Chittooran & Miles (2001). The following figure chronicles the research-based components of effective test preparation programs and explores the Initial and Advanced _T.E.S.T._ examination preparation program developed and utilized at the institution studied:
<table>
<thead>
<tr>
<th></th>
<th>Content Validation</th>
<th>T.E.S.T Model Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framework for effective exam</td>
<td>Best practices in exam preparation programs</td>
<td>Initial: components used in \textit{T.E.S.T.} Model C-BASE Exam preparation program</td>
</tr>
<tr>
<td>programs</td>
<td></td>
<td>Advanced: components used in \textit{T.E.S.T.} Model PRAXIS-II Exam preparation program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Model Under Study: \textit{T.E.S.T.} Program</td>
</tr>
<tr>
<td>Curriculum and Test Content</td>
<td>Test-wiseness based Strategies, not content</td>
<td>Practice Writing Prompts, Social Studies and Math content knowledge; Act Science; ACT science questions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elementary Education Content knowledge; Sample questions; group processing</td>
</tr>
<tr>
<td>Approaches and Test Formats</td>
<td>Skills, techniques and strategies</td>
<td>Roman numeral questions, reasoning through graphs, charts, and figures; positive reinforcement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Roman numeral questions, reasoning through graphs, charts, and figures; positive reinforcement</td>
</tr>
<tr>
<td>Test-taking Strategies</td>
<td>Efficiency and test-wiseness; prevention of test anxiety</td>
<td>Reasoning, elimination, translation strategies, trick avoidance; stem cues; test-anxiety reduction strategies; awareness of attitude</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reasoning, elimination, translation strategies, trick avoidance; stem cues; test-anxiety reduction strategies; awareness of attitude</td>
</tr>
<tr>
<td>Timing of Test-Preparation</td>
<td>Time management</td>
<td>Sample questions are timed; emphasis on completion and error avoidance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample questions are timed; emphasis on completion and error avoidance</td>
</tr>
<tr>
<td>Student Motivation</td>
<td>Practices must motivate and reach students</td>
<td>Motivation via guidance through C-BASE challenge; self-efficacy enhancement; course/program requirement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Motivation via guidance through PRAXIS-II challenge; self-efficacy enhancement; course/program requirement</td>
</tr>
</tbody>
</table>

\textit{Figure 1. Table showing alignment and comparison of the initial and advanced T.E.S.T. model with components of valid and effective test preparation programs.}
The *T.E.S.T.* examination preparation program has been implemented at the institution studied since 2002 yet has never been formally evaluated to gauge the effect upon participants. The study sought to answer several key questions related to the effectiveness of the examination preparation program. These questions led to three problems addressed by the study.

*Problem addressed in study.*

First, literature review indicates that examination preparation can improve teacher candidate score performance on the standardized teacher licensure examinations (Taylor, 1992; Gulek, 2003; Mee, 2000), yet revealed a lack of information regarding how participation in the Initial and Advanced *T.E.S.T.* examination preparation program affects elementary education teacher candidates at the institution studied. Second, there is a lack of information about whether qualifying status for admission to teacher education at the institution studied affects the performance of elementary education teacher candidates on C-BASE and PRAXIS-II teacher licensure examinations. Third, there is a lack of information about the effects of covariates (previous standardized examination test scores for teacher candidates) when considering main and interaction effects and Initial and Advanced T.E.S.T. program participation and qualification status. Prior research by Taylor (1992) and Kiger (2003) suggests that ACT composite score is correlated to performance on elementary education licensure examinations.

*Study group.*

The study group was limited to Elementary Education Majors who completed a teacher education program at the institution studied between 1995 and 2007. These teacher candidates attempted three standardized examinations, the ACT, C-BASE, and
Approximately 100 teacher candidates attempt the required elementary education PRAXIS-II examination (10011) annually, but not all teacher candidates completed the program or took each examination. These teacher candidates were excluded, as they lacked one or more of the required standardized tests or did not fully complete the same program of study as the sample group. Teacher candidates who transferred to the institution studied with C-BASE scores from another higher education institution were also excluded, as they did not participate in either the initial or advanced T.E.S.T. examination preparation model.

Acquisition of archival examination records and privacy assurances.

Almost 800 elementary education teacher candidates completed the program and met all requirements and completed all required teacher education licensure examinations at the institution studied from 1995-2007. After receiving approval from the custodian of records at the institution studied and permission from the Institutional Review Board (IRB), elementary education teacher candidate archival examination records were retrieved from the Unit Assessment System Archives. They were delivered electronically in spreadsheets to a research assistant, who removed all individually identifiable information. The research assistant cross-referenced the scores with teacher education program admittance files to determine qualification and participation status based on archival records.

Refer to chapter 3, Methodology, for two helpful figures which delineate (a) required test scores and minimum competencies for teacher candidates at the institution studied between 1995 and 2007 and (b) the process of protecting teacher candidate privacy utilized by the researcher and the research assistant to compile the data utilized.
After ensuring data security and teacher candidate privacy, the research assistant disaggregated the data, assigning qualification status and participation level and, using SPSS and Microsoft Excel software, electronically sent it to the researcher for analysis.

*Independent variables.*

Elementary education teacher candidate standardized test performance data were collected. Several independent variables were used. (a) Participation status: full participant, transition participant, non-participant. (b) Qualification status: qualifier or non-qualifier. (c) ACT composite scores.

*Dependent variables.*

The dependent variables or outcome variables (Field, 2005) measured in this study were C-BASE and PRAXIS-II examination scores on the initial attempt for elementary education teacher candidates at the institution studied. The independent variables consist of scale (ACT) and categorical (participation and qualification status) data. Univariate analyses of covariance (MANCOVA) were completed to test for significant group differences between each category of independent variables. Using MANCOVA, participation and qualification status were each examined against both outcome or dependent variables (PRAXIS-II or C-BASE score) while holding ACT score constant in an effort to control for test-taking ability. Use of a covariate was recommended by Field (2005, p. 364) for measuring variables in an effort to control for the influence they have on the dependent variable while accounting for some of the unexplained variance in the study design in terms of other variables so as to reduce error and minimize confounding effects.
**Rationale for selected statistical analyses.**

This study used a static-group comparison design (Fraenkel & Wallen, 2003, p. 273). The study utilized 2-way Multivariate Analysis of Covariance (MANCOVA) to evaluate differences among group means. The researcher used multivariate statistical analysis techniques on independent and dependent variables. Mertler and Vannatta (2004) and Field (2005) suggest the use of 2-way analysis of covariance (MANCOVA) tests to determine the significance of group differences when a study has two or more independent and dependent variables and a covariate. In this study, there are two outcome variables, C-BASE and PRAXIS-II composite scores, and three predictor variables, participation level and qualification status (categorical) and ACT composite score (continuous). ACT composite score is the covariate in the MANCOVA.

**Multivariate analyses of covariance.**

Field (2005) suggests that an independent variable identified in prior research as a valid predictor variable of dependent variable outcome can be utilized as a covariate. In this study, literature review identified strong support for the use of ACT and C-BASE composite scores as covariates for the predictor variables of PRAXIS-II examination performance for elementary education teacher candidates (Field, 2005, p. 87; Kiger, 2003; Pultorak, 1988; Taylor, 1992). The covariates were deemed to be plausible predictors of prior test-taking ability as measured by initial ACT and/or initial C-BASE composite scores. This study will utilize MANCOVA to test for significance in group mean differences, and 2-way MANCOVA to determine main effects and interaction effects and differences between and among group means by participation status and qualification status.
Use of single covariate in the study.

Mertler and Vannatta (2004) suggest using covariates when predictor variables are identified and may be measured, so as to reduce error variance (p. 93-95). However, they caution against using multiple covariates when each is strongly correlated to each other. In the proposed study, ACT and C-BASE scores and subscores were identified as potential covariates. However, due to the high coefficient of correlation of ACT-C-BASE, C-BASE-PRAXIS-II on the Pearson Product Moment coefficient of correlation, the researcher chose not to utilize multiple covariates, as recommended by Stephens (1992) in Mertler and Vannatta (2004). Research does not support this procedure, noting that when there is a weak correlation between two covariates, each will be removing from the dependent variable relatively unique portions of the error variance. The authors note that with strong correlation between the covariates, (e.g., r > .80) then those two covariates are removing essentially the same error variance from the dependent variable. Mertler and Vannatta (2004) recommend removing the second covariate, as it contributes little to improving the design and defining variances. This study utilized ACT as the sole covariate based upon these recommendations.

P-Value.

This study established a P-value at 0.10 and rejected the null hypothesis if the p-value was smaller than or equal to 0.10. If the p-value is rejected, then post-hoc tests for main effect and interaction effects were pursued by the researcher and the results displayed and analyzed. The analysis utilized Pearson’s-r product moment coefficient correlation, measures of centrality, standard deviations, figures, charts, and graphs to represent the findings and facilitate analysis of the results. The outcomes of the study
included elementary education teacher candidate performance data for initial attempts on two standardized tests: (a) the College Basic Academic Subjects Examination (C-BASE composite and subsections) and (b) the PRAXIS-II: Elementary Education: Curriculum, Instruction, and Assessment (PRAXIS-II 10011) standardized test scores.

Null hypotheses.

In order to investigate the problem, address the purpose, and to answer the research questions of the study, the following null hypotheses were tested.

\( H_01: \) There is no difference in descriptive statistics of teacher candidates’ performance on the C-BASE examination and sub-scores and Praxis-II examination and sub-scores when considering participation status (non-participant, transition participant, and full participant) and Qualification status (non-qualifier and qualifier).

\( H_02: \) There is no relationship between elementary education teacher candidate performance in the ACT and C-BASE examinations and the PRAXIS-II.

\( H_03: \) There is no difference in main effects and interaction effects between elementary education teacher candidate C-BASE examination score and sub-scores performance when considering initial and advanced T.E.S.T. program participation level and qualification status.

\( H_04: \) There is no difference in main effects and interaction effects between elementary education teacher candidate PRAXIS-II examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status.
Descriptive Analysis Results

In this study, Research Question #1 sought to determine the group characteristics and descriptive statistics for elementary education teacher candidates whose examination scores were measured by qualification status and participation level. The first independent variable in the study, participation level, had three possible variations, non-participant, transition participant, and full participant. The second independent variable or predictor variable (Field, 2005), qualification status, had two possible variations, qualifier and non-qualifier. Two outcome or dependent variables, C-BASE composite score and PRAXIS-II score, were used.

Overall results.

Based on the findings from this study, the descriptive statistics indicate that the population of elementary education teacher candidates showed mean examination scores of 22.03 (ACT), 295.5 (C-BASE composite), and 177.9 (PRAXIS-II) with respective standard deviations of 2.87, 38.9, and 10.9. To better display the overall examination scores for the study group, histograms were developed for ACT, C-BASE, and PRAXIS-II examination. Figures 2-7 reveal mean ACT, C-BASE, and PRAXIS-II scores for the entire population of elementary education teacher candidates at the institution studied.

Study group performance on ACT examination.

The quality of teacher candidates, as judged by academic ability and standardized test-taking ability on ACT, C-BASE, and PRAXIS-II, improved considerably at the institution studied. These results and supporting figures will be discussed more in the following paragraphs.
The following three figures (Figures 2, 3, and 4) provide a visual representation of elementary education teacher candidate test taking ability at the institution studied between 1995 and 2007. Figure 2, an ACT score histogram, shows that many teacher candidates arrived at the institution with below-average ACT scores, when compared to the normal distribution and state and national median ACT composite scores (Fairtest, 2002d; ACT, 2008b). Moreover, approximately 200 elementary education teacher candidates did not earn at least a composite ACT score of 20 on their initial attempt to pass the ACT, which was the minimum required entrance requirement. In 2002, for a short time the institution studied moved the minimum ACT score to a 22 composite, which comprised 47.4% of all teacher candidates at the institution studied. The following figure displays ACT composite scores for the population of elementary teacher candidates.
Figure 2. A histogram of ACT examination composite scores of Elementary Education teacher candidates at the institution studied from 1995-2007 (n = 804) is provided. Note. The curve displayed represents normal distribution.

Qualification requirements.

Thus, approximately half of elementary education teacher candidates during the transition participation era of the T.E.S.T. examination preparation program did not initially qualify for admittance to their professional education program. This placed them in an “at-risk” status for non-qualification for admittance to teacher education due to the increased standardized examination requirements at the institution studied during 2001 and 2002. Please refer to Chapter three, table 2, for licensure minimums scores for all participation levels.

Note that Figure 2 utilizes the normal distribution curve to highlight elementary education teacher candidate performance on the ACT examination, which is used as a covariate predictor variable in MANCOVA analyses in this study. In Figure 2, teacher
candidates performed relatively weaker than the normal distribution, and the data are 
slightly skewed to the left of the median, indicating weaker performance on the ACT. 
This will assist future researchers by detailing the population at the institution studied. 

Figure 3 reveals a histogram of ACT composite scores by participation level across time-
bound groups from 1995-2007. At the institution studied, a moderately selective teacher 
education program, most students’ ACT composite score was between 18 and 24 on their 
initial attempt. The minimum required score for admittance to teacher education ranged 
from 20 to 22 from 1995 to 2007 at the institution studied. See Chapter 3, Table 2, 
Licensure testing minimum requirements by study groups, 1995-2007 for minimum ACT 
requirements at the institution studied.
Figure 3. A histogram of ACT examination composite scores of Elementary Education teacher candidates at the institution studied from 1995-2007 by participation status is provided (n= 804).
Figure 4. A histogram of ACT examination composite scores of Elementary Education teacher candidates at the institution studied from 1995-2007 (n= 804) is provided.

Study group performance on C-BASE examination.

Figure 5, C-BASE score histogram, again reveals that teacher candidates at the institution studied perform below average (the data are skewed to the left of the distribution) compared to the normal distribution on the C-BASE examination, the second in the series of three required teacher licensure examinations at the institution studied. Elementary teacher candidates generally take that examination at the end of their sophomore year, after completing general education requirements. Figure 5 reveals that approximately three out of four (77.5%) of elementary education teacher candidates earned a mean C-BASE composite score of 265 or higher.

This is important in that teacher candidates are required to earn at least a 265 composite score on each section of the C-BASE examination at the institution studied,
higher than the state minimum of 235. Additionally, 94.6% of teacher candidates in the study group earned a 235 composite score on their initial attempt to pass the C-BASE, but because of the higher minimum required performance level to earn admittance (refer to Chapter 3, Table 2, Licensure testing minimum requirements by study groups, 1995-2007, for more information) into professional education programs, many teacher candidates did not initially earn admittance into professional education and were required to retest. The initial T.E.S.T. examination preparation program was designed to increase teacher candidate performance and assist them in earning minimum scores.

**Elementary Education Teacher Candidates' Initial Composite C-BASE score**

![Histogram of C-BASE exam composite scores](image)

*Figure 5.* A histogram of C-BASE exam composite scores (range 80-540) for Elementary Education teacher candidates at the institution studied from 1995-2007 (n=796) is provided.

*Note.* The curve displayed represents normal distribution.
Study group performance on the PRAXIS-II examination.

Figures 6 and 7, the PRAXIS-II histogram, and PRAXIS-II pass rates, respectively, reveal that elementary teacher candidates at the institution studied have increased their performance over time and are performing at a high level in comparison to national averages. Additionally, Figure 7 indicates the median PRAXIS-II performance level of the elementary education teacher candidates have generally shown a trend of increasing performance, from 53% above the median in 2000-2001 to almost 67% above the median in the last three years at the institution studied. Elementary Education teacher candidates began attending required examination preparation programs in 2002, the year that PRAXIS-II scores, which, according to Figure 7, is the year that PRAXIS-II scores began a five-year upward trend. All of the gain above the median (in blue) indicates the elementary education teacher candidates who perform at or above the national average.
Figure 6. A histogram of PRAXIS-II examination scores (range 100-200; median 177) for Elementary Education teacher candidates at the institution studied from 1995-2007 (n=796) is provided.

Note. The curve displayed represents normal distribution.

Figure 6 shows that the graph is skewed toward higher scores when compared to the normal distribution. This is the opposite of Figures 2 and 5, which also reveal skewed data. However, in Figures 2 and 5, the ACT and C-BASE data for the same elementary education teacher candidates are skewed to the left, indicating relatively weaker examination performance than Figure 6 reveals. When considering the significance of Figures 2, 5 and 6, they may reveal an improvement in academic performance at the institution studied between 1995 and 2007 for elementary education teacher candidates. This may be a finding of interest for elementary education teacher candidates and program administrators at the institution studied.
Teacher candidate PRAXIS-II examination trends.

Figure 6 reveals that PRAXIS-II performance is higher than the normal distribution. Furthermore, Figures 6 and 7 portray a population of elementary education teacher candidates at the institution studied whose summative, end-of-program PRAXIS-II licensure examination scores reflect added value in comparison to national norms, as revealed by the histogram’s positive skewness as displayed in Figure 6. Based on descriptive statistical analysis from this study, Figure 7 reveals two findings concerning elementary education teacher candidates at the institution studied: (a) elementary education teacher candidates at the institution studied perform considerably better on the PRAXIS-II examination in Elementary Education than the median national score, and (b) median PRAXIS-II performance level of the elementary education teacher candidates shows a trend of increasing examination performance since the initial and advanced T.E.S.T. examination preparation program was required of transitional and full participants in 2000-2001 at the institution studied through 2007. During that time, median teacher candidate performance increased from 53% of teacher candidates earning PRAXIS-II scores above the median to 67%, on average, in the three most recent years. Figure 7 reveals these pass rate trends.
Figure 7. A chart revealing elementary education teacher candidate PRAXIS-II pass rate trends and median scores (since the T.E.S.T. examination preparation program began in 2000-2001 at the institution studied is provided. National median score is 177.

Note 1. General trend lines calculated using linear regression in Microsoft Excel.

Descriptive statistical analysis with tables and charts.

Descriptive statistics were calculated for each of the independent and dependent variables used in the study. The following analysis reports the findings with numerical and graphical analyses. Table 1 reveals the analysis methods utilized to answer research question 1.
Table 1
Method of Analysis Utilized to Answer Research Question #1 by Group Size for Each Analytical Method

<table>
<thead>
<tr>
<th>RQ1: Descriptive Analysis</th>
<th>Qualifiers</th>
<th>Non-qualifiers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Participant</td>
<td>100</td>
<td>47</td>
<td>147</td>
</tr>
<tr>
<td>Transition-Participant</td>
<td>135</td>
<td>71</td>
<td>206</td>
</tr>
<tr>
<td>Full-Participants</td>
<td>293</td>
<td>150</td>
<td>443</td>
</tr>
<tr>
<td>Total</td>
<td>528</td>
<td>268</td>
<td>796</td>
</tr>
</tbody>
</table>

In total, there were 796 complete records out of 804 teacher candidate data records reviewed and analyzed in the study. Table 2 reveals the overall performance on the three examinations comprising the predictor and outcome variables, regardless of participation level and qualification status. Table 2 also includes summary statistics that determine population variance, in this case standard deviation. These findings will assist future researchers, as they provide a picture of the academic abilities of the entire population of elementary education teacher candidates at the institution studied.

Table 2
Teacher Candidate Overall Examination Performance and Standard Deviation Regardless of Participation Status and/or Qualification Status at Institution Studied

<table>
<thead>
<tr>
<th>Overall</th>
<th>N</th>
<th>Mean ACT</th>
<th>SD ACT</th>
<th>Mean C-BASE</th>
<th>SD C-BASE</th>
<th>Mean Praxis-II</th>
<th>SD PRAXIS-II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>796</td>
<td>22.03</td>
<td>2.87</td>
<td>295.47</td>
<td>38.82</td>
<td>177.88</td>
<td>10.87</td>
</tr>
</tbody>
</table>

Teacher candidate participation level and qualification status.

Table 3 displays the study group population by the independent variables, qualification and participation status. The results indicate that approximately two-thirds of teacher candidates at the institution studied qualified for admittance, and one-third did not, based on their initial attempt to enter the college of education. All eventually earned admittance to the college of education. These data do not include those who left the program and/or never earned admittance into the college of education. This may have affected study results, in that the presence of the initial and advanced T.E.S.T.
examination preparation program, which assisted teacher candidates in an effort to improve their test scores, may have been the variable that confounds the results. The program may have assisted teacher candidates to earn eligibility for admittance into the teacher education program, whereas without support (non-participants from 1995-2001) some teacher candidates were not admitted to the program and thus never attempted all three licensure examinations and completed degree requirements.

Table 3
*Teacher Candidates by Qualification Status and Participation Status*

<table>
<thead>
<tr>
<th>Participation Level</th>
<th>Year</th>
<th>Total</th>
<th>Qualifiers Frequency</th>
<th>Qualifiers Percent</th>
<th>Non-Qualifiers Frequency</th>
<th>Non-Qualifiers Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-participant</td>
<td>1995-2000</td>
<td>147</td>
<td>100</td>
<td>68%</td>
<td>47</td>
<td>32%</td>
</tr>
<tr>
<td>Transition participant</td>
<td>2001-2002</td>
<td>206</td>
<td>135</td>
<td>66%</td>
<td>71</td>
<td>34%</td>
</tr>
<tr>
<td>Full participant</td>
<td>2002-2007</td>
<td>443</td>
<td>293</td>
<td>66%</td>
<td>150</td>
<td>34%</td>
</tr>
<tr>
<td>Total Participants</td>
<td></td>
<td>796</td>
<td>528</td>
<td>66%</td>
<td>268</td>
<td>34%</td>
</tr>
</tbody>
</table>

Figures 8 and 9 are charts disaggregating C-BASE composite performance by qualification status, comparing results with and without use of a covariate (ACT composite held at 22.03). Figure 8 displays mean C-BASE composite scores with and without covariate. The findings reveal conflicting results. Based on Figures 2, 3 and 8, it is evident that the population of elementary education teacher candidates at the institution studied improved across time-bound levels of participation in the study. Based on the results of the impact of participation level on test performance (using ACT as covariate), teacher candidate C-BASE composite scores regress to the mean. Use of ACT as a covariate lowers participant scores on C-BASE composite score and subscores, as participants have a higher composite ACT score than non-participants. See Table 5 for complete disaggregated performance. This disconfirms initial descriptive analysis of the impact of participation in the *T.E.S.T.* examination preparation program. When
calculating qualifying group performance (yellow bars in Figure 8), it appears that participation in the *T.E.S.T.* examination preparation program indicates an increased score. When variance related to test-taking ability (ACT covariate $r^2 = .681$) is removed, the actual performance appears to yield a negative net effect related to participation. This disconfirms expected results and anecdotal evidence about the general perception of the effectiveness of the program on elementary education teacher candidate scores.

**Comparison of C-BASE Composite Scores by Participation Status for Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 528 qualifiers)**

![Comparison of C-BASE Composite Scores by Participation Status](chart)

*Figure 8.* A chart revealing comparative (covariate vs. no covariate) performance for qualifying elementary education teacher candidates on C-BASE composite score by participation status is provided.

*Note 1. Covariate of ACT total score evaluated at 22.03*
Comparison of C-BASE Composite Scores by Participation Status for Non-Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 268 non-qualifiers)

286.2
280.3
274.9
280.5
255.8
260.5
261.0
262.6
200
210
220
230
240
250
260
270
280
290
300
310
320
330
340
350

Non Participant
(n=47)
Transition Participant
(n=71)
Full Participant
(n=150)
Mean Non-Qualifier Score
(n=268)

Figure 9. A chart revealing comparative (covariate vs. no covariate) performance for non-qualifying elementary education teacher candidates on C-BASE composite score by participation status is provided.

Note 1. Covariate of ACT total score evaluated at 22.03

Table 4 displays the mean overall elementary education teacher candidate test score performance. At the institution studied, students who initially met all minimum qualification requirements for admittance into the professional education program scored higher on every standardized examination measure, including ACT, C-BASE, and PRAXIS-II composite scores. Non-qualifiers had less standard deviation in their performance on two of the three measure in table 4 (ACT and C-BASE composite score), but had larger standard deviations on PRAXIS-II examination performance.

Table 4
Teacher Candidate Examination Scores by Qualification Status

<table>
<thead>
<tr>
<th>Qualification Status</th>
<th>N</th>
<th>Mean. ACT</th>
<th>SD ACT</th>
<th>Mean. C-BASE</th>
<th>SD C-BASE</th>
<th>Mean. Praxis-II</th>
<th>SD Praxis-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifier</td>
<td>533</td>
<td>23.1</td>
<td>2.63</td>
<td>313.2</td>
<td>32.45</td>
<td>181.6</td>
<td>8.97</td>
</tr>
<tr>
<td>Non-Qualifier</td>
<td>271</td>
<td>19.93</td>
<td>2.07</td>
<td>260.5</td>
<td>23.59</td>
<td>170.9</td>
<td>10.63</td>
</tr>
</tbody>
</table>
Examination performance by qualification status.

Table 5 reveals teacher candidate examination performance by participation status. On the ACT, non-participants (\(\bar{X} = 20.77\)) scored lower than transition participants (\(\bar{X} = 21.80\)) at the institution studied. Full participants scored highest among the three groups on the ACT (\(\bar{X} = 22.56\)), and had a lower standard deviation (SD=2.58) than transition participants (SD=3.07) and non-participants (SD=20.77). On the C-BASE exam, non-participants (\(\bar{X} = 290\)) scored lower than transition participants (\(\bar{X} = 296.4\)) and full participants (\(\bar{X} = 296.8\)) at the institution studied. Full participants scored highest among the three groups on the PRAXIS-II as well (\(\bar{X} = 178.5\)), as compared to transition participants (\(\bar{X} = 176.9\)) and non-participants (\(\bar{X} = 177.7\)). On the PRAXIS-II examination, full participants recorded a lower standard deviation (SD=10.7) than transition participants (SD=11.2) and had a similar standard deviation to non-participants (SD=10.5).

<table>
<thead>
<tr>
<th>Participation Level</th>
<th>N</th>
<th>Mean ACT</th>
<th>SD ACT</th>
<th>Mean C-BASE</th>
<th>SD C-BASE</th>
<th>Mean Praxis-II</th>
<th>SD Praxis-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-participant</td>
<td>147</td>
<td>20.77</td>
<td>3.00</td>
<td>290</td>
<td>36.3</td>
<td>177.7</td>
<td>10.5</td>
</tr>
<tr>
<td>Transition Participant</td>
<td>206</td>
<td>21.80</td>
<td>3.07</td>
<td>296.4</td>
<td>41.3</td>
<td>176.9</td>
<td>11.2</td>
</tr>
<tr>
<td>Full participant</td>
<td>443</td>
<td>22.56</td>
<td>2.58</td>
<td>296.8</td>
<td>38.4</td>
<td>178.5</td>
<td>10.7</td>
</tr>
</tbody>
</table>

Overall, these descriptive statistics reveal that among the three groups, full participants outscored non- or transition participants (those who had limited or no intervention in the initial and/or advanced T.E.S.T. examination preparation program) on the ACT, C-BASE, and PRAXIS-II while displaying generally lower standard deviations across the standardized examinations. Table 5 reveals that participants in the T.E.S.T.
examination preparation program outscored those who did not participate in the
intervention without regard to covariate on both of the dependent variables, C-BASE and
PRAXIS-II composite score.

*Teacher candidate exam performance by participation level (with covariate).*

Table 6 reveals the results of elementary education teacher candidate examination
performance on the C-BASE and PRAXIS-II when utilizing ACT composite as a
covariate. The computation of covariance utilized only one covariate as recommended by
Field (2005) and Mertler and Vannatta (2004) to avoid confounding variables and reduce
error. For the dependent variable of C-BASE, ACT composite score was determined
using the Pearson Product Moment Correlation and revealed to be a strong predictor
variable \((r = .772)\). For the PRAXIS-II examination dependent variable, two correlations
were calculated \((ACT - PRAXIS-II)\) and \((C-BASE composite - PRAXIS-II)\). The ACT-C-
BASE correlation was similar, but lower \((r = .593)\) than the C-BASE- PRAXIS-II
\((r = .609)\). For the dependent variable of PRAXIS-II, C-BASE composite score was
selected as the covariate because of its more robust correlation as revealed using the
Pearson Product Moment Correlation (Field, 2005). Thus, the more correlated variables
were utilized in the Multivariate analysis of covariance (MANCOVA) to determine the
corrected mean scores for the dependent variables (Field, 2005).

Table 6
*Teacher Candidate C-BASE Examination Performance by Participation Level and Using ACT Composite Score as Covariate.*

<table>
<thead>
<tr>
<th>Participation Level</th>
<th>Mean C-BASE</th>
<th>S.D.</th>
<th>S.E.M.</th>
<th>Mean Praxis-II</th>
<th>S.D.</th>
<th>S.E.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-participant</td>
<td>296.9(a)</td>
<td>36.3</td>
<td>2.04</td>
<td>179.4(a)</td>
<td>10.5</td>
<td>.782</td>
</tr>
<tr>
<td>Transition Participant</td>
<td>294.1(a)</td>
<td>41.3</td>
<td>1.62</td>
<td>176.8(a)</td>
<td>11.2</td>
<td>.623</td>
</tr>
<tr>
<td>Full participant</td>
<td>288.1(a)</td>
<td>38.4</td>
<td>1.1</td>
<td>176.7(a)</td>
<td>10.7</td>
<td>.423</td>
</tr>
</tbody>
</table>

*Note. ACT constant (a) evaluated in the model at 22.03*
The results of table 6 reveal that when using ACT as covariate, participation status negatively impacted teacher candidate examination performance. Full and transition participants performed slightly lower on C-BASE and PRAXIS-II examinations, but had less standard error.

*Teacher candidate performance by qualification status (with covariate).*

Table 7 reveals the corrected mean C-BASE and PRAXIS-II examination scores when using Multivariate analysis of covariance (MANCOVA) with ACT composite as the covariate and when considering qualification status. The results of table seven reveal that qualification status yielded a slight negative impact on teacher candidate examination performance. When using ACT as a covariate, qualifiers performed significantly better on C-BASE (25 points) and PRAXIS-II (four points) examinations, and had less standard error.

<table>
<thead>
<tr>
<th>Qualification Status</th>
<th>Mean C-BASE</th>
<th>S.D.</th>
<th>Error</th>
<th>Mean Praxis-II</th>
<th>S.D.</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifier</td>
<td>305.6(a)</td>
<td>32.5</td>
<td>1.08</td>
<td>179.7(a)</td>
<td>9.0</td>
<td>.416</td>
</tr>
<tr>
<td>Non-qualifier</td>
<td>280.5(a)</td>
<td>23.6</td>
<td>1.70</td>
<td>175.5(a)</td>
<td>10.6</td>
<td>.654</td>
</tr>
</tbody>
</table>

*Note. ACT constant(a) evaluated in the model at 22.03*

Table 8 reveals the corrected mean C-BASE and PRAXIS-II examination scores when using Multivariate analysis of covariance (MANCOVA) with ACT composite as the covariate and when considering qualification status. The results of table 8 reveal that qualification status strongly impacted teacher candidate examination performance. When using ACT as a covariate and considering both qualification status and participation level, qualifiers who had did not participate or were transition participants earned similar...
scores (307.6 for non-participants to 307.9 for transition participants), while full participants scored lower on C-BASE composite, with a mean score of 301.3.

Table 8

<table>
<thead>
<tr>
<th>Qualification Status</th>
<th>Participation Status</th>
<th>Mean C-BASE</th>
<th>Error</th>
<th>Mean Praxis-II</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifier Aggregate</td>
<td>305.6(a)</td>
<td>1.08</td>
<td></td>
<td>179.7(a)</td>
<td>0.416</td>
</tr>
<tr>
<td>Qualifier Non-Participant Transition</td>
<td>307.6(a)</td>
<td>2.19</td>
<td></td>
<td>181.3(a)</td>
<td>0.842</td>
</tr>
<tr>
<td>Qualifier Participant</td>
<td>307.9(a)</td>
<td>1.90</td>
<td></td>
<td>178.6(a)</td>
<td>0.731</td>
</tr>
<tr>
<td>Qualifier Full Participant</td>
<td>301.3(a)</td>
<td>1.39</td>
<td></td>
<td>179.3(a)</td>
<td>0.534</td>
</tr>
</tbody>
</table>

*Note. ACT constant(a) evaluated in the model at 22.03*

Qualification status defined.

As discussed in the section of Chapter 1 in this study, a Qualifier is a teacher candidate who met or exceeded all minimum teacher education program entrance requirements when they sought admission to the education program at the institution studied. Qualifiers met all minimum teacher education standardized test requirements for the ACT and C-BASE, had an adequate grade point average, and passed a battery of core competency academic courses. A Non-qualifier, conversely, is a teacher candidate who did not initially earn acceptance into the education program due to one or more of these reasons: (a) insufficient grade point average (b) insufficient minimum ACT and/or C-BASE examination score (c) failure to successfully complete all coursework requirements. Most non-qualifiers earned scores on the ACT and/or C-BASE examination that did not meet minimum college of education entrance requirements at the time in which they sought admission to the college of education.

Tables 8 and 9 reveal that, for C-BASE composite and sub-scores, qualifiers outranked non-qualifiers by at least 20 points, and as much as 27, depending on
participation level when considering ACT as a covariate. Transition participants who were qualifiers earned composite C-BASE scores 27.6 points higher than their non-qualifier counterparts. Similarly, qualifying non-participants outperformed non-qualifying non-participants by 21.4 points. Finally, qualifiers who participated fully in the T.E.S.T. examination preparation program were revealed to have outperformed non-qualifying full participants on C-BASE, averaging more than 27 points higher than non-qualifying full participants (301.3 for full participant qualifier vs. 274.9 for full participant non-qualifiers). When holding constant for ACT score as covariate, trend data from tables 8 and 9 indicate that, generally speaking, as participation increased, performance on the C-BASE and PRAXIS-II examinations decreased.

Table 9

<table>
<thead>
<tr>
<th>Qualification Status</th>
<th>Participation Status</th>
<th>Mean C-BASE</th>
<th>Mean S.E.M.</th>
<th>Mean Praxis-II</th>
<th>Mean S.E.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-qualifier</td>
<td>Non-Participant</td>
<td>286.2(a)</td>
<td>3.41</td>
<td>177.5(a)</td>
<td>1.31</td>
</tr>
<tr>
<td>Non-qualifier</td>
<td>Transition Participant</td>
<td>280.3(a)</td>
<td>2.69</td>
<td>175.1(a)</td>
<td>1.03</td>
</tr>
<tr>
<td>Non-qualifier</td>
<td>Full Participant</td>
<td>274.9(a)</td>
<td>1.87</td>
<td>174.0(a)</td>
<td>0.719</td>
</tr>
<tr>
<td>Non-qualifier</td>
<td>Aggregate</td>
<td>280.5(a)</td>
<td>1.7</td>
<td>175.5(a)</td>
<td>0.654</td>
</tr>
</tbody>
</table>

Note. ACT constant(a) evaluated in the model at 22.03

Summary of disaggregated data.

Appendices E1 through E19 display findings on C-BASE composite and subscores and PRAXIS-II performance when disaggregated by teacher candidate qualification status and participation level. The figures reveal a general trend that qualifiers outperform non-qualifiers. They also revealed that, in general, participation in
the *T.E.S.T.* examination preparation program positively affected performance for the elementary education teacher candidates, but not when utilizing ACT composite score as a covariate. Throughout the teacher candidates’ participation in the teacher education program at the institution studied, their performance on standardized examinations increased (from ACT composite through C-BASE composite through PRAXIS-II examinations). Teacher candidates performed best on the Mathematics subsection of the C-BASE, especially with participation in the *T.E.S.T.* examination preparation program, and performed comparatively worse on the social studies subsection of the C-BASE examination. Please refer to Appendix E1-E19, Data Charts for Research Questions 3 and 4, C-BASE and PRAXIS-II Performance, By Qualification Status and Participation Level, for graphs displaying each disaggregated study finding.

The next section describes some factors within the population of elementary education teacher candidates at the institution studied which may account for some variance within test score performance by participation level and qualification status.

*Teacher candidate non-completer variables.*

Teacher candidates who were not admitted to the professional education program at the institution studied, or failed to complete their professional education program and earn licensure, were not included in the study because they did not complete all licensure examinations and/or the complete program of study. As a result, all teacher candidate data included in the study reflects program completion status. It is likely that some elementary education teacher candidates at the institution studied did not earn passing scores on one or more standardized examination (ACT, C-BASE or PRAXIS-II) from 1995-2007.
Time-bound participation levels.

The three participation levels in this study indicate time-bound groups. Non-participants took ACT, C-BASE and PRAXIS-II at the institution studied between 1995 and 2000. Transition participants took those examinations and may or may not have participated in the initial and/or advanced T.E.S.T. examination preparation program between 2000 and 2002, as attendance was not mandatory. Full participants took the examinations and were obligated to attend the T.E.S.T. program between 2002 and 2007.

Research Question 1 Summary

Findings reveal that overall, academic ability of teacher candidates at the institution studied, as judged by academic ability and standardized test taking performance, improved considerably from 1995-2007. When considering qualification status, qualifiers outscored non-qualifiers on both the C-BASE composite score and subscores and ACT examinations. Analysis revealed that use of a covariate produced confounding results, as holding constant for ACT caused regression to the mean in the population. With ACT as a covariate and considering disaggregated analyses displayed in Appendices E1-E19, and figures and tables in chapter 4, participation in the T.E.S.T. exam preparation program was determined to detract from performance on the C-BASE and ACT. The next section will present and analyze findings for research question two.

Research Question Two Summary

This section continues with findings and analyses from the second research question, which concerns the relationship between elementary education teacher candidate performance on the ACT and C-BASE examinations and the PRAXIS-II
examination. It begins with a discussion of the coefficient of correlation research, followed by a description of study findings for this research question.

Null Hypothesis for Research Question Two

There is no relationship between elementary education teacher candidate performance in the ACT and C-BASE examinations and the PRAXIS-II.

Analysis of Research Question Two

Table 10, Correlation Analysis of study variables, reveals very strong correlation (Field, 2005, p. 111) between three standardized examinations taken by elementary education teacher candidates at the institution studied, the ACT, C-BASE and PRAXIS-II. Each correlation is strongly positive and statistically significant at the .000 level. The strongest positive correlation is \( r = 0.772, r^2 = 0.595, \text{Sig.}=0.00 \) for ACT-C-BASE, which supports research by Taylor (1992) and Kiger (2003). Thus, ACT-C-BASE correlation accounts for 59.5% of variance between the two variables. The other two correlations calculated were also very strongly positively correlated, both exceeding 0.5. A strong positive correlation that was significant and practical was found \( (r=0.609, r^2=0.371, \text{Sig.}=0.00) \) between PRAXIS-II and C-BASE. A strong positive correlation that was significant and practical was found \( (r=0.593, r^2=0.352, \text{Sig.}=0.00) \) between and ACT and PRAXIS-II. The null hypothesis was rejected. There is a strong relationship between elementary education teacher candidate performance between and among ACT, C-BASE, and PRAXIS-II standardized examinations for elementary education teacher candidates at the institution studied. Table 10 reveals correlations between dependent and independent variables.
<table>
<thead>
<tr>
<th>Correlations</th>
<th>Coefficient of Correlation</th>
<th>( r^2 )</th>
<th>Significance (Two-Tailed)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT composite score and C-BASE composite score</td>
<td>0.772</td>
<td>0.596</td>
<td>0.000(a)</td>
</tr>
<tr>
<td>ACT composite score and elementary education (10011) PRAXIS-II composite score</td>
<td>0.593</td>
<td>0.352</td>
<td>0.000(a)</td>
</tr>
<tr>
<td>C-BASE composite score and elementary education (10011) PRAXIS-II composite score</td>
<td>0.609</td>
<td>0.371</td>
<td>0.000(a)</td>
</tr>
</tbody>
</table>

* Correlation calculated using Pearson Product Moment Coefficient of Correlation
(a) indicates statistically significant (p<0.10)

Research Question Three and Four Summary

This section lists research questions three and four and gives null hypotheses while briefly discussing the rationale for statistical analysis. A table of analyses utilized by group size is presented to assist the reader. The section concluded with presentation and analysis of findings for research questions three and four.

Use of MANCOVA to analyze results.

A multivariate analysis of covariance (MANCOVA) was utilized to determine the main effects and interaction effects between the variables tested. ACT score (22.03 as constant) was determined to be the optimal covariate for use in the multivariate analysis of variance for the dependent variables of C-BASE and PRAXIS-II composite scores when considering participation level and qualification status, the predictor variables.

Multicollinearity and unique variance.

Field’s (2005) recommendations to avoid multicollinearity and duplicate attribution of partial variances by utilizing one covariate, ACT, instead of both ACT and
C-BASE (for dependent variable PRAXIS-II) were followed, as they have very strong inter-correlation with one another. To avoid multicollinearity, Field (2005, p. 174) recommends discarding multiple covariates that are so strongly correlated to one another as to produce erroneous attribution of variance by providing little, if any, unique variance to the model. Based on the results from computing correlation coefficients as displayed in Table 8, to avoid multicollinearity the ACT composite score was utilized as sole covariate and held constant (22.03) (Field, 2005). The next section discusses research questions and null hypotheses for research questions three and four.

*Research question three: C-BASE main and interaction effects.*

The null hypothesis is that there is no difference in main effects and interaction effects between elementary education teacher candidate C-BASE examination performance when considering *T.E.S.T.* program participation level and qualification status.

This section continues with findings and analyses from the third research question, which concerns difference in main effects and interaction effects between elementary education teacher candidate C-BASE examination performance when considering *T.E.S.T.* program participation level and qualification status relationship when using a covariate (ACT score). In Table 10, Multivariate Analysis of Covariance (MANCOVA) identified a significant main effect for Qualification Status and C-BASE composite score (\(F=141.2, \text{Sig.}=0.00\)), as well as a significant main effect for Participation level and C-BASE (\(F=9.252, \text{Sig.}=0.00\)).

Also, MANCOVA did not identify a significant interaction effect for Participation Status*Qualification Status (\(F=.847, \text{Sig.}=.429\)) with alpha established at 0.10. The null
hypothesis was rejected only for Participation Level and Qualification Status main effects.

Of the six C-BASE scores calculated in the study, data from research question three were reduced to two significant and practical findings. Considering the qualification status independent variable, C-BASE composite score and Social Science score had the strongest practicality (Effect Sizes=.152 and .122, respectively). They were also statistically significant (Sig.=0.00 for both) and had adequate power (1.000). Other C-BASE sub-scores for the qualification independent variables tested in the study had limited practicality despite being statistically significant (all at Sig.=0.00); with low effect size (ES=.007 or lower).

Considering the participation status independent variable, C-BASE English score and Composite score had the strongest practicality (Effect Sizes=.03 and .02, respectively). They were also statistically significant (Sig.=0.00 for both) and had adequate power (1.000). Other C-BASE sub-scores for the qualification independent variables tested in the study had limited practicality despite being statistically significant (all at Sig.=0.00). Overall, participation status for each C-BASE subscore was statistically significant but limited in practicality, accounting for a small amount of the variance between test takers. Table 11 displays the results of Multivariate Analysis of Covariance (MANCOVA) for dependent variables C-BASE and PRAXIS-II.
Table 11
Multivariate Analysis of Covariance (MANCOVA) with Dependent Variables all C-BASE sections with ACT composite as covariate (N=796)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>SS</th>
<th>df</th>
<th>r^2</th>
<th>F</th>
<th>Sig</th>
<th>ES</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-BASE Composite Score Corrected Model (a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Effects</td>
<td>819,217.4</td>
<td>6</td>
<td>.681</td>
<td>284.2</td>
<td>0.00</td>
<td>.684</td>
<td>1.00</td>
</tr>
<tr>
<td>Qualification Status</td>
<td>67831.4</td>
<td>1</td>
<td></td>
<td>141.2</td>
<td>0.00</td>
<td>.152</td>
<td>1.00</td>
</tr>
<tr>
<td>Participation Status</td>
<td>8889.9</td>
<td>2</td>
<td></td>
<td>9.3</td>
<td>0.00</td>
<td>.023</td>
<td>.99</td>
</tr>
<tr>
<td>Interaction Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation*Qualification</td>
<td>814.3</td>
<td>2</td>
<td></td>
<td>.847</td>
<td>0.43</td>
<td>.002</td>
<td>.30</td>
</tr>
<tr>
<td>C-BASE English Score Corrected Model (a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Effects</td>
<td>620853.1</td>
<td>6</td>
<td>.454</td>
<td>111.4</td>
<td>0.00</td>
<td>.459</td>
<td>1.00</td>
</tr>
<tr>
<td>Qualification Status</td>
<td>31245.3</td>
<td>1</td>
<td></td>
<td>33.6</td>
<td>0.00</td>
<td>.041</td>
<td>1.00</td>
</tr>
<tr>
<td>Participation Status</td>
<td>19750.7</td>
<td>2</td>
<td></td>
<td>10.6</td>
<td>0.00</td>
<td>.026</td>
<td>1.00</td>
</tr>
<tr>
<td>Interaction Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation*Qualification</td>
<td>2384.1</td>
<td>2</td>
<td></td>
<td>.847</td>
<td>0.28</td>
<td>.003</td>
<td>.40</td>
</tr>
<tr>
<td>C-BASE Writing Score Corrected Model (a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Effects</td>
<td>312921.1</td>
<td>6</td>
<td>.276</td>
<td>51.5</td>
<td>0.00</td>
<td>.281</td>
<td>1.00</td>
</tr>
<tr>
<td>Qualification Status</td>
<td>12450.5</td>
<td>1</td>
<td></td>
<td>12.3</td>
<td>0.00</td>
<td>.01</td>
<td>1.00</td>
</tr>
<tr>
<td>Participation Status</td>
<td>10766.1</td>
<td>2</td>
<td></td>
<td>5.3</td>
<td>0.00</td>
<td>.01</td>
<td>.90</td>
</tr>
<tr>
<td>Interaction Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation*Qualification</td>
<td>3628.8</td>
<td>2</td>
<td></td>
<td>.847</td>
<td>0.17</td>
<td>.01</td>
<td>.50</td>
</tr>
<tr>
<td>C-BASE Science Score Corrected Model (a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Effects</td>
<td>1,000,000.0</td>
<td>6</td>
<td>.482</td>
<td>124.4</td>
<td>0.00</td>
<td>.49</td>
<td>1.00</td>
</tr>
<tr>
<td>Qualification Status</td>
<td>84140.0</td>
<td>1</td>
<td></td>
<td>62.8</td>
<td>0.00</td>
<td>.07</td>
<td>1.00</td>
</tr>
<tr>
<td>Participation Status</td>
<td>12211.0</td>
<td>2</td>
<td></td>
<td>4.6</td>
<td>0.00</td>
<td>.01</td>
<td>.86</td>
</tr>
<tr>
<td>Interaction Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation*Qualification</td>
<td>3890.0</td>
<td>2</td>
<td></td>
<td>.847</td>
<td>0.24</td>
<td>.00</td>
<td>.43</td>
</tr>
<tr>
<td>C-BASE Mathematics Score Corrected Model (a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Effects</td>
<td>992612.7</td>
<td>6</td>
<td>.446</td>
<td>107.7</td>
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<td>1.00</td>
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<td>0.96</td>
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<td>.11</td>
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</table>

Note 1. *=p<.10
Note 2. (a) covariate of ACT total score evaluated at 22.03
Note 3. (b) denotes met/exceeded analysis criteria for statistical significance
Note 4. (c) denotes met/exceeded analysis criteria for effect size
Note 5. (d) denotes met/exceeded analysis criteria for power
Research question four: PRAXIS-II main and interaction effects.

The null hypothesis is that there is no difference in main effects and interaction effects between elementary education teacher candidate PRAXIS-II examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status. This section continues with findings and analyses from the fourth research question, which concerns difference in main effects and interaction effects between elementary education teacher candidate PRAXIS-II examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status relationship when using a covariate (ACT score).

For research question four, there is a significant main effect (F=87.0, Sig.=0.00). The equation is moderately practical (Effect Size=.40, adjusted $R^2=.398$). There were no significant interaction effects. In Table 11, MANCOVA revealed the main effect for Qualification Status and PRAXIS-II composite score was (F=27.0, Sig.=0.00), as well as Participation Level and PRAXIS-II (F=4.97, Sig.=0.01). Also, no significant interaction effect for Participation Status*Qualification Status was found (F=.890, Sig.=.411) with alpha established at 0.10. The null hypothesis was rejected for Participation Level and Qualification Status main effects but not for interaction effects between the variables. Power was strong for main effect, qualification status, and participation level. For research question four, Effect Size was significant only for main effect, as qualification status and participation level had low practicality despite being statistically significant (Sig.<.000). Table 12 reveals the findings for research question four.
Table 12
Multivariate Analysis of Covariance (MANCOVA) with dependent variable PRAXIS-II using covariate (N=796)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>SS</th>
<th>df</th>
<th>r²</th>
<th>F</th>
<th>Sig (b)</th>
<th>ES (c)</th>
<th>Power (d)</th>
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<tr>
<td>PRAXIS-II Corrected Model (a)</td>
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<tr>
<td>Main Effects</td>
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<td>6</td>
<td>.398</td>
<td>87.0</td>
<td>0.00 (b)</td>
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<td>.01</td>
<td>.890</td>
<td>0.411</td>
<td>.00</td>
<td>.309</td>
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</tbody>
</table>

Note 1. *=p<.10
Note 2. (a) Covariate of ACT total score evaluated at 22.03
Note 3. (b) denotes met/exceeded analysis criteria for statistical significance
Note 4. (c) denotes met/exceeded analysis criteria for effect size
Note 5. (d) denotes met/exceeded analysis criteria for power

Summary

This chapter has presented the findings for the study. Based on the findings, it was determined that elementary education teacher candidates at the institution studied showed improvement in their examination performance over the course of their time in the education program at the institution studied. Entrance scores on ACT and C-BASE were slightly below the national norm. Licensure examination results, however, reveal strong performance gains on PRAXIS-II for elementary education teacher candidates at the institution studied. It was determined that Qualification Status and Participation level, although statistically significant, did not account for a large percentage of variance in examination scores when considering participation in the T.E.S.T. initial and advanced examination program. Qualifiers to the college of education outscored non-qualifiers by a large margin on all dependent variables, and participant qualifiers recorded the highest mean C-BASE and PRAXIS-II examination scores.
It was determined that participant qualifiers (who already possess a strong background in testing based on prior ACT performance), were able to benefit from the initial and advanced *T.E.S.T.* examination preparation program as evinced by their improved scores. The same was not true for non-qualifiers, who were unable to perform as well on the C-BASE and PRAXIS-II examinations and revealed reduced examination performance, when holding constant for ACT and participating in the *T.E.S.T.* examination preparation program.

*ACT composite as constant.*

It was determined that when holding ACT composite score constant at (22.03), as recommended by prior researchers to account for examination ability, teacher candidates participating in the *T.E.S.T.* program did not generally score better on the PRAXIS-II or C-BASE examinations than non-participants. For all dependent variables, effect size was small to moderate and power was strong. Calculation of the Pearson Product Moment Coefficient revealed strong correlations between and among the ACT, C-BASE, and PRAXIS-II examinations (*r*=0.593, 0.609, and 0.772).

*Independent variable correlation.*

The coefficient of correlation for the ACT-C-BASE, as measured in this study, was very strong (*r*=.772) and significant at the 0.01 level. Field (2005, p. 111) suggests that .50 or higher is a large effect. Thus, because the correlation between the independent variables originally proposed (ACT and C-BASE composite scores) was a large effect, the researcher elected not to utilize both ACT composite score and C-BASE composite score as covariates, as recommended by Mertler and Vannatta (2004). In this study, Pearson Product Moment Coefficients of Correlation were calculated and are displayed in
tabular form (see Table 8). The independent and dependent variables involving standardized examination scores, ACT composite score, C-BASE composite score, and elementary education PRAXIS-II examination were demonstrated to be strongly correlated. This finding was similar to findings in literature review as cited in Taylor (1992) and Kiger (2003). Field (2005, p. 111) and Mertler and Vannatta (2004) state that coefficients of correlation may be computed for ratio or interval data, including test scores such as the ACT, C-BASE, and PRAXIS-II. The researcher calculated the correlation between and among the independent and dependent variables using the Pearson Product Moment Correlation.

Conceptual underpinnings.

When reflecting on the conceptual underpinnings of the study, which include examination preparation best practices, content knowledge, and avoidance of examination anxiety, it is evident that more skilled examination takers were able to utilize the knowledge gained in the T.E.S.T. examination preparation program better than their counterparts who lack strong ACT and C-BASE performance. This leads the researcher to conclude that other variables, possibly including test anxiety, or lack of “flow” or “optimal experience” (Csikszentmihalyi, 1990), may have been mitigating factors accounting for some of the variance in testing ability throughout the population. While this study did not measure all potential factors that account for the variance in test scores, such as curriculum, test anxiety, content knowledge, effort, and preparation, it is clear that there is evidence that elementary education teacher candidates at the institution studied significantly improved their test scores from the beginning of their careers to the end of their professional education program. Value was added to elementary education
program completers’ test-taking abilities, as determined by the general increase in PRAXIS-II examination performance at the institution studied during the time of the T.E.S.T. examination preparation program in comparison with ACT and C-BASE performance. However, based on analysis of findings, there is not evidence to conclude that the T.E.S.T. examination preparation program affected the test score improvements, as teacher candidates participating in the T.E.S.T. program showed relatively small gains or losses when utilizing ACT as a covariate in the study.

Discussion and conclusions.

Appendixes E1-E18 reveal all independent and dependent variables in disaggregated graphs. When considering the findings as displayed in the appendices, it is apparent that Elementary Education teacher candidates who participated in the T.E.S.T. program did not generally receive higher scores than non-participants when holding constant for ACT score variance (22.03). Based on these findings over time (1995-2007), significant increases were apparent in Elementary Education teacher candidate examination performance at the institution studied. Yet, when ACT is held constant, a contrary finding emerges. Participation in the T.E.S.T. program was determined to be statistically significant, with participants generally faring worse than non-participants. Test scores dramatically increased at the institution studied. This leads the researcher to conclude that confounding variables exist, which may constitute a threat to internal validity and are a limitation to the study. Additionally one may conclude that examination score increases were not necessarily due to examination preparation programs, but instead may be attributable to an institutional shift in admissions policy changes related to minimum required teacher licensure examination score increases that took effect
between 1999 and 2002. Other factors, in addition to increasing teacher education program entrance requirements, may have motivated elementary education teacher candidates to earn better scores and improve their licensure exam performance. Relatively weaker teacher candidates who could not earn a 22 ACT in 2001 and 2002, the two years the institution studied briefly enforced that comparatively higher minimum examination score, may have been weeded out of the program. This potentially removed Elementary Education teacher candidates with relatively lower PRAXIS-II, C-BASE and ACT scores from the pool of potential teacher candidates, which may have resulted in a missing pool of below-average test-takers. It is possible that raising test scores may have led to negative effects for certain groups of teacher candidates, such as those exhibiting psychic entropy (Csikszentmihalyi, 1990), low self-efficacy (Bandura, 1994), emotionality (Stober, 2004) and test anxiety (Spielberger & Vagg, 1995).

Findings reveal that participant qualifiers outperformed non-qualifiers. Non-qualifiers, many of whom expressed grave concerns related to their ability to perform optimally during high-stakes, high-pressure standardized testing situations, were likely less able than those teacher candidates who qualified, to assimilate the test-wiseness strategies, content knowledge, and self-efficacy enhancing strategies offered in the T.E.S.T. model. Simply put, they were unable to get into the flow (Csikszentmihalyi, 1996). The visual depiction in Chapter 4, Figure 3, The T.E.S.T. Model for Optimal Test Taking Experience, is a graphical representation of the intersection of strong content knowledge, test-taking skill and self-efficacy. Non-qualifiers have difficulty achieving optimal experience (Csikszentmihalyi, 1990) and likely would be in the outer rings of the blue sphere. When one of these three crucial areas is out of balance, emotionality (Stober,
2004; Spielberger & Vagg, 1995) and physical manifestation of symptoms of test-anxiety can create psychic entropy (Csikszentmihalyi, 1990).

Chapter 5 will provide suggestions for further research in greater detail, using quantitative and qualitative research methodology. This future research would contribute to the general body of knowledge. It would potentially allow the institution studied to more completely account for factors which may reveal some potential reasons that teacher candidates’ standardized examination ability moved from underperforming to highly successful, even positively skewed, between entrance into and completion of the teacher education program at the institution studied. Thus, methodologies emphasizing value-added research models will be suggested. Chapter 5 will also list the findings, conclusions, and recommendations for further research.
Chapter Five: Findings, Conclusions, and Recommendations

Problem of the Study

Although several researchers have noted an increase in high-stakes testing for teacher licensure, there is a lack of information about the effect of a standardized examination preparation program that may assist teacher candidates in preparing for the C-BASE and PRAXIS-II. Despite awareness of the phenomena of high-stakes examinations, which cause some elementary education teacher candidates to exhibit symptoms of test anxiety and limit their ability to perform up to the level of their true capability (Chittooran & Miles, 2001; Spielberger & Vagg, 1995; Stober, 2004), little research exists about preferred or highly effective models of test preparation for the C-BASE or PRAXIS-II examinations. The study used one teacher education institution to determine if participation in an examination preparation program based on best practices in an examination preparation program designed to move students into the optimal experience to positively impact performance on the teacher education licensure examination (Csikszentmihalyi, 1996).

Despite offering the T.E.S.T. examination preparation program since 2001, no research has been conducted about the relationships between participating in the T.E.S.T. examination preparation program and performance on either of the licensure examinations required to earn admittance into and completion from the elementary education teacher education program. There is a lack of information about the effectiveness of the initial and advanced versions T.E.S.T. exam preparation program on teacher candidate success on the C-BASE and Elementary Education PRAXIS-II.
examinations. This study gauged the effect of participation in the initial and advanced T.E.S.T. examination preparation program.

Purpose of the Study

The purpose of the study is to determine how participating in the initial and advanced T.E.S.T. impacts performance on two key teacher licensure examination, the C-BASE and the PRAXIS-II for Elementary Education majors. The purpose of the study is to determine the main effects and interaction effects between candidate C-BASE and PRAXIS-II performance when considering teacher candidate participation level for initial and advanced T.E.S.T. examination preparation program and their qualification status while using ACT and C-BASE scores as covariates.

Null Hypotheses

In order to investigate the problem, address the purpose, and to answer the research questions of the study, the following null hypotheses were tested.

H₀₁: There is no difference in descriptive statistics of teacher candidates’ performance on the C-BASE examination and sub-scores and PRAXIS-II examination and sub-scores when considering participation status (non-participant, transition participant, and full participant) and Qualification status (non-qualifier and qualifier).

H₀₂: There is no relationship between elementary education teacher candidate performance in the ACT and C-BASE examinations and the PRAXIS-II.

H₀₃: There is no difference in main effects and interaction effects between elementary education teacher candidate C-BASE examination score and
sub-scores performance when considering initial and advanced T.E.S.T. program participation level and qualification status.

**H₀₄:** There is no difference in main effects and interaction effects between elementary education teacher candidate PRAXIS-II examination performance when considering initial and advanced T.E.S.T. program participation level and qualification status.

**Study Group**

The study group was limited to Elementary Education Majors who completed a teacher education program at the institution studied between 1995 and 2007. These teacher candidates attempted three standardized examinations, the ACT, C-BASE, and PRAXIS-II. Approximately 100 teacher candidates attempt the required elementary education PRAXIS-II examination (10011) annually, but not all teacher candidates completed the program or took each examination. These teacher candidates were excluded, as they lacked one or more of the required standardized tests or did not fully complete the same program of study as the sample group. Teacher candidates who transferred to the institution studied with C-BASE scores from another higher education institution were also excluded, as they did not participate in either the initial or advanced T.E.S.T. examination preparation model.

**Statistical Methods**

Descriptive statistics were calculated including mean and standard deviation values dependent variables C-BASE and PRAXIS-II. In addition, these descriptive statistics were provided for each category of independent variable, including participation level and qualification status.
In addition, Multivariate analyses of covariance (MANCOVA) were computed to check for significant group differences between categories of independent variables (Field, 2005; Mertler & Vannatta, 2004). The composite ACT score of was used as the covariate in these analyses in an effort to control for variance among the population.

Independent Variables

Three independent variables or factors were examined in this study: (a) Participation in the initial T.E.S.T. examination preparation program. The three possible teacher candidate participation states are full-participant, transition participant, and non-participant. (b) Teacher candidate qualification status: Qualified and non-qualified (c) Composite ACT scores.

Dependent Variables

The dependent variables or outcome variables (Field, 2005) measured in this study were C-BASE and PRAXIS-II examination scores on the initial attempt for elementary education teacher candidates at the institution studied. Univariate analyses of covariance (MANCOVA) were completed to test for significant group differences between each category of independent variables. Using MANCOVA, participation and qualification status were each examined against both outcome or dependent variables (PRAXIS-II or C-BASE score) while holding ACT score constant in an effort to control for test-taking ability. Use of a covariate was recommended by Field (2005, p. 364) for measuring variables in an effort to control for the influence they have on the dependent variable while accounting for some of the unexplained variance in the study design in terms of other variables so as to reduce error and minimize confounding effects.
Study Findings

Careful examination of data collected to answer the problem and research questions in this study led to the following findings:

Research question one: Descriptive statistics.

Descriptive analysis statistics revealed that participants in the T.E.S.T. examination preparation program had higher scores on the C-BASE and PRAXIS-II examinations than non-participants. However, when utilizing ACT as a covariate and performing Multivariate Analysis of Covariance (MANCOVA), participants in the T.E.S.T. examination preparation program had generally lower scores on the C-BASE and PRAXIS-II examinations than non-participants. Over time at the institution studied, elementary education teacher candidate examination scores improved consistently, and PRAXIS-II performance for the population exceeded national norms since the development and implementation of the T.E.S.T. examination preparation program.

Research question two: Correlation analysis.

The coefficient of correlation for the ACT-C-BASE, as measured in this study, was very strong ($r=.772$) and significant at the 0.01 level. Field (2005, p. 111) suggests that .50 or higher is a large effect. Thus, because the correlation between the independent variables originally proposed (ACT and C-BASE composite scores) was a large effect, the researcher elected not to utilize both ACT composite score and C-BASE composite score as covariates, as recommended by Mertler and Vannatta (2004). The independent and dependent variables involving standardized examination scores, ACT composite score, C-BASE composite score, and elementary education PRAXIS-II examination were revealed to be strongly correlated. This finding was similar to findings in literature.
review as cited in Taylor (1992) and Kiger (2003). Field (2005) and Mertler and Vannatta (2004) state that coefficients of correlation may be computed for ratio or interval data, including test scores such as the ACT, C-BASE, and PRAXIS-II. The researcher calculated the correlation between and among the independent and dependent variables using the Pearson Product Moment Correlation.

**RQ#’s three and four: Dependent variable C-BASE, PRAXIS-II examinations.**

When using ACT as a covariate and considering both qualification status and participation level, qualifiers who did not participate or were transition participants earned similar scores (307.6 for non-participants to 307.9 for transition participants), while full participants scored lower on C-BASE composite (301.3).

Compared to non-qualifiers, however, qualifiers outscored non-qualifiers by at least 20 points, and as much as 27, depending on participation level. Transition participants who were qualifiers earned composite C-BASE scores 27.6 points higher than their non-qualifier counterparts. Similarly, qualifying non-participants outperformed non-qualifying non-participants by 21.4 points. Finally, Qualifiers who participated fully in the *T.E.S.T.* examination preparation program were revealed to have performed better on C-BASE, 27 points than non-qualifying full participants. However, when holding constant for ACT score as covariate, trend data from Table 7 indicate that, generally speaking, as participation increased, performance on the C-BASE and PRAXIS-II examinations decreased.

**Summary of conclusions from study findings.**

Based on these findings over time (1995-2007), large ACT, C-BASE, and PRAXIS-II exam score increases were apparent in Elementary Education teacher
candidates at the institution studied. Yet, when ACT is held constant, a contrary finding emerges. Although participation in the T.E.S.T. program was determined to be statistically significant, participants fared worse than non-participants. Meanwhile, test scores dramatically increased at the institution studied. This leads the researcher to conclude that confounding variables exist, and may be related to increased admission score requirements put into effect at the institution studied between 1999 and 2002.

Additionally, one may conclude that examination score increases were not necessarily due to examination preparation programs, but instead attributable to a culture shift underway between 1995 and 2007. Other factors, including increasing teacher education program entrance requirements, may have inspired teacher candidates to earn better scores. This may have removed Elementary Education teacher candidates with relatively lower PRAXIS-II, C-BASE and ACT scores from the pool of potential teacher candidates. It is possible that raising test scores may have led to negative effects for certain groups of teacher candidates, including psychic entropy (Csikszentmihalyi, 1990), low self-efficacy (Bandura, 1994), emotionality (Stober, 2004) and test anxiety (Spielberger & Vagg, 1995).

Findings reveal that participant qualifiers outperformed non-qualifiers. Non-qualifiers, many of whom expressed grave concerns related to their ability to perform optimally during high-stakes, high-pressure standardized testing situations, were likely less able than those teacher candidates who qualified, to assimilate the test-wiseness strategies, content knowledge, and self-efficacy enhancing strategies offered in the T.E.S.T. model. Simply put, they were unable to get into the flow (Csikszentmihalyi, 1996). The following visual depiction, Figure 1, The T.E.S.T. Model for Optimal Test
Taking Experience, is a graphical representation of the intersection of strong content knowledge, test-taking skill and self-efficacy. Non-qualifiers have difficulty achieving optimal experience (Csikszentmihalyi, 1990) and likely would be in the outer rings of Figure 1. When one of these three crucial areas is out of balance, emotionality (Stober, 2004; Spielberger & Vagg, 1995) and physical manifestation of symptoms of test-anxiety can create psychic entropy (Csikszentmihalyi, 1990).

![Figure 1. A visual representation of the basis for the T.E.S.T. exam preparation program, where optimal performance occurs when all three variables are very high. Discussion and Recommendations](image)

This section includes a discussion of the study and recommendations for future research that could build upon the knowledge created through this study. The discussion and recommendations are derived from literature review and the findings and conclusions of the study.
Discussion.

The effectiveness of examination preparation programs is a timely and important concern for teacher candidates and administrators of teacher education programs in the era of educational accountability (Bryant, 2002; Wakefield, 2003). This study uncovered findings in areas of examination preparation and educational accountability worthy of discussion by institutional practitioners. Both the descriptive statistics and Multivariate Analyses of Covariance (MANCOVA’s) from the study may provide useful information elementary education teacher candidates, teacher educators, and state and University-level stakeholders concerned about teacher candidate quality and/or effectiveness of teacher candidate preparation.

Literature review.

Research on components of effective examination programs is synthesized in a figure at the beginning of Chapters 1 and 4, and is an overview of the review of literature related to best practices in examination preparation program development. Taylor (1992) first identified an examination preparation program that effectively improved student performance on elementary education licensure examinations, and Mee (2000), Miyasaka (2000) Chittooran & Miles (2001) and Bryant (2002) have developed programs or frameworks for effective examination preparations. Using prior research on suggested tenets of effective examination programs, the initial and advanced T.E.S.T. examination preparation program was designed to assist teacher candidates by: (a) improving content knowledge (b) increasing knowledge of effective test-taking skills, referred to as test-wiseness (c) acknowledging the effects of test anxiety and reducing them.
Participation level analysis and conclusions.

Based on analysis of results, participants in the T.E.S.T. examination preparation program had higher scores on the C-BASE and PRAXIS-II examinations than non-participants. However, since the population of elementary education teacher candidates shifted their performance from below average (ACT and C-BASE) to average over time, it is not surprising that when using Multivariate Analysis of Covariance (MANCOVA) utilizing ACT as a covariate revealed that participants in the T.E.S.T. examination preparation program had generally lower scores on the C-BASE and PRAXIS-II examinations than non-participants.

This study sought to gauge the effectiveness of the T.E.S.T. program. Utilizing a covariate to reduce variance in the population (ACT) was a recommendation following suggestions by Taylor (1992) and Mee (2000). Statistical analysis revealed that the use of ACT as a covariate produced findings that were opposite of what was expected. When variance related to standardized examination ability is factored in using Multivariate Analyses of Covariance (MANCOVA), the effect size is moderate to small for the population (.152). As teacher candidate ACT requirements increased, teacher candidate scores increased on C-BASE and PRAXIS-II examinations. Thus, although the findings reveal significant differences between participants, transition participants, and non-participants, it is unclear if other variables, including raised standards coinciding with external accountability pressures upon teacher education program administrators at the institution studied, may have confounded the results. Additionally, it is impossible to account for those teacher candidates who did not complete their teacher education program due to poor test taking ability or other factors.
Ceiling effect.

A ceiling effect for PRAXIS-II performance was noted within the population. A noticeable ceiling effect of compression of top-end teacher candidate scores was evident in this study. This is not surprising, given that the state cut score to earn elementary education licensure, 164, and the national median, 177, are less than three full standard deviations from the maximum possible score (200). Mean PRAXIS-II scores for the population were 177.9 with a standard deviation of 10.9. Thus, since the ceiling, 200, was only slightly more than two standard deviations above the mean, yet the floor was seven standard deviations below the mean, there was compression of scores at the top end.

Qualification status analysis and conclusions.

Multivariate analyses of covariance (MANCOVA) revealed significant differences between qualifiers and non-qualifiers. Qualifiers scored considerably higher on the ACT, C-BASE, and PRAXIS-II examinations than non-qualifiers. Qualifiers who participated in the T.E.S.T. examination preparation program scored better on the C-BASE and subsections and elementary education PRAXIS-II examination than non-qualifiers who participated in the examination preparation program. In other words, one may conclude that more talented students (qualifiers) were able to more effectively utilize the test-preparation techniques, content knowledge, and self-efficacy boosting practices learned in the initial (C-BASE) and advanced (PRAXIS-II) examination program and improved their scores on the C-BASE and PRAXIS-II in comparison with non-qualifiers.

Correlation between examinations.

Of note is that calculations of Correlation (Pearson Product Moment) are strong to very strong among the three examinations (ACT, C-BASE, and PRAXIS-II), ranging
from 0.593 (ACT – PRAXIS-II) to 0.609 (C-BASE - PRAXIS-II) to 0.772 (ACT – C-
BASE). Previous studies have uncovered results similar to the findings in this study.
Taylor (1992), Bryant (2002) and Mee (2000) determined that standardized examinations
were strongly correlated. The following list clarifies the conclusions reached based on
analysis of findings and synthesis of literature review with findings.

1. Confounding variables exist in teacher candidate examination performance
   and the relationship to institutional increases in minimum teacher licensure cut
   scores during the time in which the program under study was evaluated.
2. Teacher candidates’ exam performance improved in ACT, C-BASE, and
   PRAXIS-II over time but not necessarily due to exam preparation.
3. Other factors, including increased College of education entrance requirements,
   may have affected exam results
4. Test anxiety or other stress-inducing factors may be limiting teacher
   candidates’ optimal performance.
5. Students with content knowledge (e.g. such as math) were able to use the
   T.E.S.T. model to augment innate test-wiseness, test anxiety reducing
   techniques, resulting in a net participation benefit.

The following table provides a summary of the findings, conclusions and
recommendations.
<table>
<thead>
<tr>
<th>Findings</th>
<th>Conclusions</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
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<td>Confounding variables exist, which may be a threat to internal validity.</td>
<td>Teacher candidate exam performance improved in ACT, C-BASE, and PRAXIS-II over time but not necessarily due to exam preparation.</td>
<td>Pursue research to decipher which groups of students benefited and why. Analyze the relationship, if any, between effective teaching (as measured by in-class evaluations and student learning gains) for teacher candidates compared to test-taking ability.</td>
</tr>
<tr>
<td>When looking at performance based participation level, it appears that participation in the T.E.S.T. program positively affects C-BASE/PRAXIS II performance. Over time, significant increases were apparent in elementary education teacher candidate examination performance. However, with ACT as a covariate, a contrary finding emerges. Elementary Education teacher candidates perform worse on C-BASE and PRAXIS-II when participating in T.E.S.T. Program when holding ACT constant, despite consistent improvement of the entire population.</td>
<td>Factors, including increased College of Education entrance requirements, may have affected exam results.</td>
<td>Raising scores to ensure exam passage may have negative effects on groups of test takers. Based on review of literature, this may include diverse and/or low S.E.S. test-takers, or those with test anxiety, who are most likely to perform poorly on exams. Further research is needed to evaluate at-risk teacher candidates in the era of accountability and high-stakes examinations.</td>
</tr>
<tr>
<td>Most qualifiers pass all licensure examinations, and many non-qualifiers achieve comparatively lower PRAXIS-II scores. Students who participate in the T.E.S.T. program outperform their peers.</td>
<td>At the institution studied, the Teacher Education program screening process is effective.</td>
<td>Keep qualification requirements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continue to assess and evaluate program effectiveness over time.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use data to prevent failure (proactive advisement).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Funnel teacher candidates into preparation programs.</td>
</tr>
<tr>
<td>Findings</td>
<td>Conclusions</td>
<td>Recommendations</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
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<td>-------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Relatively high coefficient of correlation on ACT examinations.</td>
<td>Much variance in difference in examination scores is accounted for, but there is a lack of information about teacher candidate perceptions of T.E.S.T. program effectiveness.</td>
<td>Research teacher candidate perceptions on examination preparation and anxiety in order to determine other unknown variance in exam performance.</td>
</tr>
<tr>
<td></td>
<td>Test anxiety or other stress-inducing factors may be limiting teacher candidates’ optimal performance.</td>
<td>Test anxiety or other stress-inducing factors may be limiting teacher candidates’ optimal performance.</td>
</tr>
<tr>
<td>Using ACT covariate, elementary education examination performance shows a decrease in most C-BASE subsections and the PRAXIS-II examination composite score for participants.</td>
<td>Benefits of participation in the current T.E.S.T. examination preparation program are unclear for certain groups.</td>
<td>Mixed methodology to answer new Research Questions generated. Combination of qualitative and quantitative analysis, including matched pairs. Delve into potential limiting factors, text anxiety, psychic entropy, and other covariates. Beware of multicollinearity.</td>
</tr>
<tr>
<td>Math and composite C-BASE scores are higher after participating in the T.E.S.T. examination preparation program.</td>
<td>Students with content knowledge (e.g. math) were able to use test-wiseness, test anxiety reducing techniques to their benefit.</td>
<td>Study C-BASE subsections. Institutionally, become more involved with state and national level test result analysis to determine meaning of results and seek better practices.</td>
</tr>
</tbody>
</table>
Recommendations.

A combination of qualitative and quantitative research methods is recommended. This would allow an investigator to more effectively design a study to account for cognitive measures (content knowledge, test-wisiness strategies) and emotional measures (test anxiety, optimal experience) in order to account for the largest possible variance in licensure examination performance for the elementary education teacher candidate population. It is strongly recommended that the institution undertake a study of teacher candidate perceptions related to three key areas: (a) their perceptions of effectiveness of the T.E.S.T. model (b) a self-rating of prevalence of exhibited symptoms of test anxiety, including emotionality, and (c) the test-wisiness strategies utilized during testing situations. Similarly, research should be undertaken to determine the relationship between classroom performance (grades earned as a student and teaching ability as measured by formative and summative observations of teaching effectiveness) in order to assess the relationship, if any, between being a good student and/or test taker and being a good teacher.

Further research should be undertaken at the institution studied to gauge the impact of examination preparation programs on elementary education teacher candidate examination performance. Future research might build upon the knowledge created from excellent studies involving: (a) test wiseness (b) effective examination preparation programs (c) self-efficacy and optimal performance; (d) improved covariates. This research would enable a researcher to solidly base the conceptual underpinnings for effectively measuring and evaluating the impact of examination preparation programs related to teacher education and licensure examinations.
Further research should be undertaken to determine how to improve examination performance for all teacher candidates in all teacher education programs at the institution. Study findings revealed significant differences between qualifiers and non-qualifiers, and based on that finding a suggested course of action would be to evaluate the untested variables that may explain the differences among these groups. A thorough examination of the other variables, in addition to test-taking ability, should be undertaken at the institution studied to improve the experience for elementary education teacher candidates.

**Recommendations for teacher educators and program administrators.**

Based on the findings and conclusions of this study, the researcher offers the following recommendations for teacher educators and program administrators.

1. It is especially important for practitioners to develop and implement research-based examination preparation programs for elementary education teacher candidates, who tend to underperform their peers from other majors on PRAXIS-II examinations and have lower mean ACT scores, which research shows is strongly correlated to performance on standardized examinations such as the C-BASE and PRAXIS-II.

2. Teacher educators should follow suggestions from the literature to investigate test anxiety in non-qualifying students. The findings and conclusions indicate a need to explore the effects of test anxiety and psychic entropy on elementary education teacher candidates.

3. If teacher education program administrators want to ensure high pass rates on licensure examination such as the PRAXIS-II examinations,
they should continue to utilize high entrance requirements for admission into the education program, as they are effective in discriminating between the teacher candidates who will or will not be likely to earn passing scores on the PRAXIS-II.

4. Teacher education program administrators should utilize the ACT score for proactive advisement or as formative data to funnel at-risk teacher candidates into intervention and tutoring opportunities in order to assist them in becoming eligible for admittance to colleges of education. Due to its strong correlation with other tests, the composite ACT score functions as an excellent formative assessment for proactive advisement.

Summary of the Study

Based on the results of elementary education teacher candidate performance improvement between admittance to the university (ACT), completion of general education requirements at the midpoint of their career (C-BASE) and program completion (PRAXIS-II), teacher candidates at the institution experienced significant improvement on those three examinations. By the time teacher candidates graduated, their PRAXIS-II scores were considerably higher than median scores across the nation. Multivariate Analyses of Covariance (MANCOVA) revealed significant mean differences in teacher candidate C-BASE and PRAXIS-II examination performance by qualification status and participation level. Qualifiers outperformed non-qualifiers. Transition and full participants underperformed non-participants, when utilizing ACT composite score as covariate. Pearson Product Moment Coefficient of Correlation was
determined to be very strong between the three examinations, leading to multicollinearity 
(Field, 2005). To reduce the potentially confounding effects of removing similar 
variances, the researcher utilized ACT composite score to hold constant for test-taking 
ability in the population of elementary education teacher candidates across time-bound 
participation levels.

**Time-bound participation levels.**

The three time-bound levels were: (a) 1995-2001, (b) 2001-2002, and (c) 2002-
2007. The institution where this study took place raised required admittance scores on 
ACT composite (the covariate) in 1999 and 2001, leading to confounding effects. Simply 
put, the teacher candidates may have improved their group performance and earned 
admission because of the accountability-driven increase. If they did not earn a 21 or a 22 
on the ACT, teacher candidates knew they had to change their major or be removed from 
teacher education, which may have been a confounding variable in this study. At the 
institution studied, the mean ACT, C-BASE, and PRAXIS-II exam scores increased from 
1995-2007, and the institution was able to support teacher candidates to achieve better 
scores, as revealed in findings in chapter 4 and in appendices E1-E19.

**ACT trends.**

As the ACT scores increased (see chapter 4, figures 2-7) and were held constant 
across time-bound participation levels in the *T.E.S.T.* examination preparation program, 
the net effect of the program appears to have been a negative one with minimal 
practicality, as participants scored lower than non-participants when holding constant for 
ACT. To better determine the effects of participation in the *T.E.S.T.* program, the 
researcher recommends that the institution might consider expanding the limited
inoculation (Messner, personal communication, 2008) of the T.E.S.T. examination preparation program. In its current state, the T.E.S.T. examination preparation program is only four hours in a 4,000 hour comprehensive teacher education curriculum. A more expansive inoculation, or increased exposure to the T.E.S.T. examination preparation program, may be helpful in determining the effectiveness of the program.

Optimal experience.

Students who performed well on the C-BASE and PRAXIS-II, or were able to have the optimal experience (Csikszentmihalyi, 1990) were almost invariably those that had qualified for admission to the college of education and attended the initial and advanced T.E.S.T. examination preparation programs. Non-qualifiers fared comparatively worse. The significant differences in qualification status and participation level allowed the researcher to reject null hypotheses. However, there is still a lack of information about why elementary education teacher candidates performed as they did. Future research is needed to delve deeper into the related phenomena of examination preparation programs, test-wiseness, and the effects of test anxiety.

In conclusion, this study sought to add to the research base regarding the impact of an examination preparation program for elementary education teacher candidates on C-BASE and PRAXIS-II teacher licensure examination scores. Continued research is needed regarding the effectiveness of examination programs at the institution studied in order to better prepare all teacher candidates and assist them in earning licensure by passing high-stakes examinations. Specifically, future researchers should develop and implement studies that provide specific and practical information about best practices in preparing students to pass the C-BASE and PRAXIS-II examinations and utilize
available test score data, such as ACT or other college entrance examination information. Additionally, the institution studied should continue to utilize the assessment system that affords the institution an opportunity to proactively advise teacher candidates.
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Appendix A

*T.E.S.T.* Examination Preparation Program Components
1. Explanation of the initial and advanced T.E.S.T Model for increasing teacher candidate success on the C-BASE and Praxis-II examinations emphasizing four main skills or strategies to be utilized on each question: (a) translating; (b) eliminating; (c) solving; and (d) looking for and avoiding common standardized testing tricks.

2. An overview of specified test content from ETS’ Elementary Education: Curriculum, Instruction and Assessment (test number 10011) Test-At-A-Glance Booklet. (Available at http://www.ets.org/praxis) or Assessment Resource Center’s C-BASE (College Basic Academic Subjects Examination)

3. A review of the time constraints for the examination, both overall and per question, with an emphasis on efficiency and time-management skills and strategies that increase teacher candidate test-taking skills without reducing accuracy or increasing careless errors.

4. Emphasis on physically writing on the C-BASE and/or PRAXIS-II, including: (a) circling key words in stems; (b) crossing out ridiculous, wrong or implausible responses; (c) drawing arrows to establish trends, patterns or relationships where applicable; and (d) underlining and acknowledging and avoiding distractors.

5. Staying physically alert during the C-BASE and PRAXIS-II by constantly moving both hands (if able) and the pencil to reduce wayward cognition (Baker, personal communication, March 20, 2006) and off-task behaviors.
6. Emphasis on positive mental preparation for standardized examinations, including awareness and avoidance of low-self efficacy regarding standardized examination performance.

7. Emphasis on the prevention and/or management of test anxiety, excessive worry, and emotionality by defining, acknowledging, and confronting negative self-thoughts pertaining to performance on standardized examinations (Chittooran and Miles, 2001).

8. For the PRAXIS-II, emphasis on consideration of meeting the needs of diverse learners when debating about which of two reasonable responses to select. For the C-BASE, when narrowed to two or three reasonable choices for a particular question, ensuring that the student selects the MOST FAMILIAR name, idea, concept, among the remaining choices.

9. For both C-BASE and PRAXIS-II, teacher candidates receive instruction on how to decode text into small chunks, phrases, and/or ideas that make the question much easier to comprehend, and therefore affording teacher candidates improved opportunity to eliminate incorrect or flawed potential answers. This treatment component, called translating, is a prominent feature of the initial and advanced T.E.S.T. models.

10. Emphasis on elimination of irrelevant, impossible, highly illogical, and/or extraordinarily unfamiliar potential responses by using logic. This treatment component, called eliminating, is a central component of the initial and advanced T.E.S.T. models.
11. Introducing the concept of strategic reasoning and defining it as the process of figuring out answers from information given on a test, a principle possessed by test-wise individuals (Chittooran and Miles, 2001).

12. Demonstration that a solid foundation in skilled strategic reasoning, or solving with evidence, is essential for teacher candidates as they navigate the C-BASE and PRAXIS-II: Elementary Education Praxis-II: Curriculum, Instruction, and Assessment (10011).

13. In the Initial T.E.S.T. model, introduction of the fact that Elementary Education Praxis-II examination, at thirty-one pages, is considerably longer than almost all other Praxis-II examinations. Teacher candidates learn that the examination contains numerous very long questions that are challenging to comprehend, making recall of the specified task problem statement quite difficult to recall. The T.E.S.T. model introduces strategies exhibited by test-wise test-takers including great skill at decoding and translating text to best eliminate choices from information given.

14. Exposure to teacher candidates of a process to solve exceptionally long, wordy, and boring word problems involving hypothetical scenarios. Teacher candidates must decode, translate into more familiar terms or phrases, use logic to eliminate inappropriate responses, and identify, isolate, and solve by proving the correct or best response using evidence provided in the prompt. This concept, solving with evidence, is a prominent feature of the initial and advanced T.E.S.T. models.

15. Explanation of the core concept embodied in the test-taking aphorism, “if you can’t prove it, it is probably wrong,” to develop participant understanding of the
importance of being able to locate evidence in text that supports or refutes
information in the answer choices to facilitate elimination of incorrect responses.

16. Introducing participants to evidence that more than 1/3 of all Elementary
Education Praxis-II examination questions require no prior knowledge, only skill
at strategic reasoning (Available through the Test at a Glance Booklet, at
http://www.ets.org/praxis), and emphasizing strategies to increase teacher
candidate performance on questions not requiring specific recall of evidence from
curricula and/or experiences in order to arrive at a logical conclusion. For the C-
BASE, introduction to teacher candidates of the concept of “best among worst”
answers when no choice seems exceptionally ideal, particularly on the English
reading comprehension section.

17. Emphasis on several test-wise strategies or processes to logically eliminate
incorrect choices or highly improbable answers, then selecting the most
appropriate responses remaining from non-eliminated choices.

18. Detailing research on the important of changing incorrect answers when facts,
evidence, or information from the question or previous or future questions
necessitate such a change.

19. Explaining and solving examples of how to treat questions which contain roman
numerals and choices such as “I, II, and III,” or “All of the above” as true-false
statements, and to eliminate responses when proven partially incorrect. For the C-
BASE examination, special emphasis is placed upon this strategy as a method of
answering questions with historical anachronisms, out-of-order countries on a
Map or globe, or major bodies of water mislabeled.
20. A brief overview of essential content knowledge commonly tested on the elementary education Praxis-II, including: (a) key educational theorists and their contributions; (b) the importance of selecting a response which reaches all students and is developmentally-appropriate based on the age level, subject area, and specific emotional, cognitive, and behavioral needs of the students specified in the scenario outlined in the question; (c) avoidance of selecting responses which could be construed as what lazy teachers would do; (d) reviewing foundational knowledge of effective educational assessment techniques and strategies that would be most likely to maximize student learning for all students; (e) when left with two choices of apparently equal probability of being correct, selecting the response with more evidence of students constructing their own learning by working together collaboratively or engaging in student-focused activities; and, a corollary (f) refraining from selecting a response that appears teacher-directed at the expense of student learning.

21. Exposure to strategies to answer standardized test questions from unfamiliar examinations, including released items from the ACT, C-BASE, and other non-elementary education PRAXIS-II examinations, to enhance participant confidence and self-efficacy in their ability to eliminate incorrect responses, effectively manage time, select appropriate answers based upon student age, subject learned, and developmental needs.

22. Convey the importance of selecting a response for each question, even if it is a guess, because there is no penalty for incorrect guesses on the elementary education PRAXIS-II or the C-BASE.
23. Emphasizing the peer-based development of participant groups to prepare for the examination, collaboratively answer sample C-BASE and PRAXIS-II questions by translating, eliminating, solving with evidence and looking for and avoiding tricks.

24. Emphasizing the reacculturation of participants to the language of testing by demonstrating principles of psychometrically-sound test construction techniques in order to more effectively become acclimated to this language by understanding how the tests are made (Bruffee, 1999).

25. Explain the physiological effects of test-anxiety by highlighting research on Cortisol effects related to the psychological impact of test-anxiety wrought by low self-efficacy during high-stakes standardized tests.

26. Demonstration of results of utilizing the T.E.S.T. model for the instructor on 20 Praxis-II tests attempted without requisite curricular background to be adequately prepared for the examinations, including 19 earned passing scores. Reinforce the possibility of success, even on questions on the C-BASE and PRAXIS-II where the “right” answer seems unclear or is unknown.
Institutional Review Board Decision Form Proposal #1890, Evaluation of the Impact of Participation in the T.E.S.T. Examination Preparation Program
Northwest Missouri State University
Institutional Review Board
Decision Form

Proposal #1890                                Date 3/04/08

Proposal Author(s):   Tim Wall

Proposal Title:   Evaluation of the impact of participation in the TEST examination prep...

  X  The Institutional Review Board has accepted/approved your proposal.

  You are now officially ready to start collecting data.

Thank you for your interest in research at Northwest Missouri State University.

Jerrold Barnett, Chair
Professor of Psychology/Sociology/Counseling
Permission to Access and Use Data From Unit Assessment System Archives to Conduct Research
MEMORANDUM

TO: Tim Wall

FROM: Max Ruhl
       Director of Professional Education
       Dean, College of Education and Human Services

DATE: January 29, 2008

RE: Research from Unit Assessment System Archives

I am pleased to write granting you permission to access and use data from the Unit Assessment System Archives at Northwest to conduct research on the impact of participation in the T.E.S.T. program for elementary education teacher candidates. We will, of course, look forward to reviewing what you learn from this study.

Please let me know should you need further assistance.

kah
Appendix D

Approval Notice from Institutional Review Board, University of Missouri – Columbia,
Application #1110018
Comments Regarding Project #1110018

Comment Number: 183433 (03-13-2008)

Application Approval Notice (Jan 2008) sent on Mar 13, 2008:
To: pemday@nwmissouri.edu, timwall@nwmissouri.edu, awilson@nwmissouri.edu
   BCC: harringtond@missouri.edu
   Subject: Campus IRB Application Approval Notice: IRB # 1110018

Investigators:

Your project received IRB approval. Please click on the following link for more information regarding your IRB approval.

https://irb.missouri.edu/eirb/letter/2624
Appendix E

Data Charts for Research Questions 3 and 4, C-BASE and PRAXIS-II performance, disaggregated by qualification status and participation level.
Comparison of C-BASE Composite Scores by Participation Status for Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 528 qualifiers)

**Figure E1.** A chart displaying mean dependent variable (C-BASE Composite) scores disaggregated by participation status and covariance for qualifying elementary education teacher candidates.
Comparison of C-BASE Composite Scores by Participation Status for Non-Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 268 non-qualifiers)

Figure E2. A chart displaying mean dependent variable (C-BASE Composite) scores disaggregated by participation status and covariance for non-qualifying elementary education teacher candidates.
Comparison of C-BASE Examination English Scores by Participation Status for Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 528 qualifiers)

Figure E3. A chart displaying mean dependent variable (C-BASE English) scores disaggregated by participation status and covariance for qualifying elementary education teacher candidates.
Comparison of C-BASE Exam English Scores by Participation Status for Non-Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 268 non-qualifiers)

**Figure E4.** A chart displaying mean dependent variable (C-BASE English) scores disaggregated by participation status and covariance for non-qualifying elementary education teacher candidates.
Comparison of C-BASE Examination Writing Scores by Participation Status for Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 528 qualifiers)

**Figure E5.** A chart displaying mean dependent variable (C-BASE Writing) scores disaggregated by participation status and covariance for qualifying elementary education teacher candidates.
Figure E6. A chart displaying mean dependent variable (C-BASE Writing) scores disaggregated by participation status and covariance for non-qualifying elementary education teacher candidates.
Figure E7. A chart displaying mean dependent variable (C-BASE Science) scores disaggregated by participation status and covariance for qualifying elementary education teacher candidates.
Figure E8. A chart displaying mean dependent variable (C-BASE Science) scores disaggregated by participation status and covariance for non-qualifying elementary education teacher candidates.
Comparison of C-BASE Examination Mathematics Scores by Participation Status for Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 528 qualifiers)

Figure E9. A chart displaying mean dependent variable (C-BASE Mathematics) scores disaggregated by participation status and covariance for qualifying elementary education teacher candidates.
Comparison of C-BASE Examination Mathematics Scores by Participation Status for Non-Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 268 non-qualifiers)

Figure E10. A chart displaying mean dependent variable (C-BASE Mathematics) scores disaggregated by participation status and covariance for non-qualifying elementary education teacher candidates.
Comparison of C-BASE Examination Social Studies Scores by Participation Status for Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n = 528 qualifiers)

Figure E11. A chart displaying mean dependent variable (C-BASE Social Studies) scores disaggregated by participation status and covariance for qualifying elementary education teacher candidates.
Comparison of C-BASE Examination Social Studies Scores by Participation Status for Non-Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 268 non-qualifiers)

Figure E12. A chart displaying mean dependent variable (C-BASE Social Studies) scores disaggregated by participation status and covariance for non-qualifying elementary education teacher candidates.
Comparison of PRAXIS-II Examination Scores by Participation Status for Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 528 qualifiers)

Figure E13. A chart displaying mean dependent variable (PRAXIS-II) scores disaggregated by participation status and covariance for qualifying elementary education teacher candidates.
Comparison of PRAXIS-II Examination Scores by Participation Status for Non-Qualifiers with and without Covariate (ACT = 22.03) at Institution Studied, 1995-2007 (n= 268 non-qualifiers)

Figure E14. A chart displaying mean dependent variable (PRAXIS-II) scores disaggregated by participation status and covariance for non-qualifying elementary education teacher candidates.
Figure E15. A chart displaying mean dependent variable (PRAXIS-II) examination scores disaggregated by participation status between qualifiers and non-qualifiers without covariance for elementary education teacher candidates.
Comparison of PRAXIS-II Examination Scores by Participation Status between Qualifiers and Non-Qualifiers with Covariance (ACT = 22.03) at Institution Studied, 1995-2007 (n= 796)

Figure E16. A chart displaying mean dependent variable (PRAXIS-II) examination scores disaggregated by participation status between qualifiers and non-qualifiers using ACT as covariate (ACT = 22.03) for elementary education teacher candidates.
Comparison of C-BASE Examination Scores for Qualifiers by Participation Status at Institution Studied, 1995-2007 (n=528 qualifiers)

Figure E17. A chart displaying all mean dependent variable (C-BASE) examination scores disaggregated by participation status for qualifying elementary education teacher candidates.
Comparison of C-BASE Examination Scores by Participation Status for Qualifiers with ACT as covariate (N= 22.030) at Institution Studied, 1995-2007 (n=528 qualifiers)

<table>
<thead>
<tr>
<th>Participation Status</th>
<th>Composite</th>
<th>English</th>
<th>Science</th>
<th>Math</th>
<th>Social Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Participant</td>
<td>325.6</td>
<td>302.5</td>
<td>294.3</td>
<td>301.0</td>
<td>288.3</td>
</tr>
<tr>
<td>Transition Participant</td>
<td>332.1</td>
<td>307.9</td>
<td>297.9</td>
<td>299.0</td>
<td>296.4</td>
</tr>
<tr>
<td>Full Participant</td>
<td>326.8</td>
<td>307.0</td>
<td>291.5</td>
<td>293.0</td>
<td>298.3</td>
</tr>
</tbody>
</table>

Figure E18. A chart displaying mean dependent variable (C-BASE) examination scores disaggregated by participation status for qualifying elementary education teacher candidates using ACT as covariate (ACT = 22.03).
Vita

Timothy J. Wall was born in Springfield, Illinois on July 15, 1972. Following graduation from Parkway West High School in Ballwin, Missouri in 1991, he completed a Bachelor of Arts (History, 1997) with minors in English and French at Truman State University in Kirksville, Missouri. He received a Master of Science in Education in Teaching History (2001) from Northwest Missouri State University. In 2008, he received an Ed.D. in Educational Leadership and Policy Analysis from the University of Missouri-Columbia.

His professional experience includes eight years in higher education at Iowa Western Community College (Clarinda, IA) and Northwest Missouri State University (Maryville, MO), as an Educational Leadership and Social Science and Humanities faculty member with administrative responsibilities related to Assessment System Development and Implementation and Directing the Office of Teacher Education Student Services. Other professional experiences include numerous invited teacher education assessment and standardized examination preparation professional consultations for schools, school districts, and colleges and universities. Currently, he in his sixth year as a faculty member in the Department of Educational Leadership at Northwest Missouri State University. He resides in Maryville, MO. Tim is a fan of the St. Louis Cardinals.