TEACHER CERTIFICATION CONTENT AREA TESTS: PREDICTORS OF TEACHER KNOWLEDGE FOR POST-BACCALAUREATE SECONDARY CANDIDATES

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In response to a growing teacher shortage, increasing numbers of secondary teachers are prepared through streamlined certification programs. For this reason, assessing candidates' content area knowledge gained from institutions of higher education across the United States is an important program admission factor as candidates must demonstrate content area knowledge by passing a Texas content area certification test (TExES). This study examines content knowledge for candidates enrolled in an online post-baccalaureate program from September 1, 2002 through April 30, 2005.

Academic transcript analysis and grades 8-12 subject tests of the TExES were used as a proxy for subject matter knowledge for a sample of individuals seeking initial teacher certification in a post-baccalaureate teacher certification at the University of North Texas. Descriptive data,linear regression, and logistic regression analyses were used to draw conclusions about the content area knowledge of the individuals in the sample. Scores on the TExES were used to determine the relationships between the content area knowledge of initial certification students and the number of content area courses completed, the grade point averages, and time elapsed between the completion of the last content area course and the student's initial attempt on the TExES. Results differed by the content area of the candidates.

Analysis of variance results indicate significant differences between the five test

groups with regard to number of courses taken $F(4,139) = 9.334$, $p < .001$ grade point average $F(4,139) = 5.733$, $p < .001$ and time between the last course taken $F(4,139) = 6.135$, $p < .001$.

The three-predictor model was statistically significant $F(3,32) = 3.753$, $p = .02$ for the History test group. The variable, upper-level grade point average accounted for approximately 12% variance among scores within the History test group, and the variable months of time elapsed between last content area course work and the initial state content examination accounted for approximately 13% of variance among scores.

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CHAPTER I

INTRODUCTION

Teaching requires a complex blend of knowing what to teach and how to teach. Teachers' subject matter knowledge is a foundational component in this equation because teachers must know the subject that they are teaching in order to help others learn. Ball and McDiarmid (1990) write, "Teachers' conceptions of knowledge shape their practice—the kinds of questions they ask, the ideas they enforce, the sorts of tasks they assign" (p. 438).

Diverse definitions of teacher knowledge and a variety of lenses from which to examine teacher knowledge are well documented in the literature. For example, Shulman (1986) indicates pedagogical content knowledge may be the most important form of knowledge with regard to student achievement. Another definition of teacher knowledge offered by Sanders and Morris (2000) is teacher content knowledge as "factual information, central concepts, organizing principles, and ideas that experts recognize as making up the discipline" (p. 399).

Recently, No Child Left Behind legislation defined teacher content knowledge as content preparation or the ability to pass a state content test. The legislation labels teachers who meet either of these requirements as *highly qualified*. This definition of a highly qualified *teacher* privileges teachers' content area knowledge as measured by teacher testing over other kinds of teacher knowledge and creates a very narrow view of what defines a highly qualified teacher.

Need for the Study

Across the nation a severe teacher shortage exists especially in content fields such as science, mathematics, special education, and bilingual education. In an effort to alleviate this shortage, states have increasingly moved toward streamlined certification programs, commonly referred to as alternative certification routes. For example, in 2001, one out of every four newly certified teachers in Texas, one-fifth of newly certified teachers in California, and 22% of newly certified teachers in New Jersey were certified through an alternative certification provider (U.S. Department of Education, 2002, p. 31).

Alternative certification programs open up a new avenue of research regarding the knowledge that contributes to effective teaching. The knowledge of alternatively certified individuals gained from work experience, life experience, and academic coursework may differ from that of traditionally prepared teachers who receive substantial training in pedagogy through pedagogy coursework, observation, and student teaching prior to entering the classroom. Since the No Child Left Behind legislation defines teacher knowledge as taking academic area coursework and passing state examinations, it is important to study the relationship of teacher content area knowledge to state certification examination scores. No Child Left Behind legislation defines teacher knowledge as taking academic area coursework and passing state exams. However, in order to build efficient and effective programs, teacher educators must further define teacher knowledge in relation to particular state tests within particular content areas, and with particular student groups. Although some researchers such as Linda Darling-Hammond (2003) have argued teacher content knowledge is important, teacher educators are faced with the reality of having to help particular groups of students attain success according to particular state requirements. This study is designed to do that in the context of one teacher certification program. Variables associated with teacher content knowledge such as number and type of courses taken, grade point average, and the age of coursework are variables used by many researchers as indicators of teacher knowledge (NCES, 1999; Zeng, Simonsson, & Poelzer, 2002; Wilmore & McNeil, 2002; Jones, Sherman, Ninness, and Hallman, 2002; Chambers, Munday, Sienty, & Justice, 1999; Simonsson, Poelzer, Zeng, 2000; Poelzer, Zeng, & Simonsson, 2000; White & Burke, 1994).

Purpose of the Study

The purpose of the study was to illuminate the complexities of content knowledge in its relation to scores on the Texas Examinations of Educator Standards by investigating the following variables: (1) the number of upper-level content area courses, (2) the upper-level content area grade point average, (3) the number of months between the last upper-level content area course was completed in the certification field and the month the student initially attempted the Texas Examinations of Educator Standards, (4) and the score on the content area Texas Examinations of Educator Standards of post-baccalaureate teacher certification candidates. This study investigated possible predictor variables for scores on the Texas Examinations of Educator Standards in the content areas of grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies for a sample of secondary teacher certification candidates enrolled in the Secondary Online Post-Baccalaureate Teacher Certification Program at the University of North Texas.

Research Questions

The study addressed the following research questions:

1. What is the nature of the content area knowledge of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program seeking teacher certification at the University of North Texas as described by the following questions?
    a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher Certification Program students earned in their certification fields?
    b. What is the upper-level content area grade point average of Secondary Online Post-Baccalaureate Teacher Certification Program students?
    c. How much time has elapsed between the completion of the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards?
    d. What are the Texas Examinations of Educator Standards scores for individuals in the sample?
2. To what extent does upper-level content area coursework predict a passing score on the Texas Examinations of Educator Standards?
3. To what extent does upper-level content area grade point average predict a passing score on the Texas Examinations of Educator Standards?
4. To what extent does the time elapsed between the last upper-level content area course in the certification field and the time the student initially attempted the

Texas Examinations of Educator Standards predict a passing score on the Texas Examinations of Educator Standards?

Definition of Terms

This section provides definitions of terms used in various sections of this study. These terms should provide relevant background and explanations necessary to familiarize the reader with terms related to teacher certification and teacher testing. For the purpose of this study, the following operational definitions will be used:

CERTIFICATION FIELD*:* The certification field is the content area that the teacher is permitted to teach as outlined by the teacher certification agency in a particular state.

DOMAIN: Broad areas of content measured on the Texas Examinations of Educator Standards. For example, the grades 8-12 English Language Arts and Reading Texas Examinations of Educator Standards includes the broad content domains of English and Reading. The grades 8-12 Social Studies Texas Examinations of Educator Standards includes the broad content domains of economics, history, geography, government, psychology, and sociology.

EXAMINATION FOR THE CERTIFICATION OF EDUCATORS IN TEXAS: The Examination for the Certification of Educators in Texas is the testing system used for teacher licensure in some certification fields. This testing framework will be replaced by the Texas Examinations of Educator Standards in 2006.

GRADE POINT AVERAGE*:* For the purposes of this study, grade point average is calculated as the sum of all grade points of upper-level content area courses taken at the junior level or above divided by the sum of the number of credits earned. Grade points are normally calculated on a 4 point scale where 4 is the highest and 0 is the lowest number of grade points.

HIGHLY QUALIFIED TEACHER*:* A term introduced by No Child Left Behind legislation specifying minimum content preparation requirements for teachers. According to the legislation, a highly qualified *teacher* holds a minimum of a bachelor's degree and has passed a state academic subject test in the area the teacher teaches (Public Law 107-110, 2002).

POST-BACCALAUREATE COURSEWORK*:* Any coursework completed after the requirements of a bachelor's degree have been satisfied.

TEACHER OF RECORD*:* The teacher of record refers to the person assigned to a particular classroom and may or may not be a certified or licensed teacher.

TEXAS ACADEMIC SKILLS PROGRAM: The Texas Academic Skills Program is designed to measure student mastery of basic skills in writing, reading, and mathematics. It was mandated by the Texas legislature for college and university admission purposes. Mastery of basic skills was deemed necessary to be successful in university coursework.

TEXAS EXAMINATIONS OF EDUCATOR STANDARDS: The Texas Examinations of Educator Standards is the testing system used in Texas for teacher licensure. In Texas, teachers are required to pass the certification area test in all subjects that they are teaching and a test of pedagogical knowledge. This testing system is developed by National Evaluations Systems (State Board for Educator Certification, 2005).

CHAPTER II

REVIEW OF THE LITERATURE

Although teaching may require a complex blend of knowing what to teach and how to teach, Title II of the No Child Left Behind legislation privileges academic content knowledge as measured by teacher testing. This review of literature seeks to synthesize the body of research directly related to the implementation of Title II of No Child Left Behind legislation, to which teacher education providers are held accountable. The review is divided into five sections:

(1) Teacher Content Knowledge As Determined by Colleges and Universities

(2) Teacher Content Knowledge as Determined by *No Child Left Behind* legislation

(3) Teacher Testing as a Measure of Teacher Content Knowledge

(4) Realignment of Texas Teacher Certification Policy in Response to No Child Left Behind legislation

(5) Student Achievement Related to Teacher Knowledge

The first section, "Teacher Knowledge as Determined by Colleges and Universities," includes a discussion of the evolution of teacher content knowledge over the past century, contemporary definitions of teacher knowledge described in the literature, and the current state of teacher content knowledge as measured via formal college and university coursework.

The second section, entitled "Teacher Knowledge as Determined by No Child Left Behind Legislation," includes a discussion of No Child Left Behind legislation as it relates to teacher knowledge and federal definitions of the highly qualified teacher.

The third section is entitled “Teacher Testing as a Measure of Teacher Content Knowledge.” This section includes a discussion of various ways in which teacher knowledge is measured, the history of teacher testing, the development and types of teacher tests currently available, the limits of teacher testing, and the business of testing.

The fourth section is entitled “Realignment of Texas Teacher Certification Policy in Response to No Child Left Behind legislation.” This section includes a discussion of the history of teacher testing in Texas, federal control versus the state control of teacher licensure, and the alignment of Texas secondary teacher certification with No Child Left Behind legislation.

The fifth section is entitled “Student Achievement Related to Teacher Knowledge.” This section includes a discussion of the effect of a teacher’s academic degree on student achievement as well as a discussion of the value-added approach as a means to measure student achievement.

Teacher Content Knowledge as Determined by Colleges and Universities

History of Teacher Content Knowledge

Prior to the existence of formal programs of teacher education, a liberal arts education imbued with the classics was considered adequate teacher preparation (Zeichner & Liston, 1989). As public education in the form of common schools, schools that were open to everyone, began to grow and spread across the United States, so too was the need for qualified individuals to teach in the common school classrooms. Normal schools served the function of preparing individuals for teaching. The idea of an institution to prepare teachers was borrowed from the German educator, Augustus

Herman, and introduced to the United States by Horace Mann in Lexington, Massachusetts, in 1839. Normal schools were designed to prepare secondary teachers for the classroom and a life of teaching through a one-year to two-year program of study. For admission, students were required to state their intention to teach upon completion of the program.

The curriculum of normal schools overlapped high school and first-year college curricula with the most emphasis on the technical aspects of teaching. Incoming students were expected to possess general knowledge of elementary school subjects such as reading, writing, and mathematics; however, some of these academic courses were offered as some students attended the normal schools without this requisite knowledge (Urban, 1990; Pushkin, 2001; Parker, 1990).

Normal school enrollment grew steadily for over fifty years. Normal school enrollment began with three students in 1839 and grew to nearly 23,000 in 1875 in over 100 normal schools across the United States. Slower growth is recorded in the South. Two normal schools were founded in the South before the Civil War and ten were founded immediately after the war. The first normal school west of the Mississippi River was Sam Houston State University (Parker, 1990). Interestingly, Urban (1990) notes that nearly 260 public and private normal schools existed across the United States by the turn of the 19th century, yet all together these schools graduated about 25% of new teachers hired that year across the United States. At this time there were few city, district, or state certification policies or standardized hiring practices.

In the 1930s and 1940s, many normal schools dissolved, merged with departments of education at universities, or evolved into teachers colleges in order to compete with the growth of universities and the changing landscape of knowledge that was required to teach. Prior to this time, an elementary education and an understanding of teaching methods was adequate knowledge for an effective teacher; however, with widespread urbanization, immigration, and modernization characteristic of the time, this limited education no longer served the needs of students in the classroom. Under this new arrangement, teacher colleges became multi-purpose institutions that offered degrees in arts and sciences and required four years of high school education for admission (Urban, 1990; Pushkin, 2001; Parker, 1990).

As normal schools evolved into teachers colleges, universities began to take responsibility for teacher education. Not all universities were interested in teacher preparation and some believed it tarnished the image of the university. Universities were resistant to create teacher education programs as many believed that training for professions tainted the university image of research and advanced studies in the classics. The addition of educational psychology, particularly child study research under President G. Stanley Hall at Clark University in Worchester, Massachusetts, and John Dewey's creation of the laboratory school, helped elevate the lowly status of teacher education across universities (Urban, 1990). Soon teacher preparation programs proliferated through colleges and universities despite the initial lack of interest.

The shift from normal schools to teacher colleges and universities had great impact on teacher education and subsequently teacher knowledge. Normal schools were designed to prepare teachers for classroom teaching and emphasized the technical, day-to-day operations of a school. This curriculum was not the sole mission of teachers colleges and certainly not of universities. Under the normal school program of study, teacher education students completed coursework in methods, elementary subjects, mental science, practice teaching, and observation.

Under the teachers college program of study, teacher education students took courses in arts and sciences. As professors in the arts and sciences took control of teaching teachers, the discipline was emphasized over knowledge of pedagogy. Teachers began to identify themselves with their academic areas rather than with departments of education, especially at the secondary level where students were termed “specialists” in their content areas.

The academic tradition of teacher education (Zeichner & Liston,1989; Doyle, 1990) is the most prevalent orientation of teacher education in the United States and is supported by critics of professional education courses such as Abraham Flexner, author of *Universities: American, English, German* (1930). In his work, Flexner argues that the mastery of subject matter is the most important goal in the education of teachers.

Arthur Bestor, another critic of teacher preparation who criticized teacher education courses as “technical” and “vocational” in his work *Educational Wastelands* (1953), asserts that an emphasis on subject matter knowledge would draw academically talented students into teaching who would otherwise be repelled by requirements to take many education courses devoid of intellectual value.

Definitions of Teacher Content Knowledge

Sanders and Morris (2000) define teacher content knowledge as the “factual information, central concepts, organizing principles, and ideas that experts recognize as making up the discipline” (p. 399). Mewborn (2000) expands the definition of teacher content knowledge by dividing it into three dimensions. These include *substantive* *knowledge*, *knowledge of the discipline*, and *pedagogical content knowledge* (p. 6). *Substantive content knowledge* is similar to the Saunders definition above; however, *knowledge of the discipline* denotes an understanding of the discipline's canon and methods of inquiry within the discipline. *Pedagogical content knowledge* refers to the knowledge of how to best structure, present, and assess the knowledge of the discipline to others (Shulman, 1986).

In addition, Reynolds (1990) lists nine interrelated areas that comprise teacher knowledge. These include pedagogy, students, content, curriculum, context, content-specific pedagogy, professional issues, general knowledge, and enabling skills (p. 10).

Like Mewborn (2000), Reynolds (1990) describes eight dimensions within a teacher's content knowledge. These include:

> (1) frameworks or paradigm used to direct inquiry and interpret data; (2) facts, terms, and concepts in the discipline and the relationships among them; (3) methodologies used for inquiry in the discipline; (4) the relationships among concepts and theories across content areas; (5) how to judge the correctness of the content; (f) how to apply the concepts and methodologies to problems; (6) the nature of the discipline as an area of inquiry through history; and (7) the discipline's role in culture and society (p. 15).

The Current State of Teacher Content Knowledge as Measured Via Formal Coursework

Although researchers have found that content knowledge as measured by coursework is important to a point, other researchers have shown that significant numbers of teachers teach subjects in which they do not have a major, minor, or full certification. Three major studies have explored amount of teacher knowledge as measured by completed coursework and teaching assignment. First, using 1987-1988 and 1990-1991 Schools and Staffing Survey data from the National Center of Education Statistics, Bobbitt and McMillan (1994) found that over 97% of teachers reported that they held either a major, minor, or certification in the area they teach the majority of the day. These findings are limited, however, as certification is defined by Bobbitt and McMillan (1994) as holding an advanced, standard or probationary certificate. These terms are not standardized across states; therefore, an individual who holds a standard certificate in one state may have completed very different requirements from someone who holds a standard certificate in another state (p. 5).

Second, Ingersoll (1999) using a nationally representative sample from the Schools and Staffing Survey in 1993-1994 found that 33% of all secondary math teachers, 25% of all secondary English teachers, and 20% of all science teachers did not hold a major or minor in the field in which they teach nor in related academic field or related education field.

Third, using data from the 1999-2000 Schools and Staffing Survey, Wirt (2004) found that middle school students were more likely to be assigned a teacher without a major, minor or certification in the field they teach than high school students. In middle school, 19% of students in English, 23% of students in mathematics, 17% of students in science, and 15% of students in social studies had a teacher without the aforementioned credentials. The percentages drop in high school as 7% of students in English, 10% of students in mathematics, 7% of students in science, and 7% of students in social studies are assigned a teacher without a major, minor, or certification in the field (p. 27).

Wirt (2004) also found that teacher degree areas differ across grade level assignments. Almost half of all elementary teachers in the sample majored in general education while the other half majored in an academic field or in a content area specialization in education for their undergraduate or graduate degree. In high school almost one-half of all teachers majored in an academic field, while 38% majored in a content area specialization and 7% in general education.

In summary, as researchers suggest (Bobbitt & McMillan, 1994; Ingersoll, 1999; Wirt, 2004) teacher certification and teaching assignment are not always well aligned. The alignment of teacher certification and teacher assignment is made even more difficult because each state individually determines the parameters of a teacher certification and pairs it with a teaching assignment.

Teacher Content Knowledge as Determined by No Child Left Behind Legislation

Title II of No Child Left Behind, the sixth reauthorization of the Elementary and Secondary Education Act of 1965, represents a significant shift in the federal government's involvement in the definition of teacher knowledge and the way teachers have been traditionally prepared and certified (Cohen-Vogel, 2005).

Title II federal legislation introduced the term *quality teacher* and specified minimum content preparation requirements for quality teachers. Specifically, according to the legislation, a highly qualified teacher*:*

- holds a bachelor's degree, and
- has passed a state academic subject test (Public Law 107-110, 2002).

Specifically, § 9101 (23) of No Child Left Behind legislation states,

> The term 'highly qualified' when used with respect to a middle or secondary school teacher who is new to the profession, means that the teacher holds at least a bachelor's degree and has demonstrated a high level of competency in each of the academic subjects in which the teacher teaches by passing a rigorous State academic subject test in each of the academic subjects in which the teacher teaches (which may consist of a passing level of performance on a State-required certification or licensing test or tests in each of the academic subjects in which the teacher teaches).

Chapter B of Title II of No Child Left Behind legislation (Public Law 107-110, 2002) states that the purpose of the highly qualified legislation is to attract non-traditional teacher candidates into the field of teaching who have experience, expertise, and academic qualifications other than traditional coursework. This purpose greatly expands programs outside of colleges of education and encourages the development and expansion of state-approved alternative certification routes. Alternative certification programs typically decrease the amount of time it takes to become a teacher, which is reported to alleviate teacher shortages and attract individuals into the field of teaching who would be unwilling to engage in extended coursework preparation at the university.

Critics of No Child Left Behind legislation claim that subject matter knowledge alone is an insufficient definition of a highly qualified teacher. Regarding the growing prominence of subject matter knowledge triggered by No Child Left Behind policy, Cochran-Smith (2005) writes,

> The emphasis on subject matter knowledge is accompanied by rejection of, or at least questions about, the need for pedagogical knowledge, particularly knowledge that might be taught in education schools. Even inside the worlds of university-based teacher preparation and state-level program approval, where pedagogy and classroom practice remain essential indicators of a teachers' readiness to teach, there is growing faith—at least on the surface—that general knowledge of the liberal arts and sciences, coupled with more specific knowledge in the subject fields to be taught, is the magic bullet needed to improve teacher preparation (p. 12).

In summary, the No Child Left Behind legislation significantly narrows the variables associated with teacher content knowledge. Instead of viewing variables traditionally associated with teacher content knowledge such as using the numbers and types of courses taken, the type of degree attained, age of coursework, grade point average, and verbal knowledge, a highly qualified teacher as defined by the No Child Left Behind legislation possesses only a bachelor's degree and has passed a state test.

Teacher Testing as a Measure of Teacher Content Knowledge

Teacher Knowledge Has Been Measured in a Variety of Ways

Within the body of literature, teacher knowledge is measured in a variety of ways. The National Center for Educational Statistics (NCES, 1999) reports that teacher knowledge has been measured using "data on the type and number of courses taken, majors and minors, credits earned in specific content areas, and achievement in specific content areas" (p. 3). Current measures include scores on content area tests such as Praxis II, grade point average in major, area of certification, Graduate Record

Examination score, number and type of courses taken, credits earned, and undergraduate/graduate major or minor (NCES, 1999, p. 3).

History of Teacher Testing

No Child Left Behind legislation places great emphasis on teacher testing. As stated earlier, according to the legislation, a highly qualified teacher holds a minimum of a bachelor’s degree and has passed a state academic subject test in the area the teacher teaches (Public Law 107-110, 2002). However, teacher testing can be traced to the social efficiency movement several decades ago. Emerging largely from schools of education, the social efficiency model sought to legitimize teacher education by developing a “knowledge base” from which programs and activities would be drawn.

The origins of present day teacher testing evolved from Competency Performance Based Teacher Education in the 1960s and 1970s. Teacher performance was stated in behavioral terms, rather than in terms of completed specified coursework (Zeichner & Liston, 1989). Of Competency Performance Based Education, Feiman-Nemser (1990) writes, “teacher educators state explicitly the competencies students will acquire in their program and criteria by which they will be assessed” (p. 224). Feiman-Nemser (1990) notes that state legislatures promote this tradition by requiring teacher testing for initial licensure.

Russell (2005) marks the 1970s as the beginning of the trend toward formalized teacher testing in the United States. In an effort to promote high standards in the teaching profession and guarantee a minimum level of competency in the classroom, states in the 1980s and 1990s began to adopt various strategies including teacher testing as a means of ensuring that only qualified, competent individuals entered the classroom. Teacher testing presented itself to policy makers as an efficient, cost-effective way to accomplish this goal (Russell, 2005). The Western Governors Association, a non-partisan coalition of governors serving 18 states and three U.S. flag Pacific Islands, was a pivotal player in the development of state content standards as the basis for teacher testing (Conley, 2005).

The movement towards teacher testing in the 1980s and 1990s has become inclusive across the fifty states as of 2004. Presently, all fifty states and the District of Colombia have some sort of written teacher testing as a requisite for initial licensure. Of these, forty-three states require assessments of basic skills, forty-three states require a test of subject matter knowledge in the certification field, and thirty-five states require a test of pedagogical and professional knowledge. Thirty states use all three forms of assessment, and twelve use two of these assessment methods (Council of Chief State School Officers, 2004).

Development and Types of Teacher Tests

Certain larger states such as Texas and California have contracted with test developers to create a state-specific test based on state kindergarten through grade twelve standards. However, since test development is costly, the most frequently used teacher knowledge tests are Praxis I and Praxis II developed by the Educational Testing Service (Russell, 2005).

Russell (2005) describes the partnership in test development between a state and a testing company in three ways. The first kind of test is the “off-the-shelf” test. Here the contracted test development agency designs and administers the test without input from the state. The most common is the National Teacher Examination, also known as the Praxis I and Praxis II, offered by Educational Testing Service. The second category of test is a variation of the “off-the-shelf” test. Here tests are modified to include questions that are directly applicable to the teaching guidelines of a particular state. These questions are usually open-ended response questions. The last category of tests is “custom-made” tests. Here states hire test contractors to create a test system that is unique to the particular state. These tests often match the grades kindergarten through grade twelve curriculum standards for students. Texas uses a custom-made test system created by National Evaluation Systems.

Teacher tests undergo an extensive development process prior to being administered to teacher certification candidates. For example, the Praxis Series Subject Assessments began as a survey. Practicing teachers and teacher educators were mailed a list of knowledge and skills that beginning teachers should possess. Items on the survey were then ranked in order of importance. This list was again sent out to teachers for review. From this consensus, questions for the examination were developed and reviewed.

In Texas, the development of the Texas Examinations of Educator Standards examinations underwent a ten-step process. These steps include the following: (1) Standards were developed based on the Texas Essential Knowledge and Skills, the curriculum for Texas students in grades kindergarten through grade twelve. (2) The standards were then reviewed by a committee of educators and were placed on the State Board for Educator Certification website for public review. (3) Test frameworks were developed and reviewed from the approved standards. The test frameworks outline specific, measurable competencies that beginning teachers are expected to possess in Texas. (4) The frameworks were then distributed to practicing Texas teachers and teacher educators. These individuals ranked in order of importance the competencies listed. Frameworks were revised if needed. (5) National Evaluation Systems developed test items to measure the competencies outlined in the frameworks. (6) The test items were field tested on a representative sample of teacher certification candidates. (7) Committees reviewed the pilot data for reliability, validity, and potential bias. (8) Committees developed scoring guidelines for test fields with open-response question formats. (9) The tests were administered to candidates for certification. (10). Based on the initial scores of the test administration, committees set passing standards for each test field (National Evaluation Systems, 2004).

The Limits of Teacher Testing

Although a majority of states rely on teacher testing to ensure high standards, the literature shows that the reliance of a state academic subject test to reflect teacher competency is problematic. These problems are listed below and a detailed discussion for each problem follows the list. These problems include:

(1) poor alignment of tests with state standards (Russell, 2005),

(2) lack of rigor (Mitchell & Barth, 1999; Hanushek & Rivkin, 2004),

(3) low set point for the passing score (Mitchell & Barth, 1999),

(4) does not assess pedagogical content knowledge (Shulman, 1987; Monk, 1994),

(5) combining broad content areas and not requiring the mastery of all domains included on the test (Mitchell & Barth, 1999; State Board of Educator Certification, 2004),

(6) ambivalent relationships among number of courses taken, grade point average, and test score (Monk, 1994; Ferguson & Womack, 1993).

(7) holding colleges of education responsible for passing rates on tests (Public Law 107-110, 2001).

A 1999 study by the Education Trust (Mitchell & Barth, 1999) presents one of the problems related to teacher testing. The study shows that the content of many licensure exams is not of great rigor, and the passing rates, which are set by state certification agencies, not the test publisher, are low. The foundation performed a content analysis on secondary English Language Arts, Mathematics, and Science tests from the Educational Testing Service which publishes the Praxis series and tests from the National Evaluation Systems which designs state-specific examinations. Their findings reveal that most of the tests assess high school level content and that none of the tests assess content at the baccalaureate level. In fact, many of the science tests reviewed devoted a significant proportion of questions to content learned in middle school. Overall, none of the tests reviewed contained content that assesses *pedagogical content knowledge* as discussed in section one of this literature review (Mitchell & Barth, 1999).

Another problem with teacher testing presented in the literature is how states are navigating the policy of teacher testing in order to comply with No Child Left Behind legislation guidelines. In the Secretary's *Report on Teacher Quality* (2003), the Secretary writes, "No Child Left Behind legislation will hopefully cause states to tighten up their subject matter requirements, rather than be persuaded to bend to pressure to lower their academic standards for their teachers" (p. 5). However, this is not how some states are navigating the guidelines.

As a way to meet No Child Left Behind legislation standards, some states have created broad certification areas that do not fall neatly into university academic area majors. For instance, in Texas, an individual seeking secondary grades 8-12 Social Studies certification is licensed to teach economics, geography, government, history, psychology, and sociology at the high school level. The individual is not required to hold a bachelor's degree in any of these areas to be considered highly qualified, but rather, the individual is required to pass the grades 8-12 Social Studies state academic test covering all of these subjects. The grades 8-12 Social Studies test in Texas consists of 120 multiple choice questions and covers five domains. These include (1) world history, (2) U.S. history, (3) geography, culture, and the behavioral and social sciences, (4) government and citizenship, and (5) economics and science, technology, and society (State Board for Educator Certification, 2004).

Many states use the Praxis II for Social Studies as a requirement for initial licensure. The Praxis II for Social Studies is similar. This test consists of 130 multiple choice questions and consists of six categories. These include (1) U. S. history, (2) world history, (3) government, civics, political science, (4) geography, (5) economics, (6) behavioral sciences (Educational Testing Service, 2005).

Another example from Texas is secondary grades 8-12 Science certification. An individual who passes the secondary grades 8-12 Science test can be certified to teach high school biology, chemistry, astronomy, physics, and geology without having significant coursework in any of these areas. (State Board for Educator Certification, 2004).

Another problem with the way states are implementing teacher testing is presented by Mitchell and Barth (1999). These researchers point out that individuals can pass state certification tests without having to pass all the domain areas assessed on the test, meaning a high mastery on the biology portion of the Texas Examinations of Educator Standards grades 8-12 Science test can mask failure on the chemistry or physics portion of the test, yet the teacher will be fully licensed and considered highly qualified under Title II of No Child Left Behind legislation to teach chemistry or physics.

Additionally, testing as an indicator of effective teaching receives mixed reviews in the literature. For example, Latham, Gitomer, & Ziomekl (1999) champion the use of teacher tests as measures of teacher quality citing teaching as an “academic enterprise” (p. 24) and that teachers “be drawn from among the more academically able” (p. 24). In addition, researchers (Kain & Singleton, 1996; Hanushek, 1971; Ferguson, 1991 and 1998; Ferguson & Ladd, 1995; Ehrenberg & Brewer, 1995; Laczko-Kerr & Berliner, 2003) have shown a teachers’ verbal ability as measured by a variety of testing instruments to be positively correlated to their student’s test scores.

However, Ferguson and Womack (1993) using data from 266 high school student teachers at Arkansas Tech University found that a subject major and scores on the Arkansas state subject matter competency test explained less than 1% of the variation between the ratings of the student teachers’ performance by their student teaching supervisors. Using data from the National Teachers Examination and student teacher supervisor evaluations as measures of effectiveness, Ferguson and Womack (1993) found teachers’ grade point averages in their majors and their test scores on content knowledge were weaker predictors of classroom performance than the number of education courses completed. In addition, Hanushek and Rivkin (2004) report that data based on teacher test scores may be difficult to interpret as each test may include different content, depth, and rigor.

In a retention study exploring teachers' subject matter competence and their likelihood to stay in teaching, using a sample of teachers in North Carolina over a period of four years, Shugart and Hounshell (1995) found that teachers who scored higher on the National Teacher Examination in Biology and General Science were more likely to never enter teaching or to leave teaching after a short time, while teachers who scored lower on the National Teacher Examination were more likely to make teaching a career (p. 63).

Furthermore, under Title II No Child Left Behind legislation, teacher education programs are held responsible for the passing rates of their program participants on teacher certification examinations. Several researchers (Zeng, Simonsson, Poelzer, 2002; Wilmore & McNeil, 2002; Jones, Sherman, Ninness, & Hallman, 2002; Chambers, Munday, Sienty, & Justice, 1999; Simonsson, Poelzer, Zeng, 2000; Poelzer, Zeng, & Simonsson, 2000, White & Burke, 1994) in Texas have investigated variables that predict passing the Examination for the Certification of Educators in Texas, the test formerly used in Texas to assess teacher competency. These researchers have explored various sample groups including pre-service teachers seeking elementary certification, pre-service teachers seeking secondary certification, Hispanic pre-service teachers, and administrators. Each of these studies utilized a logistic regression model of analysis.

One example of these studies is Zeng et al's (2002) research of 120 and 136 elementary pre-service teachers drawn from 1999 and 2001 data found that pass rates for this group on the Examination for the Certification of Educators in Texas professional development exam can be predicted with 71.1% accuracy using the variables of Texas Academic Skills Program, reading and grade point average scores. The Texas Academic Skills Program is purported to assess the basic skills of beginning post-secondary students in writing, reading, and mathematics. The Texas legislature deemed the mastery of basic skills deemed necessary to be successful in university coursework. White and Burke's (1994) study of elementary pre-service teachers found grade point average and the Scholastic Academic Test scores to be statistically significant and positively correlated with passing the Examination for the Certification of Educators in Texas scores. Simonsson, Poelzer, and Zang (2000) found that reading scores on the Texas Academic Skills Program, practice Examination for the Certification of Educators in Texas scores, and American College Testing assessment scores predicted passing scores on the professional development Examination for the Certification of Educators in Texas for secondary teachers. Poelzer, Zeng, and Simonsson (2000) substantiated these findings using a sample of Hispanic students as well.

Jones, Sherman, Ninness, and Hallman (2002) replicated these previous studies using a sample of students seeking certification in educational administration. Using a sample of fifty-three students from two universities, these researchers found Graduate Record Examination scores were predictors of passing the Standard Principal Examination for the Certification of Educators in Texas. Similarly, using data from 337 students over a period of five years, Wilmore and McNeil (2002) found a correlation between Graduate Record Examination scores, gender, race, and undergraduate grade point average in predicting Examination for the Certification of Educators in Texas scores on the Standard Principal Examination for the Certification of Educators in Texas scores.

The Business of Testing

American businesses lobbied policymakers to seek an efficient means to improve the academic caliber of prospective teachers in hopes of helping students become highly skilled workers in the future (Latham et al, 1999). This served as a catalyst for the exponential growth in teacher testing in the 1980s and 1990s.

Holding inflation and changes in the value of the dollar constant, Clarke, Madaus, Horn, and Ramos (2001) report from 1955 through 1997 sales in testing increased from less than $7 million in 1955 to over $263 million in 1997. In particular, the revenues of the Educational Testing Service, the maker of the Praxis I and Praxis II tests, reported revenues of $150 million in 1970 and $500 million in 1998 (p. 3).

Opponents of the testing movement criticize the lack of accountability and governmental regulation of private testing companies. Good (1996) writes that educational testing is a big business that employs large political lobbying groups to protect their influence and investments in education. Good (1996) reports over 200 million achievement tests are administered in the United States annually. Because of these interests, standardized testing continues to be the mode of inquiry in determining teacher effectiveness and student achievement even though these methodologies are criticized for their lack of validity and reliability in measuring these constructs. Miner

(2004) cites that companies such as Educational Testing Service are not held responsible to the American public for their actions.

In summary, the methods of measuring teacher content knowledge have evolved over the past century. This evolution includes an attempt to develop an accountability system via the development of types of teacher tests initiated by the Competency Performance Based Teacher Education movement of the 1960s and 1970s. However, teacher testing as a measure of content knowledge presents certain problems such as lack of test rigor, poor alignment of tests with state standards, low set points for the passing score, and a failure to measure pedagogical content knowledge (Mitchell & Barth, 1999; Russell, 2005; Shulman, 1986; Monk, 1994; Allen, 2003).

Realignment of Texas Teacher Certification Policy in Response to No Child Left Behind legislation

History of Teacher Testing in Texas

Texas Administrative Code 230.5(b) requires individuals seeking teacher certification to pass competency examinations. The first of its kind, the Texas Examination of Current Administrators and Teachers was administered in March 1986. This test measured teachers' general skills in reading, writing, and mathematics. During the first test administration in March 1986, 97% of teachers and administrators passed the Texas Examination of Current Administrators and Teachers (Kain & Singleton, 1996).

This examination was replaced by the Examination for the Certification of Educators during the same year. The teaching certificates based on the Examination for the Certification of Educators, cover early childhood through grades six or eight and grades six through twelve. In 1998, the State Board for Educator Certification, the Texas Higher Education Coordinating Board and their testing contractor National Evaluation Systems worked collaboratively to develop beginning teacher standards that relate directly to the Texas Essential Knowledge and Skills for grades kindergarten through twelve, the curriculum for public school students. The Texas Examinations of Educator Standards will completely replace the Examination for the Certification of Educators tests in 2006. The teaching certificates based on Texas Examinations of Educator Standards cover early childhood through grade four, grades four through eight, and grades eight through twelve. Some certificates will remain “all level,” such as gifted and talented and special education. The Texas Examinations of Educator Standards purports to measure a teacher’s mastery of the Texas Essential Knowledge and Skills for grades kindergarten through twelve as well as competencies that a beginning teacher should know (Texas Examinations of Educator Standards Faculty Manual, 2004). (See Texas Examinations of Educator Standards competency frameworks in Appendix A, B, C, D, E for tests examined in this study).

In addition to passing the Examination for the Certification of Educators or Texas Examinations of Educator Standards, teacher candidates must also pass the Texas Higher Education Assessment which was passed into state law in 1987 under Senate Bill 286, Texas Education Code, Section 51.3062 under the name Texas Academic Skills Program. A major catalyst for the administration of the Texas Academic Skills Program was a report issued by the Texas Higher Education Coordinating Board entitled, *A Generation of Failure: The Case for Testing and Remediation in Texas Higher Education.* The report highlighted high school seniors’ lack of preparation for college-level coursework. The Texas Higher Education Assessment measures students' general knowledge of reading, writing, and mathematics (Texas Higher Education Assessment Faculty Manual, 2002).

Federal Control vs. State Control of Teacher Licensure

Historically, education has been the responsibility of individual states as outlined in the tenth amendment. Under the tenth amendment, the responsibility of licensing teachers belongs to each state. From a policy standpoint, No Child Left Behind legislation highlights the tension between local state control and federal control as states comply with federal legislation in order to receive federal funds.

Traditionally, prospective teachers have earned teacher certification by completing an approved course of study as outlined by a college or university, which has been designated as a certification-issuing agency by the state. In order to become an issuing agency, the state approves a program for teacher certification submitted by a college or university that falls within the requirements of state licensure. The "state-approved program" may consist of required coursework, field experience such as student teaching, and passing content and/or pedagogy tests. Once these requirements have been met, the candidate is granted a teaching certificate. The requirements for obtaining a license to teach are not standardized, thus the requirements for obtaining a license vary greatly from state to state and in some states by each educational institution.

Furthermore, some states have as many as six types of initial certificates, while other states have only one. Likewise, the terminology used for various types of teaching licenses is not standardized. Feistritzer (2005) cites thirty different titles that are used for initial teaching certificates, and more than fifty titles are used for second stage teaching certificates throughout the fifty states and the District of Columbia. Hanushek and Rivkin (2004) confirms this finding. The researchers write,

> States, for example, determine the requirements to be a certified teacher, set the rules of collective bargaining on teacher contracts, and determine the financial structure including providing varying amounts of support for local schools depending upon their circumstances and tax base. States also specify the specific curriculum and outcome standards, establish testing requirements, and regulate a wide range of matters of the education process including various class-size requirements, the rules for placement into special education classes, and disciplinary procedures (p. 15).

Alignment of Texas Secondary Teacher Certification to No Child Left Behind Legislation

The historical orientation of states' control over education contributes to the problems of the provisions outlined in No Child Left Behind legislation as each state differs with regard to standards of teacher quality. To become a highly qualified secondary teacher in Texas under No Child Left Behind guidelines, a new teacher candidate must meet three requirements.

- First, a new teacher candidate must hold a bachelor's degree from an accredited college or university in an academic major related to a Texas certification field. This is not a significant change for Texas certification since majors in education have not been offered by Texas colleges and universities since 1987 state legislation (Frost, 2003).

- Second, a new teacher candidate must complete teacher training through an approved program. These programs vary widely in content and duration. They are offered through colleges and universities, school districts, regional service centers, community colleges as well as business entities (State Board for Educator Certification, 2005).
- Third, a new teacher candidate must pass the appropriate teacher certification tests for the subject and grade level that the teacher will teach. In Texas, secondary teacher candidates are required to successfully complete a test of their academic content knowledge and of their pedagogical and professional knowledge (State Board for Educator Certification, 2005).

Individuals seeking certification in Basic Business are not required to take a content area test because a test is not yet developed in this area. Individuals seeking certification in Spanish and French fields are also required to take the Texas Oral Proficiency Test, which is a test of listening and speaking skills, in addition to the content and pedagogy tests (State Board for Educator Certification, 2005).

For individuals who are already certified from another state or country, the single requirement for Texas state licensure is to pass the appropriate teacher certification tests for the subject and grade level that the teacher will teach. These individuals are allowed to teach for one year in Texas schools under a probationary certificate while they complete the Texas testing requirements. Texas also has reciprocity agreements with other states. The Texas certification tests are waived if certification candidates have met the comparable Texas passing score on selected tests; however, not all teaching fields are included in the reciprocity agreements. Texas only has reciprocity agreements with states whose certification tests are “similar to and at least as rigorous as” (State Board for Educator Certification, 2005) the corresponding Texas exams. The State Board for Educator Certification sets the passing standards for tests which have thus far been found to be comparable to corresponding Texas exams. These states include: Arizona, Colorado, Illinois, Massachusetts, Michigan, New Mexico, and Oklahoma. (State Board for Educator Certification, 2005).

In Texas, there are a variety of teacher education program models. Unaffected by No Child Left Behind legislation are the undergraduate program models of study. The undergraduate program of study requires secondary education students to major in an academic area that closely aligns with a Texas certification field. Beginning in the junior year, a candidate will complete a maximum of twenty-fours of education coursework culminating in a semester of student teaching. Education coursework includes foundations of education, educational psychology, methods courses, classroom management, diversity, literacy, and student teaching.

The major impact of No Child Left Behind legislation is on graduate programs leading to teacher certification. Specifically, the alternative certification model is an increasingly common method of certification in Texas and is offered both in colleges of education and by private commercial providers. In Texas, each alternative certification program has unique requirements and these requirements vary broadly from program to program (Feistritzer, C. E., 2005).

As alternative certification programs vary widely in content and duration, Feistritzer (2005) attempted to classify each kind of program eventually outlining eleven different alternative certification models used in the United States. Table 1 provides an overview of Feistritzer's alternative certification program classification model. The program model of interest to this study is the class E university-based post-baccalaureate program model because in this model teacher certification candidates already have a bachelor's degree in a certification field or a field that is closely related to a certification field. They apply for admission to the teacher education graduate program at a university and are eligible for a Texas probationary certificate, which allows them to begin teaching immediately in a Texas secondary classroom.

In Texas, only the probationary certificate identifies an individual as highly qualified under No Child Left Behind guidelines. Teachers who held standard certificates prior to No Child Left Behind legislation may be considered highly qualified if they demonstrate content area mastery via the state tests or through High Objective Uniform State Standard of Evaluation. Probationary certificates are issued when teacher candidates:

(1) have a baccalaureate degree;
(2) are enrolled in a state-approved certification program; and
(3) have met subject matter competency either through college coursework equivalent to an academic major in the teaching field or pass the certification test in the teaching field in which the candidate will be teaching (State Board for Educator Certification, 2005).

This means a growing number of Texas teachers who are college graduates are considered highly qualified under No Child Left Behind and currently teach in Texas secondary classrooms only having received varying durations of pedagogical training. For example, some possible scenarios include:

(1) probationary certification candidates complete eight weeks of training in pedagogy and pass the content test in their teaching field and the pedagogy test;
(2) probationary certification candidates have twenty-four hours of coursework in their certification field and enroll in a teacher preparation program where they will complete their pedagogy training in one to three years;
(3) probationary certification candidates meet academic content requirements, enroll in a teacher preparation program and begin teaching after completing all program requirements except for one-year of probationary teaching where they serve as the teacher-of-record.

Problems arise for probationary certification candidates, school districts, and teacher preparation providers when teacher candidates lack the requisite knowledge to pass the academic portion of the Texas Examinations of Educator Standards, the certification test required for licensure. If teacher candidates do not pass the certification tests, they are likely to lose their teaching positions. Teacher turnover costs school districts time and money in the recruitment, training, and integration of newly hired teachers in the district's policies and school culture. Teacher turnover also impacts student achievement. The resources could be better spent on instruction, programs for students, or developing career teachers.

Additionally, Texas certification policies served as a model for much of the No Child Left Behind legislation related to teacher quality (Conley, 2003). Since Texas experienced the deregulation of teacher education prior to No Child Left Behind legislation, researchers have the ability to look at this program model with its varieties of content knowledge of teacher candidates and perhaps anticipate the future landscape of teacher knowledge if this policy persists.

In summary, Texas has a long history of using teacher tests as a measure of teacher content knowledge, but unlike, the No Child Left Behind legislation, Texas measured teachers' general skills in reading, writing, and mathematics and required individuals pursuing a certification in secondary education to hold a major in their certification field. In addition, the state of Texas contracted with a test development company and invested funds to create a testing system aligned with the grades kindergarten through twelve Texas Essential Knowledge and Skills, the curriculum of public schools.

Table 1

Classification of Alternative Routes to Teaching

Class	*Description of alternative routes to teaching*
Class A	This category is reserved for those that meet the following criteria: • The alternative certification route has been designed for the explicit purpose of attracting talented individuals who already have at least a bachelor's degree in a field other than education into elementary and secondary school teaching. • The alternative route is not restricted to shortages, secondary grade levels or content area. • These alternative teacher certification routes involve teaching with a trained mentor, and any formal instruction that deals with the theory and practice of teaching during the school year—and sometimes in the summer before and/or after.
Class B	Teacher certification routes that have been designed specifically to bring talented individuals who already have at least a bachelor's degree into teaching. These routes involve specially designed mentoring and some formal instruction. However, these routes either restrict the route to shortages and/or secondary grade levels and/or content areas.
Class C	These routes entail review of academic and professional background, and academic transcript analysis of the candidate. They involve specially (individually) designed inservice and course-taking necessary to reach competencies required for certification, if applicable. The state and/or local

	school district have major responsibility for program design.
Class D	These routes entail review of academic and professional background, and academic transcript analysis. They involve specially (individually) designed inservice and course-taking necessary to reach competencies required for certification, if applicable. An institution of higher education has major responsibility for program design.
Class E	These post-baccalaureate programs are based at an institution of higher education.
Class F	These programs are basically emergency routes. The prospective teacher issued some type of emergency certificate or waive which allows the individual to teach, usually without any on-site support or supervision, while taking the traditional teacher education courses requisite for full certification.
Class G	Programs in this class are for persons who have few requirements left to fulfill before becoming certified through the traditional approved college teacher education program route, (e.g., persons certified in one state moving to another; or persons certified in one endorsement area seeking to become certified in another).
Class H	This class includes those routes that enable a person who has some “special” qualifications, such as a well-known author or Nobel prize winner, to teach certain subjects.
Class I	These states reported that they were not implementing alternatives to the approved college teacher education program route for licensing teachers.

Class J	These programs are designed to eliminate emergency routes. They prepare individuals who do not meet basic requirements to become qualified to enter an alternative route or a traditional route for teacher licensing.
Class K	These avenues to certification accommodate specific populations for teaching, e.g., Teach for America, Troops to Teachers and college professors who want to teach in K-12 schools.

Source: Feisritzer, C. E. (2005). Alternative teacher certification: A state-by-state analysis 2005. Washington, DC. National Center for Education Information, p. 35.

Student Achievement Related to Teacher Knowledge

Effect of Teacher Academic Degree on Student Achievement

Although No Child Left Behind legislation stresses strong subject matter knowledge for teachers, a review of the literature shows mixed outcomes regarding the effect of teachers' subject matter knowledge on student achievement. A review of the body of research by the Education Commission of the States (Allen, 2003), a nonpartisan research organization, represents a comprehensive synthesis of the data available regarding the advantage of having strong subject-matter preparation. The report is based on a review of ninety-two studies that were selected from a pool of over 500 studies. Studies were selected for analysis if they met the following criteria:

(a) relevant to the research question;

(b) original research;

(c) published in a peer-reviewed scientific journal;

(d) published in the last twenty years;

(e) related to teacher education in the United States;

(f) empirical in nature; and

(g) adhered to accepted standards of scholarly research (Allen, Education Commission of the States, 2003, p. 121).

The Education Commission of the States (Allen, 2003) found five studies that speak directly to the outcomes of teachers possessing strong subject-matter knowledge. The Commission cites Druva and Anderson (1983), Goldhaber and Brewer (1997) and (2000), Darling-Hammond (2000) and Chaney (1995) as showing a positive correlation between teacher subject matter knowledge as measured by coursework (either possessing a major, minor, or graduate degree) and student achievement.

Druva and Anderson (1983) performed a meta-analysis on sixty-five studies of kindergarten through grade twelve Science teachers. The Goldhaber and Brewer studies (1997) and (2000), the Darling-Hammond (2000) study, and the Chaney (1995) study each employed multiple regression statistical analyses where students' achievement scores on the National Assessment of Educational Progress were the dependent variable. The independent variable was the subject matter preparation of the students' teachers operationalized as the type of degree the teacher held. Each study found subject matter preparation in the teachers' certification fields to be positively correlated to student achievement.

The Education Commission of the States (Allen, 2003) also found studies that speak to the context of teaching assignment and teachers' academic preparation in relation to student achievement. Studying the achievement gains of elementary math students, Rowan, Correnti, and Miller (2002), using multiple regression analysis, found a negative correlation between teachers having an advanced mathematics degree and student achievement. However, using 1996 National Assessment of Educational Progress data, Hawkins, Stancavage, and Dossey (1998) found that fourth graders who had teachers who held a degree in mathematics, mathematics education, or general education outperformed students whose teacher had a degree in another field. What this means is that teacher subject matter knowledge is important to student achievement depending upon the teachers' major field of study. But while the research shows that elementary students are more likely to have higher achievement gains when their teachers have a degree in the field that they are teaching, too much content preparation may negatively impact student achievement at the elementary level.

Within the high school context, the Education Commission of the States (Allen, 2003) cites four studies that show achievement scores of students are higher when the teachers' academic preparation coursework aligns with their teaching assignment. For example, Goldhaber and Brewer (1997) using data drawn from National Education Longitudinal Study of 1988, found that the achievement scores of high school mathematics students were positively correlated with having a teacher who held an undergraduate or graduate degree in mathematics; whereas, the scores of high school mathematics students were negatively correlated with having teachers who held degrees in other subjects.

Similarly, Rowan, Chiang, and Miller (1997) using the 1988 National Education Longitudinal Study data substantiate Goldhaber and Brewer's findings in mathematics in 1997. Goldhaber and Brewer (2000) found similar results in a replication of their 1997 study for mathematics students and teachers; however, they found no correlation between student achievement in science and the subject-matter major of science teachers.

Likewise, Monk (1994) found no correlation between student achievement in life science and the subject matter preparation of science teachers. Each of these studies (Goldhaber and Brewer, 1997; Rowan, Chiang, and Miller, 1997; Goldhaber and Brewer, 2000; Monk, 1994) employed multiple regression statistical analysis where the students' achievement scores served as the dependent variable and the teachers' subject matter preparation in terms of degree field was the independent variable.

What this means is that high school students are more likely to have higher achievement gains when their teachers have completed coursework equivalent to a major in mathematics when they are teaching mathematics. However, these findings may be characteristic of mathematics teaching only and not generalize to other academic areas.

Title II of No Child Left Behind legislation does not stipulate requirements for teacher pedagogical content knowledge; however, some researchers (Darling-Hammond, 2003; Wilkins, 2002; Monk, 1994) argue that content knowledge alone is not a strong indicator of teacher effectiveness.

Furthermore, using data on 2,829 students from the Longitudinal Study of American Youth, Monk (1994) found a “diminishing returns” effect in his study of teachers’ content knowledge. Monk’s (1994) work shows that student achievement scores in mathematics level off when a teacher has completed five content area courses. In addition, Monk (1994) shows that students with higher achievement scores were more likely to have teachers with a considerable number of courses in content-specific pedagogy than students with lower achievement scores. To illustrate, Monk (1994) states:

> The addition of courses beyond the fifth course has a smaller effect on pupil performance, compared with the effect of an additional math course up to and including the fifth course. In contrast to the 1.2% increase in pupil performance noted earlier, the addition of a mathematics course beginning with the 6th course, is associated with a 0.2% increase. Mathematics education courses also have positive effects on pupil performance. Undergraduate mathematics education has

a positive effect on pupil performance at both the sophomore and junior grade levels. For the undergraduate mathematics education courses, the impact of an additional course is on the order of a 0.4% increase in test performance. A statistical test of difference between the coefficients estimated for undergraduate mathematics courses and undergraduate mathematics education courses indicated that the difference is significant at better than the 0.01 level. Thus it appears that courses in undergraduate mathematics pedagogy contribute more to pupil performance gains than do courses in undergraduate mathematics (p. 130).

The body of research reviewed supports the No Child Left Behind legislation claim that teachers' academic content knowledge is important, but not so important that it excludes the importance of teachers' pedagogical content knowledge. As stated earlier, Title II of No Child Left Behind legislation stipulates requirements for teachers' academic knowledge, but does not stipulate requirements for pedagogical content knowledge even though the body of research directly points to positive correlations between a teacher's pedagogical knowledge and student achievement.

Student Achievement and the Value-Added Approach

Hanushek (1990) also discusses the value-added approach. This framework has been used in Tennessee since 1993 to evaluate student achievement data related to teacher quality and in Texas since 1998. This research frame employs a statistical methodology to estimate the aggregated yearly growth in student learning using annual data from the norm-referenced tests that include the content areas of mathematics, science, social studies, reading, and language arts.

The model uses the student's past achievement record as a starting point from which to measure success. The model also assumes that changes in test scores from one year to the next accurately reflect student progress in learning (Sanders, W. L. & Rivers, J. C., 1998).

The limitation to this approach is its restriction of teacher effectiveness characteristics. For example this approach uses data that is frequently available to researchers, namely scores on standardized tests, college coursework, and teachers' years of experience. These variables present a limited view of teacher effectiveness (Hanushek, 1990). It is also difficult to isolate indicators of effective teaching due to structural, organizational, and personal variations in teacher quality. Hanushek and Rivkin (2004) write:

> Existing evidence on schools highlight the substantial variation in teacher quality that exists today, even among teachers with similar education and experience. This variation appears to result from several factors: differences in skill and effort; inadequate personnel practices (particularly the retention process but also the hiring process) in many schools and districts; and differences in the number and quality of teachers willing to work by subject and working conditions (p. 18).

To conclude, most researchers agree that teacher content area knowledge is a predictor of student achievement (Allen, 2003; Monk, 1994; Darling-Hammond, 2000). However, some researchers (Darling-Hammond, 2003; Wilkens, 2002) argue that content knowledge alone is not a strong indicator of teacher effectiveness, rather teachers' pedagogical content knowledge is a stronger predictor of student achievement.

Chapter II Summary

Teacher knowledge is an important factor for student achievement. However, teacher knowledge is a complex variable, and there are competing views regarding how to measure teacher knowledge and what type of teacher knowledge is most important.

Researchers have investigated teacher knowledge as a function of coursework completed in a content field, academic major, grade point average, verbal ability, years of experience, and test scores. These factors have been commonly used in educational research due to the fact they are easy to collect and cost-effective. More complex indicators of teacher knowledge such as performance assessment, portfolios, and classroom observations are time consuming, costly, and have not been the subject of national data collection efforts.

No Child Left Behind legislation narrowly defines teacher knowledge as holding a bachelor's degree and passing a state certification examination. Although the goal of the No Child Left Behind legislated definition of a highly qualified teacher is to improve educational equity and increase student achievement by ensuring teachers know the content they are teaching, the literature does not support this method of determining teacher knowledge in a meaningful way. For example, some of the licensure tests are not of great rigor, the passing rates are set low, the examinations cover broad content areas, and mastery of all test domains is not required. In addition, only larger states such as Texas and California are capable of making an investment in state-specific licensure tests that are aligned with kindergarten through grade twelve standards.

However, teacher education providers must comply with the regulations of No Child Left Behind legislation or risk losing their credentials as providers. Under Title II of

No Child Left Behind legislation, teacher education providers are held accountable for the scores of teacher candidates on teacher competency examinations.

Furthermore, the only certain outcome of the business of testing is that test companies will continue to benefit financially when policymakers rely on this means of determining teacher knowledge. While teacher testing may be one factor in determining teacher knowledge, the use of multiple means to assess the knowledge of teachers should be used in order to screen and select quality teachers.

Unfortunately, the No Child Left Behind legislation requirement of passing a state academic area competency test will not translate into quality teaching, and subsequently student academic achievement is not supported in the body of literature which examines the relationship between teacher content knowledge and teacher test scores. Instead, teachers holding an academic major in the subject that they teach and teachers with pedagogical content knowledge are most able to positively affect student academic achievement.

Before No Child Left Behind legislation, Texas teachers were required to hold an academic major in the subjects that they taught and pass a state content examination. No Child Left Behind legislation has effectively lowered the teacher content knowledge bar by equating an academic major to an academic degree in a related field. For example, a degree with a major in journalism is equated to a degree with a major in English, and a degree with a major in accounting is equated to a degree with a major in mathematics. The student achievement outcomes of allowing an individual who is deficient in a broad and deep study of mathematics along with pedagogical content knowledge to gain state certification in secondary Mathematics should be evident to any individual outside of education.

A second way the content knowledge bar has been lowered in Texas by No Child Left Behind legislation is to equate an academic major with twenty-four semester hours of content area coursework related to a certification field (twelve upper-level). A final way the content knowledge bar has been lowered in Texas by No Child Left Behind legislation is to equate a bachelor's degree in any area and a passing score on the state test with an academic major.

Because there appears to be no end in sight for the teacher shortage and because outside of pedagogical content knowledge, teacher content area knowledge is one of the most important predictors of student academic success, this study attempts to better understand the content area knowledge of teacher candidates in a post-baccalaureate program in relation to the academic standards set forth by No Child Left Behind legislation.

CHAPTER III

METHODOLOGY

The following are the research questions that were addressed in this study:

Research Question 1

What is the nature of the certification area knowledge of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program seeking teacher certification at the University of North Texas?

a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher Certification Program students earned in their certification field?
b. What is the upper-level content area grade point average of Secondary Online Post-Baccalaureate Teacher Certification Program students?
c. How much time has elapsed between the completion of the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards?
d. What are the Texas Examinations of Educator Standards scores for individuals in the sample?

Research Question 2

To what extent does upper-level content area coursework predict a passing score on the Texas Examinations of Educator Standards?

Research Question 3

To what extent does upper-level content area grade point average predict a passing score on the Texas Examinations of Educator Standards?

Research Question 4

To what extent does the time elapsed between the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards predict a passing score on the Texas Examinations of Educator Standards?

Research Design

Scores on the Texas Examinations of Educator Standards were used to determine the relationship between knowledge of initial certification students and: (1) number of upper-level content area courses, (2) upper-level grade point average, and (3) how much time has elapsed between the completion of the last upper-level content area course completed in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards?

The primary dependent variable used in this study was the individual’s score on the appropriate content area test of the Texas Examinations of Educator Standards. The independent or predictor variables included (1) number of upper level content area courses, (2) upper-level content area grade point average, and (3) how much time has elapsed between the completion of the last upper-level content area course completed in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards.

Descriptive data, analysis of variance, multiple linear regression, and logistic regression statistical analyses were used to draw conclusions about the content area knowledge of the individuals in the sample and the significance of the predictors examined. Descriptive data include the mean, mode, range, and standard deviations of the variables under study. An analysis of variance and Tukey *HSD* “honest significant difference” post-hoc tests were used to identify statistically significant differences between the mean scores for the variables examined. Tukey *HSD* “honest significant difference” post hoc tests were used because the groups were composed of different sample sizes. Logistic regression and linear regression analysis were used to identify predictor variables associated with passing the Texas Examinations for Educator Standards. The next section includes further information about the use of logistic regression and linear regression in this study.

Participants

The subjects in the study were a convenience sample of 144 students who took the Texas Examinations of Educator Standards and were seeking secondary teacher certification through the Secondary Online Post-Baccalaureate Teacher Certification Program at the University of North Texas during the 2002-2003, 2003-2004, and 2004-2005 academic school years. The sample included all students in the Online Post-Baccalaureate Secondary Teacher Certification Program who were seeking initial certification in one of the following certification fields: grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies. These certification areas were chosen for three reasons. First, these areas are considered core academic subjects and fall within

No Child Left Behind legislation guidelines that require a highly qualified teacher to teach in these subjects by the 2005-2006 school year. Secondly, these certification areas represent the largest number of teacher certification candidates available in the Secondary Online Post-Baccalaureate Teacher Certification Program at the University of North Texas. Third, all of these certification fields use the Texas Examinations of Educator Standards as a requirement for certification. Other certification fields still use the Examination for the Certification of Educators in Texas. However, this testing framework will be replaced by the Texas Examinations of Educator Standards testing framework by 2006.

Requirements for Program Admissions

All students in the sample met the program's academic requirements for admission. Requirements for the program include a 2.8 grade point average for overall coursework for the undergraduate degree, a 3.0 grade point average on the last sixty hours of the undergraduate degree, or a 3.4 grade point average on a completed Master's degree. In addition, students must pass all parts of the Texas Academic Skills Program (TASP) or Texas Higher Education Assessment (THEA). These tests reportedly measure a student's basic competency in reading, writing, and mathematics. More information about these tests can be found at http://www.tasp.nesinc.com. If students are seeking a Master's degree in addition to initial teacher certification, acceptable Graduate Record Examination scores may be used in lieu of Texas Academic Skills Program or Texas Higher Education Assessment scores. Minimum Graduate Record Examination scores for the program are 391 verbal and 436 quantitative.

Before beginning the program, students must demonstrate minimum content area competency according to university program guidelines which require twenty-four hours of coursework with twelve hours at the junior level or above in a Texas certification field. Depending on the initial certification a student is seeking, each individual in the sample has a minimum of twenty-four hours in the areas of Biology, Economics, English, Geography, Government, History, Political Science, Mathematics, Psychology, or Sociology. The study met all Institutional Review Board requirements.

Participant Demographics and University Background

Tables 2, 3, and 4 present demographic data of the sample. Seventy-eight percent of the sample participants were white. Sixty-one percent of the sample participants were female. In addition, the sample represents a wide variety of content knowledge as participants earned degrees from various colleges and universities. Thirty percent of individuals in the sample earned a bachelor’s degree from the University of North Texas; whereas, 70% of individuals in the sample earned a bachelor’s degree from another university. Fifty-eight percent of individuals in the sample earned a bachelor’s degree from a college or university in Texas; whereas, 42% of individuals earned a bachelor’s degree from a college or university not in Texas. See Table 5.

The *U.S. News and World Report 2006* college and university selectivity measures were used to determine the selectivity of the colleges and universities that the sample participants attended (Table 6). Selectivity refers to the ratio of applicants who applied to admissions at a given university and the actual number that were accepted by the university. A more selective university has a greater applicant pool from which to choose than a less selective university.

This system is not without its limitations. The limitations of using college and university selectivity measures relevant to this study are that (1) the researcher is assuming that the selectivity measures have remained constant since the time of the student's graduation, and (2) it is difficult to compare selectivity measures of universities that are categorized into different ranks by *U.S. News and World Report*. For example, *U.S. News and World Report* compares universities to their peers and categorizes universities into four groups. These include (1) National University, (2) Liberal Arts College, (3) University-Master's, and (4) Comprehensive College—Bachelor's. The master's and comprehensive schools are further divided into sub groups by location. These include North, South, West, and Midwest.

Colleges and universities in the top half of their categories are ranked numerically. Others are placed in third and fourth tiers. *U.S. News and World Report* states, "You cannot compare the ranks of institutions in different categories because schools are assessed only against their peers" (*U.S. news and world report 2006: Ultimate college guide 2006*, p. 320).

Table 2

Ethnicity of the Sample Participants

N=144	Number	Percentage
African American	8	5.5%
Asian	2	1.3%
Hispanic	5	3.5%
Native American	3	2.0%
White	112	77.7%
Not Specified	14	9.7%

Percentages may not equal 100% due to rounding error.

Table 3

Gender of the Sample Participants

N=144	Number	Percentage
Female	88	61.1%
Male	56	38.9%

Table 4

Number and Percentage of Sample Participants in Each Certification Test Category

N=144	Number	Percentage
English Language Arts and Reading	50	34.7%
History	36	25.0%
Life Science	18	12.5%
Mathematics	26	18.0%
Social Studies	14	9.7%

Percentages may not equal 100% due to rounding error.

Table 5

Sample Participants Who Earned A Baccalaureate Degree From The University Of North Texas and Sample Participants Who Did Not Earn a Baccalaureate Degree from the University Of North Texas

N=144	*Number*	*Percentage*
Baccalaureate degrees from other states	60	41.6%
Baccalaureate degrees from Texas institutions	84	58.3%
Baccalaureate degrees from the University of North Texas	43	29.8%

Table 6

The Relationship Of U.S. News and World Report Selectivity Measures for Colleges And Universities to Success on the Texas Examinations of Educator Standards for English Language Arts And Reading, History, Life Science, Mathematics, and Social Studies Test Groups

Test Group (N=144)	*Less Selective or N/A*		*Selective*		*More Selective*		*Most Selective*	
	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
English Language Arts and Reading (N = 50)	5 (10%)	0 (0%)	29 (58%)	0 (0%)	16 (32%)	0 (0%)	0 (0%)	0 (0%)
History (N = 36)	4 (11%)	1 (3%)	15 (42%)	4 (11%)	10 (28%)	1 (3%)	1 (3%)	0 (0%)
Life Science (N = 18)	0 (0%)	1 (6%)	7 (39%)	4 (22%)	5 (28%)	1 (6%)	0 (0%)	0 (0%)
Mathematics (N = 26)	0 (0%)	4 (15%)	2 (8%)	6 (23%)	10 (38%)	2 (8%)	2 (8%)	0 (0%)
Social Studies (N = 14)	1 (7%)	1 (7%)	8 (57%)	0 (0%)	3 (21%)	1 (7%)	0 (0%)	0 (0%)
All Groups (N=144)	10 (7%)	7 (5%)	61 (42%)	14 (10%)	44 (31%)	5 (3%)	3 (2%)	0 (0%)

Percentages may not equal 100% due to rounding error.

Instrumentation

The English Language Arts and Reading, History, Life Science, Mathematics, and Social Studies subject tests of the Texas Examinations of Educator Standards were used as a proxy for subject matter knowledge for the sample of individuals seeking initial teacher certification in the Secondary Online Post-Baccalaureate Teacher Certification Program at the University of North Texas. The Texas Examinations of Educator Standards scores and student data and student data routinely collected for admission to the Teacher Education program were used to determine the relationship between knowledge of initial certification students and (1) number of upper-level content area courses completed, (2) upper-level grade point average, and (3) how much time has elapsed between the completion of the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards.

Academic transcripts were used to determine the level and number of upper-level content area courses, the upper-level hours and credits earned, the name of the university, the title of the course, and the year and month the last upper-level content area course was completed. Academic transcript information is routinely collected by the program administrator at the University of North Texas Secondary Online Post-Baccalaureate Teacher Certification Program for purposes of program evaluation.

Data Collection Procedure

The independent or predictor variables included (1) number of upper-level content area courses completed, (2) upper-level content area grade point average, and (3) how much time has elapsed between the completion of the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards.

Grade point average has been used by researchers to predict scores on the professional development test of the Examination for the Certification of Educators in Texas (Chambers et al., 1999; White et al., 1994; Zeng, 2002; Simonsson et al., 2000; Poelzer et al., 2000; Jones et al., 2002; Wilmore et al., 2002).

The course number, the title of the course, the number of credits earned and the number of grade points earned were collected from the students' academic transcripts submitted for admission to the Secondary Online Post-Baccalaureate Teacher Certification Program. This data is routinely collected for admission to the certification program. Variables used in this study are summarized in Tables 7 and 8.

In addition, the year and month of the last upper-level content area course completed in the certification field up to the year and month of the students' first attempt on the content area portion of the Texas Examinations of Educator Standards was recorded. In other words, coursework completed in the subject field after the participant had taken the content portion of the Texas Examinations of Educator Standards was not recorded for analysis nor was coursework recorded for analysis that was taken during the same semester as the Texas Examinations of Educator Standards test administration. For example, if a student completed upper-level content area coursework in December, 2004, and took the state exam in February, 2005, then the years and months recorded was zero years and two months.

Data Analysis Procedures

The statistical package SPSS ® version 13 was used for all statistical analyses. Descriptive data, logistic regression, and linear statistical analyses were used to draw conclusions about the content area knowledge of the individuals in the sample and the significance of the predictors examined. One-way analysis of variance and Tukey *HSD* "honest statistical difference" analyses were used to determine statistical difference between the groups on the descriptive measures. Because of the high passing rate of the sample participants, the linear regression analysis may lend more insight into the predictor variables under study. However, the logistical regression analysis was used for program administrators and policymakers who are interested in program pass/fail rates.

The dependent variable was treated in two ways. First, the individual's scaled score was used for analysis in the multiple linear regression analyses. Second, the scaled score was converted into a dichotomous pass/fail variable and used for the logistic regression analyses. If the scaled score was equal or greater than the state standardized passing score of 240, the score was converted to a passing score. This was coded as 1. If the scaled score was less than 240, the score was converted to a failing score. This was coded as 0.

Academic Transcript Analysis

The Texas Examinations of Educator Standards frameworks were used as a guide in determining which courses were recorded for data analysis (See Appendix A, B, C, D, and E). Courses were reviewed by two experts. If no agreement could be made as to whether or not the course should be recorded, a third expert reviewed the academic transcript. These frameworks can be accessed at http://www.sbec.state.tx.us/SBECOnline/standtest/testfram.asp. Courses that related to the content area certification field were recorded. Table 9 presents information on courses that were analyzed based on the competencies of the framework for each content test in the study. The number of credits and grade points collected for data analysis followed the grading policies set forth by the University of North Texas. Advanced placement courses and credit by examination were not recorded because they are not at the junior level or above. The grade of F or WF was not recorded when replaced by a later grade. A grade of F or WF was recorded if the course was not retaken. A grade of W was not recorded, nor was a Q drop, which means that a student dropped a course after the official drop date. Individuals with a grade of Incomplete was not included in the analysis.

Data Analysis Procedures for Research Question 1

This question was answered with a display of descriptive data showing the mean, median, and range of upper-level content area college credit hours (at or above the junior level) in candidates' certification field, the upper-level content area grade point average of candidates' content area field, and the time elapsed between the last upper-level content area course completed in the certification field and the time the student took the Texas Examinations of Educator Standards. A one-way analysis of variance and Tukey *HSD* post-hoc tests were used to determine statistically significant differences among the groups on the independent variables.

Data Analysis Procedures for Research Questions 2, 3, and 4

The research questions pertaining to number of upper-level content area courses completed, the upper-level content area grade point average, and how much time has elapsed between the completion of the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards were examined using logistic regression and multiple linear regression. A discussion of the rationale for using logistic regression followed by a discussion of the rational for using linear multiple regression data analysis procedures are presented.

Wright (1995) cites five conditions which must be met for a logistic regression model to be valid. First, the variable of interest must be dichotomous. This study met this assumption as the dependent variable is measured as either passing the Texas Examinations of Educator Standards or not passing the Texas Examinations of Educator Standards. Secondly, a single case can only be represented once. To meet this assumption, the data associated with the subject's first test administration was used in the statistical analysis. In Texas, all teachers eventually must pass their certification area Texas Examinations of Educator Standards; therefore, this study seeks to explore the predictor variables associated with passing the Texas Examinations of Educator Standards on the first attempt. Third, the model must adhere to the specificity assumption which requires that the model contains all relevant predictors and no irrelevant predictors. The predictors in this study have been used by other researchers (Chambers et al., 1999; White et al., 1994; Zeng, 2002; Simonsson et al., 2000; Poelzer et al., 2000; Jones et al., 2002; Wilmore et al., 2002) and are commonly used for admission purposes for teacher certification programs. Fourth, the categories of the variables must be “mutually exclusive” and “collectively exhaustive” (Wright, 1995). The data used in this study were both mutually exclusive and collectively exhaustive. Students had one measure for (1) passing and not passing, (2) upper-level content area grade point average, (3) number of upper-level content area courses, and (4) time elapsed between the last upper-level content area course completed and the first attempt on the Texas Examinations of Educator Standards. Fifth, Wright (1995) cites that ten cases per predictor variable are appropriate for logistic regression analysis because “standard errors for maximum likelihood coefficients are large-sample estimates” (p. 221).

Although the sample represents the largest sample sizes available in the Secondary Online Post-Baccalaureate Teacher Certification Program, the sample sizes and the proportion of individuals passing their respective content area certification test were problematic in the logistical regression portion of the study. Because logistic regression relies on maximum likelihood estimation (MLE), only the History, Life Science, and Mathematics test groups were eligible for logistic regression analysis because of the size and composition of the English Language Arts and Reading and Social Studies test group. All of the participants in the English Language Arts and Reading group passed the test on the first attempt. The Social Studies test group was too small for logistical regression analysis and only two individuals in the Social Studies test group failed the Texas Examinations of Educator Standards on the first attempt. Maximum likelihood estimation means that reliability estimates decline when there are few cases for each observed combination of independent variables. Wright (1995) recommends a minimum of ten observations per variable for the logistic regression model. However, because of the low sample size and low number of failing cases for the History, Life Science, and Mathematics groups are the only groups in the study eligible for the logistic regression analysis; therefore, the results of that analysis should be viewed tentatively.

The correlation coefficient (B), degrees of freedom, significance, odds ratio, and percentage of correct classifications are reported. The odds ratio (exp^b) shows how likely it is that an observation is a member of the target group, students who passed the Texas Examinations of Educator Standards, rather than a member of the other group, students who did not pass the Texas Examinations of Educator Standards. Finally, the model classification, or hit rate, reported how many subjects were accurately classified by the model.

In addition, a linear regression analysis was performed using the subject's scaled score on the Texas Examinations of Educator Standards as the dependent variable. The regression (B) coefficients and the correlation coefficients (R), (R^2), and adjusted (R^2) are presented. Effect sizes of each predictor are discussed.

Multiple linear regression, a statistical analysis that reveals the relationship between several independent or predictor variables and a dependent or criterion variable, was used in this study. Prior to running the analysis, histograms and scatterplots were used to ensure that the assumptions of multiple regression had been met. These assumptions include: (1) The relationship between the variables is linear, (2) The predicted minus the observed variables are normally distributed, and (3) that heteroskedasticity does not exist, meaning that the standard deviations of the conditional distributions are equal (Hinkle, 2003, p. 143). The sample was adequate in each of the certification fields for the linear regression portion of the study.

Table 7

Dependent Variables Used In This Study

Variable		Measurement and Coding Procedures	Type of Variable
Dependent	Pass/Fail Status on Texas Examinations of Educator Standards in content area of English Language Arts and Reading, History, Life Science, Mathematics, and Social Studies	Passing scores were coded as 1 and failing scores were coded as 0.	Dichotomous
Dependent	Scaled score on Texas Examinations of Educator Standards in content area of English Language Arts and Reading, History, Life Science, Mathematics, and Social Studies	Scaled scores were used.	Continuous

Table 8

Independent Variables Used In This Study

Variable		Measurement and Coding Procedures	Type of Variable
Independent	Upper-level grade point average	Grade point average was calculated by dividing the summation of all grade points of courses taken at the junior level or above by the summation of the number of credits earned. A spread sheet program was used to calculate grade point average	Continuous
Independent	Upper-level content area coursework hours	Coursework hours were the summation of all credit hours earned in the content field at or above the junior level including master's and doctoral credit hours earned.	Continuous
Independent	Time elapsed between last upper-level content area course and first attempt on Texas Examinations of Educator Standards	The time elapsed between the last upper-level content area course completed in the certification field and the student's first attempt on the Texas Examinations of Educator Standards content examination. The unit of analysis included years and months. Courses were not considered for analysis if they were taken in the same or subsequent semester of the student's first Texas Examination of Educator Standards test administration.	Continuous

Table 9

Coursework Applicable to Texas Examinations of Educator Standards Certification Field Test

Content Area Test	Department of Coursework Recorded for Analysis
English Language Arts and Reading	English, Linguistics, Reading
History	History
Life Science	Biochemistry, Biology, Pharmacology, Zoology
Mathematics	Mathematics, Statistics
Social Studies	Economics, Geography, Government, History, Political Science, Psychology Sociology,

Assumptions

This study is based on several assumptions. One assumption relates to the identification of significant indicators of teacher quality. Other assumptions relate to the ability of a standardized test to measure teacher content knowledge.

First, one assumption is that there are indicators of teacher knowledge and that they can be quantified by some measure. In this study it is an assumption that the number of upper-level content area courses, the upper-level content area grade point average, and the age of upper-level content coursework are indicators of teacher knowledge.

Second, another assumption is that a paper-pencil test can measure teacher content knowledge. In this study the Texas Examinations of Educator Standards is purported to measure teacher content knowledge related to the Texas Essential Knowledge and Skills.

Finally, another assumption of teacher testing is that a certain level of teacher content knowledge is related to student achievement. In Texas, the Texas Examinations of Educator Standards score should be related to students' Texas Acquisition of Knowledge and Skills scores.

Limitations

This study was limited in several ways. First, the study was limited by the sample size in some of the groups. As stated earlier, Wright (1995) recommends a minimum of ten observations per variable for the logistic regression model.

Second, this study was limited by the high passing rate of the sample participants on their respective Texas Examinations of Educator Standards content tests. Ideally, in a sample a researcher would want an equal number of passing cases and failing cases to meet the conditions of logistic regression.

Third, this study may have been limited by the admissions requirements necessary to enter the Secondary Online Post-Baccalaureate Teacher Certification Program, the program from which the sample was drawn. These program admissions standards require students to demonstrate their ability to perform in a rigorous, scholastic environment; therefore, the requirements of the program may have limited this study’s ability to explore teacher content knowledge among a diverse group of participants with varying degrees of academic success. The requirements for the program include:

(1) A 2.8 overall grade point average, a 3.0 grade point average on the last sixty hours of the undergraduate degree, or a 3.4 grade point average on a completed Master’s degree.

(2) Students must demonstrate minimum content area competency according to university program guidelines which require twenty-four hours of coursework (twelve upper-level) in a Texas certification field. Depending on the initial certification a student is seeking, each individual in the sample had a

minimum of twenty-four hours in the areas of Biology, Economics, English, Geography, Government, History, Political Science, Mathematics, Psychology, Sociology, or a closely related field such as Linguistics, Reading, Biochemistry, Pharmacology, or Statistics .

(3) Students must pass all parts of the Texas Academic Skills Program or Texas Higher Education Assessment. The minimum score requirements for these assessments are 240 reading, 230 mathematics, and 220 writing. These tests purport to measure a student's basic competency in reading, writing, and mathematics.

(4) Students seeking a Master's degree in addition to initial teacher certification, are required to submit acceptable Graduate Record Examination scores, which may be used in lieu of Texas Academic Skills Program or Texas Higher Education Assessment scores. Minimum Graduate Record Examination scores for the program are 391 verbal and 436 quantitative.

Fourth, this study may be limited by the online nature of the program of which the participants were drawn. Results might not be generalizable to programs that have face-to-face instruction or a hybrid program of online instruction and face-to-face instruction.

Fifth, the sample used for this study was comprised of nearly 78% White and 61% female participants. This study does not examine the effects of gender, ethnicity, age, or occupational background of students participating in online teacher certification programs; therefore, caution should be taken in applying the findings of this study to programs which have different demographics.

Sixth, the sample size for the Social Studies test group (N=14) and the Life Science test group (N=18) is small; therefore, these results may not be generalizable to other online teacher certification programs.

Seventh, this study analyzes only one program in Texas and the results may not be generalizable to other online teacher certification programs.

Eighth, the Texas Examination of Educator Standards is a state certification test used in Texas and findings may not be generalizable to other programs using teacher certification assessments such as Praxis ®.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The purpose of this study was to investigate predictor variables for passing scores on the Texas Examinations of Educator Standards in the content areas of grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies. Predictor variables included number of upper-level content area courses, upper-level content area grade point average, and the time the last upper-level content area course was completed in the certification field. These effects were examined using the following four research questions:

1. What is the nature of the content area knowledge of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program seeking teacher certification at the University of North Texas?
    a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher Certification Program students earned in their certification field?
    b. What is the upper-level content area grade point average of Secondary Online Post-Baccalaureate Teacher Certification Program students?
    c. How much time has elapsed between the completion of the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards?

d. What are the Texas Examinations of Educator Standards scores for individuals in the sample?

2. To what extent does upper-level content area coursework predict a passing score on the Texas Examinations of Educator Standards?
3. To what extent does upper-level content area grade point average predict a passing score on the Texas Examinations of Educator Standards?
4. To what extent does the time elapsed between the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards predict a passing score on the Texas Examinations of Educator Standards?

The statistical package SPSS ® version 13 was used for all statistical analyses. The first question was tested using descriptive statistics including mean, range, and standard deviation. A one-way analysis of variance was used to determine if groups were statistically significantly different and the Tukey *HSD* “honest significant difference” post-hoc test was used to determine group differences based on the variables tested. Research questions 2, 3, and 4 were analyzed using a linear regression. The dependent variable was the scaled scores on the subject’s Texas Examinations of Educator Standards content area test and the independent variables were number of upper-level content area courses completed, upper-level content area grade point average, and time elapsed of the last upper-level content area course completed in the certification field and the student’s first attempt on the Texas Examinations of Educator Standards. Each of these variables was treated as a continuous variable.

Research questions 2, 3, and 4 were also tested using logistic regression where pass/fail status on an individual's content area test was used as the dependent variable and number of upper-level content area courses, upper-level content area grade point average, and the time elapsed between the last upper-level content area course in the certification field and the first attempt on the Texas Examinations of Educator Standards were used as the three independent variables in the model. The dependent variable was dichotomous and the three independent variables were continuous.

Research Question One

Research Question 1a

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher certification students earned in their certification field?

Academic transcript analysis.

The research question was examined by evaluating each participant's academic transcripts from all of the colleges and universities that he or she attended. The course number, title of the course, number of credit hours, and grade points were recorded for each upper-level content area course related to the domains of knowledge tested in the participant's particular Texas Examinations of Educator Standards certification area test. For example, the Texas Examinations of Educator Standards Social Studies test measures a student's competency in the following six areas: History, Government, Economics, Psychology, Sociology, and Geography. Courses matching each of these domains of knowledge were noted and entered into the analysis. Table 9 shows the courses that were matched to the domains of knowledge on the test for each test group in the study. Courses at the 3000 and above level were analyzed using SPSS ® statistical software.

When courses were transferred from other universities, additional Internet research was used to determine the level of coursework for universities that do not use the 3000, 4000, 5000, 6000 course-level system. For example, the University of Texas at Austin uses a system where the first digit of the course number denotes the credit value of the course and the last two digits denote the rank of the course (i.e. 01 through 19 is lower division; 20 through 70 is upper division, and 80 through 99 is graduate level).

Descriptive data for upper-level content coursework.

Table 10 presents descriptive data for the number of upper-level content courses for the entire sample and for the variable, number of upper-level content area courses for each content area in the study (i.e., grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, grades 8-12 Social Studies).

Total sample numbers range from fourteen individuals seeking certification in Social Studies to fifty individuals seeking certification in English Language Arts and Reading (Table 10). The minimum number of upper-level content courses taken was two courses and the maximum number of upper-level content courses taken was twenty five. Social Studies individuals represented the least deviation in terms of number of upper-level content area courses completed (*SD* = 2.341) while the most deviation was represented for the certification field of Life Science (*SD* = 4.913). Individuals pursuing Life Science certification had the highest median (11.000) and the highest mean (11.833) for number of upper-level content area courses completed followed by the English Language Arts and Reading test group which had a median of 9.0 and a mean of 9.960 for number of upper-level content coursework completed.

Table 10

Number of Upper-Level Content Area Courses in the Certification Field by Texas Examinations of Educator Standards Test Subject for the English Language Arts And Reading, History, Life Science, Mathematics, and Social Studies Test Groups

	N	Minimum	Maximum	Median	Mean	Standard Deviation
English Language Arts and Reading	50	4.0	25.0	9	9.960	2.851
History	36	2.0	16.0	7	6.778	3.080
Life Science	18	6.0	24.0	11	11.833	4.913
Mathematics	26	2.0	13.0	6	6.423	2.859
Social Studies	14	4.0	13.0	7	7.643	2.341
All Groups	144	2.0	25.0	8	8.321	4.090

Figure 1 shows the number of upper-level content area courses taken by individuals seeking a certification in grades 8-12 English Language Arts and Reading, which is a broad certification field including the sub fields of English and Reading. The sample consisted of 50 individuals.

- Thirty of the fifty individuals (60%) completed nine or more upper-level content courses in the certification field of English Language Arts and Reading;
- Seven of the fifty individuals (14%) completed five or less upper-level courses in the certification field of English Language Arts and Reading;
- Seven of the fifty individuals (14%) completed fifteen or more upper-level courses in the certification field of English Language Arts and Reading;
- One person of the fifty individuals (2%) completed twenty-five upper-level courses in the certification field of English Language Arts and Reading;
- Twenty-nine certification candidates (58%) completed between five and ten upper-level courses in the certification field of English Language Arts and Reading, which represents the most characteristic number of upper-level courses taken by total group;
- The median number of upper-level courses for the English Language Arts and Reading test group is 9;
- Three individuals (6%) in the English Language Arts and Reading group completed two courses in Reading before taking the state content test;

- Forty-seven individuals (94%) in this test group initially did not have any upper-level content coursework in Reading before taking the state content test.

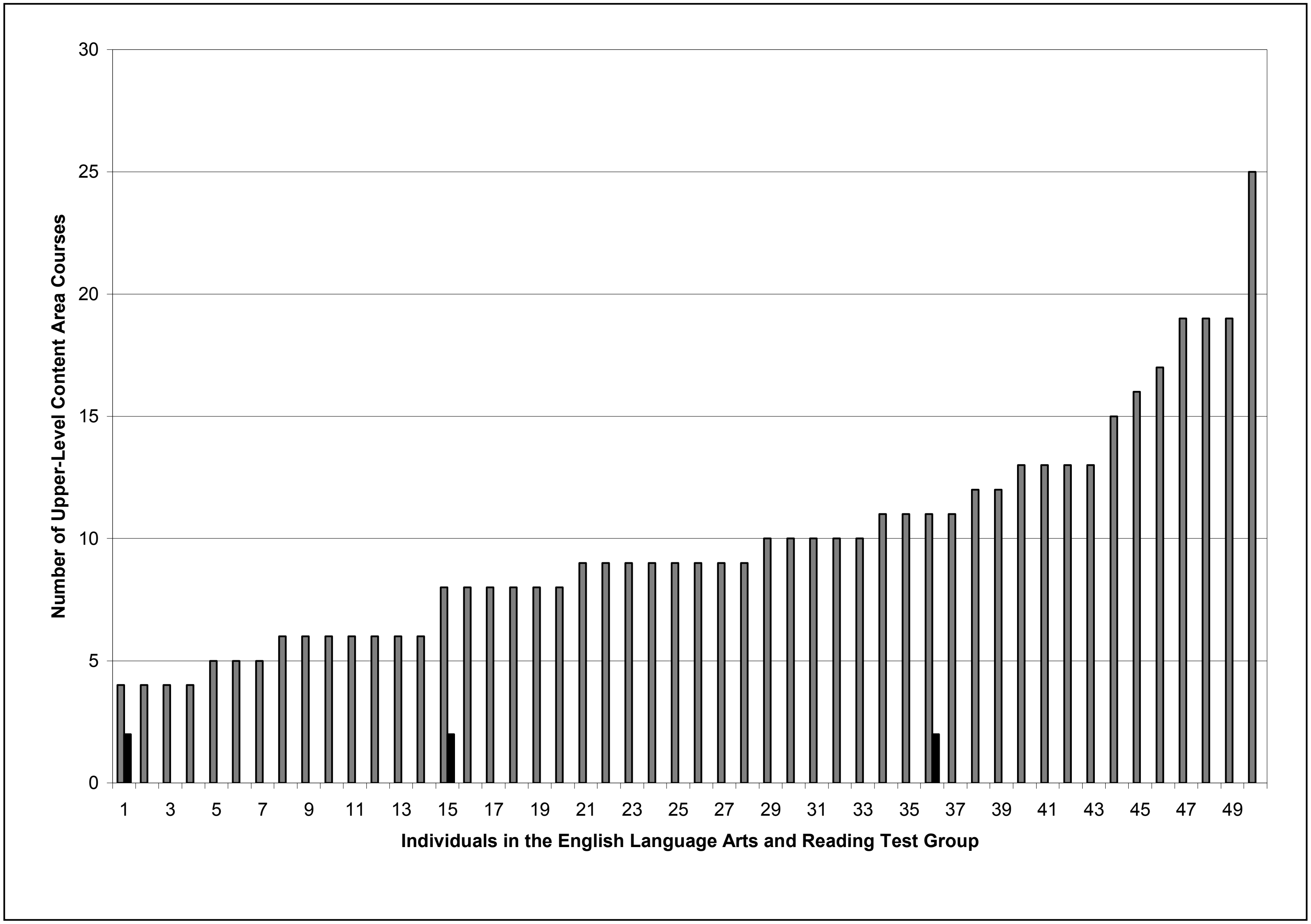

Figure 1. Number of upper-level content area courses in English Language Arts and Reading certification field by sub areas (N=50).

Figure 2 shows the number of upper-level content area courses taken by individuals seeking a certification in grades 8-12 History. The sample consisted of 36 individuals.

- Nineteen of the thirty-six individuals (53%) completed seven or more upper-level content area courses in History;
- Fourteen of the thirty-six individuals (39%) completed six to eight upper-level content area courses in History;
- Fourteen of the thirty-six individuals (39%) completed four to six upper-level content area courses in History;
- Ten of the thirty-six individuals (27.7%) completed four or less upper-level content area courses in History;
- One individual (2.7%) in the sample completed one upper-level content area courses in History;
- Twenty-two individuals (82%) in the History test group completed five to ten upper-level content area courses in History; and
- The median number of upper-level content area courses for the History test group was seven courses.

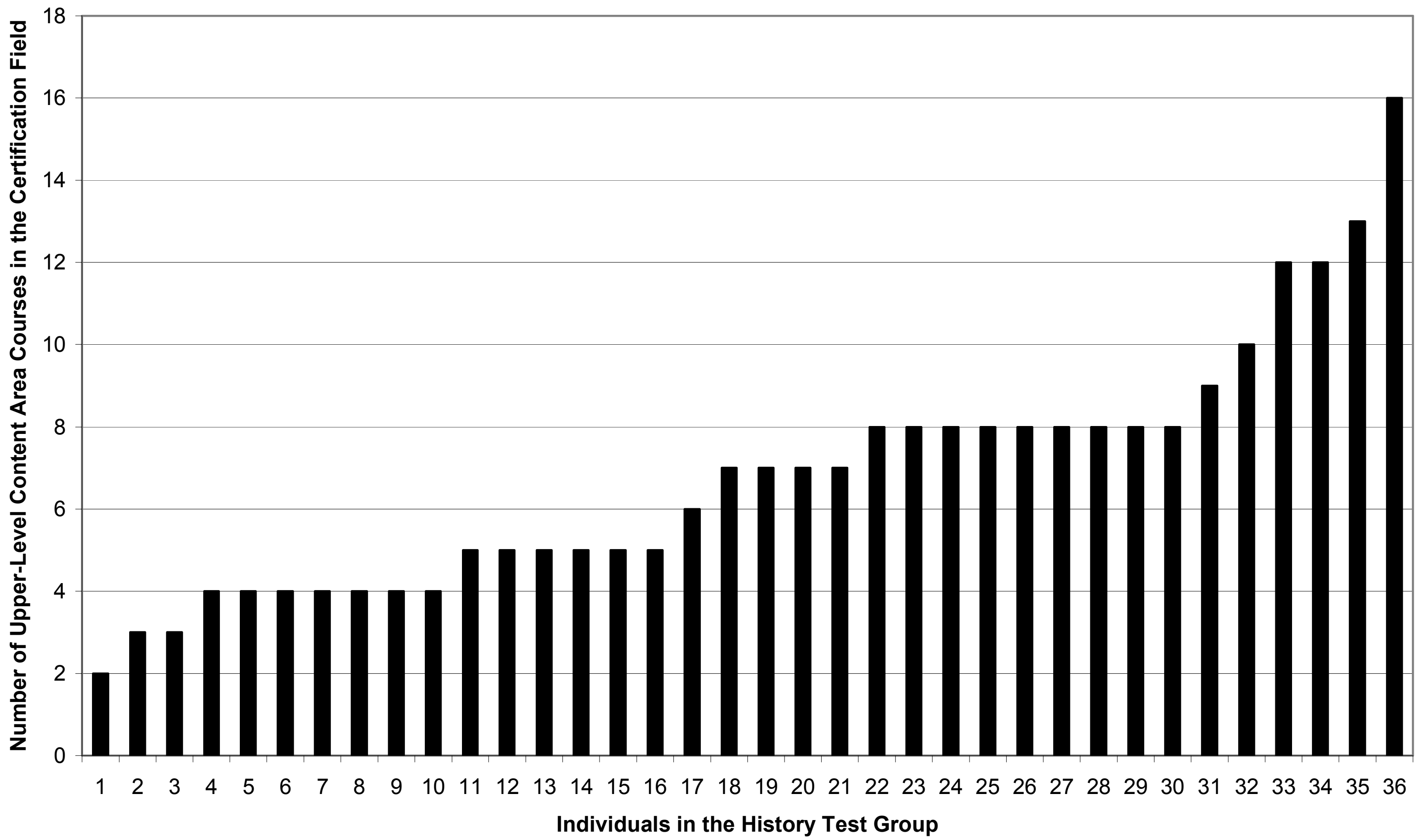

Figure 2 Number of upper-level content area courses in the certification field for the History test group (N=36)

Figure 3 shows the number of upper-level content courses taken by individuals seeking a certification in grades 8-12 Life Science. The sample consisted of 18 individuals.

- Eight of the eighteen individuals (44.4%) completed less than ten upper-level content area courses in the certification field of Life Science;
- Seven of the eighteen individuals (38.8%) completed between ten and fifteen upper-level content area courses in Life Science;
- Three out of eighteen individuals (16.6%) completed more than fifteen upper-level content area courses in Life Science;
- The most upper-level content area courses completed in the Life Science test group was twenty-four; and
- The median number of upper-level content area courses for the Life Science test group was eleven upper-level content area courses.

Figure 4 shows the number of upper-level content area courses taken by individuals seeking a certification in grades 8-12 Mathematics. The sample consisted of 26 individuals.

- Twelve of the twenty-six individuals (46.1%) completed five or fewer upper-level content area courses in Mathematics;
- Sixteen of the twenty-six individuals (61.5%) completed between five and ten upper-level content area courses in Mathematics;
- Two of the twenty-six individuals (7.6%) completed more than ten upper-level content area courses in Mathematics; and

- The most upper-level content area courses completed in Mathematics by an individual in the Mathematics test group was thirteen.

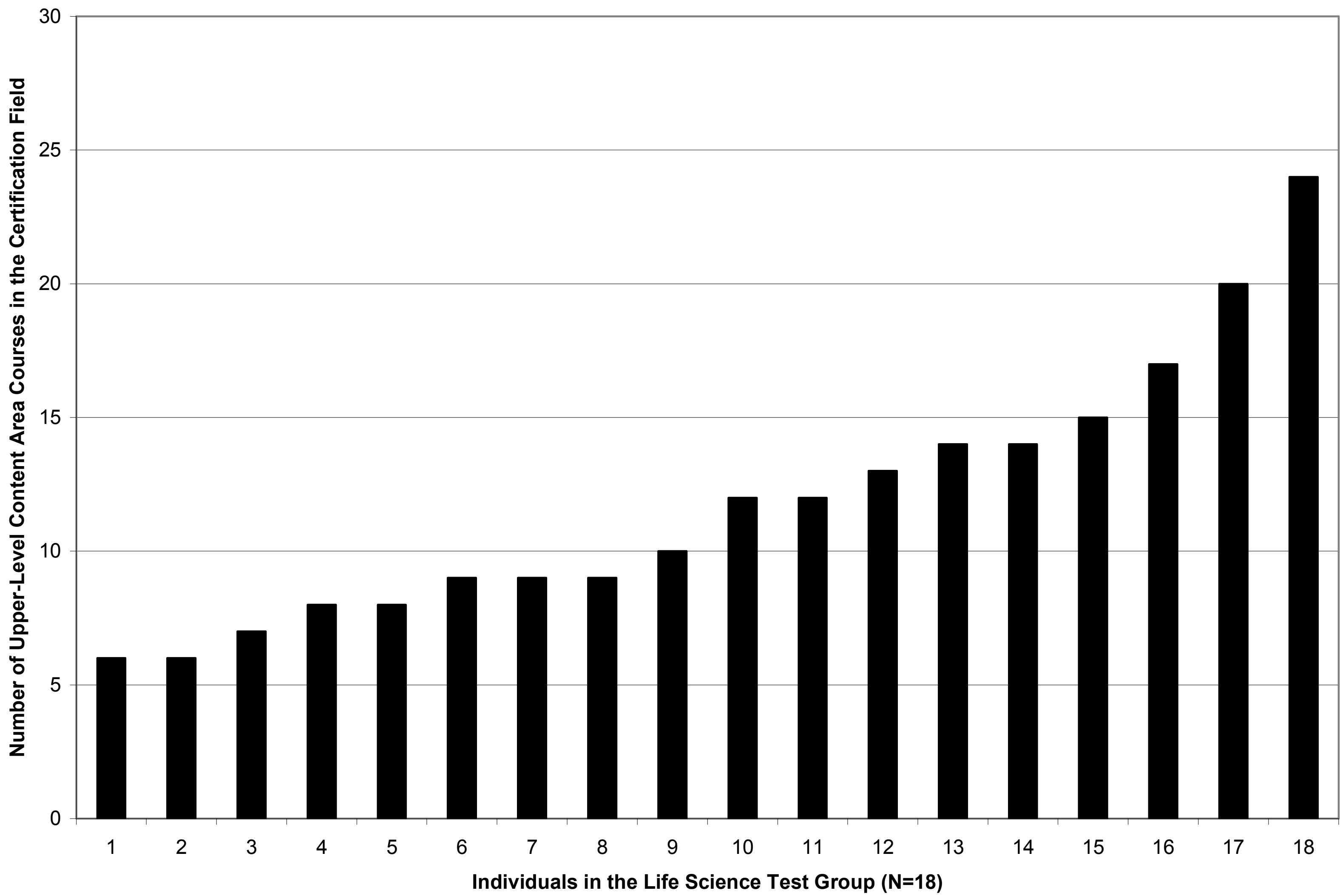

Figure 3. Number of upper-level content area courses in the certification field for the Life Science test group (N=18).

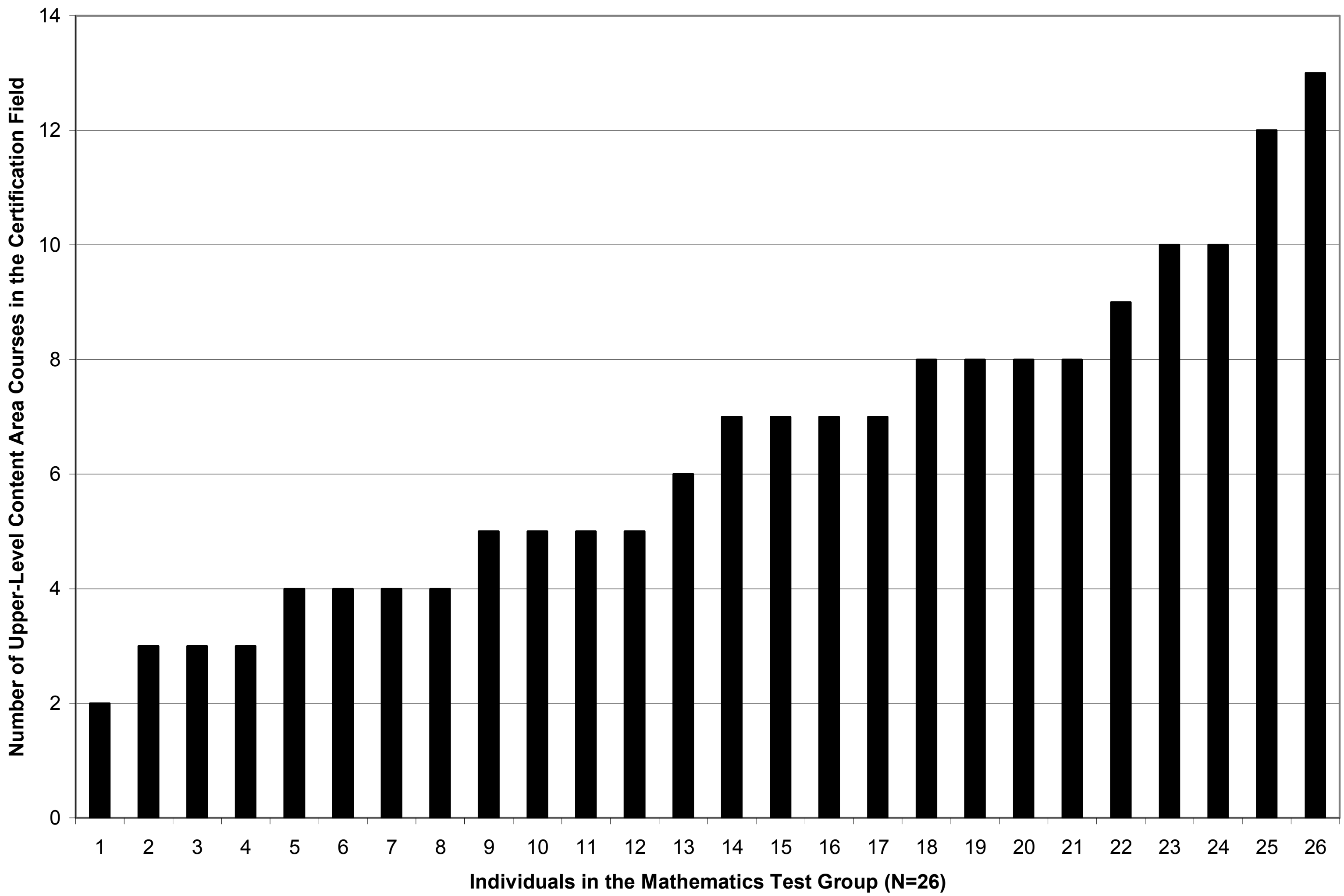

Figure 4. Number of upper-level content area courses in the certification field for the Mathematics test group (N=26).

Figure 5 shows the number of upper-level content area courses taken by individuals seeking a certification in grades 8-12 Social Studies, which is a broad certification field including the following six sub fields: History, Economics, Geography, Government, Psychology, and Sociology. The sample consisted of 14 individuals.

- Two of the fourteen individuals (14.2%) in the Social Studies group completed four upper-level content area courses in the certification field of Social Studies;
- Eleven of the fourteen individuals (78.5%) in the Social Studies group completed five to ten upper-level content area courses in the certification field of Social Studies;
- One of the fourteen individuals (7.1%) in the Social Studies group completed thirteen upper-level content area courses in the certification field of Social Studies
- The median and the mode for number of upper-level content area courses for the Social Studies test group was seven.

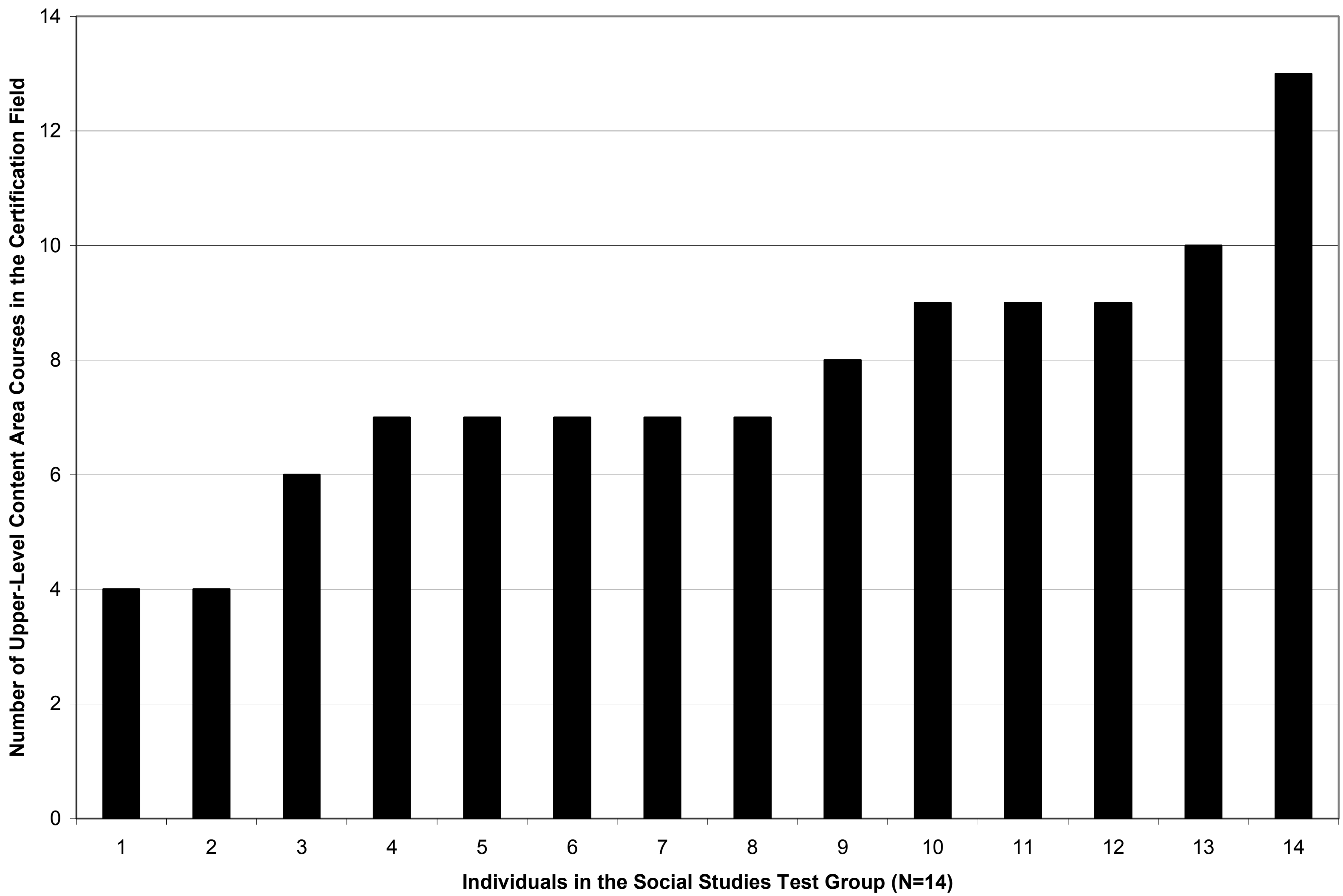

Figure 5. Number of upper-level content area courses in the certification field for the Social Studies test group (N=14).

Figure 6 shows a breakdown of the domains included in the Social Studies certification field. This upper-level content area coursework represents the areas of History, Economics, Geography, Government, Psychology, and Sociology. These individuals will be certified to teach grades 8-12 History, Economics, Geography, Government, Psychology, and Sociology. The sample consisted of fourteen individuals.

- None of the fourteen sample participants earned upper-level content area coursework that represents each of these curricular areas.
- Three participants (21.4%) had not completed upper-level coursework in History;
- Five participants (35.7%) did not have upper-level coursework in Government;
- Five participants (35.7%) did not have upper-level coursework in Sociology;
- Eleven participants (78.5%) did not have upper-level coursework in Geography;
- Twelve participants (85.7%) did not have upper-level coursework in Economics; and
- Eleven participants (78.5%) did not have upper-level coursework in Psychology.

An examination of these results to determine the number of upper-level coursework represented by domain revealed the following (N=14):

- One participant (7.1%) had upper-level coursework representing one of the six domains;

- Seven participants (50%) had upper-level coursework representing two of the six domains;
- Two participants (14.2%)had upper-level coursework representing three of the six domains;
- Three participants (21.4%) had upper-level coursework representing four of the six domains;
- One participant (7.1%) had upper-level coursework representing five of the six domains; and
- None of the participants had coursework representing all six of the domains that are represented on the Social Studies Texas Examinations of Educator Standards.

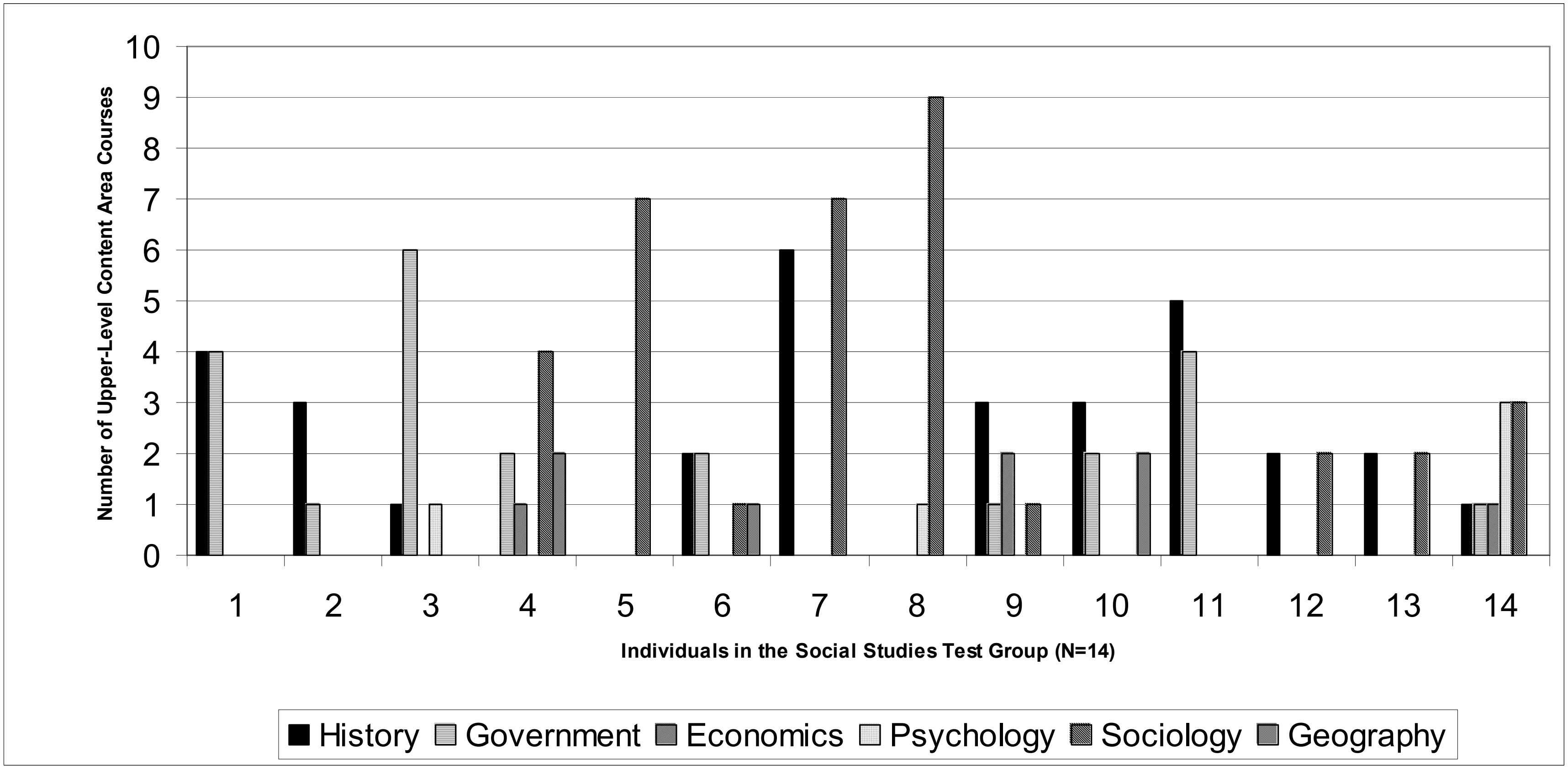

Figure 6. Number of upper-level content area courses in the Social Studies certification field by sub areas (N=14).

One-way analysis of variance.

The results of a one-way analysis of variance presented in Table 11 show that there is a statistically significant difference $F(4, 139) = 9.334$; $p < .001$ between the groups for the independent variable, number of upper-level content area courses.

Table 11

One-Way Analysis Of Variance for the Variable, Number of Upper-Level Content Courses

Courses	Sum of Squares	Df	Mean Square	F	*Sig.*
Between Groups	535.624	4	133.906	9.334	<.001
Within Groups	1994.203	139	14.347		
Total	2743.976	143			

Tukey-*HSD* “honest significant difference” post-hoc tests were used to locate the differences between the groups on the variable, number of upper-level content area courses. Significant mean differences were found for the certification areas of grades 8-12 Life Science and grades 8-12 English Language Arts and Reading when compared to other certification fields in the sample (Tables 12 and 13). A discussion of the results for the grades 8-12 Life Science test group follows.

Results show the average number of upper-level content area courses of the grades 8-12 Life Science test group is statistically significantly higher ($p < .001$) than the grades 8-12 History, grades 8-12 Mathematics, and grades 8-12 Social Studies test groups (Table 12). The mean for the grades 8-12 Life Science test group was 11.833 while the means for grades 8-12 History (6.778), grades 8-12 Mathematics (6.423), and grades 8-12 Social Studies (7.643) are statistically significantly different from the grades 8-12 Life Science test group. Mean differences ranged from 6.423 to 7.642.

Table 12

Results Of Tukey HSD For The Variable, Number of Upper-Level Content Area Courses Showing Groups that are Statistically Significantly Different from One Another

Test Group	Mean	Test Group	Mean	Mean Difference	Standard Error	*Sig.*
Life Science	11.833	History	6.778	5.055	1.063	<.001
Life Science	11.833	Mathematics	6.423	5.410	1.129	<.001
Life Science	11.833	Social Studies	7.642	4.190	1.312	.021

A second area where statistically significant differences were found for the variable, number of upper-level content area courses taken was in the grades 8-12 English Language Arts and Reading test group. The average number of upper-level content area courses of the grades 8-12 English Language Arts and Reading test group was statistically significantly higher compared to the grades 8-12 History and grades 8-12 Mathematics test groups. Table 13 presents the results of the Tukey-*HSD* "honest significant difference" analysis. The mean score for the grades 8-12 English Language Arts and Reading test group was 9.960 and the mean score for the grades 8-12 History test group was 6.778, which is a mean difference of 3.182. The mean score for the grades 8-12 English Language Arts and Reading test group (9.960) compared to the mean score for grades 8-12 Mathematics test group(6.423) showed a mean difference of 3.536.

Table 13

Results of Tukey HSD for the Variable Number of Courses Showing Groups that are Statistically Significantly Different from One Another

Test Group	Mean	Test Group	Mean	Mean Difference	Standard Error	*Sig.*
English Language Arts and Reading	9.960	History	6.778	3.182	.805	.002
English Language Arts and Reading	9.960	Mathematics	6.423	3.536	.890	.001

Research Question 1b

What is the nature of the content area knowledge of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program seeking teacher certification at the University of North Texas?

> b. What is the upper-level content area grade point average of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program?

Academic transcript analysis.

The research question was examined by evaluating each participant's academic transcripts from all of the colleges and universities that he or she attended. The course number, title of the course, number of credit hours, and grade points were recorded for each course that matched the domains tested in the participant's particular Texas Examinations of Educator Standards content area test. Domains are shown in Table 10.

A spreadsheet was used to calculate the individual's upper-level content area grade point average in the test content area. Grade point average was determined by dividing the summation of all grade points of courses taken at the junior level or above by the summation of the number of credits earned. Additional Internet research was used to determine the appropriate number of grade points and credit hours for universities that do not use the traditional 4.0 scale.

Descriptive data for grade point average.

Table 14 presents descriptive data for the variable, upper-level content area grade point average by test group in each certification field included in the study (i.e., grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies).

Table 14

Upper-Level Content Area Grade Point Average in Certification Field for English Language Arts And Reading, History, Life Science, Mathematics, and Social Studies Test Groups

Test Group	*N*	*Minimum*	*Maximum*	*Median*	*Mean*	*Standard Deviation*
English Language Arts and Reading	50	2.710	4.000	3.525	3.535	.333
History	36	2.130	4.000	3.400	3.332	.457
Life Science	18	2.400	4.000	3.190	3.173	.439
Mathematics	26	1.700	4.000	3.185	3.053	.647
Social Studies	14	2.860	4.000	3.405	3.403	.328
All groups	144	1.700	4.000	3.400	3.359	.476

As shown in Table 14, total sample numbers range from fourteen individuals seeking certification in grades 8-12 Social Studies to fifty individuals seeking certification in grades 8-12 English Language Arts and Reading. The minimum grade point average in the upper-level content area was 1.7 and the maximum upper-level content area grade point average was 4.0. The mean of all groups together in the sample for the variable, upper-level content area grade point average was 3.359 with a standard deviation of 0.476. Grades 8-12 Social Studies individuals represented the least deviation in terms of upper-level content area grade point average (*SD* = 0.328) while the most deviation was represented by the certification field of grades 8-12 History (*SD* = 0.457). Individuals pursuing the grades 8-12 English Language Arts and Reading certification had the highest median upper-level content area grade point average (3.525) and the highest mean upper-level content area grade point average (3.535), followed by the grades 8-12 Social Studies test group, which had a median of 3.405 and a mean of 3.403. Individuals pursuing the grades 8-12 Mathematics certification had the lowest median upper-level content area grade point average (3.185) and the lowest mean upper-level content area grade point average (3.053).

Figures 7, 8, 9, 10, and 11 present descriptive data on each individual's grade point average in upper-level content courses for each Texas Examinations of Educator Standards test group in the sample (i.e., grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies).

Figure 7 shows the upper-level content area grade point average obtained for the grades 8-12 English Language Arts and Reading test group on their upper-level content area coursework. The sample includes fifty individuals. An analysis of the data for Figure 7 shows:

- The upper-level grade point average for grades 8-12 English Language Arts and Reading students ranged from 2.710 to 4.0;
- Six individuals out of fifty individuals (12%) in the grades 8-12 English Language Arts and Reading test group earned a 4.0 grade point average on their upper-level content coursework;
- Twenty-eight individuals (56%) had a grade point average of 3.5 or higher for grades 8-12 English Language Arts and Reading upper-level content area coursework;
- The upper-level grades 8-12 English Language Arts and Reading content area grade point average for forty-seven individuals (94%) was 3.0 or higher;
- Three students (6%) had a grade point average for upper-level grades 8-12 English Language Arts and Reading coursework that fell between 2.5 and 3.0; and
- The median upper-level content area grade point average for the grades 8-12 English Language Arts and Reading test group was 3.525

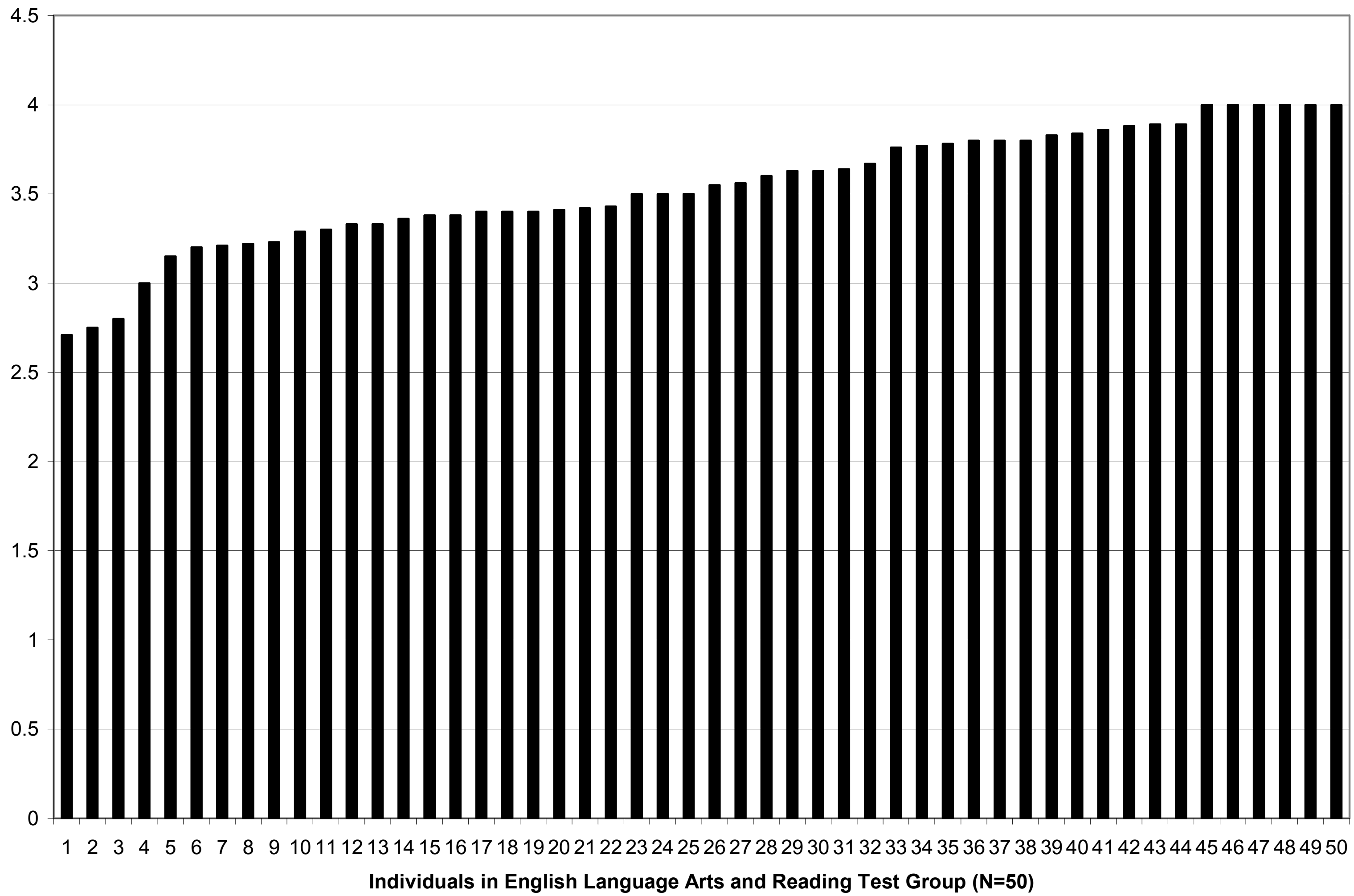

Figure 7. Grade point average of upper-level content area coursework in the certification field for the English Language Arts and Reading test group (N=50).

The upper-level content area grade point average for grades 8-12 History certification students is shown in Figure 8. The sample included thirty-six students. As shown in Figure 8:

- The grade point averages for upper-level content area coursework for the grades 8-12 History test group ranges from 2.130 to 4.000;
- The median grade point average for upper-level content area coursework for the grades 8-12 History test group was 3.400;
- Sixteen of the thirty-six students (44.4%) in the grades 8-12 History test group have an upper-level History grade point average of 3.5 or higher;
- Twenty-eight out of thirty-six students (77.7%) have an upper-level History grade point average of 3.0 or higher; and
- Two students' upper-level History grade point average (8.3%) was 2.5 or lower.

The upper-level content area grade point average for individuals pursuing a Life Science certification is shown in Figure 9. The sample includes eighteen individuals. As shown in Figure 9:

- The upper-level content area grade point averages ranged from 2.400 to 4.000 for the grades 8-12 Life Science test group;
- The upper-level Life Science grade point average for one student was 4.000;
- Seven of the eighteen students (38.8%) showed a grade point average of 3.5 or higher for upper-level Life Science coursework
- Eleven of eighteen students (61.1%) showed a grade point average of 3.0 or higher for upper-level Life Science coursework;

- Seven students out of eighteen (38.8%) have an upper-level content area grade point average between 2.5 and 3.0; and
- One student's (5.5%) upper-level grade point average in Life Science was below 2.5.

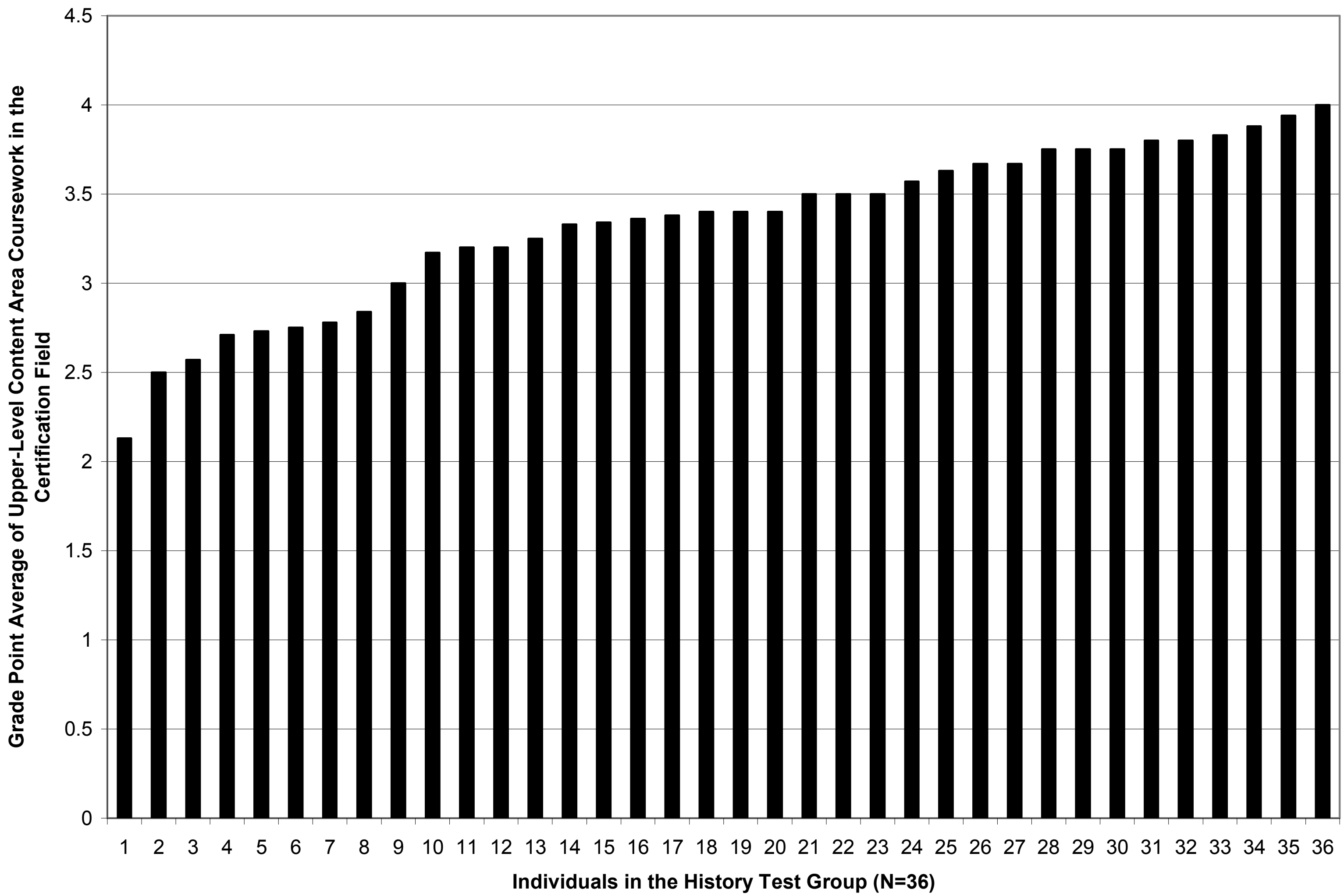

Figure 8. Grade point average of upper-level content area coursework in the certification field for the History test group (N=36).

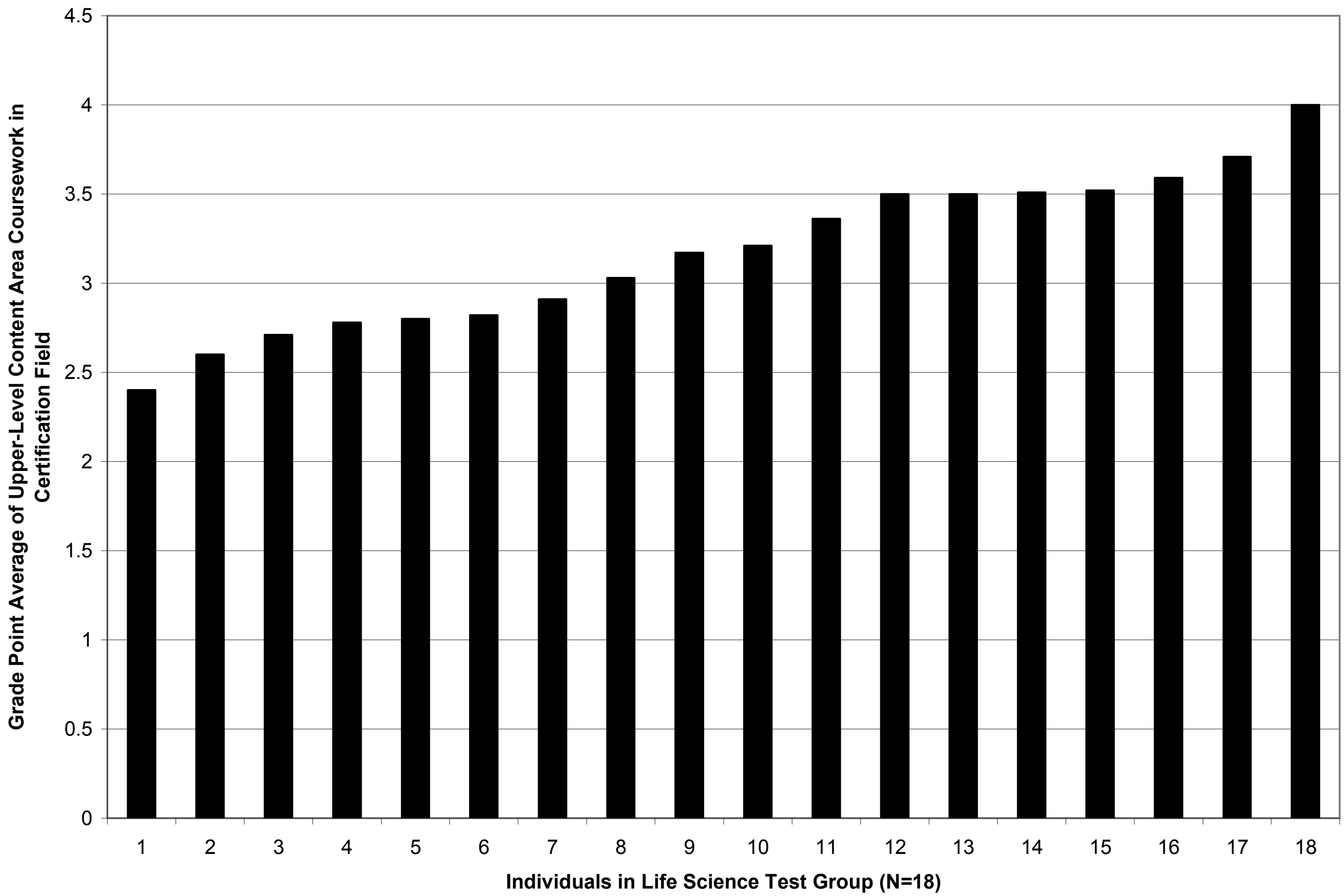

Figure 9. Grade point average of upper-level content area coursework in the certification field for the Life Science test group (N=18).

The upper-level content area grade point average for grades 8-12 Mathematics certification students is shown in Figure 10. The sample includes twenty-six individuals. As shown in Figure 10:

- The upper-level content area grade point average for the grades 8-12 Mathematics test group ranges from 1.700 to 4.000;
- The median upper-level content area grade point average for the grades 8-12 Mathematics test group was 3.185;
- Three out of twenty-six individuals (11.5%) in the grades 8-12 Mathematics test group had an upper-level content area grade point average of 4.000;
- Six of twenty-six students (23%) have a grade point average of 3.5 or higher for upper-level content area Mathematics coursework;
- Fifteen of twenty-six students (57.6%) have grade point average of 3.0 or higher for upper-level content area Mathematics coursework;
- Six of twenty-six students (23%) have a grade point average of less than 2.5 for upper-level content area Mathematics coursework; and
- One student’s (3.8%) upper-level content area Mathematics coursework grade point average was less than 2.0.

The upper-level content area grade point average for Social Studies students is shown in Figure 11. The sample includes fourteen individuals. As shown in Figure 11:

- The upper-level content area grade point average for the grades 8-12 Social Studies certification students ranges from 2.860 to 4.000;
- The median upper-level content area grade point average for the Social Studies test group was 3.405;

- One individual out of fourteen students (7.1%) has an upper-level content area grade point average of 4.0;
- Six out of fourteen students (42.8%) have an upper-level content area grade point average of 3.5 or higher
- Twelve out of fourteen students (85.7%) have an upper-level content area grade point average of 3.0 or higher; and
- Two students have an upper-level content area grade point average less than 3.0.

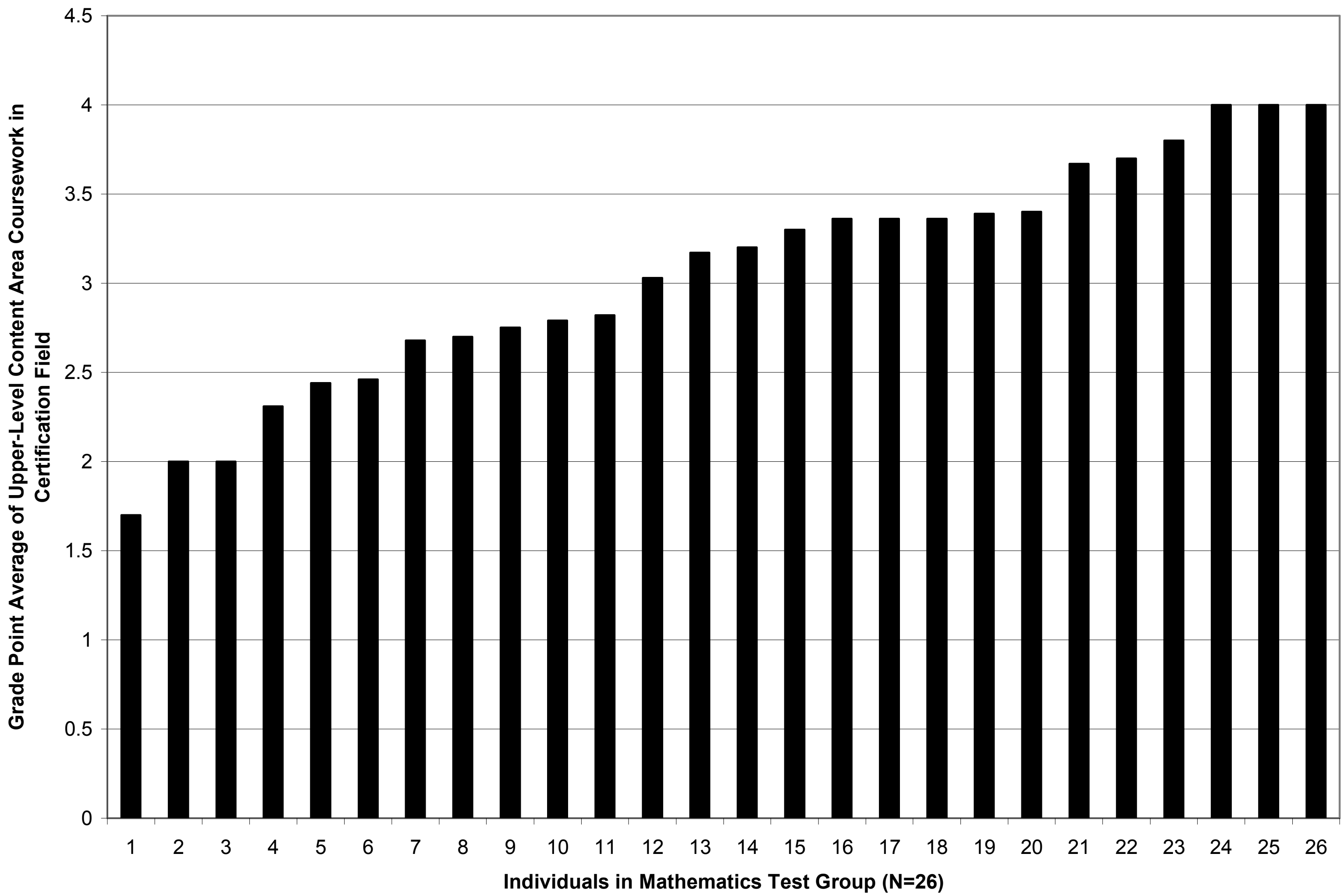

Figure 10. Grade point average of upper-level content area coursework in the certification field for the Mathematics test group (N=26).

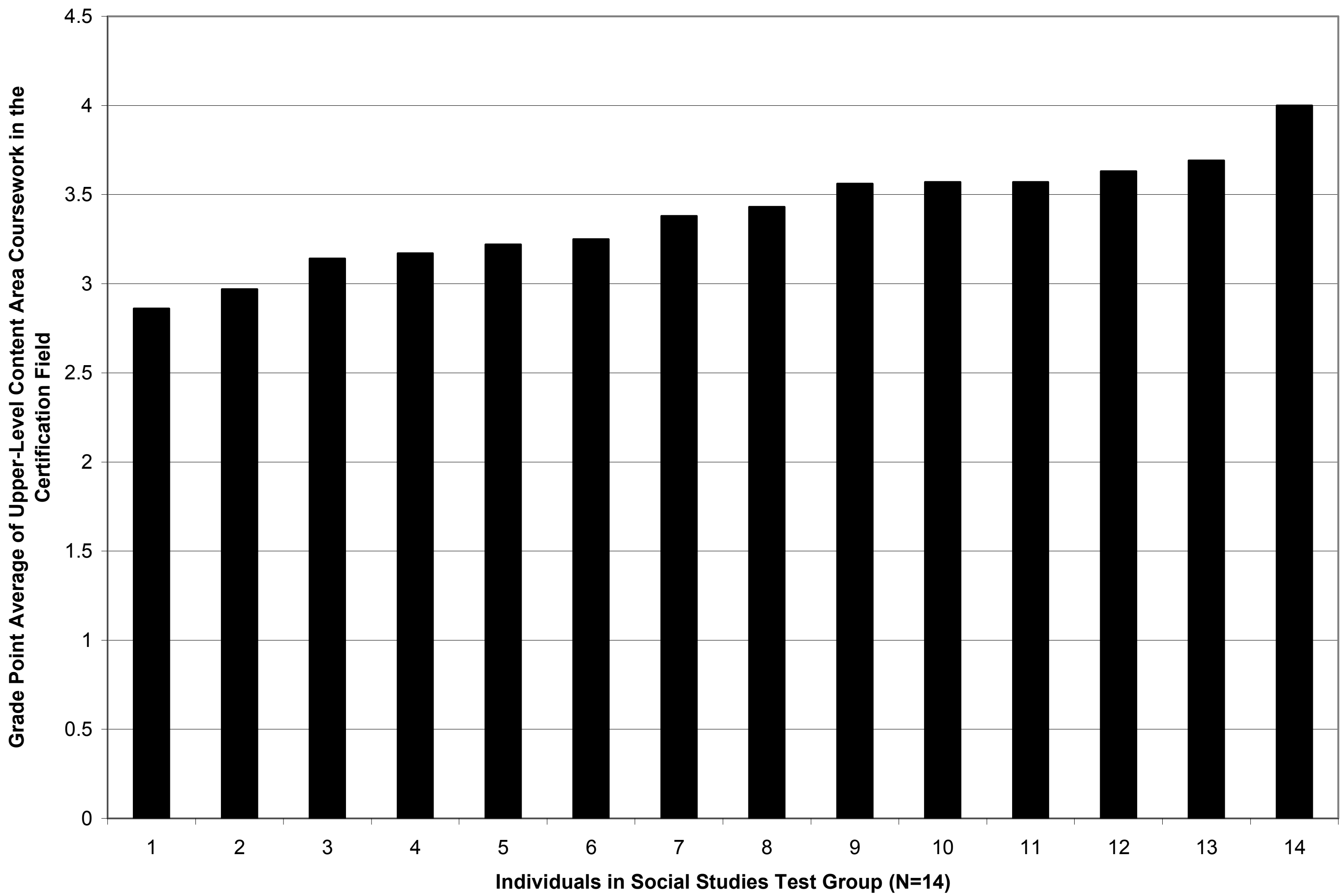

Figure 11. Grade point average of upper-level content area coursework in the certification field for the Social Studies test group (N=14).

One-way analysis of variance.

The results of a one-way analysis of variance presented in Table 15 show that there is a statistically significant difference $F(4, 139) = 5.733$; $p < .001$ between the groups for the independent variable, upper-level content area grade point average. Tukey-*HSD* "honest significant difference" post-hoc tests were used to locate the differences between the groups. The upper-level content area grade point average for the grades 8-12 English Language Arts and Reading test group is statistically significantly higher ($p < .001$) from the upper-level content area grade point average of the grades 8-12 Mathematics test group. In addition, the upper-level content area grade point average of the grades 8-12 English Language Arts and Reading test group was statistically significantly higher ($p = .037$) than the upper-level content area grade point average of the grades 8-12 Life Science test group.

Table 15

One-Way Analysis of Variance for the Variable, Upper-Level Content Area Grade Point Average

Grade point average	*Sum of Squares*	*df*	*Mean Square*	*F*	*sig*
Between Groups	4.606	4	1.152	5.733	<.001
Within Groups	27.919	139	.201		
Total	32.525	143			

Table 16 presents the results of the post-hoc tests for the variable upper-level content area grade point average. Statistically significant mean differences were found for two paired groupings. The upper-level content area grade point average mean for grades 8-12 English Language Arts and Reading test group (3.535) was compared to the upper-level content area grade point average mean for the grades 8-12 Mathematics test group (3.053) and for the grades 8-12 Life Science test group (3.173). The upper-level content area grade point average mean difference between grades 8-12 English Language Arts and Reading and grades 8-12 Mathematics was .482 which was statistically significant ($p < .001$) as was the upper-level content area grade point average mean difference between grades 8-12 English Language Arts and Reading and grades 8-12 Life Science (.363), which was also statistically significant ($p = .037$).

Table 16

Tukey HSD for the Variable, Upper-Level Content Area Grade Point Average

Test Group	Mean	Test Group	Mean	Mean Difference	Standard Error	*Sig.*
English Language Arts and Reading	3.536	Mathematics	3.054	.482	.106	<.001
English Language Arts and Reading	3.536	Life Science	3.173	.363	.121	.037

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Research Question 1c

What is the nature of the content area knowledge of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program seeking teacher certification at the University of North Texas?

c. How much time has elapsed between the completion of the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards?

Academic transcript analysis.

The research question was examined by evaluating each participant's academic transcripts from all of the colleges and universities that he or she attended. The year and month the last upper-level content area course in the certification field was recorded as well as the year and month the student initially attempted the Texas Examinations of Educator Standards. For example, if a student completed upper-level content area coursework in December, 2004 and took the state content exam in February, 2005, then zero years and two months was recorded. This number represents the year and month elapsed between the completion of the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards

Descriptive data for age of upper-level content area coursework.

Table 17 presents descriptive data for the age of the last upper-level content course completed in the certification field, relative to the time students initially attempted the Texas Examinations of Educator Standards. A total of one hundred forty-four students were examined and subdivided into five certification fields: grades 8-12 English

Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies. Sample size according to certification field ranged from fourteen students (Social Studies) to fifty students (English Language Arts and Reading). The time elapsed between the completion of the last upper-level content area course and the date of the initial attempt of the Texas Examinations of Educator Standards for all groups was variable from one month elapsed to 401 months (approximately thirty-three years) elapsed. The mean time elapsed between upper-level content area coursework completion and the initial attempt on the state content examination ranged from 49.722 (~4 years) to 151.808 months (~13 years), the median ranged from 11.500 (~ 1 year) to 170.000 in months (~14 years), the mode ranged from 5.000 (~.5 years) to 20.000 months (~ 2 years). The standard deviation ranged from 60.369 (~5 years) to 128.019 in months (~11 years).

Table 17

Months of Time Elapsed Between the Last Upper-Level Content Area Coursework in the Certification Field and the Initial Attempt on the State Content Examination by Test Group

	N	*Minimum*	*Maximum*	*Median*	*Mean*	*Mode*	*Standard Deviation*
English Language Arts and Reading	50	1	348	22.500	52.300	5	72.505
History	36	1	369	11.500	49.722	5	93.672
Life Science	18	4	348	18.000	56.556	5	96.290
Mathematics	26	2	401	170.000	151.808	20	128.019
Social Studies	14	7	202	34.500	62.929	7	60.369
All Groups	144	1	401	22.000	71.188	5	98.508

Figure 12 shows the number of months elapsed between the completion of the last upper-level course in the content field and the initial attempt on the Texas Examinations of Educator Standards. The sample included 50 individuals. Results indicate:

- The time elapsed between upper-level content area coursework for grades 8-12 English Language Arts and Reading certification students and the initial attempt on the state content examination ranged from one month to 348 months (29 years);

- The median for the time elapsed between upper-level content area coursework for grades 8-12 English Language Arts and Reading certification students and the initial attempt on the state content examination was 22.500 months (~2 years);
- Thirty-seven out of fifty individuals (74%) of grades 8-12 English Language Arts and Reading certification students completed upper-level content area coursework during a five year period preceding the initial state content test attempt;
- Seven out of fifty individuals (14%) in the grades 8-12 English Language Arts and Reading test group completed upper-level content area coursework between a five and ten year interval preceding the initial state content test attempt;
- Three out of the fifty individuals (6%) in the grades 8-12 English Language Arts and Reading test group completed upper-level content area coursework between a ten and fifteen year interval preceding the initial state content test attempt;
- Two students in the sample group (4%) completed upper-level content area coursework between a fifteen and twenty year interval preceding the initial state content test attempt;
- One student in the sample group (2%) completed upper-level content area coursework twenty-nine years prior to the initial attempt on the state content examination.
- Forty-four out of fifty students (88%) in the grades 8-12 English Language Arts and Reading test group completed upper-level content area coursework within the ten last years preceding the initial state content examination attempt.

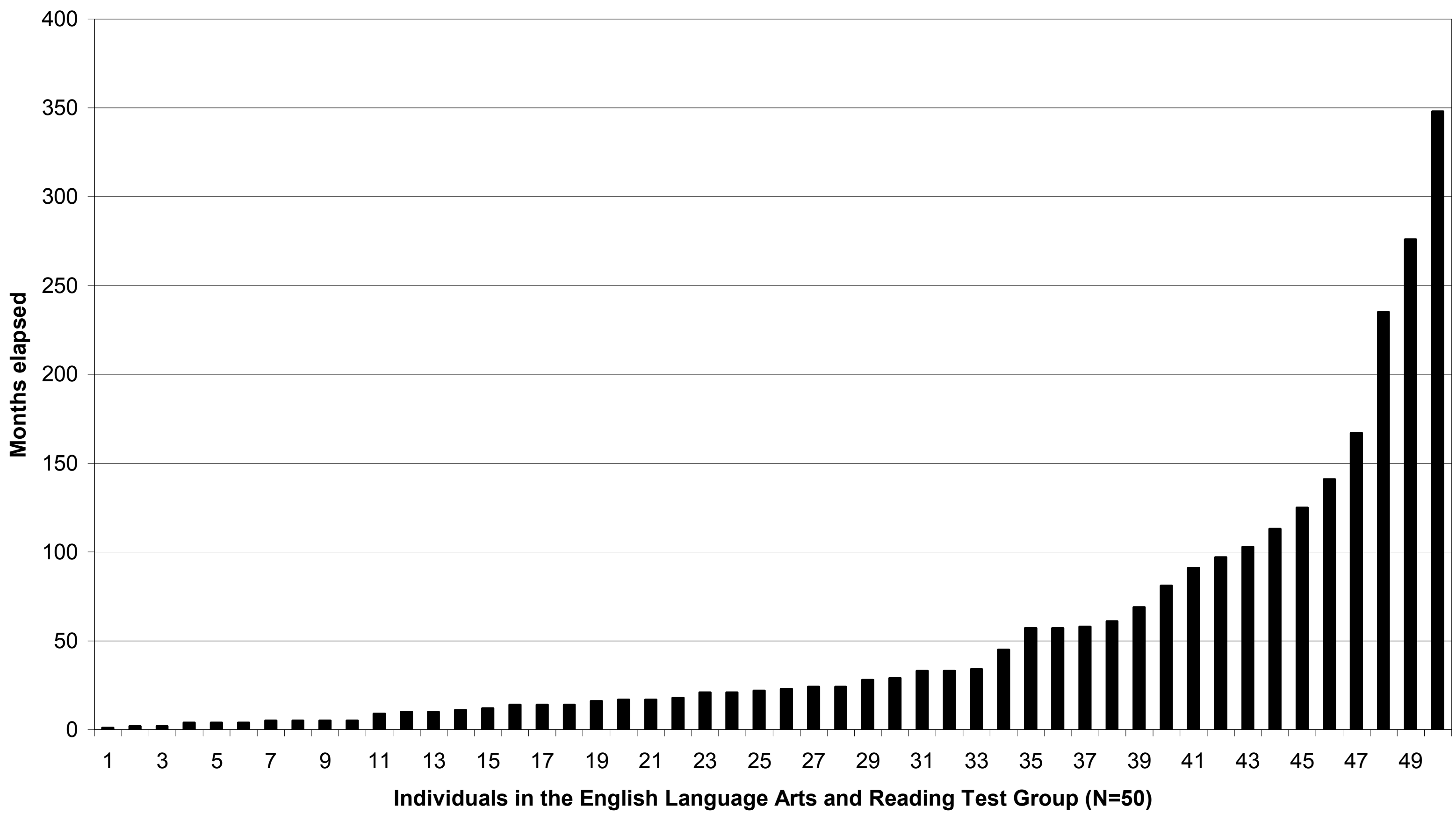

Figure 12. Months of time elapsed between the last upper-level content area coursework in the certification field and the initial attempt on the state content examination for the English Language Arts and Reading test group (n=50).

Figure 13 shows the number of months elapsed between the completion of the last History content course and the initial attempt on the Texas Examinations of Educator Standards. The sample included thirty-six students. Results show:

- The time elapsed between upper-level content area coursework for grades 8-12 History certification students and the initial attempt on the state content examination ranged from one month to 369 months (~30 years);
- The median for the time elapsed between upper-level content area coursework for grades 8-12 History certification students and the initial attempt on the state content examination was 11.500 months (~1 year), the mean was 49.722 months (~ 4 years), the mode was 5 months. The standard deviation was 93.672 months (~8 years);
- Thirty-one out of thirty-six individuals (86%) of grades 8-12 History certification students completed upper-level content area coursework during a five year period preceding the initial state content test attempt;
- One out of thirty-six individuals (3%) in the grades 8-12 History test group completed upper-level content area coursework between a five and ten year interval preceding the initial state content test attempt;
- One out of thirty-six individuals (3%) in the grades 8-12 History test group completed upper-level content area coursework between a ten and fifteen year interval preceding the initial state content test attempt.
- One out of thirty-six individuals (3%) in the grades 8-12 History test group completed upper-level content area coursework between a twenty and twenty-five year interval preceding the initial state content test attempt; and

- Two out of thirty-six individuals (6%) in the grades 8-12 History test group completed upper-level content area coursework about thirty years ago.

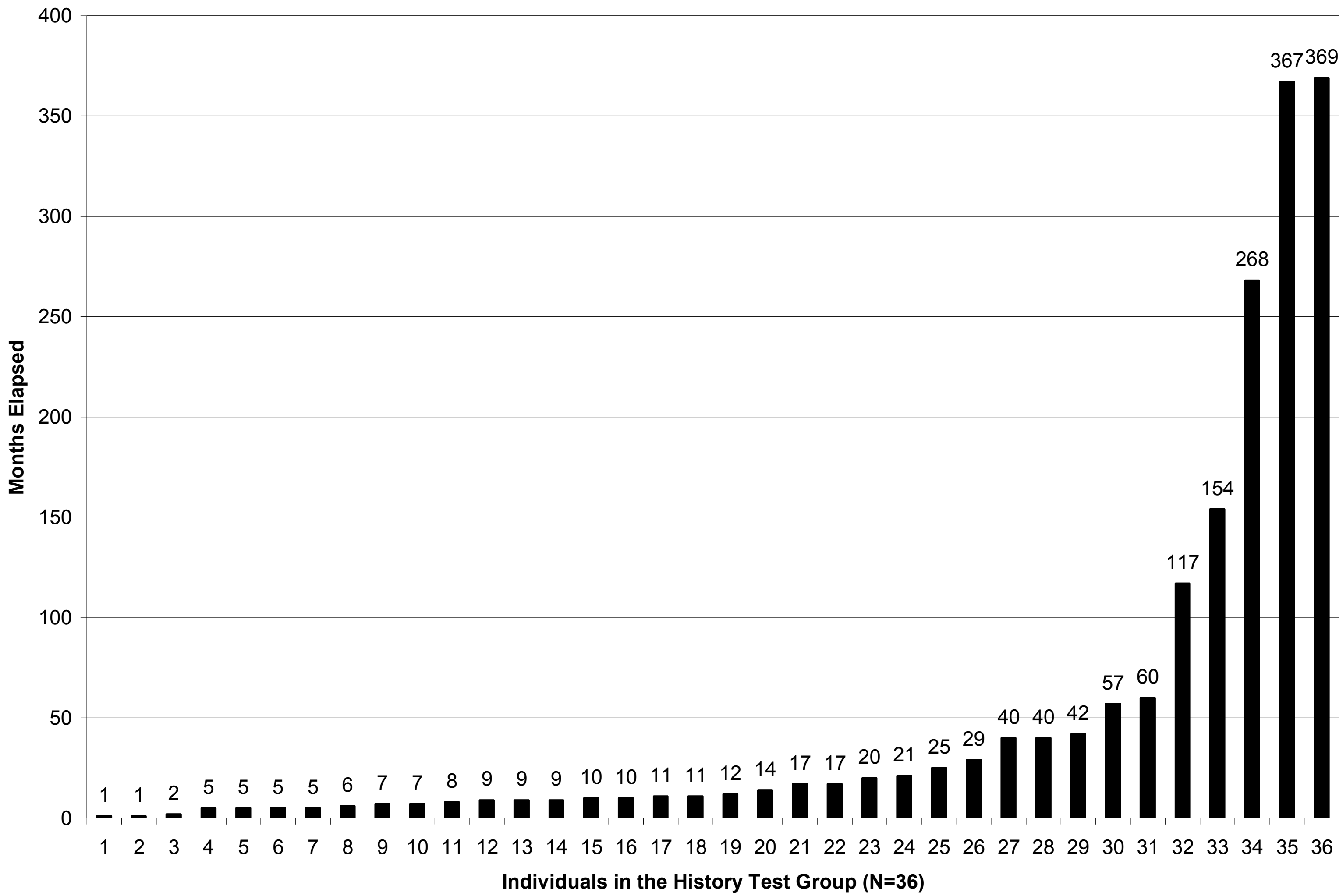

Figure 13. Months of time elapsed between last upper-level content area coursework in the certification field and the initial state content examination for the History test group (n=36).

Figure 14 shows the number of months elapsed between the completion of the last upper-level Life Science content course and the initial attempt on the Texas Examinations of Educator Standards. The sample included eighteen students. Results show:

- The time elapsed between upper-level content area coursework for grades 8-12 Life Science certification students and the initial attempt on the state content examination ranged from four months to 348 months (29 years);
- The median for the time elapsed between upper-level content area coursework for grades 8-12 Life Science certification students and the initial attempt on the state content examination was 18.000 months (1.5 years), the mean was 56.556 months (~ 5 years), the mode was 5 months. The standard deviation was 96.290 months (~8 years);
- Fourteen out of eighteen individuals (78%) of grades 8-12 Life Science certification students completed upper-level content area coursework during a five year period preceding the initial state content test attempt;
- Two out of eighteen individuals (11%) in the grades 8-12 Life Science test group completed upper-level content area coursework between a five and ten year interval preceding the initial state content test attempt;
- One out of eighteen individuals (6%) in the grades 8-12 Life Science test group completed upper-level content area coursework twenty-two years preceding the initial state content test attempt.

- One out of eighteen individuals (6%) in the grades 8-12 Life Science test group completed upper-level content area coursework twenty-nine years preceding the initial state content test attempt.

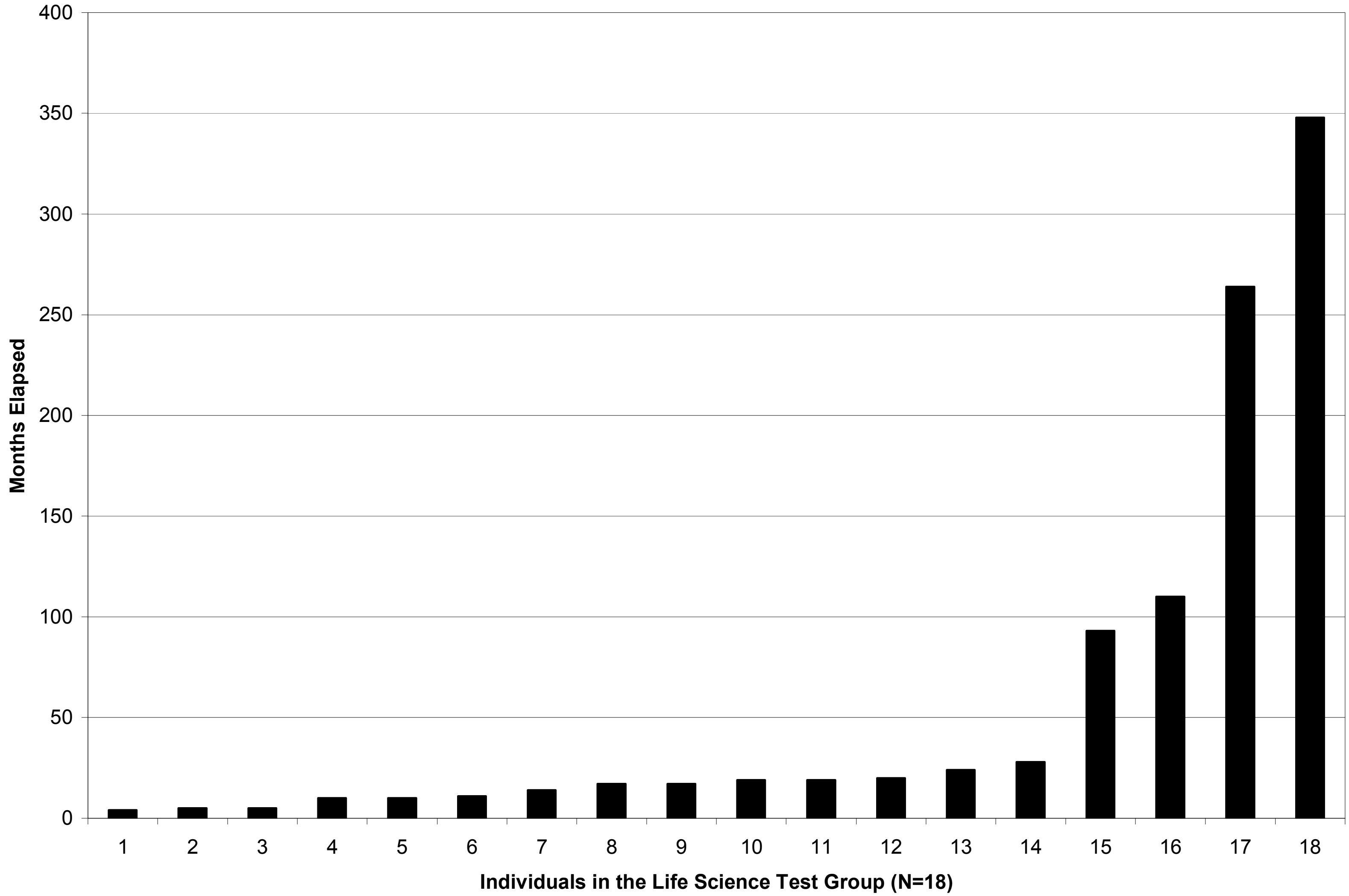

Figure 14. Months of time elapsed between last upper-level content area coursework in the certification field and the initial state content examination for the Life Science test group (n=18).

Figure 15 shows the number of months elapsed between the last upper-level Mathematics content course and the initial attempt on the Texas Examinations of Educator Standards. The sample included twenty-six students. Results show:

- The time elapsed between upper-level content area coursework for grades 8-12 Mathematics certification students and the initial attempt on the state content examination ranged from two months to 401 months (~33 years);
- The median for the time elapsed between upper-level content area coursework for grades 8-12 Mathematics certification students and the initial attempt on the state content examination was 170.000 months (~14 years), the mean was 151.808 months (~ 12 years), the mode was 20 months (~1.5 years). The standard deviation was 128.019 months (~10.5 years);
- Eleven out of twenty-six individuals (42%) of grades 8-12 Mathematics certification students completed upper-level content area coursework during a five year period preceding the initial state content test attempt;
- One out of twenty-six individuals (4%) in the grades 8-12 Mathematics test group completed upper-level content area coursework between a five and ten year interval preceding the initial state content test attempt;
- One out of twenty-six individuals (4%) in the grades 8-12 Mathematics test group completed upper-level content area coursework between a ten and fifteen year interval preceding the initial state content test attempt.
- Five out of twenty-six individuals (19%) in the grades 8-12 Mathematics test group completed upper-level content area coursework between a fifteen and twenty year interval preceding the initial state content test attempt;

- Five out of twenty-six individual in the grades 8-12 Mathematics test group completed upper-level content area coursework between a twenty and twenty-five year interval preceding the initial state content test attempt;
- Two out of twenty-six individuals (8%) in the grades 8-12 Mathematics test group completed upper-level content area coursework between a twenty-five and thirty year interval preceding the initial state content test attempt;
- One out of twenty-six individuals (4%) in the grades 8-12 Mathematics test group completed upper-level content area coursework approximately thirty-three years preceding the initial state content test attempt; and
- Fourteen out of twenty-six individuals (53.8%) in the grades 8-12 Mathematics test group completed upper-level content area coursework more than ten years preceding the initial state content test attempt.

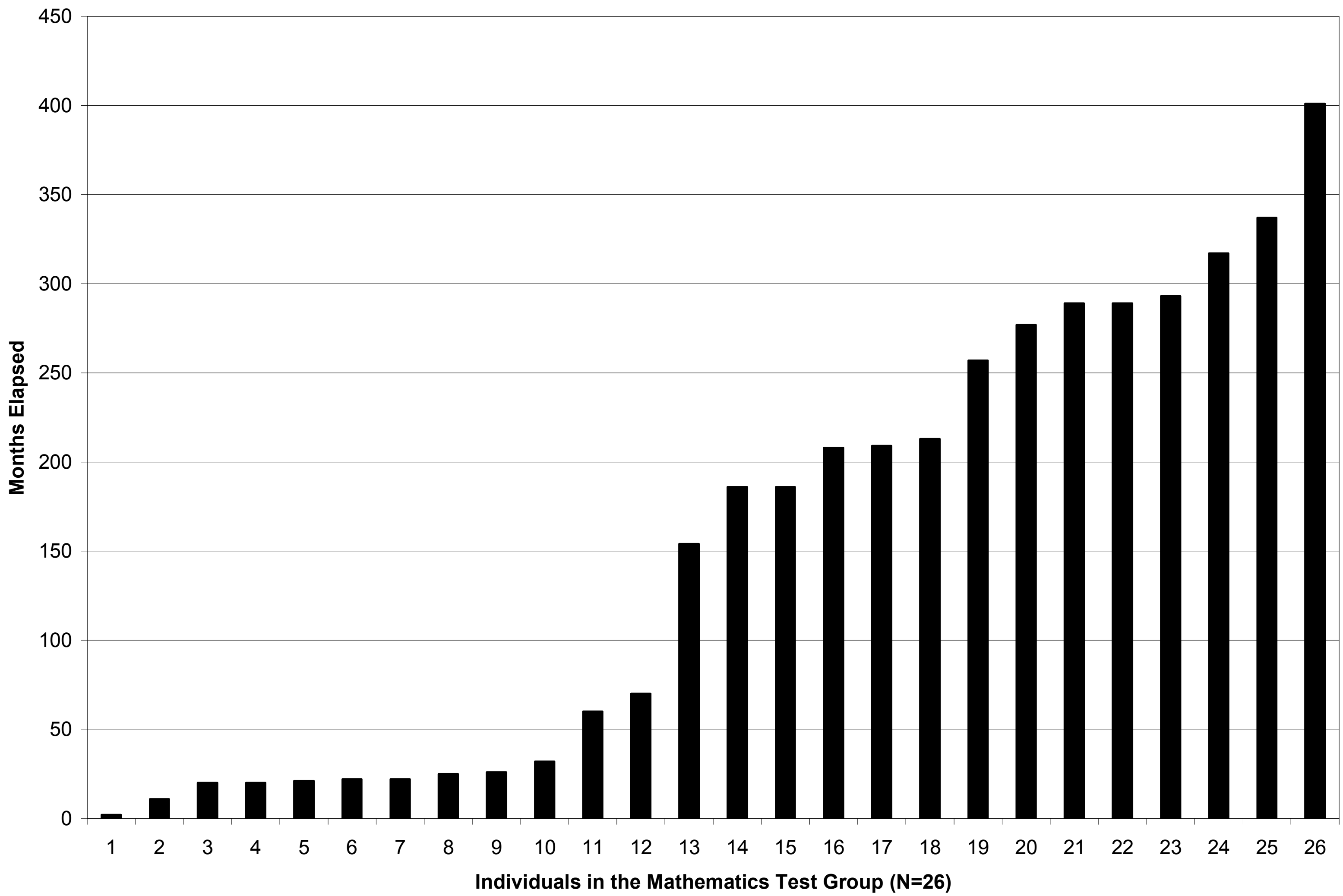

Figure 15. Months of time elapsed between last upper-level content area coursework in the certification field and the initial state content examination for the Mathematics test group (n=26).

Figure 16 shows the number of months elapsed between the completion of the last upper-level Social Studies content course and the initial attempt on the Texas Examinations of Educator Standards. The sample included fourteen individuals. Results show:

- The time elapsed between upper-level content area coursework for grades 8-12 Social Studies certification students and the initial attempt on the state content examination ranged from seven months to 202 months (~17 years);
- The median for the time elapsed between upper-level content area coursework for grades 8-12 Social Studies certification students and the initial attempt on the state content examination was 34.5.000 months (~3 years), the mean was 62.929 months (~5 years), the mode was 7 months. The standard deviation was 60.369 months (~5 years);
- Eight out of fourteen individuals (57%) of grades 8-12 Social Studies certification students completed upper-level content area coursework during a five year period preceding the initial state content test attempt;
- Two out of fourteen individuals (14%) in the grades 8-12 Social Studies test group completed upper-level content area coursework between a five and ten year interval preceding the initial state content test attempt;
- Three out of fourteen individuals (21%) in the grades 8-12 Social Studies test group completed upper-level content area coursework between a ten and fifteen year interval preceding the initial state content test attempt.

- One out of fourteen individuals (7%) in the grades 8-12 Social Studies test group completed upper-level content area coursework approximately sixteen years preceding the initial state content test attempt;
- Four out of fourteen individuals (29%) in the grades 8-12 Social Studies test group completed upper-level content area coursework more than ten years preceding the initial state content test attempt.

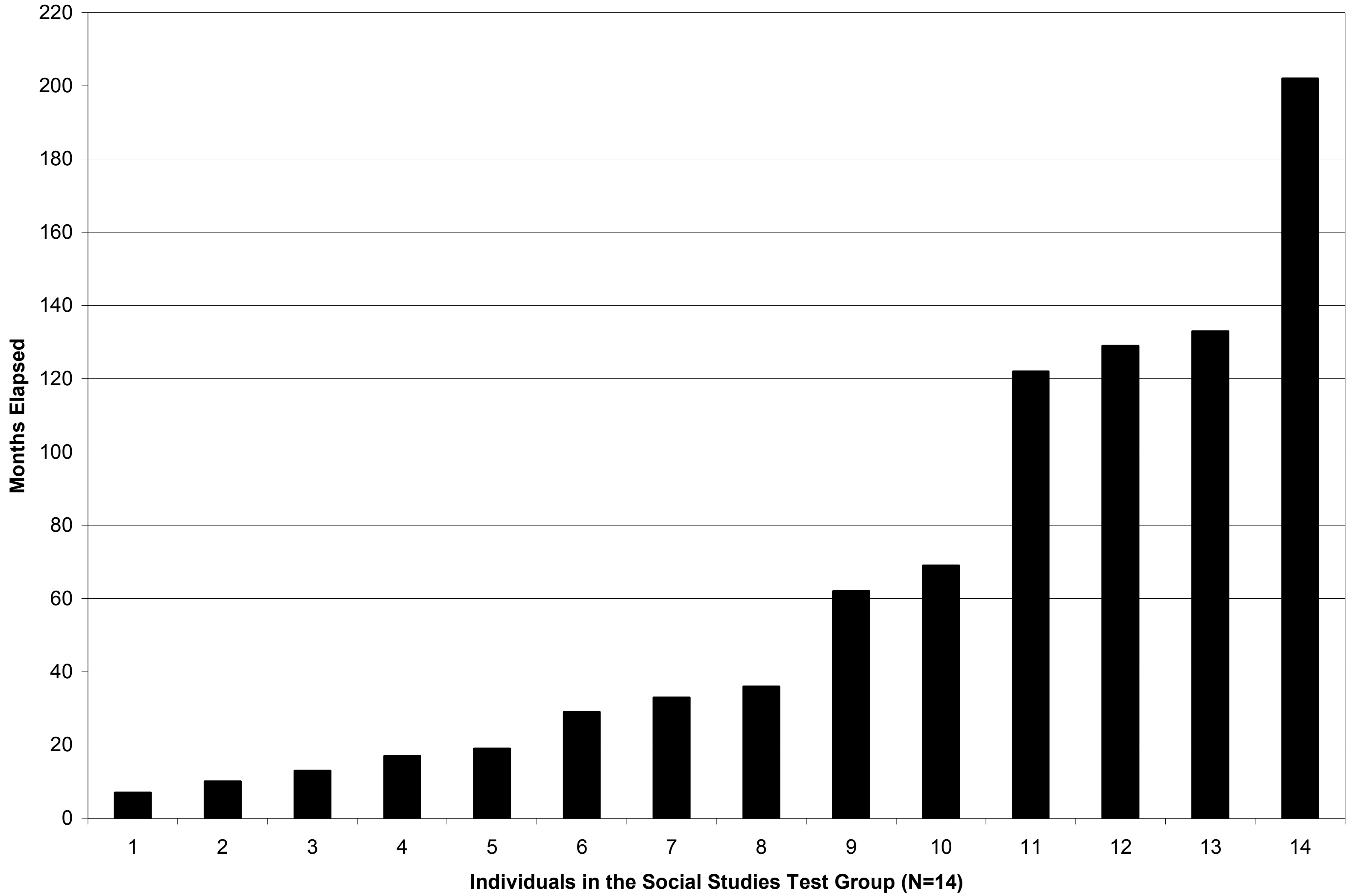

Figure 16. Months of time elapsed between last upper-level content area coursework in the certification field and the initial state content examination for the Social Studies test group (N=14).

One-way analysis of variance.

The results of a one-way analysis of variance are presented in Table 18 for the variable, months of time elapsed between the last upper-level content area coursework completed in the certification field and the initial state content examination. Results show that there is a statistically significant difference $F = (4, 139) = 6.135$; $p < .001$ between the groups for the independent variable, months of time elapsed between the last upper-level content area coursework completed in the certification field and the initial state content examination.

Table 18

One-Way Analysis Of Variance for the Variable Months of Time Elapsed Between Last Upper-Level Content Area Coursework and the Initial State Content Examination

Months of Time Elapsed	Sum of Squares	df	Mean Square	F	*Sig.*
Between Groups	208222.800	4	52055.701	6.135	<.001
Within Groups	1179411.100	139	8484.972		
Total	1387633.900	143			

Tukey-*HSD* “honest significant difference” post-hoc tests were used to locate the differences between the groups (Table 19). The grades 8-12 Mathematics test group was statistically significantly different compared to all groups examined: the grades 8-12 English Language Arts and Reading test group ($p < .001$), the grades 8-12 History test group ($p < .001$), and the grades 8-12 Life Science test group ($p = .008$), and grades 8-12 Social Studies test group ($p = .034$).

The mean for the variable, months of time elapsed between the last upper-level content coursework completed and the initial state content examination for the grades 8-12 Mathematics test group was 151.808. The mean for the variable, months of time elapsed between the last upper-level content coursework completed and the initial state content examination for the grades 8-12 English Language Arts and Reading test group was 52.300, which is a mean difference of 99.508 (~8 years). The mean for the variable, months of time elapsed between the last upper-level content coursework completed and the initial state content examination for the grades 8-12 Life Science certification students was 56.556, which is a mean difference of 95.252 (~8 years) compared to Mathematics students. The mean for the variable, months of time elapsed between the last upper-level content coursework completed and the initial state content examination for the grades 8-12 History certification test group was 49.722, which is a mean difference of 102.086 (~8.5 years) compared to Mathematics students. Finally, the mean for the variable, months of time elapsed between the last upper-level content coursework completed and the initial state content examination for the grades 8-12 Social Studies certification test group was 62.929, which is a mean difference of 88.879 (~7.5 years) compared to Mathematics students.

Table 19

Tukey HSD for the Months of Time Elapsed Between Last Upper-Level Content Coursework in the Certification Field and the Initial State Content Examination

Test Group	Mean	Test Group	Mean	Mean Difference	Standard Error	p
Mathematics	151.808	English Language Arts and Reading	52.300	99.508	22.272	<.001
Mathematics	151.808	History	49.722	102.086	23.707	<.001
Mathematics	151.808	Life Science	56.556	95.252	28.244	.008
Mathematics	151.808	Social Studies	62.929	88.879	30.536	.034

Research Question 1d

What is the nature of the content area knowledge of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program seeking teacher certification at the University of North Texas?

d. What are the Texas Examinations of Educator Standards scores of individuals in the sample?

Descriptive data for Texas Examinations of Educator Standards test score.

The number of test takers in each test group is presented in Table 20. The grades 8-12 English Language Arts and Reading certification field was the largest test group in the sample with fifty students taking the grades 8-12 English Language Arts and Reading content area test. The grades 8-12 Social Studies certification field was the smallest test group in the sample with fourteen students taking the grades 8-12 Social Studies content area test.

The number of individuals in the sample who passed or failed their respective Texas Examinations of Educator Standards content area test is presented in Table 20. Twenty-six out of 144 students (18%) in the sample failed their respective Texas Examinations of Educator Standards content area test on the first attempt. The grades 8-12 English Language Arts and Reading test group had the highest passing rate with all fifty individuals in the sample (100%) passing the test on the first attempt. The grades 8-12 Mathematics test group had the lowest passing rate with eleven out of thirty-six students (42.3%) not passing the test on the first attempt.

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Table 20

Number of Test Takers Who Passed Or Failed the Texas Examinations of Educator Standards Subject Test by Test Group (English Language Arts And Reading, History, Life Science, Mathematics, and Social Studies)

Test	N = 144	Fail	Percentage Failing	Pass	Percentage Passing
English Language Arts and Reading	50	0	0%	50	100%
History	36	7	19.4%	29	80.5%
Life Science	18	6	33.3%	12	66.6%
Mathematics	26	11	42.3%	15	57.6%
Social Studies	14	2	14.2%	12	85.7%
All Groups	144	26	18%	118	81.9%

Table 21 presents descriptive data on the Texas Examinations of Educator Standards scores represented in the sample. Scores at 240 or above are considered passing. Scores below 240 are considered failing. The grades 8-12 English Language Arts and Reading test group had the highest mean score of 266 (n = 50). The grades 8-12 Life Science test group had the lowest mean score of 243.61 (n = 18).

The grades 8-12 English Language Arts and Reading test group has the least deviation from the mean with a standard deviation of 11.427 while the grades 8-12 Mathematics and grades 8-12 Life Science test groups were more variable having a standard deviation of 22.434 for Mathematics and 27.104 for Life Science. The median score ranged from 248 in the Life Science test group to 267 in the English Language Arts and Reading test group.

Table 21

Descriptive Statistics for Test Score by Certification Field Test

	N	Minimum	Maximum	Mode	Mean	Median	Standard Deviation
English Language Arts and Reading	50	240	295	268	266.00	267	11.427
History	36	215	288	242	256.17	258	18.776
Life Science	18	194	281	246	243.61	248	27.104
Mathematics	26	223	292	238	256.38	260	22.434
Social Studies	14	230	277	269	256.21	257	14.386
Group Total	144	194	295	254	258.00	263	19.414

Figure 17 shows the individual scores on the Texas Examination of Educator Standards for the grades 8-12 English Language Arts and Reading test group. The sample consisted of fifty individuals.

- Four of the fifty individuals (8%) in the grades 8-12 English Language Arts and Reading test group scored below 250;
- Ten of the fifty individuals (20%) in the grades 8-12 English Language Arts and Reading test group scored between 250 and 259;
- Twenty-eight of the fifty individuals (56%) in the grades 8-12 English Language Arts and Reading test group scored between 260 and 269;
- Twelve of the fifty individuals (24%) in the grades 8-12 English Language Arts and Reading test group scored between 270 and 279
- Five of the fifty individuals (10%) in the grades 8-12 English Language Arts and Reading test group scored between 280 and 289;
- Forty-six of the fifty individuals (92%) in the grades 8-12 English Language Arts and Reading test group scored above 260; and
- One individual out of fifty (2%) in the grades 8-12 English Language Arts and Reading test group scored 295 on the state content test.

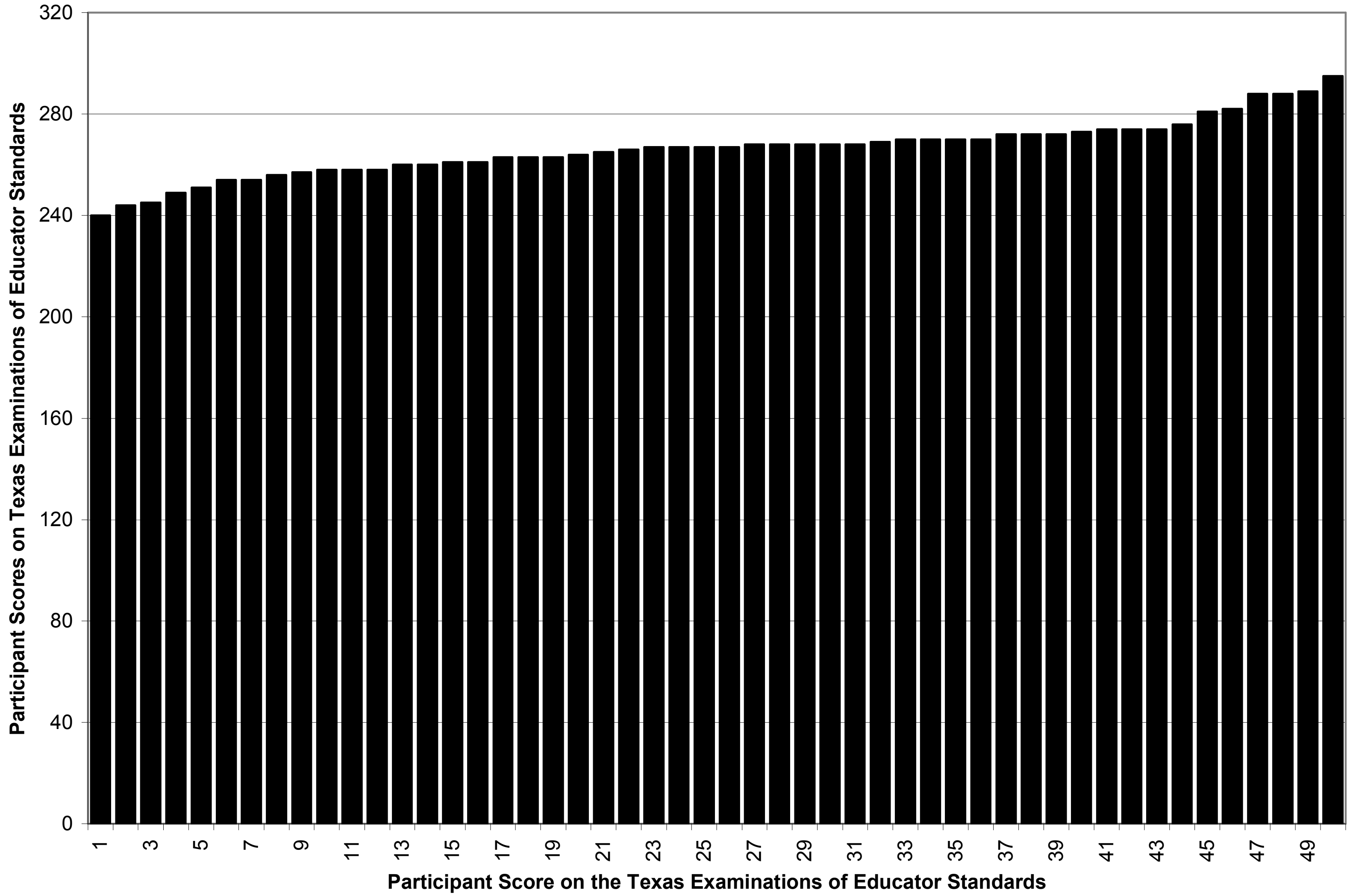

Figure 17. Individual scores on the Texas Examinations of Educator Standards for the English Language Arts and Reading Test Group (N=50).

Figure 18 shows the individual scores on the Texas Examinations of Educator Standards for the grades 8-12 History test group. The sample consisted of thirty-six individuals.

- Two of the thirty-six students (5.5%) in the grades 8-12 History test group scored below 220;
- Three of the thirty-six students (8.3%) in the grades 8-12 History test group scored between 220 and 229;
- Two of the thirty-six students (5.5%) in the grades 8-12 History test group scored between 230 and 239;
- Four of the thirty-six students (11.1%) in the grades 8-12 History test group scored between 240 and 249;
- Eight of the thirty-six students (22.2%) in the grades 8-12 History test group scored between 250 and 259;
- Seven of the thirty-six students (19.4%) in the grades 8-12 History test group scored between 260 and 269;
- Nine of the thirty-six students (25%) in the grades 8-12 History test group scored between 270 and 279;
- One of the thirty-six students (2.7%) in the grades 8-12 History test group scored between 280 and 289;
- Twenty-five of the thirty-six students (69.4%) in the grades 8-12 History test group scored above 250; and
- One of the thirty-six students (2.7%) in the grades 8-12 History test group scored 288 on the state content test.

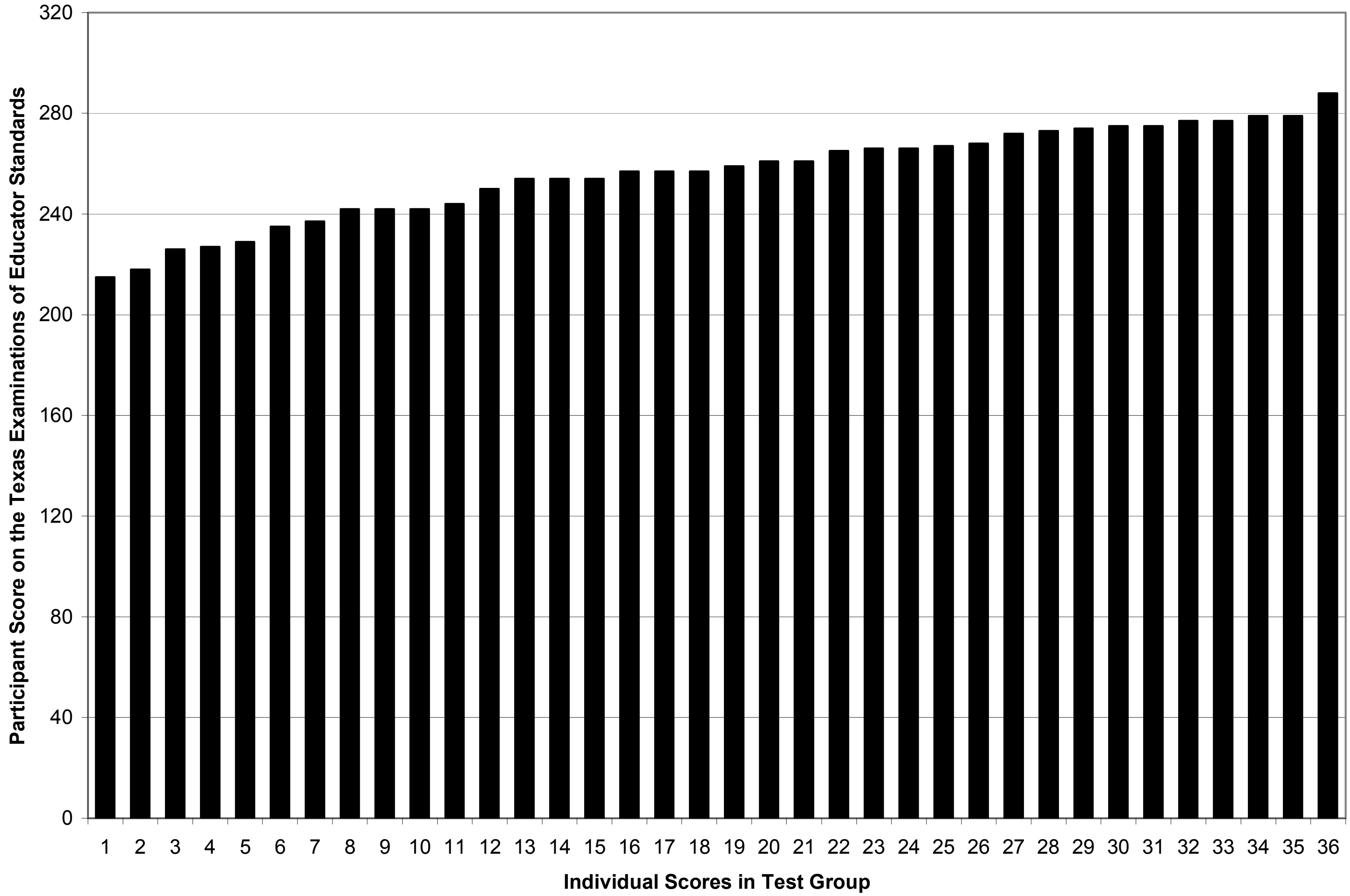

Figure 18. Individual scores on the Texas Examinations of Educator Standards for the History Test Group (N=36).

Figure 19 shows the individual scores on the Texas Examinations of Educator Standards for the grades 8-12 Life Science test group. The sample consisted of eighteen individuals.

- One of the eighteen (5.5%) students in the grades 8-12 Life Science test group scored below 200;
- Four of the eighteen students (22.2%) in the grades 8-12 Life Science test group scored below 220;
- One of the eighteen students (5.5%) in the grades 8-12 Life Science test group scored between 220 and 229;
- Four of the eighteen students (22.2%) in the grades 8-12 Life Science test group scored between 240 and 249;
- Three of the eighteen students (16.6%) in the grades 8-12 Life Science test group scored between 250 and 259;
- One of the eighteen students (5.5%) in the grades 8-12 Life Science test group scored between 260 and 269;
- Three of the eighteen students (16.6%) in the grades 8-12 Life Science test group scored between 270 and 279;
- One of the eighteen students (5.5%) in the grades 8-12 Life Science test group scored a 281; and
- Eight of the eighteen students (44.4%) in the grades 8-12 Life Science test group scored above 250.

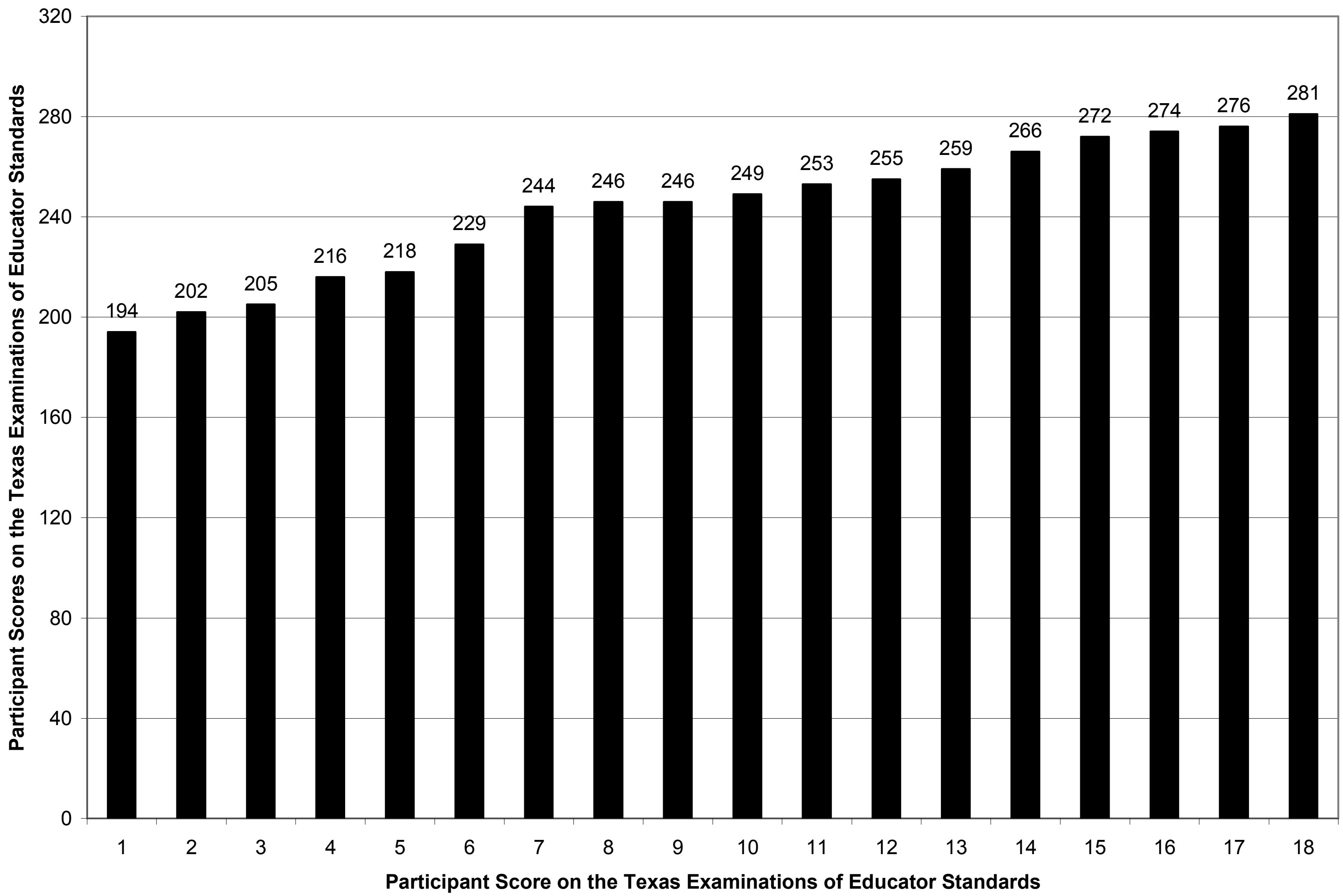

Figure 19. Individual scores on the Texas Examinations of Educator Standards for the Life Science Test Group (N=18).

Figure 20 shows the individual scores on the Texas Examinations of Educator Standards for the grades 8-12 Mathematics test group. The sample consisted of twenty-six individuals.

- Three of the twenty-six students (11.5%) in the grades 8-12 Mathematics test group scored below 230;
- Eight of the twenty-six students (30.7%) in the grades 8-12 Mathematics test group scored between 230 and 239;
- Two of the twenty-six students (7.6%) in the grades 8-12 Mathematics test group scored between 250 and 259;
- One of the twenty-six students (3.8%) in the grades 8-12 Mathematics test group scored between 260 and 269;
- Nine of the twenty-six students (34.6%) in the grades 8-12 Mathematics test group scored between 270 and 279;
- Two of the twenty-six individuals (7.6%) in the grades 8-12 Mathematics test group scored between 280 and 289;
- One of the twenty-six individuals (3.8%) in the grades 8-12 Mathematics test group scored 292 on the state Mathematics content test; and
- Fifteen of the twenty-six individuals (57.6%) in the grades 8-12 Mathematics test group scored 250 or above on the state Mathematics content test.

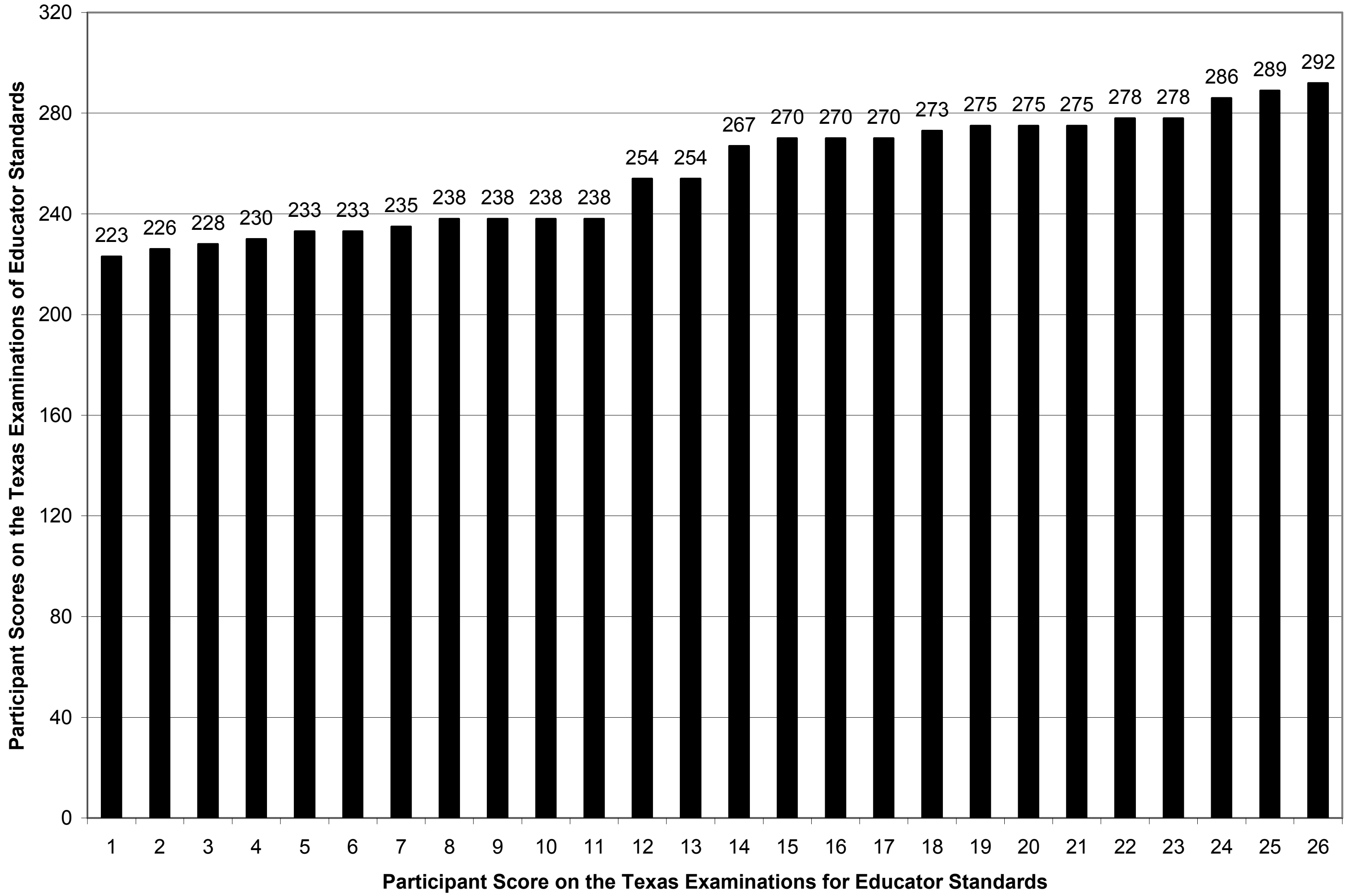

Figure 20. Individual scores on the Texas Examinations of Educator Standards for the Mathematics Test Group (N=26).

Figure 21 shows the individual scores on the Texas Examinations of Educator Standards for the grades 8-12 Social Studies test group. The sample consisted of fourteen individuals.

- Two of the fourteen students (14.2%) in the grades 8-12 Social Studies test group scored below 240;
- Two of the fourteen students (14.2%) in the grades 8-12 Social Studies test group scored between 240 and 249;
- Four of the fourteen students (28.5%) in the grades 8-12 Social Studies test group scored between 250 and 259;
- Four of the fourteen students (28.5%) in the grades 8-12 Social Studies test group scored between 260 and 269;
- Two of the fourteen students (14.2%) in the grades 8-12 Social Studies test group scored between 270 and 279; and
- Ten of the fourteen students (71.4%) in the grades 8-12 Social Studies test group scored between 250 and above.

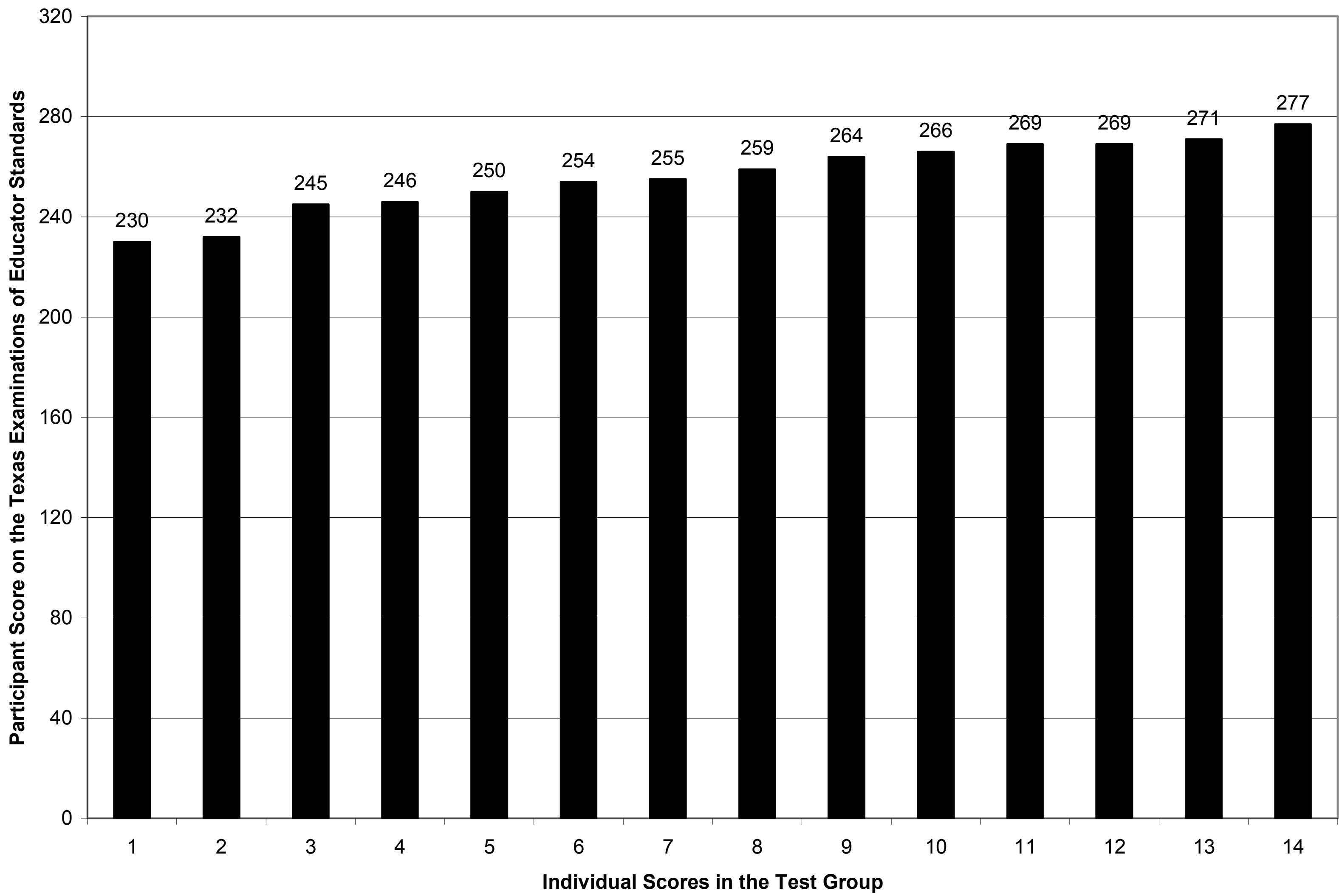

Figure 21. Individual scores on the Texas Examinations of Educator Standards for the Social Studies Test Group (N=14).

One-way analysis of variance.

The results of a one-way analysis of variance are presented in Table 22 for the variable, individual score on the Texas Examinations of Educator Standards content test. Results show that there is a statistically significant difference F (4, 139) = 5.531; p <.001) between the groups examined for the independent variable, individual score on the Texas Examinations of Educator Standards content test.

Table 22

Results of One-Way Analysis Of Variance for the Variable Individual Test Scores for the Texas Examinations of Educator Standards Content Area Test

		Sum of Squares	df	Mean Square	F	*Sig.*
Score	Between Groups	7401.038	4	1850.259	5.531	<.001
	Within Groups	46498.289	139	334.520		
	Total	53899.326	143			

Tukey-*HSD* “honest significant difference” post-hoc tests were used to locate the differences between the groups (Table 23). The grades 8-12 English Language Arts and Reading test group was statistically significantly different compared to the grades 8-12 Life Science test group (p < .001). The mean individual test score for the Texas Examinations of Educator Standards for the grades 8-12 English Language Arts and Reading test group was 266. The mean individual test score for the Texas Examinations of Educator Standards for the grades 8-12 Life Science test group was nearly 244, which is a mean difference of 22.689.

Table 23

Results of Tukey HSD for the Variable, Individual Test Scores on the Texas Examinations of Educator Standards Content Test Showing Groups That Are Statistically Significantly Different From One Another

Test Group	*Mean*	*Test Group*	*Mean*	*Mean Difference*	*Standard Error*	*p*
Life Science	243.61	English Language Arts	266	22.689	4.772	<.001

Research Question Two

Research question two asks:

> To what extent does the number of upper-level content area courses predict a passing score on the Texas Examinations of Educator Standards?

Research question two was examined using a linear regression and a logistic regression. The subject's scaled score on the Texas Examinations of Educator Standards was used as the dependent variable and the independent variable was number of upper-level content area courses, upper-level content area grade point average, and months of time elapsed between the last upper-level content area coursework and the initial state content examination. The individual's scaled score was converted to a dichotomous pass/fail variable for the logistic regression and the same independent variables were used in the analysis.

Table 24 presents correlations between the subjects' Texas Examinations of Educator Standards scaled score and the number of upper-level courses completed in the certification field. For the variable, number of upper-level content area courses completed in the certification field, none of the test score groups showed correlations at a statistically significant level ($p < .05$).

Table 24

Correlations between Scores on the Texas Examinations for Educator Standards and Number of Upper-Level Content Area Courses Completed in the Certification Field

Test group	*N*	*Correlation Coefficient*	*Sig.*
English Language Arts and Reading	50	.121	.402
History	36	-.057	.741
Life Science	18	.274	.272
Mathematics	26	.121	.554
Social Studies	14	.389	.170

Results of Linear Regression for Research Question Two

Table 25 presents the summary of regression for the three-predictor model including the number of upper-level content area courses completed in the certification field, upper-level content area grade point average, and months of time elapsed between the last upper-level content area course completed in the certification field and the initial state content examination. The only test group for the model that was statistically significant was the grades 8-12 History test group.

In this group the overall effect size was $R^2 = .249$ with minimum shrinkage in the adjusted R^2 value, .179. This value suggests a limited amount of sampling error for this group of test takers. In addition, the effect size for this group was statistically significant, $F\ (3, 32) = 3.542$, $p < .025$. See Table 26.

Table 27 presents the beta weights and structure coefficients for each test group for the variable, number of upper-level content area courses completed in the certification field. The number of upper-level content area courses completed in the certification field predictor was not statistically significant at the $p < .05$ level for any of the test groups. This means that the variable, number of upper-level content area courses taken in the certification field did not account for any variance among scores in this sample.

Table 25

Summary of Regression for Model Using Number of Upper-Level Content Area Courses, Upper-Level Content Area Grade Point Average, and Months of Time Elapsed Between Last Upper-Level Content Area Coursework and the Initial State Content Examination as Predictor Variables

Test Group	*R*	R^2	Adjusted R^2	*Sig.*
English Language Arts and Reading	.369	.136	.080	.078
History	**.499**	**.249**	**.179**	**.025***
Life Science	.285	.081	-.115	.746
Mathematics	.481	.232	.127	.116
Social Studies	.515	.266	.045	.357

Table 26

Analysis Of Variance for Three-Predictor Linear Regression Model for the History Texas Examinations of Educator Standards Test Group

History Test Group	*Sum of Squares*	*DF*	*Mean Square*	*F*	*Sig.*
Regression	3075.706	3	1025.325	3.542	.025
Residual	9263.294	32	289.478		
Total	12339.000	35			

Table 27

Beta Weights and Structure Coefficients for the Variables, Number of Upper-Level Content Area Courses, Upper-Level Content Area Grade Point Average, and Months of Time Elapsed Between Upper-Level Content Area Course Completed and the Initial State Content Examination

Test Group	Beta	Structure Coefficients	Squared Structure Coefficients	*Sig.*
Variable, number of upper-level content area courses in certification field				
English Language Arts	-.213	-.083	.006	.603
History	**.137**	**.023**	**.000**	**.886**
Life Science	1.212	.220	.048	.491
Mathematics	.850	.108	.012	.568
Social Studies	2.849	.464	.215	.128
Variable, upper-level content area grade point average				
English Language Arts	3.024	.069	.005	.826
History	**14.497**	**.353**	**.125**	**.028**
Life Science	.985	.016	.000	.954
Mathematics	9.593	.277	.077	.154
Social Studies	9.154	.209	.043	.491
Variable, months of time elapsed between last upper-level content area coursework in the certification field and the initial state content examination				
English Language Arts	.038	.240	.058	.108
History	**.073**	**.362**	**.131**	**.027**
Life Science	-.026	-.093	.009	.764
Mathematics	.062	.354	.125	.072
Social Studies	-.074	-.310	.096	.347

Results of Logistic Regression for Research Question Two

Research question two was also examined using logistic regression. Because logistic regression relies on maximum likelihood estimation (MLE), only the grades 8-12 History, grades 8-12 Life Science, and grades 8-12 Mathematics test groups were eligible for logistic regression analysis. Maximum likelihood estimation means that reliability estimates decline when there are few cases for each observed combination of independent variables. Wright (1995) recommends a minimum of ten observations per variable for the logistic regression model. Since the grades 8-12 English Language Arts and Reading test group had a 100% passing rate, and since only two out of fourteen individuals in the grades 8-12 Social Studies test groups failed, there were too few failing cases to reliably use logistic regression analysis. Ideally, to use logistic regression analysis the sample should consist of approximately 50% of cases passing and 50% of cases failing.

The dependent variable in the model measures the pass/fail status of individuals in the Secondary Online Post-Baccalaureate Teacher Certification Program on his or her respective Texas Examinations of Educator Standards content area test. The individual's initial test score was used in the analysis. The dependent variable was coded as 1 for passing and 0 for not passing. The three independent variables include number of upper-level content area courses completed in the certification field, upper-level content area grade point average, and months elapsed between the last upper-level content area course completed in the certification field and the initial state content examination.

The predictor variable, number of upper-level courses in the certification field completed was not statistically significant for the grades 8-12 History, grades 8-12 Life Science, or grades 8-12 Mathematics test groups.

Research Question Three

Research question three asks:

> To what extent does upper-level content area grade point average predict a passing score on the Texas Examinations of Educator Standards?

Research question three was examined using linear regression and logistic regression analyses. The subject's scaled score on the Texas Examinations of Educator Standards was used as the dependent variable and the independent variables were number of upper-level content area courses, upper-level content area grade point average, and months of time elapsed between the last upper-level content area course in the certification field and the initial state content examination. The individual's scaled score was converted to a dichotomous pass/fail variable for the logistic regression and the same independent variables were used in the analysis.

Table 28 presents correlations between the subjects' Texas Examinations of Educator Standards scaled score and upper-level content area grade point average in the certification field. For the variable, upper-level content area grade point average, only the grades 8-12 English Language Arts and Reading test group and the grades 8-12 History test groups showed a correlation between the subject's score on the Texas Examinations of Educator Standards and the variable, upper-level content area grade point average at a statistically significant level. The relationship between the English Language Arts and Reading test group and grade point average was statistically significant ($p < .039$). The correlation coefficient of $R = .293$ represents the relationship between the individual's score on the grades 8-12 English Language Arts content area examination and upper-level content area grade point average. The significance level for the History test group was p = .038 with a correlation coefficient of R = .348, which represents the relationship between the individual's score on the grades 8-12 History content area examination and upper-level content area grade point average.

The variable, upper-level content area grade point average was positively related with scores on the Texas Examinations of Educator Standards in grades 8-12 English Language Arts and Reading test group and also for the grades 8-12 History test group. This means that higher upper-level content area grade point averages are related to higher scores on these two examinations.

Table 28

Correlations Between Scores on the Texas Examinations For Educator Standards and the Variable, Upper-Level Content Area Grade Point Average in the Certification Field for Each Test Group

Test group	N	Correlation Coefficient	*Sig.*
English Language Arts and Reading	**50**	**.293**	**.039***
History	**36**	**.348**	**.038***
Life Science	18	.101	.690
Mathematics	26	.309	.125
Social Studies	14	.190	.515

Results of Linear Regression for Research Question Three

The only test group for the three-predictor model utilizing number of upper-level content area courses in the certification field, upper-level content area grade point average in the certification field, and months of time elapsed between the last upper-level course in the certification field and the initial state content examination, that was statistically significant was the grades 8-12 History test group. In this group the overall effect size was R^2 = .249 with an adjusted R^2 value of .179 (Table 25). This suggests a limited amount of sampling error for this group of test takers. In addition, the effect size for this group was statistically significant, F (3, 32) = 3.542, p < .025 (Table 26).

Table 27 presents the beta weights and structure coefficients for each test group for the variable, upper-level content area grade point average. For the grades 8-12 History test group, upper-level content area grade point average was statistically significant (p = .028). From an examination of the Beta weights and structure coefficients, it is noted that the variable, upper-level content area grade point average is shown to have a positive relationship with higher scores on the Texas Examinations of Educator Standards grades 8-12 History test. Upper-level content area grade point average has the largest Beta weight and a reasonable structure coefficient of .353. The squared structure coefficient of .125 informs the reader that upper-level content area grade point average accounts for 12.5% of the variance among scores on the grades 8-12 History test of the Texas Examinations of Educator Standards.

Results of the Logistic Regression Analysis for Research Question Three

Research question three was also examined using logistic regression. Because logistic regression relies on maximum likelihood estimation (MLE), only the grades 8-12 History, grades 8-12 Life Science, and grades 8-12 Mathematics test groups were eligible for logistic regression analysis. Maximum likelihood estimation means that reliability estimates decline when there are few cases for each observed combination of independent variables. Wright (1995) recommends a minimum of ten observations per variable for the logistic regression model. The grades 8-12 English Language Arts and Reading and grades 8-12 Social Studies test groups had too few failing cases to reliably use logistic regression analysis.

The dependent variable in the three-predictor model utilizing number of upper-level content area courses, upper-level content area grade point average, and months of time elapsed between last upper-level content area course in the certification field and the initial state content examination, measures the pass/fail status of individuals in the Secondary Online Post-Baccalaureate Teacher Certification Program on his or her respective Texas Examinations of Educator Standards content area test. The individual's initial test score was used in the analysis. The dependent variable was coded as 1 for passing and 0 for not passing.

Table 29 presents the logistic regression results for the grades 8-12 History test group. The variable, upper-level content area grade point average was the only variable in the logistic regression model that was statistically significant (p = .017) for the grades 8-12 History test group. The *exp(B)* = 33.610 indicates the odds of passing the grades 8-12 History Texas Examinations of Educator Standards are 33.610 times greater with every one unit increase of an individual’s upper-level content area grade point average. This means that on average a student with an upper-level content area grade point average of 3.8 in his or her History coursework is approximately 33.6 times more likely to pass the grades 8-12 History Texas Examinations of Educator Standards than an individual who has a 2.8 in his or her History upper-level coursework. The variable, upper-level content area grade point average was not statistically significant for the grades 8-12 Life Science test group or for the grades 8-12 Mathematics test group. The three predictor model of number of upper-level content area courses completed, upper-level content area grade point average, and months of time elapsed between last upper-level content course in the certification field and the initial state content examination classified 86.1% of the cases correctly while the null model correctly classified 82.4% of the cases.

Table 29

Logistical Regression for the Three-Predictor Model Utilizing Number of Upper-Level Content Area Courses, Upper-Level Content Area Grade Point Average, and Months of Time Elapsed Between Last Upper-Level Content Area Coursework and the Initial State Content Examination for the History Test Group

	B	*df*	*Sig.*	*Exp(B)*
Courses	.132	1	.537	1.141
Grade point average	3.515	1	.017	33.610
Months elapsed	.047	1	.159	1.048
Constant	-11.719	1	.033	<.001
Model chi-square [df]	12.009	1	.007	
Percentage of correct classifications	86.1			
Null model percentage of correct classifications	82.4			

Research Question Four

Research question four asks:

To what extent does the time elapsed between the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards predict a passing score on the Texas Examinations of Educator Standards?

Research question four was examined using a linear regression and a logistic regression. The subject's scaled score on the Texas Examinations of Educator Standards was used as the dependent variable and the independent variable was number of upper-level content area courses, upper-level content area grade point average, and months of time elapsed between last upper-level content area course in the certification field and the initial state content examination attempt. The individual's scaled score was converted to a dichotomous pass/fail variable for the logistic regression and the same independent variables were used in the analysis.

Table 30 presents correlations between the subjects' Texas Examinations of Educator Standards scaled score and months of time elapsed between last upper-level content area course in the certification field and the initial state content examination attempt. For the variable, months of time elapsed between last upper-level content area course in the certification field and the initial state content examination attempt, only the grades 8-12 History test group showed a correlation at a statistically significant level (p = .035). Individuals with higher scores on the Texas Examinations for Educators Standards in the grades 8-12 History certification field completed their coursework longer ago than individuals' with lower scores on the History test.

Table 30

Correlations Between Scores on the Texas Examinations For Educator Standards and the Variable, Months of Time Elapsed Between the Last Upper-Level Content Area Course Completed in the Certification Field and the Initial State Content Examination

Test group	N	Correlation Coefficient	*Sig.*
English Language Arts and Reading	50	.211	.141
History	36	.353	.035*
Life Science	18	-.212	.397
Mathematics	26	.376	.058
Social Studies	14	-.232	.421

Results of Linear Regression for Research Question Four

As shown in Table 25, the only test group for the three-predictor model utilizing number of upper-level content area courses, upper-level content area grade point average, and months of time elapsed between last upper-level content area course in the certification field and the initial state content examination, that was statistically significant was the History test group (p = .025). In this group the overall effect size was R^2 = .249 with minimum shrinkage in the adjusted R^2 value, .179. This suggests a limited amount of sampling error for this group of test takers. In addition, the effect size for this group was statistically significant, $F(3, 32) = 3.542$, $p < .025$ (See Table 26).

Table 27 presents the beta weights and structure coefficients for each test group for the variable, months of time elapsed between the last upper-level content area course and the initial state content examination. For the grades 8-12 History test taker group, the variable, months of time elapsed between the last upper-level content area course and the initial state content examination was statistically significant (p = .027). The Beta weights (.073) and structure coefficients (.362) for the variable, months of time elapsed between last upper-level content area coursework and the initial state content examination shows a positive correlation. This means that the variables, months of time elapsed between the last upper-level content area course and the initial state content examination and scores on the Texas Examinations of Educator Standards grades 8-12 History content area test are positively related. This means that the longer ago students completed their content area certification coursework, the more likely they are to perform better on the Texas Examinations for Educator Standards in grades 8-12 History. The squared structure coefficient of .131 informs the reader that the variable, months of time elapsed between the last upper-level content area coursework and the initial state content examination accounts for 13.1% of the variance among grades 8-12 History scores on the Texas Examinations for Educator Standards.

Results of the Logistic Regression Analysis for Research Question Four

Research question four was also examined using logistic regression. Because logistic regression relies on maximum likelihood estimation (MLE), only the grades 8-12 History, grades 8-12 Life Science, and grades 8-12 Mathematics test groups were eligible for logistic regression analysis. Maximum likelihood estimation means that reliability estimates decline when there are few cases for each observed combination of independent variables. Wright (1995) recommends a minimum of ten observations per variable for the logistic regression model.

The dependent variable is the pass/fail status of individuals in the Secondary Online Post-Baccalaureate Teacher Certification Program on his or her respective Texas Examinations of Educator Standards content area test. The individual's initial test score was used in the analysis. The dependent variable was coded as 1 for passing and 0 for not passing. The three independent variables include number of upper-level content area courses completed in the certification field, upper-level content area grade point average, and months of time elapsed between the last upper-level content area coursework in the certification field and the initial state content examination.

Table 31 presents the logistic regression results for the grades 8-12 Mathematics test group. The variable, months of time elapsed between last upper-level content area coursework in the certification field and the initial state content examination attempt was not statistically significant for the grades 8-12 History and grades 8-12 Life Science test group. The variable, months of time elapsed between last upper-level content area coursework in the certification field and the initial state content examination was the only variable in the model that was statistically significant (p = .039) for the grades 8-12

Mathematics test group. The *exp(B)* = 1.008 indicating the odds of passing the grades 8-12 Mathematics Texas Examinations of Educator Standards are 1.008 times greater with every one unit increase of an individual's time elapsed in months between the upper-level coursework completion date and the initial attempt on the state content examination. For example, this means that on average a student who completed certification field coursework five month prior to taking the state content examination has approximately a 1% better chance of passing the Texas Examinations for Educator Standards in grades 8-12 Mathematics than someone who completed coursework four months prior to taking the state content examination. The three predictor model of number of upper-level content area courses completed in the certification field, upper-level content area grade point average, and months of time elapsed between last upper-level content area coursework in the certification field correctly classified 84.6% of the cases while the null model correctly classified 87.3%.

Table 31

Logistical Regression Results for the Mathematics Test Group

	B	*df*	*Sig.*	*Exp(B)*
Months elapsed	.008	1	.039	1.008
Grade point average	.880	1	.220	2.411
Courses	.050	1	.746	1.052
Constant	-3.855	1	.127	.021
Model chi-square [df]	7.180			
Percentage of correct classifications	84.6			
Null model percentage of correct classifications	87.3			

CHAPTER V

CONCLUSIONS

Using Title II of No Child Left Behind legislation as a reference point, this study investigated the nature of the content knowledge of post-baccalaureate certification students in the Secondary Online Post-Baccalaureate Teacher Certification Program at the University of North Texas by examining possible predictor variables for scores on the Texas Examination of Educator Standards in the content areas of grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies.

The following discussion reviews the results of the study and clarifies the findings by providing a brief overview of the study, a review of the limitations of the study, the contribution of this study to the body of research on teacher knowledge, as well as implications and recommendations for further research.

Included in the study were 144 post-baccalaureate teacher certification candidates who took the Texas Examinations of Educator Standards in their respective subject field and were seeking secondary teacher certification through the Secondary Online Post-Baccalaureate Teacher Certification Program at the University of North Texas during the 2002-2003, 2003-2004, and 2004-2005 academic school years. The sample included all students in the Secondary Online Post-Baccalaureate Teacher Certification Program who were seeking an initial certification in one of the following areas: grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies.

The grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies subject tests of the Texas Examinations of Educator Standards were used as a proxy for subject matter knowledge for the sample of individuals seeking initial teacher certification in the Secondary Online Post-Baccalaureate Teacher Certification Program at the University of North Texas. This instrument was used to determine the relationship between knowledge of initial certification students and number of upper-level content area courses in the certification field, upper-level content area grade point average in the certification field, and months of time elapsed between the last upper-level content area coursework in the certification field and the initial state content examination.

Introduction to Conclusion and Discussion for Research Question 1a

In this section the conclusions and discussion for research question 1a, regarding the number of upper-level content area courses in the certification field for individuals in the sample will be reviewed. Each of the five content areas examined in this study will be sequentially discussed (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies) and followed by a summary of the major findings for the total sample group.

Conclusion and Discussion for Research Question 1a

English Language Arts and Reading.

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher certification students earned in their certification field?

As shown in Table 10 and Figure 1, the median number of upper-level content area courses in the grades 8-12 English Language Arts and Reading test group was 9 and the mean was 9.960. The range for the sample (N=50) was 4 to 25 courses.

Overall, the students in the English Language Arts and Reading sample have a strong content background. On average, this sample of students had completed almost ten advanced courses in their subject field. This means that, on average, this sample of students has thirty hours of advanced coursework in English Language Arts and

Reading. Many of the teacher candidates in this test group had completed Master's degrees in English. Out of the five test groups examined (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies), the grades 8-12 English Language Arts and Reading test group overall had the most upper-level content area coursework. These candidates meet the No Child Left Behind expectation for strong academic background in their certification field.

However, these general findings may mask the ways that the Texas Education Agency is navigating the federal No Child Left Behind definition of a highly qualified teacher by creating broad teacher certification fields. For example, in Texas individuals who are certified to teach grades 8-12 English Language Arts and Reading are certified to teach both English courses and Reading courses; however, in this sample only three people have completed a meager two courses in Reading. Forty-seven individuals (94%) in this test group initially did not have upper-level content coursework in Reading before taking the state content test. As Texas becomes home to a growing number of students for whom English is not their first language and as state-wide mandated testing emphasizes reading, more teachers will need expertise in the methods of teaching reading, especially to adolescent learners. The real knowledge of these teacher candidates of how to structure the discipline of reading, create activities that promote reading, and assess reading may not be that of someone who is truly highly qualified and has the ability to promote student achievement in this area.

Conclusion and Discussion for Research Question 1a

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher certification students earned in their certification field?

History.

As shown in Table 10 and Figure 2, the median number of upper-level content area courses in History was 7 and the mean was 6.778. The range for the sample (N=36) was 2 to 16 courses. Twenty-two individuals (82%) in the grades 8-12 History test group completed five to ten upper-level courses in History, meaning most of these teacher candidates completed an academic major in History. Based on parameters for a typical academic major in a field (30 to 36 semester credit hours), fifteen of thirty-six individuals (41.6%) in the grades 8-12 History test group have an academic major.

However, ten (27.7%) individuals in the sample (N=36) had the minimum upper-level program coursework requirement of twelve hours of upper-level content area credit. The Secondary Online Post-Baccalaureate Teacher Certification Program considers only coursework in the target certification field. For example, only History coursework can be used for consideration for program admission.

In Texas, however, closely related fields can also be used for program admission purposes and for determining a secondary teacher's status with regard to High Objective Uniform Standard of Evaluation requirements established by No Child Left Behind legislation [P. L. 107-110, Section 9101 (23) (C) (ii)]. For example, an individual seeking certification in History may use coursework in Geography, Government, Economics, Political Science, and History to meet the No Child Left Behind legislation highly qualified provision for secondary teachers. See Appendix B for certification fields that are considered (closely related) when determining a secondary teachers' highly qualified status.

Conclusion and Discussion for Research Question 1a

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher certification students earned in their certification field?

Life Science.

According to Table 10 and Figure 3, the median number of upper-level content area courses in grades 8-12 Life Science was 11 and the mean was 11.833. The range for the sample (N=26) was 6 to 24 courses. This test group has the highest mean of the test groups examined in the study. In addition, this test group has the highest variability in the number of upper-level coursework.

Based on parameters for a typical academic major in a field (30 to 36 semester credit hours), fifteen of eighteen individuals (83.3%) in the grades 8-12 Life Science test group have an academic major in Biology. The standard deviation for upper-level content courses in Life Science was 4.913 suggesting considerable variability in the content courses that represents an academic major or coursework equivalent to an undergraduate major in Life Science. Some Life Science degrees contain as many as sixty Life Science courses while others are comprised of thirty to thirty-six hours of Life Science coursework.

A typical candidate pursuing a degree in Biology is interested in a career related to health or medicine. If an individual is interested in becoming a doctor, they must take the Medical College Admission Test. Many colleges and universities have structured their degree programs to address the knowledge and skills requisite of a pre-med student. Perhaps this explains the large number of content area coursework related to Biology found in this study.

Research suggests little benefit for secondary teachers to have completed more than five courses in the content area (Monk, 1994) and that completing pedagogical content knowledge coursework (Shulman, 1987) is a much more powerful way to increase student achievement. In addition, research shows that individuals who have an abundance of science coursework are more likely to leave teaching (Ingersoll, 1999).

The continuing debate about what is the right amount of coursework necessary to become an effective grades 8-12 Life Science teacher suggests that colleges of education, colleges where the academic major of science is housed, and state and federal policy makers have dramatically different views on the amount of knowledge that effective Life Science teachers must possess. Finding a way to bridge these differences is the challenge for these stakeholders as the school children across the United States are the individuals who are will reap the positive and negative outcomes of this debate. This is particularly important in light of severe teacher shortages across the nation and especially in Texas.

Conclusion and Discussion for Research Question 1a

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher certification students earned in their certification field?

Mathematics.

As shown in Table 10 and Figure 4, the median number of upper-level content area courses in grades 8-12 Mathematics was 6 and the mean was 6.423. The range for the sample (N=26) was 2 to 13 courses in Mathematics. The grades 8-12 Mathematics test group was the lowest test group for median and mean in terms of upper-level coursework and represents the lowest maximum number of upper-level courses taken in the certification field This test group had low variability for the standard deviation (2.859) suggesting that Mathematics majors are trained in a highly similar manner regardless of where their degree is obtained.

Twelve of twenty-six individuals (46.1%) in the Mathematics test group have an academic major in Mathematics. Similar to the research for science teachers, research suggests little benefit for secondary Mathematics teachers to have completed more than five courses in the content area (Monk, 1994) and that completing pedagogical content knowledge coursework (Shulman, 1987) is a much more powerful way to increase student achievement.

In addition, research shows that individuals who have an abundance of Mathematics coursework are more likely to leave teaching (Ingersoll, 1999). Individuals who possess mathematics knowledge are highly sought after in the workforce and when economic times are good, the teacher shortage in this field is exacerbated.

Again, there are competing views concerning what Mathematics formal background training is necessary to become an effective Mathematics teacher who is capable of advancing student achievement. Until the implementation of No Child Left Behind legislation, some mathematics teachers across the United States had degrees in education, which may have included few courses in formal mathematics, while other secondary mathematics teachers were trained as mathematicians and had formal degrees in Mathematics. Therefore, the training of mathematics teachers varied broadly state by state.

With the No Child Left Behind legislation emphasis on teacher content knowledge, teacher certification programs across the nation have been forced to make programmatic changes with regard to academic preparation for teacher certification candidates. These changes have taken place in a very short time period and the impact of these changes will not be known for several years to come. Additionally, these changes have carried a large price tag for states that have just begun to implement teacher content standards required by No Child Left Behind legislation.

Conclusion and Discussion for Research Question 1a

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher certification students earned in their certification field?

Social Studies.

As shown in Table 10 and Figures 5 and 6, the median number of upper-level content area courses in grades 8-12 Social Studies was 7 and the mean was 7.643. The range for the sample (N=14) was 4 to 13 courses in the grades 8-12 Social Studies test group.

Based on parameters for a typical academic major in a field (30 to 36 semester credit hours), twelve of fourteen individuals (85.7%) in the Social Studies test group have an academic major in a field that is related to Social Studies (e. g. Economics, History, Geography, Government, Psychology, Sociology). In this sample test group, the academic majors were History, Criminal Justice, Political Science, Public Administration, Sociology, Social Sciences, Secondary Education, Coaching and Sports, and Interdisciplinary Studies. This shows that the knowledge necessary to pass the Texas Examinations of Educator Standards may be gleaned from a variety of content backgrounds.

As shown in Figure 6, none of the fourteen sample participants earned upper-level content coursework that represented each domain. The intent of No Child Left Behind legislation is for secondary teachers to be content experts, however, the implementation of broad field certification areas such as the grades 8-12 Social Studies certification in Texas make it impossible for the secondary Social Studies teacher to show competence in all six domains demonstrated by academic transcript analysis of completed coursework in the six domains (i. e. Economics, Geography, Government, History, Psychology, Sociology) through the completion of coursework. It is highly unlikely that individuals would have more than a major and perhaps a minor in two of these domains let alone six of the domains. Although these individuals are considered highly qualified under No Child Left Behind legislation and Texas state guidelines, the amount, depth, and breadth of their coursework in their certification field is contrary to the intent of No Child Left Behind legislation.

In Texas, high school graduates are required to take four credits of Social Studies courses as a graduation requirement. Students are required to complete one credit (one year) of World Geography, World History, and U.S. History. Additionally, students are required to complete one-half credit (one semester) of Economics and Government. This means that it is likely that a student will have a Social Studies teacher that does not have content coursework in their teaching assignment. For example, in this test group sample (Figure 6), half of the individuals had completed upper-level coursework in only two of the six domains. In this sample test group, 78.5% of participants had upper-level coursework in Geography which is a required course for high school freshmen. Over 35% of the test group did not have upper-level coursework in Government and 85.7% of the participants had no upper-level coursework in Economics, which should be considered a significant problem given that all Texas high school seniors take Government and Economics as requirements for graduation. The impact of teachers not prepared in all of the areas they are certified to teach warrants further research.

Table 32

Fields that are considered (closely related) when determining a secondary teachers' highly qualified *status for the grades 8-12 History certification field*

Certification Field	Closely Related Field
Civics and Government	Economics
	Geography
	History
	Political Science
Economics	Geography
	Government
	History
	Political Science
Geography	Economics
	Government
	History
	Political Science
History	Economics
	Geography
	Government
	Political Science

Summary of Conclusions and Discussion of Research Question 1a

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

> a. How many upper-level content area courses (at or above the junior level) have Secondary Online Post-Baccalaureate Teacher certification students earned in their certification field?

All test groups.

Among the five test groups (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies) examined in this study, the grades 8-12 English Language Arts and Reading test group and the grades 8-12 Life Science test group have the most upper-level content area coursework. In addition, the grades 8-12 Mathematics test group and the grades 8-12 Social Studies test group have the lowest maximum number of courses among the sample test groups. The grades 8-12 Mathematics test group represents the lowest for the median and the mean on the upper-level content area coursework variable. A one-way analysis of variance (Table 11) shows there is a statistically significant difference F (4, 139) = 9.334; $p < .001$ between the groups for the independent variable, number of upper-level content area courses. The results of the Tukey *HSD* for the variable number of upper-level content area courses show statistically significant differences for the test group grades 8-12 Life Science and for the test group grades 8-12 English Language Arts and Reading. The test group grades 8-12 Life Science was statistically significantly different in terms of upper-level content area courses compared to the grades 8-12 History, grades 8-12 Mathematics, and grades 8-

12 Social Studies test groups' upper-level content area coursework ($p < .05$). Perhaps academic degrees in this content area greatly exceed the academic major of thirty to thirty-six semester credit hours because many Biology programs are designed for students who will study medicine in the future. Typically, they are not designed for students who want to become secondary teachers.

A second area where statistically significant differences were found is for the number of upper-level content area courses completed was in the grades 8-12 English Language Arts and Reading test group. The test group grades 8-12 English Language Arts and Reading was statistically significantly different in terms of upper-level content area courses compared to the grades 8-12 History and grades 8-12 Mathematics test groups' upper-level content area coursework ($p < .05$). It was found in this sample test group that a large number of the individuals have completed Master's degrees in English.

Introduction to Conclusion and Discussion for Research Question 1b

In this section the conclusions and discussion for research question 1b, regarding the upper-level content area grade point average in the certification field for individuals in the sample will be reviewed. Each of the five content areas examined in this study will be sequentially discussed (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, grades 8-12 Social Studies) and followed by a summary of the major findings for the total sample group.

Conclusion and Discussion for Research Question 1b

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

> b. What is the upper-level content area grade point average of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program?

English Language Arts and Reading.

As shown in Table 14 and Figure 7, the grades 8-12 English Language Arts and Reading test group median for upper-level content area grade point average was 3.525 and the mean was 3.535. The range for the sample (N=50) was 2.710 to 4.000. The upper-level English Language Arts and Reading content area grade point average for forty-seven out of fifty individuals (94%) was 3.0 or higher. In addition, 56% of the test group (N=50) had a grade point average of 3.5 or higher.

The upper-level content area grade point average of these individuals fit the national trend of grade point average for Humanities undergraduate majors. Using data from the 1999-2000 Bachelor's Degree and Beyond, the National Center for Education Statistics reports that the grade point average in the academic major for students in the field of Humanities is 3.45 (United States Department of Education, 2001). The sample of individuals in the grades 8-12 English Language Arts and Reading test group exceed this national average for grade point average.

According to No Child Left Behind legislation, these individuals meet the implicit high grade point average expectation of a highly qualified secondary English Language Arts and Reading teacher. These individuals have a firm understanding of the knowledge that they possess. Traditionally, the grades associated with a particular course represent varying levels of mastery for the content and process knowledge associated with that course. For example, a student who receives a letter grade of "C" in a course is thought to take away less knowledge than a student who earned a grade of "A" in the course. Therefore, the grades 8-12 English Language Arts and Reading test group in this sample appear to represent a group who are very knowledgeable about the content area of English Language Arts and Reading. However, it has not escaped the author's attention that the selectivity of the university, the rigor of the course, and the professor are variables that greatly influence this assumption.

Conclusion and Discussion for Research Question 1b

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

b. What is the upper-level content area grade point average of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program?

History.

As shown in Table 14 and Figure 8, the grades 8-12 History test group median for upper-level content area grade point average was 3.400 and the mean was 3.332. The range for the sample (N=36) was 2.130 to 4.000. Sixteen of the thirty-six individuals (44.4%) in the grades 8-12 History test group have an upper-level History grade point average of 3.5 or higher. In addition, twenty-eight out of thirty-six students (77.7%) have an upper-level History grade point average of 3.0 or higher. Only eight of the thirty-six individuals (22.2%) in the grades 8-12 History group have a grade point average below 3.0.

Similar to the grades 8-12 English Language Arts and Reading test group, the grades 8-12 History test group demonstrates high upper-level content area grade point averages overall which according to No Child Left Behind legislation, meets the implicit high grade point average expectation of a highly qualified secondary History teacher.

World History and American History are required courses for all high school students in Texas. It is the implicit assumption of No *Child Left Behind* legislation that individuals who have demonstrated content area competence via a high grade point average will be most likely to convey higher level knowledge and understanding of History to the students that they teach and to increase the academic achievement of these students as measured with state tests.

In addition, similar to the grades 8-12 English Language Arts and Reading test group, the upper-level content area grade point average of the grades 8-12 History test group is comparable to the national trend of grade point average for Humanities undergraduate majors. Using data from the 1999-2000 Bachelor's Degree and Beyond, the National Center for Education Statistics reports that the grade point average in the academic major for students in the field of Humanities is 3.45 (United States Department of Education, 2001). The sample of individuals in the grades 8-12 History test group exceeds this national average for grade point average.

Conclusion and Discussion for Research Question 1b

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

> b. What is the upper-level content area grade point average of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program?

Life Science.

As shown in Table 14 and Figure 9, the grades 8-12 Life Science test group median for upper-level content area grade point average was 3.190 and the mean was 3.173. The range for the sample (N=18) was 2.400 to 4.000. Eleven out of eighteen students (61.1%) showed an upper-level content area grade point average of 3.0 or higher for Life Science coursework. Seven of eighteen students (38.8%) showed a grade point average of 3.5 or higher for upper-level Life Science coursework. Like the upper-level content area grade point average of individuals in the grades 8-12 English

Language Arts and Reading test group and individuals in the grades 8-12 History test group, the grade point average of the grades 8-12 Life Science test group is comparable to the national average put forth by the National Center for Education Statistics showing the average national undergraduate grade point average in a Life Science major to be 3.27 (U. S. Department of Education, 2001).

Individuals in this sample test group will be certified to teach high school Biology and 8th grade science. This is interesting because 8th grade science is interdisciplinary in Texas. This course includes Biology, Chemistry, Physics, Earth Science, and Astronomy. A high grade point average in a Biology or Biology-related major will not prepare an 8th grade science teacher for content fields they may not have studied at all or have studied in very little detail.

Conclusion and Discussion for Research Question 1b

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

> b. What is the upper-level content area grade point average of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program?

Mathematics.

As shown in Table 14 and Figure 10, the grades 8-12 Mathematics test group median for upper-level content area grade point average was 3.185 and the mean was 3.053. The range for the sample (N=26) was 1.700 to 4.000. Fifteen of twenty-six students (57.6%) have grade point average of 3.0 or higher for upper-level content area coursework. Six of twenty-six students (23%) have a grade point average of 3.5 or higher for upper-level content area coursework in Mathematics. Although the percentage of students with a 3.0 grade point average for upper-level content area coursework is lower than other groups examined in this study, considering the rigor of most upper-level Mathematics courses, it is remarkable that this number of individuals in the sample have a grade point average of 3.0 or higher in upper-level Mathematics coursework. The National Center for Education Statistics using findings drawn Baccalaureate and Beyond data, shows the national undergraduate major in Mathematics to be 3.34 (U.S. Department of Education, 2001).

However, lower upper-level content area grade point averages may not be a negative characteristic for this test group. Wilkens (2002) showed that Mathematics teachers with a high grade point average were more likely to teach using traditional methods such as direct instruction than Mathematics teachers with lower grade point averages. Because these individuals may have a natural affinity for Mathematics, they were less inclined to use hands-on teaching techniques such as the use of instructional manipulatives in the classroom although these kinds of methods have been shown to be successful tools of learning for less capable students in Mathematics.

Conclusion and Discussion for Research Question 1b

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

b. What is the upper-level content area grade point average of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program?

Social Studies.

As shown in Table 14 and Figure 11, the grades 8-12 Social Studies test group median for upper-level content area grade point average was 3.405 and the mean was 3.403. The range for the sample (N=14) was 2.860 to 4.000. Twelve out of fourteen students (85.7%) have an upper-level content area grade point average of 3.0 or higher. In addition, six out of fourteen students (42.8%) have an upper-level content area grade point average of 3.5 or higher.

The data for the Social Studies test group is not meaningful because according to Figure 6 these individuals do not have full academic majors in each of the six domains representing the Texas certification field of grades 8-12 Social Studies (i.e., Economics, Geography, Government, History, Psychology, Sociology). For example, the academic majors of these individuals range from such areas as Coaching and Sports, Public Administration, Sociology, Criminal Justice, and History. However, like the grades 8-12 English Language Arts and Reading test group, grades 8-12 History test group, and grades 8-12 Life Science test group, the grades 8-12 Social Studies test group has a comparable upper-level content area grade point average to the national undergraduate major grade point average as reported by the National Center for Educational Statistics. Using findings from the Baccalaureate and Beyond, individuals who have earned a bachelor’s degree in Humanities have an undergraduate major of 3.45 (U.S. Department of Education).

Summary of Conclusions and Discussion of Research Question 1b

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

b. What is the upper-level content area grade point average of post-baccalaureate students in the Secondary Online Post-Baccalaureate Teacher Certification Program?

All test groups.

Among the five test groups (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies) examined in this study, the grades 8-12 English Language Arts and Reading test group and the grades 8-12 Social Studies test group have the highest median and mean upper-level content area grade point averages.

In addition, the grades 8-12 Mathematics test group followed by the grades 8-12 Life Science test group was the lowest in terms of grade point average on upper-level content area coursework. A one-way analysis of variance (Table 15) shows there is a statistically significant difference $F = (4, 139) = 5.733$; $p < .001$ between the groups for the independent variable, upper-level content area grade point average. The results of the Tukey *HSD* for the variable, upper-level content area grade point average show statistically significant differences for only one test group. The grades 8-12 English Language Arts and Reading was statistically significantly different in terms of upper-level content area grade point average compared to the grades 8-12 Mathematics and grades 8-12 Life Science test groups' upper-level content area grade point average ($p < .05$).

The upper-level content area grade point averages of the grades 8-12 English Language Arts and Reading test group, the grades 8-12 History test group, the grades 8-12 Life Science test group, and the grades 8-12 Social Studies test group is comparable to the national average for undergraduate majors in these areas as reported by the National Center for Educational Statistics (U.S. Department of Education, 2001). The Mathematics test group in this sample had a lower upper-level content area grade point average than the national grade point average for Mathematics majors reported by the National Center for Educational Statistics.

The association of grade point average and quality teaching is not a linear relationship; therefore, using high grade point averages as a measure of teacher quality is not supported by research that examines the link between grade point average and teacher retention, grade point average and student achievement (to some extent), and grade point average in the content area and pedagogical knowledge (Darling, Hammond, 2000).

Introduction to Conclusion and Discussion for Research Question 1c

In this section the conclusions and discussion for research question 1c, regarding the months of time elapsed between last upper-level content area coursework in the certification field for individuals and the initial state content examination attempt in the sample will be reviewed. Each of the five content areas examined in this study will be sequentially discussed (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies) and followed by a summary of the major findings for the total sample group.

Conclusion and Discussion for Research Question 1c

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

> c. How many months of time have elapsed between the completion of the last upper-level content area course in the certification field and the months of time the student initially attempted the Texas Examinations of Educator Standards?

English Language Arts and Reading.

As shown in Table 17 and Figure 12, the grades 8-12 English Language Arts and Reading test group median for the months of time elapsed between the last upper-level content coursework and the initial state content examination was 22.500 months (~2 years) and the mode was 5 months. The range for the sample (N=50) was one month to 348 months (29 years) for the variable, months of time elapsed between the last upper-level content coursework and the initial state content examination.

An examination of how recently individuals completed their upper-level course work in English Language Arts and Reading, showed that thirty-seven of the fifty (74%) grades 8-12 English Language Arts and Reading certification students completed coursework in the content field five years preceding the initial attempt on the state content examination. Of the fifty individuals in the sample, 44 individuals (88%) completed their upper-level content area course in the last ten years. The vast majority of these individuals do not appear to be career changers, but rather are recent graduates. These results perhaps challenge the widespread belief that candidates in alternative certification programs are predominantly career changers (Feistritzer, 2005).

Typically, grades 8-12 English Language Arts and Reading certification students who complete a degree, do not take additional coursework in the content field upon admission to the Secondary Online Post-Baccalaureate Teacher Certification Program. Of the fifty individuals in the sample, five individuals (10%) took courses in English Language Arts and Reading after their most recently completed degree.

A concern about how recently the content area coursework was completed revolves around the need to stay updated in one's content field. For example, recent changes in the English Language Arts and Reading curriculum in secondary schools include the assessment of grammar conventions on state-mandated writing tests, the inclusion of multicultural literature, and an emphasis on personal narratives such as memoirs and journals. A person who completed their English degree in 1974 or even in 1985 may not have an updated knowledge base in these areas.

Conclusion and Discussion for Research Question 1c

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

> c. How many months of time have elapsed between the completion of the last upper-level content area course in the certification field and the months of time the student initially attempted the Texas Examinations of Educator Standards?

History.

As shown in Table 17 and Figure 13, the grades 8-12 History test group median for the variable, months of time elapsed between the last upper-level content area coursework and the initial state content examination was 11.500 (~4 years) and the mode was 5 months. The range for the sample (N=36) was one month to 369 months (~31 years).

An examination of how recently individuals completed their upper-level course work in History shows that thirty-one out of thirty-six students (86%) completed the last upper-level content course in History during the last five years preceding the initial attempt on the state content examination. In addition, thirty-two out of the thirty-six students (89%) completed the last upper-level content area course in History within ten years preceding the initial attempt on the state content examination. As with the grades 8-12 English Language Arts and Reading test group, the vast majority of grades 8-12 History individuals do not appear to be career changers, but rather are recent graduates. This number of recent graduates raises the question of whether or not these individuals would pursue teacher certification if alternative certification options were unavailable.

Decades ago, teachers delivered a History curriculum that focused more on topics resulting in shallow rather than deep conceptual understanding of History. Additionally, the kindergarten through grade twelve curriculum was not designed to spiral these topics throughout the educational experience but rather the same topic was taught over and over again to the same depth but at different grade levels. The traditional History curriculum was not designed to expand a student's knowledge on the curricular topics as they moved from grade level to grade level.

Furthermore, traditional History has been taught from an American perspective rather than considering historical events from the non-dominant group's perspective of world events. For example, Hawaii did not become the fiftieth state in the United States because their inhabitants wanted to affiliate with the United States, but rather a group of Americans determined that the acquisition of Pearl Harbor was a necessary strategic military port needed to enhance national security. Like the concerns discussed in the grades 8-12 English Language Arts and Reading test group, a question that arises from this examination is "Will these individuals who completed their upper-level content area coursework more than a decade be able to frame History using a contemporary view?"

Conclusion and Discussion for Research Question 1c

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

c. How many months of time have elapsed between the completion of the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards?

Life Science.

As shown in Table 17 and Figure 14, the grades 8-12 Life Science test group median for the variable, months of time elapsed between the last upper-level content area coursework and the initial state content examination was 18.000 (~1.5 years) and the mode was 5 months. The range for the sample (N=18) was four months to 348 months (29 years). An examination of how recently individuals completed their upper-level course work in Life Science shows that fourteen out of eighteen students (78%) completed the last upper-level content course in Life Science within five years preceding the initial attempt on the state content examination . In addition, sixteen out of eighteen students (89%) completed the last upper-level content area course in Life Science within ten years preceding the initial attempt on the state content examination.

A number of dramatic changes in the Life Science curriculum over the past decade make the currency of teachers' content area knowledge important. For example, the Human Genome Project has radically changed our understandings about DNA sequences and the proteins these sequences code for. Huntington's disease is an example of an autosomal dominant allele responsible for a disorder characterized by abnormal body movements (chorea) and loss of memory. Recent discoveries about the nature of this disorder were made possible because of advances in technology during the 1990s that allowed researchers to rapidly sequence DNA. Similarly, researchers have recently evolved technologies to clone a number of animals such as domesticated cats, sheep, and cows among others. Presently, the race is on to clone the first human. These are examples of the rapidly changing discipline of Life Science and the need for a teacher to possess updated knowledge about subjects his or her students will be interested in and have questions about.

Conclusion and Discussion for Research Question 1c

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

> c. How many months of time have elapsed between the completion of the last upper-level content area course in the certification field and months of time the student initially attempted the Texas Examinations of Educator Standards?

Mathematics.

As shown in Table 17 and Figure 15, the grades 8-12 Mathematics test group mean for the variable, months of time elapsed between last upper-level content coursework and the initial state content examination was 151.808 (~12.5 years); the median was 170.000 months (~14 years); and the mode was 20 months. This group had a large standard deviation of 128.019 (~10.5 years). The range for the sample (N=26) was two months to 401 months (~33.5 years).

An examination of the months of time elapsed between the last upper-level coursework and the initial state examination attempt, shows that eleven out of twenty-six students (42%) completed an upper-level content course in Mathematics within five years preceding the initial attempt on the state content examination. Twelve out of twenty-six students (46.1%) completed their last upper-level content course more than ten years preceding the first attempt on the state content examination. The grades 8-12 Mathematics test group represents a number of career-changing individuals. The downturn of the technology industry is a contributing factor to individuals seeking a new vocation in teaching (Hayasaki, 2003; Murmane et al, 1991).

Similar to Life Science, the landscape of Mathematics education has been undergoing curricular reform as well. For example, the routine use of Mathematics instructional manipulatives and graphing calculators is a recent addition to traditional Mathematics teaching strategies and instruction.

The traditional Mathematics classroom utilized direct instruction followed by student completion of worksheets with practice sets of problems. The contemporary Mathematics teacher in Calculus when teaching students how to find the area under a curve of three dimensional objects constrained by two functions might have students use modeling clay to conceptualize the area they are trying to isolate.

Another example of changes in Mathematics instruction is the use of the graphing calculator to examine logarithmic growth of bacteria. This is a more efficient method to learn this concept because the student no longer has to manually write and graph each coordinate on special paper, but rather with a few touches of the buttons on a graphing calculator, can enter the data and display the graph immediately.

One final example involves solving complex matrix algebra problems which take hours to work on paper. With a graphing calculator, these problems can be solved in a few minutes.

What these examples show is that teachers who completed their upper-level content area coursework prior to these instructional innovations may not have the knowledge base to apply these current Mathematics classroom reforms. Therefore, these teachers will require additional training in order to utilize and learn about these innovations. Teachers in the Secondary Online Post-Baccalaureate Teacher Certification Program who completed their last upper-level content area coursework more than ten years preceding the initial attempt on the state content examination, (46.1%) may require additional training in these innovations before they enter the classroom.

Conclusion and Discussion for Research Question 1c

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

> c. How many months of time have elapsed between the completion of the last upper-level content area course in the certification field and the months of time the student initially attempted the Texas Examinations of Educator Standards?

Social Studies.

As shown in Table 17 and Figure 16, the grades 8-12 Social Studies test group mean for the variable, months of time elapsed between last upper-level content coursework and the initial state content examination was 62.929 months (~5 years); the mode was 7 months; and the median was 34.500 months (~3 years). The range for the sample (N=14) was 7 months to 202 months (~17 years). The standard deviation was 60.369 (~5 years).

An examination of how recently individuals completed their upper-level course work in Social Studies shows that eight out of fourteen students (57%) completed the last upper-level content course in Social Studies within five years preceding the first attempt on the state content examination. In addition, ten out of fourteen students (71.4%) completed the last upper-level content area course in Social Studies within ten years of the initial attempt on the state content examination.

It is difficult to draw inferences concerning the relevance of the variable, months of time elapsed between last upper-level content area coursework and initial state content examination attempt because the candidates in the sample completed different domain coursework (i.e., Economics, History, Geography, Government, Life Science, Social Studies). For example, a teacher may be assigned to teach a high school Economics course but may not have completed any upper-level coursework in Economics. This teacher does not have a measure on the variable, months of time elapsed between the last upper-level content area coursework and the initial state content examination because they do not have any upper-level content area coursework related to their teaching assignment.

Conclusion and Discussion for Research Question 1c

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

c. How many months of time have elapsed between the completion of the last upper-level content area course in the certification field and the months of time the student initially attempted the Texas Examinations of Educator Standards?

All test groups.

Among the five test groups (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies) examined in this study, the mean for the variable, months of time elapsed between last upper-level coursework in the certification field and the initial state content examination, the grades 8-12 History test group was the lowest (49.722 months, ~4 years). The median was 11.5 months. A one-way analysis of variance (Table 18) shows there is a statistically significant difference F (4, 139) = 6.135; $p < .001$ between the groups for the independent variable, months of time elapsed between last upper-level content area coursework and the initial state content examination. The Tukey *HSD* post hoc test was used to determine where the differences occurred for this variable.

The results of the Tukey *HSD* for the variable, months of time elapsed between last upper-level content area coursework and the initial state content examination show statistically significant differences for the test group of grades 8-12 Mathematics and all other test groups. This may indicate that individuals in the Mathematics test group were more likely to be leaving a career they held for a number of years; whereas, individuals in the other test groups entered the Secondary Online Post-Baccalaureate Program upon graduation or were recent graduates who had not been in their chosen career for long.

Perhaps the trend of secondary Mathematics certification candidates completing their coursework much earlier than individuals in other test groups is a result of the economic fluctuations characteristic of the late 1990s and earlier 2000s after a time of relative prosperity in the stock market, especially in high-tech areas. Perhaps these individuals were forced career changers due to the downturn of the stock market, the globalization of high tech jobs, the advances in technology that exceeded the market need (Hayasaki, 2003, Murnane et al, 1991).

A final important aspect related to the grades 8-12 Mathematics test group is that this test group represents the implicit intent of No Child Left Behind legislation to emphasize alternative certification programs that reduce the length of time required to become a teacher as well as funding certain teacher preparation programs that seek career-changing individuals who have diverse life experiences that are not quantifiable but are nonetheless important. For example, federally funded programs such as Troops to Teachers provide a way for retiring military service people and their spouses to begin a new career as a teacher. These individuals are perceived as mature, experienced, and overwhelmingly diverse with many Troops to Teachers candidates being male and persons of color compared to teachers who are traditionally certified and currently teaching in United States public schools (Feistritzer, C. E., 2005b).

Presently, increasing numbers of individuals are brought into the teacher pipeline via alterative certification programs. Many of these individuals have already completed careers that span several decades and may not have engaged in formal content coursework training for many years. Although these individuals help to fill a high-need area such as Mathematics, the impact of streamlined certification programs in terms of aging content area coursework on the achievement of middle school and high school students of Mathematics is an area where further research is warranted.

Introduction to Conclusion and Discussion for Research Question 1d

In this section the conclusions and discussion for research question 1d, regarding the Texas Examinations of Educator Standards scores for individuals in the sample will be reviewed. Each of the five content areas examined in this study will be sequentially discussed (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies) and followed by a summary of the major findings for the total group sample.

Conclusion and Discussion for Research Question 1d

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

d. What are the Texas Examinations of Educator Standards scores of individuals in the sample?

English Language Arts and Reading.

As shown in Table 21 and Figure 17, the grades 8-12 English Language Arts and Reading test group median score for the Texas Examinations of Educator Standards was 267 and the mean was 266. The range for the sample (N=50) was 240 to 295 for the Texas Examinations of Educator Standards score. This group represents the smallest standard deviation (11.427) in terms of content test score. In addition, every individual in the test group received a score of 240 or greater, which is a passing score on the test.

From an examination of the individual’s scores, twenty-eight of the fifty individuals (56%) in the grades 8-12 English Language Arts and Reading test group scored between 260 and 269. In addition, twelve of the fifty (24%) individuals in the test group scored between 270 and 279. Overall, individuals in this test group had the highest passing rate (100%) accompanied by the highest score on the grades 8-12 English Language Arts and Reading Texas Examinations of Educator Standards of any of the test groups.

Compared to the other groups examined in this study, this group scored very well on this test in spite of the fact that they typically have no upper-level coursework in Reading. Thirty percent of the Texas Examinations of Educator Standards in English Language Arts and Reading is comprised of Domain II (Appendix A). This domain assesses literature, reading processes, and skills for reading literary and nonliterary texts, which is approximately 30% of the test. The domain includes two competencies. These are:

- Competency 004: The teacher understands reading processes and teaches students to apply these processes.
- Competency 005: The teacher understands reading skills and strategies for various types of nonliterary texts and teaches students to apply these skills and strategies to enhance their lifelong learning:

Possibly the questions assessing this domain are not of great rigor or individuals in this sample group have gained this knowledge from formal English coursework, informal education, or life experience. Research suggests (Ball, D. L. & McDiarmid, G.W., 1990) that teacher knowledge can be gained in high school, university coursework, or life experience. Obviously, the way this study was structured did not capture how teachers' gained their knowledge of reading processes as it relates to passing the Texas

Examinations of Educator Standards because a large number of individuals passed the examination but did not have any university coursework in Reading. Only three out of fifty individuals had two upper-level courses in Reading before taking the Texas Examinations of Educator Standards.

Conclusion and Discussion for Research Question 1d

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

d. What are the Texas Examinations of Educator Standards scores of individuals in the sample?

History.

As shown in Table 21 and Figure 18, the grades 8-12 History test group median score for the Texas Examinations of Educator Standards was 258 and the mean was 256.17. The range for the sample (N=36) was 215 to 288 for the Texas Examinations of Educator Standards score.

Twenty-five of the thirty-six students (69.4%) in the grades 8-12 History test group scored above 250. In addition, seven of the thirty-six students (19.4%) scored below 240 on this test. The stratification of scores based on intervals of ten shows that higher scoring History students are uniformly distributed across scaled score intervals of 250 to 279.

This data could suggest that the grades 8-12 History certification test compared to the grades 8-12 English Language Arts and Reading certification test does a better job of sorting the candidates' knowledge assessed by the examination. This in turn allows judgments to be made concerning the History knowledge the candidate possess which may be useful for programmatic evaluation of candidates.

Conclusion and Discussion for Research Question 1d

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

d. What are the Texas Examinations of Educator Standards scores of individuals in the sample?

Life Science.

As shown in Table 21 and Figure 19, the grades 8-12 Life Science test group median score for the Texas Examinations of Educator Standards was 248 and the mean was 243.61. The range for the sample (N=18) was 194 to 281 for the Texas Examinations of Educator Standards score.

Six of the eighteen students (33.3%) in the grades 8-12 Life Science test group scored below 240. Other than the grades 8-12 Mathematics test group, the grades 8-12 Life Science test group represents one of the greatest percentage of failures on the initial attempt of the grades 8-12 Life Science Texas Examinations of Educator Standards among any of the groups in this study (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Mathematics, and grades 8-12 Social Studies).

In this group it is highly likely that individuals will score a minimally passing score because in this sample seven of the eighteen students in the grades 8-12 Life Science test group (38.8%) scored between 240 and 259, which is a modest passing score compared to higher scoring groups like the grades 8-12 English Language Arts and Reading test group. It is remarkable that the grades 8-12 Life Science test group had the highest mean for number of upper-level content area courses. Perhaps this suggests that the test is very rigorous. It might also suggest that while the candidate possesses a great deal of discrete knowledge about Life Science, his or her ability to identify or understand broad themes and generalizations of Life Science hinders their performance on the test.

Conclusion and Discussion for Research Question 1d

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

d. What are the Texas Examinations of Educator Standards scores of individuals in the sample?

Mathematics.

As shown in Table 21 and Figure 20, the grades 8-12 Mathematics test group median score for the Texas Examinations of Educator Standards was 260 and the mean was 256.38. The range for the sample (N=26) was 223 to 292 for the Texas Examinations of Educator Standards score.

Eleven out of twenty-six students (42.3%) in grades 8-12 Mathematics test group failed the grades 8-12 Mathematics Texas Examinations of Educator Standards on the initial attempt with a score of less than 240. However, eleven out of twenty-six students (42.3%) in the grades 8-12 Mathematics test group passed the Mathematics test with a score between 270 and 289.

From an examination of the students' undergraduate major, it was determined that the majors of the students failing the test include business management, business administration, two electrical engineering, engineering technology, a double major in psychology and mathematics, and three mathematics majors. Appendix J includes the Texas Examinations of Educator Standards score on the grades 8-12 Mathematics test, the major and the year of graduation for each individual in the Mathematics test group.

Conclusion and Discussion for Research Question 1d

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

d. What are the Texas Examinations of Educator Standards scores of individuals in the sample?

Social Studies.

As shown in Table 21 and Figure 21, the grades 8-12 Social Studies test group median score for the Texas Examinations of Educator Standards was 257 and the mean was 256.21. The range for the sample (N=14) was 230 to 277 for the Texas Examinations of Educator Standards score.

The grades 8-12 Social Studies test group closely follows the grades 8-12 English Language Arts and Reading test group as the highest pass rate for the group with only two individuals not passing the Social Studies test on the initial attempt (14.2% failing). Ten of the fourteen students (71.4%) in the grades 8-12 Social Studies test group scored 250 or above. In addition, six of the fourteen individuals (42.8%) scored between 260 and 279, which is well above passing.

These findings are remarkable in terms of the number of upper-level content area courses completed by individuals in the grades 8-12 Social Studies test group. As shown in Figure 6, none of the fourteen sample participants earned upper-level content coursework that represented each domain of the examination (i.e., Economics, Geography, Government, History, Psychology, and Sociology).

The grades 8-12 Social Studies Texas Examinations of Educator Standards is comprised of six domains (Appendix E). These include:

- World History, which is approximately 17% of the test;
- U. S. History, which is approximately 22% of the test;
- Geography, Culture, and the Behavioral and Social Sciences, which is approximately 17% of the test;
- Government and Citizenship which is approximately 13% of the test;
- Economics, Science, Technology, and Society which is approximately 13% of the test; and
- Social Studies Foundations, Skills, Research, and Instruction which is approximately 17% of the test

From an examination of the undergraduate majors, these students who failed the Texas Examinations of Educator Standards had majors in political science and secondary education with a concentration in social studies. Appendix K shows the Texas Examinations of Educator Standards scores, grades 8-12 Social Studies test group majors, and graduation date. No clear trend emerges from an analysis of the major field of study for the Social Studies test group. Majors included History, Criminal Justice, Political Science, Public Administration (law enforcement), Sociology, Social

Sciences, Secondary Education with a concentration in Social Studies, Coaching and Sports, and Interdisciplinary Studies. A larger test group is needed in order to conduct a more thorough investigation on the influence of major on the Texas Examinations of Educator Standards grades 8-12 Social Studies score. It may also be that the lower-level course work in Social Studies as well as the upper-level course work in Social Studies should be examined as a contributor to passing the Texas Examinations of Educator Standards in Social Studies.

Conclusion and Discussion for Research Question 1d

What is the nature of the content area knowledge of Secondary Online Post-Baccalaureate Teacher Certification students at the University of North Texas?

d. What are the Texas Examinations of Educator Standards scores of individuals in the sample?

All test groups.

According to Table 21, the grades 8-12 English Language Arts and Reading test group (N=50) had the highest mean score of 266 and had the least deviation from the mean with a standard deviation of 11.427. The grades 8-12 English Language Arts and Reading test group scores are skewed with the majority of the scaled scores occurring at the high end of the distribution curve. In addition, none of the individuals failed the grades 8-12 Texas Examinations of Educator Standards English Language Arts and Reading test on the first attempt.

The second highest passing rate was the grades 8-12 Social Studies test group. Over eight out of ten test takers passed the grade 8-12 Social Studies Texas Examinations of Educator Standards on the first attempt.

Of the groups examined, the grades 8-12 Life Science test group had the lowest mean score of 243 (N=18) and the highest variability (*SD*=27.104). The likelihood of failing the grades 8-12 Life Science Texas Examinations of Educator Standards on the first attempt was approximately one out of three.

The likelihood of failing the grades 8-12 Mathematics Texas Examinations of Educator Standards was approximately four out of ten and represented the highest fail rate of the groups examined. Similar to the grades 8-12 Mathematics test group, the grades 8-12 Life Science test group represented more variability for all groups tested in the sample. The standard deviation for Mathematics was 22.434, and the standard deviation for Life Science was 27.104.

A possible explanation for the Texas Examinations of Educator Standards scores for grades 8-12 English Language Arts and Reading clustering at the high end of the curve is that the field of study for this group may closely match the domains and competencies assessed on this examination (Appendix A). In contrast, the field of study for the grades 8-12 Life Science (Appendix C) and grades 8-12 Mathematics certification fields (Appendix D) may not closely match the domains and competencies assessed on this examination. For example, a student who has had a number of upper-level courses in botany and plant morphology will have gained important knowledge about plants and their role in the environment, but the knowledge needed to gain a passing score of the Texas Examinations of Educator Standards in grades 8-12 Life

Science is framed in the context of environmental science and biological evolution. The focus of this test is not on reciting detailed knowledge, but rather understanding broad general themes and how all of the discrete information individuals have learned in their program of study interacts together.

Similarly, domains five and six of the grades 8-12 Mathematics Texas Examinations of Educator Standards content area test measures mathematical processes and perspectives and mathematical learning, instruction, and assessment. These domains are highly related to coursework that would typically be found in a content specific pedagogical mathematics education course. Domains five and six comprise approximately 20% of the test. An analysis of the academic transcripts for individuals in the Mathematics test group (N=26) show that only one individual had mathematics pedagogical content-specific coursework.

The remaining domains of the grades 8-12 Mathematics Texas Examinations of Educator Standards are comprised of domains one to four. These domains assess knowledge of number concepts, patterns and algebra, geometry and measurement, and probability and statistics. Based on academic transcript analysis, it is unclear why an individual with a major in mathematics, electrical engineering, double major in psychology and mathematics, or education with a concentration in integrated mathematics would fail this test. Further research into this area is warranted.

Conclusions and Discussion for Research Question 2 (All Groups)

Research question two asks:

> To what extent does content area coursework predict a passing score on the Texas Examinations of Educator Standards?

This section will review analyses which include:

(1) correlation results between the variable, number of upper-level content area courses and scores on the Texas Examinations of Educator Standards;

(2) linear regression results for the variable, number of upper-level content area courses; and

(3) logistic regression results for the variable, number of upper-level content area courses.

No Child Left Behind legislation states two ways for an individual to be considered a highly qualified new secondary teacher. These include:

(1) passing a rigorous state academic subject test in each of the academic subjects the teacher teaches; or

(2) successful completion, in each of the academic subjects in which the teacher teaches, or an academic major, a graduate degree, coursework equivalent to an undergraduate major, or advanced certification or credentialing (Department of Education, 2002).

Texas complies with the definition of highly qualified by requiring individuals who are seeking certification to successfully complete a content area test in their certification field. It is assumed that mastery of content knowledge demonstrated via a content area test can be transmitted to the classroom and improve student academic achievement.

By choosing to comply with No Child Left Behind legislation in this way, the State Board for Educator Certification assumes that a passing score on a content area test demonstrates sufficient knowledge for teaching in a particular content area in Texas regardless of where individuals obtained their content area knowledge. This knowledge might be obtained through successful completion of college or university coursework. This knowledge might be obtained through informal knowledge and life experience as well (Ball and McDiarmid, 1990).

The assumption that a passing score on the academic content area test demonstrates the knowledge required of a highly qualified teacher regardless of where the knowledge was obtained was upheld by the findings of this study because the variable, number of upper-level content area courses was not a statistically significant predictor for passing the Texas Examinations of Educator Standards for all test groups in the study.

According to Tables 24 and 25, the variable, number of upper-level content area courses in the certification field was not correlated with scores on the Texas Examinations of Educator Standards, nor was it a predictor of passing the Texas Examinations of Educator Standards at a statistically significant level ($p < .05$) for any of the test groups. Therefore, there is a mismatch between the content area tests created by the National Evaluations Systems to test the content knowledge of individuals seeking to become teachers in Texas, and the academic degree programs that are approved by The Texas Higher Education Coordinating Board, which approves academic programs for all colleges and universities in Texas as well as other boards that govern higher education academic programs in other states.

This finding that upper-level content area coursework was not a predictor for passing the content area portion of the Texas Examinations of Educator Standards clouds the definition of a highly qualified teacher as defined by No Child Left Behind. No Child Left Behind legislation calls for more academic content knowledge; however, teachers' coursework in their content field was not a predictor of their success on the Texas certification test, the marker of a highly qualified teacher in Texas.

Conclusions and Discussion for Research Question 3 (All Groups)

Research question three asks:

> To what extent does grade point average predict a passing score on the Texas Examinations of Educator Standards?

This section will review analyses which include:

(1) correlation results between the variable, upper-level content area grade point average and scores on the Texas Examinations of Educator Standards;

(2) linear regression results for the variable, upper-level content area grade point average; and

(3) logistic regression results for the variable, upper-level content area grade point average.

Another finding of this study shown in Table 28, is that the variable, upper-level content area grade point average was positively correlated with scores on the Texas Examinations of Educator Standards for the grades 8-12 English Language Arts and Reading test group (r = .293, p = .039) and for the grades 8-12 History test group (r = .348, p = .038). This means that higher upper-level content area grade point averages in these two test groups are related to higher scores on the Texas Examinations of Educator Standards. This finding, that upper-level content area grade point average is correlated with the Texas Examinations of Educator Standards scores may be useful as an admission factor for screening potential candidates in grades 8-12 English Language Arts and Reading and grades 8-12 History certification fields. However, it should also be noted that in this study upper-level content area grade point average for individuals seeking certification in grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies is not correlated with scores on the Texas Examinations of Educator Standards and perhaps should not be used as a factor to screen potential applicants in these certification fields.

In addition, Table 27 shows the results of a linear regression analysis that was used to examine the relationship of upper-level content area grade point average and the Texas Examinations of Educator Standards score. This study found that upper-level content area grade point average accounted for 12.5% of the variance among scores on the grades 8-12 History test of the Texas Examinations of Educator Standards. Again, this could be an important finding for program administrators of post-baccalaureate teacher certification programs for setting admissions standards for students seeking teacher certification in grades 8-12 History.

In the logistic regression analysis (Table 29) the variable, upper-level content area grade point average was the only variable in the model that was statistically significant ($p = .017$) for the grades 8-12 History test group. The *exp(B)* = 33.610 indicated that the odds of passing the grades 8-12 History Texas Examinations of Educator Standards are 33.610 times greater with every one unit increase of an individual’s upper-level content area grade point average. For example, this means that on average a student with an upper-level content area grade point average of 3.8 in his or her History coursework is approximately thirty-three times more likely to pass the grades 8-12 History Texas Examinations of Educator Standards than an individual who has a 2.8 in his or her History coursework. This is a logical finding as success in university coursework that includes the traditional academic pursuits of test taking will correlate with future test taking as was found in this study.

In addition, this finding may have implications for teacher certification providers who do not prepare candidates in their content fields yet are held accountable for their passing rates on content area examinations. From the results of this study, care should be taken in setting a low grade point average for purposes of admission, at least in the certification field of grades 8-12 History. Potential students may struggle to pass the Texas Examinations of Educator Standards, and indeed, they may never pass the test and have spent thousands of dollars in an unsuccessful attempt to become a certified teacher.

More research is needed here to understand the role of upper-level content area grade point average in predicting passing scores on the Texas Examinations of Educator Standards in other content areas using a larger and more varied sample of passing and failing scores. Further research in this area is warranted as the post-baccalaureate certification programs continue to serve increasing numbers of teacher certification candidates.

Conclusions and Discussion for Research Question 4 (All Groups)

Research question four asks:

> To what extent does the time elapsed between the last upper-level content area course in the certification field and the time the student initially attempted the Texas Examinations of Educator Standards predict a passing score on the Texas Examinations of Educator Standards?

This section will review analyses which include:

(1) correlation results between the variable, months of time elapsed between last upper-level content area coursework and the initial state content examination;

(2) linear regression results for the variable, months of time elapsed between last upper-level content area coursework and the initial state content examination; and

(3) logistic regression results for the variable, months of time elapsed between last upper-level content area coursework and the initial state content examination.

According to Table 30, for the variable, months of time elapsed between the last upper-level content area coursework and the initial state content examination, only the grades 8-12 History test group showed a correlation at the statistically significant level (r = .353, p = 035). Individuals with higher scores on the Texas Examinations for Educators Standards in grades 8-12 History completed their coursework longer ago than individuals with lower scores on the grades 8-12 History test.

As shown in Tables 26, the summary of regression shows that the grades 8-12 History group was the only group that was statistically significant F (3, 32) = 3.542, p = .025 in the linear regression analysis. According to Table 27, the Beta weights and structure coefficients for the grades 8-12 History test group were positively correlated. This means that the longer ago students completed their certification coursework the more likely they were to perform better on the Texas Examinations for Educator Standards in grades 8-12 History. In addition, the variable, months of time elapsed between last upper-level content area coursework and the initial state content examination accounts for 13.1% of the variance among grades 8-12 History scores on the Texas Examinations for Educator Standards (p = .027).

For the logistic regression analysis as shown in Table 31, the variable, months of time elapsed between last upper-level content area coursework and the initial state content examination was statistically significant (p = .039) for only the grades 8-12 Mathematics test group. The *exp(B)* = 1.008 indicates the odds of passing the grades 8-12 Mathematics Texas Examinations of Educator Standards are 1.008 times greater with every one month of time elapsed between the last upper-level content area coursework and the initial attempt on the state content examination. For example, this means that on average a student who completed his or her certification field coursework five months prior to taking the state content examination has approximately a 1% better chance of passing the Texas Examinations of Educator Standards in grades 8-12 Mathematics than someone who completed his or her upper-level content area coursework four months prior to taking the state content examination.

These findings uphold the No Child Left Behind legislation emphasis on streamlined routes to teaching that do not place expiration dates on teacher knowledge. This means that the legislation does not value when academic coursework or content area knowledge was obtained, and does not bar an individual from being considered highly qualified if he or she completed content area coursework requirements long ago.

However, more research is needed in this area to better understand how individuals prepare and review for the Texas Examinations of Educator Standards in the grades 8-12 History test group and other test fields. Perhaps understanding how individuals activate their content area knowledge as they prepare for the examination would further explain this variance among Texas Examinations of Educator Standards scores. For example, how much time does an individual spend preparing for the test and what resources do they use to study for the examination. This kind of information may further elucidate the role of the age of content area coursework.

Conclusion and Discussion of Linear and Logistic Regression (All Groups)

Perhaps the greatest finding of this study is that the three predictors used in this study: number of upper-level content area courses completed in the certification field, upper-level content area grade point average, and months of time elapsed between the upper-level content area coursework and the initial state content examination were not strong predictors of success on the Texas Examinations of Educator Standards. This is true for all of the content areas examined in the study (grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies). Results shown in Table 25 indicate that the only test group which was statistically significant (p =.025) using the three-predictor linear regression model was the grades 8-12 History test group. Within the History test group, however, the model performed well with approximately 25% of the variance among scores being accounted for by two variables, upper-level content area grade point average and months of time elapsed between last upper-level content area coursework and the initial state content examination (Table 27). Approximately 12.5% of the variance can be attributed to the variable, upper-level content area grade point average and 13.1% of the variance among scores can be attributed to the variable, months of time elapsed between last upper-level content area coursework and the initial state content examination.

In the logistic regression analysis (Table 29), only the History test group model correctly classified a higher percentage of passing scores (86.1%) on the Texas Examinations of Educator Standards compared to the null model (82.4%). This means that the logistic regression analysis was better able to classify passing and not passing scores on the Texas Examinations of Educator Standards without the three predictors present in the model compared to the other test groups than with the three predictors present in the model.

This implies that variables other than the ones used in this study should be examined for their efficacy in predicting passing scores on the Texas Examinations of Educator Standards. For example, perhaps measures of motivation, aptitude in test taking, study skills, and materials used to study for the examinations are better predictors of success on the Texas Examinations for Educator Standards than the variables used in this study.

Assuming that number of upper-level content area courses, upper-level content area grade point average, and age of upper-level content area coursework are indicators of teacher content knowledge, the validity of the Texas Examinations of

Educator Standards is suspect. Perhaps the individuals who perform well on the test are good test takers. Data in Appendices G – K shows the pass and fail rates of candidates taking the content area portion of the Texas Examinations of Educator Standards according to the selectivity of the college or university attended. Once again, care should be taken in considering these results since selectivity indexes are not comparable when institutions are not of the same size, have the same degree granting capacity, and located within the same region.

Summary

Beginning in the 19th century, a liberal arts education was used to prepare secondary teachers. Beginning in the 1930s, the landscape for secondary teacher preparation began to situate secondary teacher preparation in four-year colleges and universities, a dramatic evolution in which teachers were provided both content instruction and instruction in pedagogy (Feiman-Nemser, 1990; Zeichner & Liston, 1990).

No Child Left Behind legislation, which emphasizes content preparation and de-emphasizes pedagogical knowledge, creates an educational context which is similar to the 19th century model in which a liberal arts education was purported to provide secondary teachers with the knowledge that they needed to teach. Under No Child Left Behind legislation a teacher is considered a highly qualified teacher if they hold a minimum of a bachelor’s degree and have passed a state academic subject test in the area the teacher teaches (Public Law 107-110, 2002).

In addition, the testing of teacher content knowledge related to the definition of a highly qualified teacher contained in the No Child Left Behind legislation has influenced several areas of educational policy, one of which is teacher certification and preparation. The No Child Left Behind emphasis on academic content knowledge as measured by teacher testing has become the hallmark of a highly qualified teacher although since the 1970s teacher testing has been a strongly advocated by those individuals associated with the accountability movement (Conley, 2003).

For the past three decades or more, proponents of the accountability movement have lobbied policymakers to seek an efficient means to improve the academic caliber of prospective teachers (Latham et al, 1999). This served as a catalyst for the exponential growth in teacher testing that occurred during the 1980s and 1990s. Prior to the teacher testing movement, colleges and universities via academic and teacher education programs approved by higher education boards, were empowered to recommend teacher candidates for state certification. Almost overnight, policymakers usurped the power of education experts housed within colleges of education and became the new authority to determine the components that yield a quality teacher. One of these components included teacher testing. No longer would colleges and universities be the sole providers of teacher preparation and teacher certification, but alternative certification programs offered by private commercial entities would compete with universities and colleges to prepare teachers.

. It is clear the business of testing is and will continue to be big business in Texas. With the exception of grades 8-12 History test takers, content area coursework, upper-level content area grade point average, and recent completion of coursework were not statistically significant predictors for passing the Texas Examinations of Educator Standards. Because of this finding, testing will become an even bigger business as candidates purchase test preparation books and attend test preparation seminars in an effort to align their knowledge with the knowledge assessed on the test.

Although one purpose of the No Child Left Behind legislation reliance on teacher testing was to eliminate the role of gatekeepers in higher education, this study suggests that tests create another kind of gatekeeper, a gatekeeper which ignores content preparation, high success in terms of upper-level content area grade point average, and university admissions selectivity.

It has not escaped this researcher that using teacher testing as a marker of teacher knowledge is an efficient and cost-effective way to measure teacher knowledge. However, teacher knowledge is a complex variable to measure and has not been the focus of national data collection efforts in a way that will capture the subtle nuances of true quality teaching.

However, this researcher believes pedagogical training should also be a requirement for teacher certification and/or a teaching license. Until the advent of No Child Left Behind legislation, no one ever suggested that knowing “how to teach” was not as important as knowing the “content taught.” In California and Texas, what was once the teaching floor has now become the teaching ceiling as these states and others continue to eliminate certification safety nets at an alarming rate. For example, a teacher candidate may have few courses in a content area, but if he or she is able to pass the state examination, mastery of content field is assumed. Furthermore, in Texas the candidate may take and retake the exam until it is passed as there is no limit on the number of times the teacher content area competency test may be taken. In this instance, No Child Left Behind legislation has actually served to lower teacher quality by lowering the certification standards of states whose programs previously were offered as models of excellence.

One of the most important reasons teacher knowledge is important is because it has been shown to influence student academic achievement (Darling-Hammond, 2003). As No Child Left Behind suggests the teacher test is the sole criteria of teacher knowledge then it would follow that any teacher who can pass a test will be able to positively affect the achievement of students in his or her classes. A finding from this study showed that everyone in the grades 8-12 English Language Arts and Reading test group passed the grades 8-12 English Language Arts and Reading Texas Examinations of Educator Standards on the first attempt; yet only three individuals had completed formal university coursework in Reading. As Texas becomes more diverse and the United States becomes more diverse, these individuals should be able to bring out achievement among second language learners, as well as struggling and reluctant readers. However scores on state student assessments in Texas (Texas Assessment of Knowledge and Skills) do not indicate this achievement among these groups of students (*2004-2005 School Report Cards*, Texas Education Agency, 2005).

The results of this study indicate that the Texas Examinations of Educator Standards is a poor indicator of teacher knowledge. Although candidates in the Secondary Online Post-Baccalaureate Teacher Certification Program had significant numbers of upper-level courses in their content field, high grade point averages in their upper-level content area courses, and most candidates with the exception of grades 8-

12 Social Studies had academic degrees in a content field highly related to their certification area (e.g., Life Science certification and a Biology degree or Mathematics certification and a Mathematics degree), many students in grades 8-12 Life Science and grades 8-12 Mathematics did not pass the Texas Examinations of Educator Standards on the initial attempt. For example, the fail rate for grades 8-12 Life Science was approximately one out of three and the fail rate for grades 8-12 Mathematics was approximately four out of ten.

On the other hand, the candidates in the grades 8-12 Social Studies test group had the least subject matter preparation in terms of their broad field preparation (Economics, History, Geography, Government, Psychology, Sociology), yet this group had the second highest pass rate among the groups examined. This study raises two questions:

- How is it possible for students with degrees in their certification field to fail to pass their certification test?
- How is it possible for individuals with degrees in one of the sub fields of the Social Studies test and no coursework in some of the sub fields of the Social Studies test, to pass the test?

This researcher can only conjecture that the grades 8-12 Social Studies Texas Examinations of Educator Standards lacks rigor, the passing rate is set very low, or there is overlap of topics within the sub fields in university coursework that is not recognizable from an analysis of academic transcripts.

There is a substantial body of research knowledge regarding the importance of content area preparation and grade point average; however, in this study, candidates showed high grade point averages, but the upper-level content area grade point average was not a statistically significant factor related to passing the Texas Examinations of Educator Standards for all groups except the grades 8-12 History test group. For example, the mean upper-level content area grade point average for the grades 8-12 English Language Arts and Reading test group was 3.535. Even the lowest mean for upper-level content grade point average in grades 8-12 Mathematics was 3.053. It is difficult to imagine factors more related to passing a state content test than the content coursework taken and the grade point average for that coursework.

Implications

Coursework taken at the university level may not be aligned with the Texas Examinations of Educator Standards; therefore, programs may desire to develop diagnostic tests of content area knowledge related to this examination.

A second implication for grades 8-12 History test takers is that upper-level content area grade point average is statistically significantly related to a passing score on the Texas Examinations of Educator Standards. Programs should consider using upper-level content area grade point average for admission to teacher certification programs for the target certification area of grades 8-12 History.

A third implication for the grades 8-12 English Language Arts and Reading test group is that these students are able to pass the grades 8-12 English Language Arts and Reading Texas Examinations of Educator Standards without the benefit of completing formal coursework in Reading. This researcher is not suggesting that formal coursework in Reading is not warranted; however, completion of this coursework prior to taking the grades 8-12 English Language Arts and Reading Texas Examinations of Educator Standards may not be necessary.

A fourth implication for the grades 8-12 English Language Arts and Reading test group is that the grades 8-12 English Language Arts and Reading Texas Examinations of Educator Standards should be examined for rigor. This study showed candidates' scores clustered at the high end of the distribution of scaled scores. In this study this test does not appear to sort the knowledge of candidates well. The state test developers of this test should re-examine the rigor or the set pass rate for this examination.

A fifth implication for the grades 8-12 Life Science test group is that high numbers of upper-level content area coursework is not related to passing the Texas Examinations of Educator Standards. Although the grades 8-12 Life Science test group had the highest mean for upper-level content area coursework (11.833) and the highest median (11), approximately one out of three individuals taking the grades 8-12 Life Science Texas Examinations of Educator Standards failed on the initial attempt. Perhaps study guides or test preparation seminars may be beneficial to help these individuals organize the knowledge necessary to pass this test.

A sixth implication for the grades 8-12 Mathematics test group is that approximately 20% of the Mathematics Texas Examinations of Educator Standards assesses pedagogical content knowledge which was detected in only one candidate's academic transcript. Perhaps individuals seeking grades 8-12 Mathematics certification would benefit from at least one content specific pedagogical course prior to taking the examination.

An seventh implication for the grades 8-12 Social Studies test group is that any academic major related to Social Studies (Criminal Justice, Sociology, and Public Administration) appear to function equally well with regard to passing the grades 8-12 Social Studies Texas Examinations of Educator Standards. Seven of the individuals in the test group (N=14) had upper-level content area coursework in two of the six domains, but only two out of fourteen individuals failed the test. Therefore, admission criteria which requires coursework in each of the domains (Economics, Geography, Government, History, Psychology, Sociology) in the grades 8-12 Social Studies certification is not warranted.

An eighth implication of this study is for policy makers who should re-examine the validity of the content area Texas Examinations of Educator Standards in the fields of grades 8-12 English Language Arts and Reading, grades 8-12 History, grades 8-12 Life Science, grades 8-12 Mathematics, and grades 8-12 Social Studies. When traditional measures of teacher content knowledge do not triangulate with the scores on the Texas Examinations of Educator Standards, it raises concerns about the validity of the testing instrument as a measure of teacher knowledge. Furthermore, if Texas Examinations of Educator Standards scores cannot be triangulated to Texas Acquisition of Knowledge and Skills, then the use of teacher content tests should be discontinued.

Recommendations for Further Research

This study may have been constrained by the requirements of the Secondary Online Teacher Certification Program from which the sample was drawn by not allowing for a greater variability among the sample participants on the variables examined; therefore, this study should be replicated using state-wide data drawn from a variety of teacher preparation providers with differing admissions requirements. In addition, further research should examine a sample that includes more parity among passing and failing scores on the content portion of the Texas Examinations of Educator Standards. The larger groups might produce different results because statistical significance is easier to achieve with larger sample sizes. Additionally, the generalizability of the study would increase with larger samples drawn from state-wide groups.

Furthermore, although this study examined the content area knowledge of alternative certification candidates, researchers should further investigate how subject matter knowledge is acquired for both traditional certification candidates and alternative certification candidates through other avenues beyond college or university coursework. Since the variable number of courses was not found to be statistically significant in relation to scores on the Texas Examinations of Educator Standards content area tests, other sources of teacher knowledge should be examined. For example, researchers should examine teacher knowledge gained in high school as well as teacher knowledge gained from life experience.

Lastly, future studies of this nature should investigate variables associated with gender and ethnicity as predictors for passing the Texas Examinations of Educator Standards. The sample from which this study was drawn was largely a homogeneous group of white, female secondary certification candidates, and perhaps a sample comprised of a greater demographic diversity would yield different results.

APPENDIX A

TEST FRAMEWORK FOR FIELD 131: ENGLISH LANGUAGE ARTS AND READING

Domain I – Integrated Language Arts; Diverse Learners, and the Study of English

(approximately 15% of the test)

- Competency 001: The teacher understands and applies knowledge of relationships among the language arts and between the language arts and other aspects of students' lives and learning.

- Competency 002: The teacher is aware of the diversity of the student population and provides instruction that is appropriate for all students.

- Competency 003: The teacher understands the structure and development of the English language and provides students with opportunities to develop related knowledge and skills in meaningful contexts.

Domain II – Literature, Reading Processes, and Skills for Reading Literary and

Nonliterary Texts (approximately 30% of the test)

- Competency 004: The teacher understands reading processes and teaches students to apply these processes.

- Competency 005: The teacher understands reading skills and strategies for various types of nonliterary texts and teaches students to apply these skills and strategies to enhance their lifelong learning.

- Competency 006: The teacher understands literary elements, genres, and movements and demonstrates knowledge of a substantial body of literature.

- Competency 007: The teacher understands strategies for reading literary texts and provides students with opportunities to formulate, express, and support responses to literature.

Domain III – Written Communication (approximately 40% of the test)

- Competency 008: The teacher understands and promotes writing as a recursive, developmental, integrative, and ongoing process and provides students with opportunities to develop competence as writers.

- Competency 009: The teacher understands effective writing and teaches students to write effectively in a variety of forms and for various audiences, purposes, and contexts.

Domain IV – Oral Communication and Media Literacy (approximately 15% of the test)

- Competency 010: The teacher understands principles of oral communication and promotes students' development of listening and speaking skills.

- Competency 011: The teacher understands and teaches basic principles of media literacy and provides students with opportunities to apply these principles in interactions with media.

APPENDIX B

TEST FRAMEWORK FOR FIELD 133: HISTORY 8-12

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Domain I: World History (approximately 37% of the test)

- History: The social studies teacher applies knowledge of significant historical events and developments as well as of multiple historical interpretations and ideas, in order to facilitate student understanding of relationships between the past, the present, and the future.

- Geography: The social studies teacher applies knowledge of people, places, and environments to facilitate students' understanding of geographic relationships in Texas, the United States, and the world.

- Economics: The social studies teacher knows how people organize economic systems to produce, distribute, and consume goods and services, and uses this knowledge to enable students to understand economic systems and make informed economic decisions.

- Government: The social studies teacher knows how governments and structures of power function, provide order, and allocate resources and uses this knowledge to facilitate student understanding of how individuals and groups achieve their goals through political systems.

- Citizenship: The social studies teacher understands citizenship in the United States and other societies, and uses this knowledge to prepare students to participate in our society through an understanding of democratic principles and citizenship practices.

- Culture: The social studies teacher understands cultures and how they develop and adapt, and uses this knowledge to enable students to appreciate and respect cultural diversity in Texas, the United States, and the world.

- Science, Technology, and Society: The social studies teacher understands developments in science and technology, and uses this knowledge to facilitate student understanding of the social and environmental consequences of scientific discovery and technological innovation.

Domain II: U.S. History (approximately 42% of the test)

- History: The social studies teacher applies knowledge of significant historical events and developments as well as of multiple historical interpretations and ideas, in order to facilitate student understanding of relationships between the past, the present, and the future.

- Geography: The social studies teacher applies knowledge of people, places, and environments to facilitate students' understanding of geographic relationships in Texas, the United States, and the world.

- Economics: The social studies teacher knows how people organize economic systems to produce, distribute, and consume goods and services, and uses this knowledge to enable students to understand economic systems and make informed economic decisions.

- Government: The social studies teacher knows how governments and structures of power function, provide order, and allocate resources and uses this knowledge to facilitate student understanding of how individuals and groups achieve their goals through political systems.

- Citizenship: The social studies teacher understands citizenship in the United States and other societies, and uses this knowledge to prepare students to participate in our society through an understanding of democratic principles and citizenship practices.

- Culture: The social studies teacher understands cultures and how they develop and adapt, and uses this knowledge to enable students to appreciate and respect cultural diversity in Texas, the United States, and the world.

- Science, Technology, and Society: The social studies teacher understands developments in science and technology, and uses this knowledge to facilitate student understanding of the social and environmental consequences of scientific discovery and technological innovation.

Domain III: Foundations, Skills, Research, and Instruction (approximately 21% of the test)

- The social studies teacher has a comprehensive knowledge of the social sciences and recognizes the value of the social sciences.
- The social studies teacher effectively integrates the various social science disciplines.
- The social studies teacher uses knowledge and skills of social studies, as defined by the Texas Essential Knowledge and Skills (TEKS), to plan and implement effective curriculum, instruction, assessment, and evaluation.

APPENDIX C

TEST FRAMEWORK FOR FIELD 138: LIFE SCIENCE 8-12

Domain I: Scientific Inquiry and Processes (approximately 15% of the test)

- The science teacher manages classroom, field, and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens.

- The science teacher understands the correct use of tools, materials, equipment, and technologies.

- The science teacher understands the process of scientific inquiry and its role in science instruction.

- The science teacher understands the history and nature of science.

- The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions.

- The science teacher knows unifying concepts and processes that are common to all sciences.

Domain II: Cell Structure and Processes (approximately 20% of the test)

- The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS] in life science.

Domain III: Heredity and Evolution of Life (approximately 20% of the test)

- The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS] in life science.

Domain IV: Diversity of Life (approximately 20% of the test)

- The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS] in life science.

Domain V: Interdependence of Life and Environmental Systems (approximately 15% of the test)

- The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS] in life science.

Domain VI: Science Learning, Instruction and Assessment (approximately 10% of the test)

- The science teacher has theoretical and practical knowledge about teaching science and about how students learn science.

- The science teacher knows the varied and appropriate assessments and assessment practices to monitor science learning.

APPENDIX D

TEST FRAMEWORK FOR FIELD 135: MATHEMATICS 8-12

Domain I: Number Concepts (approximately 14% of the test)

- Number Concepts: The mathematics teacher understands and uses numbers, number systems and their structure, operations, and algorithms, quantitative reasoning, and technology appropriate to teach in statewide curriculum (Texas Essential Knowledge and Skills [TEKS] in order to prepare students to use mathematics.

Domain II: Patterns and Algebra (approximately 33% of the test)

- Patterns and Algebra: The mathematics teacher understands and uses patterns, relations, functions, algebraic reasoning, analysis, and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS] in order to prepare students t use mathematics.

Domain III: Geometry and Measurement (approximately 19% of the test)

- Geometry and Measurement: The mathematics teacher understands and uses geometry, spatial reasoning, measurement concepts and principles, and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS] in order to prepare students to use mathematics.

Domain IV: Probability and Statistics (approximately 14% of the test)

- Probability and Statistics: The mathematics teacher understands and uses probability and statistics, their applications, and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS] in order to prepare students to use mathematics.

Domain V: Mathematical Processes and Perspectives (approximately 10% of the test)

- Mathematical Processes: The mathematics teacher understands and uses mathematical processes to reason mathematically, to solve mathematical problems, to make mathematical connections within and outside of mathematics, and to communicate mathematically.

- Mathematical Perspectives: The mathematics teacher understands the historical development of mathematical ideas, the interrelationship between society and mathematics, the structure of mathematics, and the evolving nature of mathematics and mathematical knowledge.

Domain VI: Mathematical Learning, Instruction, and Assessment (approximately 10% of the test)

- Mathematical Learning and Instruction: The mathematics teacher understands how children learn and develop mathematical skills, procedures, and concepts, knows typical errors students make, and uses this knowledge to plan, organize, and implement instruction; to meet curriculum goals; and to teach all students to understand and use mathematics.

- Mathematical Assessment: The mathematics teacher understands assessment and uses a variety of formal and informal assessment techniques appropriate to the learner on an ongoing basis to monitor and guide instruction and to evaluate and report student progress.

APPENDIX E

TEST FRAMEWORK FOR FIELD 132: SOCIAL STUDIES 8-12

Domain I: World History (approximately 17% of the test)

- History: The social studies teacher applies knowledge of significant historical events and developments, as well as of multiple historical interpretation and ideas, in order to facilitate student understanding of relationships between the past, the present, and the future.

Domain II: U.S. History (approximately 22% of the test)

- History: The social studies teacher applies knowledge of significant historical events and developments, as well as of multiple historical interpretation and ideas, in order to facilitate student understanding of relationships between the past, the present, and the future.

Domain III: Geography, Culture, and the Behavioral and Social Sciences

(approximately 17% of the test)

- Geography: The social studies teacher applies knowledge of people, places, and environments to facilitate students' understanding of geographic relationships in Texas, the United States, and the world.

- Culture: The social studies teacher understands cultures and how they develop and adapt, and uses this knowledge to enable students to appreciate and respect cultural diversity in Texas, the United States, and the world.

Domain IV: Government and Citizenship (approximately 13% of the test)

- Government: The social studies teacher knows how governments and structures of power function, provide order, and allocate resources, and uses this knowledge to facilitate student understanding of how individuals and groups achieve their goals through political systems.

- Citizenship: The social studies teacher understands citizenship in the United States and other societies, and uses this knowledge to prepare students to participate in our society through an understanding of democratic principles and citizenship practices.

Domain V: Economics and Science, Technology, and Society (approximately 13% of the test)

- Economics: The social studies teacher knows how people organize economic systems to produce, distribute, and consume goods and services, and uses this knowledge to enable students to understand economic systems and make informed economic decisions.

- Science, Technology, and Society: The social studies teacher understands developments in science and technology, and uses this knowledge to facilitate student understanding of the social and environmental consequences of scientific discovery and technological innovation.

Domain VI: Social Studies Foundations, Skills, Research, and Instruction (approximately 17% of the test)

- The social studies teacher has a comprehensive knowledge of the social sciences and recognizes the value of the social sciences.

- The social studies teacher effectively integrates the various social science disciplines.

- The social studies teacher uses knowledge and skills of social studies, as defined by the Texas Essential Knowledge and Skills (TEKS), to plan and implement effective curriculum, instruction, assessment, and evaluation.

APPENDIX F

LIST OF SCORES IN DATA SAMPLE

English Language Arts and Reading		History	Life Science	Mathematics	Social Studies
240	267	215	194	223	230
244	268	218	202	226	232
245	268	226	205	228	245
249	268	227	216	230	246
251	268	229	218	233	250
254	268	235	229	233	254
254	269	237	244	235	255
256	270	242	246	238	259
257	270	242	246	238	264
258	270	242	249	238	266
258	270	244	253	238	269
258	272	250	255	254	269
260	272	254	259	254	271
260	272	254	266	267	277
261	273	254	272	270	
261	274	257	274	270	
263	274	257	276	270	
263	274	257	281	273	
263	276	259		275	
264	281	261		275	
265	282	261		275	
266	288	265		278	
267	288	266		278	
267	289	266		286	
267	295	267		289	
		268		292	
		272			
		273			
		274			
		275			
		275			
		277			
		277			
		279			
		279			
		288			

APPENDIX G

GRADES 8-12 ENGLISH LANGUAGE ARTS AND READING TEXAS EXAMINATIONS OF EDUCATOR STANDARDS DATA SET INCLUDING TEST SCORE, PASS/FAIL DESIGNATION, TEST ATTEMPTS, UNDERGRADUATE MAJOR, YEAR OF GRADUATION, DEGREE GRANTING INSTITUTION, *U.S. NEWS AND WORLD REPORT* UNIVERSITY RANKING, SELECTIVITY MEASURE, ACCEPTANCE RATE OF UNIVERSITY, NUMBER OF UPPER-LEVEL CONTENT AREA COURSES, AND UPPER-LEVEL CONTENT AREA GRADE POINT AVERAGE

Table 33

Grades 8-12 English Language Arts and Reading Texas Examinations of Educator Standards Data Set

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
240	P	1	Journalism and English	2001	Stephen F. Austin	3rd tier University - master's west	selective	75%	4	3
244	P	1	Theater	2000	Texas Christian University	97 National University	more selective	64%	4	2.75
245	P	1	English	2002	Texas Woman's University	4th tier, National University			19	3.41
249	P	1	English	2002	University of Science and Arts in Oklahoma	18, comp. coll.- bachelor's (West)	selective	91%	6	3.83
251	P	1	English	2000	Texas A&M Prairie View	n/a	n/a	n/a	13	4
254	P	1	English	2003	University of North Texas	4th tier, National University	selective	71%	9	3.78
254	P	1	English	2003	University of North Texas	4th tier, National University	selective	71%	9	3.67

Table 33 *(continued)*.

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
256	P	1	English	1996	University of North Texas	4th tier, National University	selective	71%	11	3.64
257	P	1	English	2002	Louisiana Tech	3rd tier National University	selective	86%	12	3.33
258	P	1	Psychology	1987	Austin College	73 liberal arts colleges	more selective	69%	6	3.21
258	P	1	English	2002	University of North Texas	4th tier, National University	selective	71%	10	3.3
258	P	1	English	1996	Abilene Christian	20, University master's west	more selective	54%	9	3.22
260	P	1	English	2001	Texas A&M Commerce	4th tier, National University	selective	62%	10	3.6
260	P	1	English	1999	Oklahoma State University	3rd tier University – master's west	selective	73%	11	4
261	P	1	English and American Literature	2003	University of Texas El Paso	4th tier, National University	less selective	99%	13	3.23

Table 33 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
261	P	1	English	1999	Texas A&M College Station	60, National University	more selective	72%	16	3.43
263	P	1	English	1999	Texas A&M College Station	60, National University	more selective	72%	6	3.5
263	P	1	English	1999	University of North Texas	4th tier, National University	selective	71%	10	3.8
263	P	1	Government and Legal Studies	1994	Texas Woman's University	4th tier, National University	less selective	70%	5	3.8
264	P	1	English	2003	University of Louisiana Monroe	4th tier University – master's – South	selective	90%	13	3.77
265	P	1	English	1999	University of North Texas	4th tier, National University	selective	71%	9	3.56
266	P	1	French	1991	Houston Baptist University	57, University master's west	selective	63%	4	2.71
267	P	1	Social Work	2000	Texas Tech	3rd, National University	selective	67%	5	3.2

Table 33 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
267	P	1	General Studies	2002	University of North Texas	4th tier, National University	selective	71%	6	3.29
267	P	1	English/Rhetoric and Writing	1972	University of Tulsa	93, National University	more selective	74%	19	3.42
268	P	1	Journalism	2002	Southern Methodist University	71, National University	more selective	64%	6	3.15
268	P	1	Psychology	2003	University of North Texas	4th tier, National University	selective	71%	6	3.8
268	P	1	English	2004	University of North Texas	4th tier, National University	selective	71%	8	3.5
268	P	1	English	2003	University of Texas Austin	52, National University	more selective	51%	6	2.8
268	P	1	Radio, TV, and Film, and English	2002	University of North Texas	4th tier, National University	selective	71%	8	3.63
269	P	1	English	2002	University of North Texas	4th tier, National University	selective	71%	8	3.63

Table 33 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
269	P	1	English	2003	University of North Texas	4th tier, National University	selective	71%	13	3.38
270	P	1	Literary Studies	1990	University of Texas Dallas	3rd tier, National University	more selective	53%	17	3.76
270	P	1	Technical Writing and English	2004	University of Texas Arlington	4th tier, National University	selective	72%	13	4
270	P	1	Composition and Language	2003	University of North Texas	4th tier, National University	selective	71%	9	3.33
270	P	1	English	1992	University of North Texas	4th tier, National University	selective	71%	10	4
272	P	1	English 2003	2003	Midwestern State University	4th tier, University, master's west	less selective	87%	8	3.38
272	P	1	English	2000	University of North Texas	4th tier, National University	selective	71%	9	3.89
272	P	1	English	2005	Texas State University	57 University – master's west	selective	73%	11	3.55

Table 33 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
273	P	1	Journalism	2000	Texas A&M College Station	60, National University	more selective	72%	5	3.4
274	P	1	English	2004	University of North Texas	4th tier, National University	selective	71%	10	3.4
274	P	1	English	1999	University of Texas Arlington	4th tier National University	selective	72%	8	3.36
274	P	1	English	2003	Austin College	73, liberal arts colleges	more selective	69%	12	3.86
276	P	1	English	1985	University of Carolina	109, National University	more selective	67%	25	3.84
281	P	1	English	1976	University of Texas Austin	52, National University	more selective	51%	15	4
282	P	1	Political Science and English	1990	University of California Riverside	85, National University	more selective	79%	19	3.88
288	P	1	English and Writing	2003	St. Edwards University	24 University master's west	selective	69%	9	3.89

Table 33 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
288	P	1	History	1981	University of Texas Austin	52, National University	more selective	51%	10	3.4
289	P	1	English	2002	Texas A&M College Station	60, National University	more selective	72%	6	4
295	P	1	English	1998	University of North Texas	4th tier, National University	selective	71%	8	3.5

APPENDIX H

GRADES 8-12 HISTORY TEXAS EXAMINATIONS OF EDUCATOR STANDARDS DATA SET INCLUDING TEST SCORE, PASS/FAIL DESIGNATION, TEST ATTEMPTS, UNDERGRADUATE MAJOR, YEAR OF GRADUATION, DEGREE GRANTING INSTITUTION, *U.S. NEWS AND WORLD REPORT* UNIVERSITY RANKING, SELECTIVITY MEASURE, ACCEPTANCE RATE OF UNIVERSITY, NUMBER OF UPPER-LEVEL CONTENT AREA COURSES, AND UPPER-LEVEL CONTENT AREA GRADE POINT AVERAGE

Table 34

Grades 8-12 History Texas Examinations of Educator Standards Data Set

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
215	F	1	History	2004	University of North Texas	4th tier, National University	selective	71%	8	2.12
218	F	3 (passed on 3rd attempt)	History	2004	University of Oklahoma	109, National University	more selective	82%	8	2.75
227	F	1	Kinesiology	2001	Texas A&M Corpus Christi	3rd tier, University - master's west	less selective	85%	4	3
229	F	3	Psychology	2002	University of North Texas	4th tier, National University	selective	71%	7	2.7
235	F	2 (passed on 2nd attempt)	History	2002	University of Texas Arlington	4th tier, National University	selective	72%	9	2.77
237	F	3 (passed on 3rd attempt)	Political Science	2003	University of North Texas	4th tier, National University	selective	71%	8	3.37

Table 34 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
242	P	1	History	2003	Columbia College	35, comp coll.-bachelor's (Midwest)	selective	60%	10	3.8
242	P	1	General Studies	2001	University of North Texas	4th tier, National University	selective	71%	5	3.4
242	P	1	Humanities	2002	University of Texas Permian Basin	4th tier, University, master's west	selective	95%	12	3.5
244	P	1	History	2003	Concordia University	17, comp. coll.-bachelor's (west)	less selective	76%	4	4
250	P	1	History	2001	Texas A&M College Station	60, National University	more selective	72%	5	3.2
251	P	1	Economics and Business	2001	Hendrix College	73, Liberal Arts Colleges	more selective	85%	4	3.75
254	P	1	History	2002	University of North Texas	4th tier, National University	selective	71%	13	3.38
254	P	1	Interdisciplinary	1989	University of Alabama	104, National University	more selective	77%	8	3.87
254	P	1	Criminal Justice	1978	Arizona State University	3rd tier, National University	selective	86%	4	3.25

Table 34 *(continued)*.

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
257	P	1	Biblical Studies	1994	Criswell College	n/a	n/a	n/a	2	2.5
257	P	1	Computer Science	2003	University of North Texas	4^{th} tier, National University	selective	71%	4	3.5
257	P	1	History	2003	University of North Texas	4^{th} tier, National University	selective	71%	8	3.36
259	P	1	History	2001	Minnesota State University	3^{rd} tier, University – master's Midwest	selective	90%	8	2.8
261	P	1	Missions	1995	Hillsdale Free Will Baptist College	n/a	n/a	n/a	3	3.33
261	P	1	History	2003	University of North Texas	4^{th} tier, National University	selective	71%	7	3.57
265	P	1	Communication Arts	1998	Southern Methodist University	71, National University	more selective	64%	5	3.94
266	P	1	Social Work	2000	University of North Texas	4^{th} tier, National University	selective	71%	5	3.4

Table 34 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
266	P	1	History	2001	University of Texas Arlington	4th tier, National University	selective	72%	8	3.62
267	P	1	History	1990	Texas Tech	3rd, National University	selective	67%	8	3.75
268	P	1	History	2004	Midwestern State	4th tier, National University – master's west	less selective	87%	6	3.83
272	P	1	Sociology	2003	University of North Texas	4th tier, National University	selective	71%	7	2.57
273	P	1	History	2002	University of Texas Austin	52, National University	more selective	51%	12	3.16
274	P	1	History	2003	Texas A&M College Station	60, National University	more selective	72%	16	3.67
275	P	1	History	1973	Roosevelt University	3rd tier, University – master's Midwest	selective	63%	3	3.66
275	P	1	Letters and Sciences	1981	University of Wisconsin	26, University, Master's Midwest	more selective	66%	5	3.8

Table 34 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
277	P	1	History	2003	Texas A&M College Station	60, National University	more selective	72%	8	3.4
277	P	1	History	1973	Cornell	13, National University	most selective	29%	7	2.72
279	P	1	Applied Arts and Sciences	2000	University of North Texas	4th tier, National University	selective	71%	5	3.2
279	P	1	Radio, TV, Film	1992	University of Texas Austin	52, National University	more selective	51%	4	3.75
288	P	1	Business	1990	University of Texas Austin	52, National University	more selective	51%	4	3.5

APPENDIX I

GRADES 8-12 LIFE SCIENCE TEXAS EXAMINATIONS OF EDUCATOR STANDARDS DATA SET INCLUDING TEST SCORE, PASS/FAIL DESIGNATION, TEST ATTEMPTS, UNDERGRADUATE MAJOR, YEAR OF GRADUATION, DEGREE GRANTING INSTITUTION, *U.S. NEWS AND WORLD REPORT* UNIVERSITY RANKING, SELECTIVITY MEASURE, ACCEPTANCE RATE OF UNIVERSITY, NUMBER OF UPPER-LEVEL CONTENT AREA COURSES, AND UPPER-LEVEL CONTENT AREA GRADE POINT AVERAGE

Table 35

Grades 8-12 Life Science Texas Examinations of Educator Standards Data Set

Test Score	*Pass/ Fail*	*Test Attempts*	*Under-graduate Major*	*Year Under-graduate Major Conferred*	*Degree Granting Institution*	U.S. News College and World Report *Ranking*	*Selectivity of University*	*Acceptance Rate of University*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
194	F	1	Biology	1975	Stephen F Austin	3rd tier, University - Masters (West)	selective	75%	6	2.6
202	F	5	Biology	2002	Texas Tech	3rd, National University	selective	67%	14	2.8
205	F	1	Biology	2002	Samford University	3, University - Master's South	more selective	88%	8	3.17
216	F	1	Biology	2005	Texas Woman's University	4th tier, National University	less selective	70%	5	3.36
218	F	2 (passed on 2nd attempt)	Biology	2002	University of North Texas	3rd tier, National University	selective	71%	12	3.5
229	F	2	Biology	2003	University of North Texas	3rd tier, National University	selective	71%	13	4
244	P	1	Biology	2002	University of North Texas	4th tier, National University	selective	71%	14	3.02
246	P	1	Biology	2002	University of North Texas	4th tier, National University	selective	71%	20	3.5

Table 35 *(continued).*

Test Score	*Pass/ Fail*	*Test Attempts*	*Under-graduate Major*	*Year Under-graduate Major Conferred*	*Degree Granting Institution*	U.S. News College and World Report *Ranking*	*Selectivity of University*	*Acceptance Rate of University*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
246	P	1	Biology	2002	University of Texas at Arlington	4th tier, National University	selective	72%	10	2.82
249	P	1	Biology	2001	University of North Texas	4th tier, National University	selective	71%	15	2.4
253	P	1	Zoology	2002	Oklahoma State University	3rd tier – National University	more selective	89%	9	2.9
255	P	1	Animal Sciences	1981	University of Maryland – College Park	55, National University	more selective	52%	6	3.58
259	P	1	Biology	1995	University of Texas – Dallas	3rd tier, National University	more selective	53%	7	3.2
266	P	1	Biology	2003	University of North Texas	3rd tier, National University	selective	71%	12	3.5
272	P	1	Biology	2002	University of North Texas	3rd tier, National University	selective	71%	17	3.71
274	P	1	Biochemistry	1999	University of North Texas	3rd tier, National University	selective	71%	24	3.52

Table 35 *(continued).*

Test Score	*Pass/ Fail*	*Test Attempts*	*Under-graduate Major*	*Year Under-graduate Major Conferred*	*Degree Granting Institution*	U.S. News College and World Report *Ranking*	*Selectivity of University*	*Acceptance Rate of University*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
276	P	1	Biomedical Science	2003	Texas A&M College Station	60, National University	more selective	72%	9	2.7
281	P	1	Biology	1997	Trinity San Antonio	I, University - Master's West	more selective	60%	9	2.78

APPENDIX J

GRADES 8-12 MATHEMATICS TEXAS EXAMINATIONS OF EDUCATOR STANDARDS DATA SET INCLUDING TEST SCORE, PASS/FAIL DESIGNATION, TEST ATTEMPTS, UNDERGRADUATE MAJOR, YEAR OF GRADUATION, DEGREE GRANTING INSTITUTION, *U.S. NEWS AND WORLD REPORT* UNIVERSITY RANKING, SELECTIVITY MEASURE, ACCEPTANCE RATE OF UNIVERSITY, NUMBER OF UPPER-LEVEL CONTENT AREA COURSES, AND UPPER-LEVEL CONTENT AREA GRADE POINT AVERAGE

Table 36

Grades 8-12 Mathematics Texas Examinations of Educator Standards Data Set

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
223	F	1	Electrical Engineering	1992	Texas A&M at Prairie View	n/a	n/a	n/a	4	2.3
226	F	1	Electrical Engineering	1982	Memphis State University	n/a	n/a	n/a	7	3.16
228	F	1	Engineering Technology	2003	University of North Texas	4th tier, National University	selective	71%	8	3.36
230	F	4 (passed on 4th attempt)	Management	2001	Amberton University	n/a	n/a	n/a	2	4
233	F	1	Psychology and Mathematics	1970	University of Central Arkansas,	3rd tier, university - Master's South	selective	99%	4	3.2
233	F	1	Business Administration	2003	University of North Texas	4th tier, National University	selective	71%	4	3.75
235	F	1	Education with integrated mathematics	2002	Ohio University, 5	109, National University	selective	86%	5	2.79
238	F	1	Mathematics	2002	University of North Texas	4th tier, National University	selective	71%	5	2

Table 36 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
238	F	1	Mathematics	1999	Texas Christian University, 9 upper-level courses, 3.03	97, National University	more selective	64%	9	3.03
238	F	1	Mathematics	2004	University of Washington	45, National University	more selective	68%	12	2.82
238	F	1	Mathematics	2004	Texas A&M Commerce	4th tier, National University	selective	62%	8	2
254	P	1	Mathematics	1976	California State University Long Beach	26, University – Master's West	selective	39%	10	2.67
254	P	1	Mathematics	2002	Austin College	73, Liberal Arts Colleges	more selective	69%	5	2.45
267	P	1	Mathematics and Physics	1977	Wheaton College	66, Liberal Arts Colleges	more selective	45%	8	3.8
270	P	1	Economics	1987	University of Texas at Austin	52, National University	more selective	51%	3	1.7
270	P	1	Business Administration	1992	Texas Tech	3rd, National University	selective	67%	4	4

Table 36 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
270	P	1	Mathematics	1987	U.S. Naval Academy	Unranked Specialty School-Military Academies	more selective	10%	7	3.3
273	P	1	Mathematics	1991	Wittenberg University	3rd tier, liberal arts college	more selective	81%	13	3.4
275	P	1	Industrial Operations and Engineering	1988	University of Michigan at Ann Arbor	25, National University	most selective	62%	5	4
275	P	1	Computer Science	1979	Washington University St. Louis	II, National University	most selective	22%	3	2.7
275	P	1	Computer Science	1981	Rochester Institute of Technology	6, University – Master's North	more selective	67%	7	3.36
278	F	1	Mathematics	1970	Youngstown State University	3rd, university – Master's (Midwest)	less selective	100%	7	2.44
278	P	1	Psychology	1998	Texas A&M College Station	60, National University	more selective	72%	3	3.66
286	P	1	Aerospace Engineering	1983	University of Texas at Austin	52, National University	more selective	51%	6	3.7

Table 36 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
289	P	1	Physics and Mathematics	1997	Valparasio University	2, University - Master's Mid-west	more selective	81%	10	3.38
292	P	1	Engineering	1981	Georgia Institute of Technology	37, National University	more selective	70%	8	3.36

APPENDIX K

GRADES 8-12 SOCIAL STUDIES TEXAS EXAMINATIONS OF EDUCATOR STANDARDS DATA SET INCLUDING TEST SCORE, PASS/FAIL DESIGNATION, TEST ATTEMPTS, UNDERGRADUATE MAJOR, YEAR OF GRADUATION, DEGREE GRANTING INSTITUTION, *U.S. NEWS AND WORLD REPORT* UNIVERSITY RANKING, SELECTIVITY MEASURE, ACCEPTANCE RATE OF UNIVERSITY, NUMBER OF UPPER-LEVEL CONTENT AREA COURSES, AND UPPER-LEVEL CONTENT AREA GRADE POINT AVERAGE

Table 37

Grades 8-12 Social Studies Texas Examinations of Educator Standards Data Set

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
230	F	1	Secondary Education with Concentration in Social Studies	2001	Oklahoma State University	3rd tier, National University	more selective	89%	4	3.25
232	F	1	Political Science	1995	Southern University, 8 upper-level courses, 3.62	4th tier, University Master's (South)	less selective	n/a	8	3.62
245	P	1	Coaching and Sports	1992	University of Southern Mississippi	4th tier, National University	selective	56%	7	3.14
246	P	1	Social Sciences	1998	University of Montevallo	58, University, Master's South	selective	80%	6	3.16
250	P	1	Criminal Justice	1978	Arizona State University	third tier, National University	selective	86%	7	3.57
254	P	1	Sociology	2000	University of North Texas	4th tier, National University	selective	71%	7	3.42

Table 37 *(continued).*

Test Score	*Pass/Fail*	*Test Attempts*	*Undergraduate Major*	*Year Undergraduate Major Conferred*	*Degree Granting Institution*	*U.S. News College Ranking*	*Selectivity*	*Acceptance Rate*	*Number of Upper-Level Content Area Courses*	*Upper-Level Content Area Grade Point Average*
255	P	1	History	2003	Angelo State University	4th tier, Master's University (West)	less selective	99%	7	3.57
259	P	1	Public Administration (Law Enforcement)	1980	University of Arizona	97, National University	more selective	83%	9	3.22
264	P	1	Interdisciplinary Studies	1993	University of Texas at Dallas	3rd tier, National University	more selective	53%	9	2.96
266	P	1	History	2003	University of Houston Clearlake	4th tier, National University	selective	81%	9	3.55
269	P	1	Sociology	2003	University of North Texas	4th tier, National University	selective	71%	10	3.9
269	P	1	Social Science	2002	University of North Texas	4th tier, National University	selective	71%	7	2.87
271	P	1	History	1999	University of North Texas	4th tier, National University	selective	71%	13	3.38
277	P	1	Criminal Justice	1994	Northeastern University	115, National University	more selective	42%	4	4

APPENDIX L

ENGLISH LANGUAGE ARTS AND READING PARTICIPANT INFORMATION

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
37	240	P	3.0	Stephen F. Austin	33	2001
Major	Applied Arts and Sciences					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 337		Amer lit since 1865			3	B
Eng 385		Lit for children			3	B
Eng 489		Hist of Eng lang			3	B
Eng 345		Shakespeare			3	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
21	244	P	2.75	Texas Christian	28	2000
Major	Theater					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 30113		Brit Lit to 1800			3	B
Eng 30143		Amer Lit to 1900			3	C
Eng 30695		Multi Ethnic Lit			3	B
Eng 40423		Restoration and 18^{th} century lit			3	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
7	245	P	3.41	Texas Woman's University	14	2002
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3223		Film and Literature			3	B
Eng 4243		Poet Romantic Period			3	A
Eng 3293		Amer Lit after 1865			3	A
Eng 3203		Adv Grammar/Comp			3	B
Eng 3323		Amer Fic			3	A
Eng 3363		Intro to Ling			3	B
Eng 3283		Amer Lit to 1865			3	B
Eng 3023		Brit Lit 1760 to Pres			3	B
Eng 3103		Writing Center Intern			3	C
Eng 4911		Ind. Study			1	A
Eng 4333		Intro Stu World Lit			3	A
Eng 3333		Plays of Shakespeare			3	B
Eng 4953		Cooperative Edu			3	A
Eng 4953		Cooperative Edu			3	A
Eng 4913		Independent Study			1	A
Eng 4913		Independent Study			1	A
Eng 5700		Classical Background			3	A
Eng 5510		Amer Lit 1830 – 1880			3	B
Eng 6200		Brit Lit 1500-1660			3	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
44	249	P	3.83	University of Science and Arts in Oklahoma	18	2002
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3003		Shakespeare			3	A
Eng 3503		Adv. Comp			3	B
Eng 3403		Advanced Grammar			3	A
Eng 4003		Ling Hist Eng Lang			3	A
Eng 4403		Literary Periods			3	A
Eng 4103		Lit genres – World poets			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
14	251	P	4	Prairie View A&M	45	2000
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3063		African-American Lit II			**3**	**A**
Eng 3233		American Lit I			3	A
Eng 3273		The Romantic Period			3	A
Eng 3053		African-American Lit I			3	A
Eng 4223		Shakespeare			3	A
Eng 3213		The Eng Lang			3	A
Eng 3243		American Lit II			3	A
Eng 3223		Adv. Grammar			3	A
Eng 4243		The Novel			3	A
Eng 5810		Literary Criticism			3	A
Eng 5510		American Lit 1830-1880			3	A
Eng 5162		Creative Writing Essay			3	A
Eng 6410		Brit Lit 1831-Present			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
22	254	P	3.77	University of North Texas	17	2003
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 4180		Adv Tech Writing			3	A
Eng 4440		Milton			3	A
Eng 4160		Adv Expos Writing			3	A
Eng 4190		Technical Editing			3	A
Eng 4250		Tech Proc and Man			3	A
Ling 4010		Eng Lang in Amer			3	A
Eng 3450		Short Story			3	A
Eng 3910		Amer Lit after 1870			3	B
Eng 4300		Modern Drama			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
46	254	P	3.66	University of North Texas	2	2003
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 4430		Shakespeare			3	B
Eng 3910		Spec Stud Lit			3	B
Eng 3450		Short Story			3	A
Eng 4170		Prin of Rhetoric			3	A
Ling 3060		Study of Lang			3	A
Eng 3910		Brit Lit to 1780			3	B
Eng 4300		Modern Drama			3	A
Eng 4100		Adv. Fiction Writing			3	A
Eng 4180		Adv. Tech Writing			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
29	256	P	3.36	University of North Texas	97	1996
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3060		Lang Study			3	A
Eng 3820		Amer Lit Survey			3	A
Eng 3410		Brit Lit Survey			3	B
Eng 4430		Shakespeare			3	C
Eng 3420		Brit Lit Survey			3	B
Eng 4040		Gen Linguistics			3	A
Eng 4010		Eng Lang in Amer			3	A
Eng 3810		Amer Lit Survey			3	B
Eng 4020		Mod Eng Structure			3	A
Eng 4400		American Fiction			3	C
Eng 4420		Poetry			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
39	257	P	3.33	Louisiana Tech	24	2002
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 303		Technical Writing			3	A
Eng 415		Shakespeare			3	B
Eng 417		Amer Lit 1865 to present			3	B
Eng 403		Chaucer			3	A
Eng 463		Sci/Tech Present			3	C
Eng 460		Adv. Tech Writing			3	A
Eng 404		Milton			3	A
Eng 475		Dickinson and Frost			3	A
Eng 413		Romantic Period			3	B
Eng 416		Amer Lit Beg to 1865			3	C
Eng 424		Southern Lit			3	B
Eng 469		Graphics in Tech Writing			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
32	258	P	3.22	Abilene Christian	91	1996
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 483		Shakespeare			3	B
Eng 311		Literary Crit and Biblio			3	B
Eng 362		Amer. Lit before 1860			3	A
Eng 351		Lit for Young Adults			3	A
Eng 363		Amer Lit after 1860			3	B
Eng 376		Fiction			3	B
Eng 496		19^{th} cent Brit Lit			3	C
Eng 377		Drama			3	B
Eng 432		Intro to Ling			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
28	258	P	3.3	University of North Texas	14	2002
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 4010		Eng Lang in Amer			3	B
Eng 3140		Int Cr Writ Fic			3	B
Eng 4010		Adv. Cr Writ			3	A
Eng 4100		Adv. Cr Writ			3	A
Ling 4040		Gen Ling			3	A
Eng 4160		Adv. Expos Writ			3	A
Eng 4940		Whitman and the Beats			3	B
Eng 4500		Brit Fic			3	A
Eng 3450		Short Story			3	C
Ling 3060		Language Study			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
13	258	P	3.21	Austin College	29	1997
Major	Psychology					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 38		Interpreting Lit			*1	B
Eng 54		Anglo-Irish Fic and Satire			*1	B
Eng 62		20^{th} Century Prose			*1	B
Eng 40		Amer Culture and Studies			*1	A
Eng 44		Writing			*1	A
Eng 4160		Adv Expos Writing			3	B

* 1 = 4 semester hours

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
8	260	P	4	Southeastern Oklahoma State	57	1999
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3893		World Lit Translation			3	A
Eng 4783		Adv English Grammar			3	A
Eng 3543		Eng Lit to 1800			3	A
Eng 3773		Amer Lit to 1865			3	A
Eng 3763		Amer Ethnic Lit			3	A
Eng 3903		Tech and Prof Writing			3	A
Eng 4973		Chaucer and Cant Tales			3	A
Eng 3653		Eng Lit Since 1800			3	A
Eng 3883		Amer Lit Since Whitman			3	A
Eng 3113		Shakespeare			3	A
Eng 4773		Eng Lang Desc Study			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
6	260	P	3.6	Texas A&M Commerce	34	2001
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 311		Shakespeare			3	A
Eng 358		American Novel After WW I			3	A
Eng 341		Technical Writing			3	B
Eng 434		US Lit and Film			3	A
Eng 457		Teaching ESL			3	B
Eng 323		Mythology			3	A
Eng 420		Approaches to Lit			3	A
Eng 317		Word Building			3	B
Eng 333		Adv Writing-Non Fiction			3	B
Eng 441		Survey of Amer. Lit I			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
1	261	P	3.23	UT El Paso	5	2003
Major	English and American Lit					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3111		English Composition			3	A
Eng 3113		Research and Critical Writing			3	B
Eng 3214		Intro to Drama			3	B
Eng 3374		Folklore of Mexican Amer			3	A
Eng 3440		Advanced Literary Studies			3	B
Eng 3311		Amer Lit to 1860			3	C
Eng 3319		16^{th} century prose poetry			3	B
Eng 3320		Shakespeare's Major Plays			3	A
Eng 3343		20^{th} century Brit Poetry			3	B
Eng 4349		English Novel 20^{th} Century			3	C
Eng 4350		Major Individuals Amer Author			3	A
Eng 3333		Romantic Lit			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
25	261	P	3.43	Texas A&M College Station	17	1999
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 376		20th Century American Novel			3	A
Eng 339		African Amer Lit			3	C
Eng 321		19th Century Romantic Lit			3	B
Eng 361		Lit for Adolescents			3	C
Eng 412		Shakespeare			3	B
Ling 310		History of Eng Lang			3	B
Read 460		Lang of Reading			3	A
Eng 481		Colonial Women			3	B
Eng 5318		Studies/Comp Theory			3	A
Eng 5307		Mod Amer Lit			3	B
Eng 5399		Studies in S. Lit			3	A
Eng 6325		Ex Patriot Novels			3	A
Eng 6313		Ethnic and Rel Lit			3	A
Eng 6391		Methods of Research			3	A
Eng 5305		The American Novel			3	A
Eng 5310		Hist of Eng Lang			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
16	263	P	3.5	Texas A&M College Station	69	1999
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 412		Shakespeare			3	B
Eng 360		Lit for Children			3	A
Eng 350		Modern Lit			3	A
Eng 321		19th Century Lit Romantic			3	A
Eng 374		Women Writers			3	B
Eng 481		Senior Seminar Islam			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
24	263	P	3.8	University of North Texas	61	1999
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3410		Brit Lit Survey			3	B
Eng 3420		Brit Lit Survey			3	B
Eng 3810		Amer Lit Survey			3	A
Eng 3150		Intro Creative Writing/Poetry			3	A
Eng 4430		Shakespeare			3	A
Eng 4040		General Ling			3	A
Eng 4290		World Drama			3	A
Eng 4500		British Fiction			3	A
Eng 4400		Amer Fic			3	A
Eng 3140		Intro Creative Writing/Fiction			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
42	263	P	3.8	Texas Woman's University	125	1994
Major	Government and Legal Studies					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3203		Adv. Grammar and Comp			3	A
Eng 3373		Confrastive Ling			3	A
Eng 3153		Amer Ethnic Lit			3	B
Eng 3333		Plays of Shakespeare			3	A
Eng 4903		18^{th} century			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
33	264	P	3.76	University of Louisiana – Monroe	4	2003
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 350		Jr. Seminar Prose			3	A
Eng 475		Romantic Movement			3	A
Eng 315		Creative Writing			3	A
Eng 437		Shakespeare Tragedy			3	A
Eng 483		History of Eng Lang			3	A
Eng 410		Modern Drama			3	B
Eng 425		Lit Criticism			3	A
Eng 427		Lit of South			3	A
Eng 476		Victorian Period			3	A
Eng 5510		Amer Lit 1830-1880			3	B
Eng 5890		Studies in Amer Novel			3	B
EDRE 5170		Mat and Dev in Reading			3	A
EDRE 5370		Adv. Reading Theory			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
20	266	P	2.71	Houston Baptist University	167	1991
Major	French and Mass Media					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 4300		Intro-Study of Language			3	B
Eng 4322		Grammar and Usage			3	C
Eng 6334		Theories of ESL			3	B
Eng 7396		Amer Women's Narr			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
38	267	P	3.62	University of North Texas	33	2002
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3820		Amer Lit Survey			3	B
Eng 3140		Intro Creative Writing/Fiction			3	B
Eng 3150		Intro Creative Writing/Poetry			3	A
Eng 4940		Whitman and the Beats			3	B
Eng 3911		Studies in Brit Lit			3	A
Eng 4940		Sem Lit or Lang			3	A
Eng 4430		Shakespeare			3	A
Eng 3450		Short Story			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
36	267	P	3.2	Texas Tech	2	2000
Major	Social Work					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 5510		Amer Lit 1830 – 1880			3	B
Eng 5540		20th Century Brit Lit			3	B
Eng 5400		Studies Shakespeare			3	B
Eng 5410		Brit Renaissance			3	B
Eng 5520		Amer Lit 1865-1914			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
43	267	P	3.28	University of North Texas	22	2002
Major	General Studies					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3921		African Amer Lit			3	B
Eng 4910		Special Problems			1	A
Eng 402		Children's Lit			2	B
Eng 353		Advanced Grammar			3	B
Eng 392		Lang Arts Fundamentals			2	B
Eng 433		Shakespeare			3	12

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
45	267	P	3.42	University of Tulsa	348	1972
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3133		Semantics			3	B
Eng 3313		19th century Amer Lit			3	B
Eng 3323		Amer Lit 20th Cent			3	A
Eng 4213		Creative Writing			3	B
Eng 4623		Mod Brit Novel			3	B
Eng 4983		Correct Lit Scene			3	A
Eng 4993		Editing and Publishing			3	A
Eng 4973		History Sci Fiction			3	A
Eng 7143		Study Ling			3	A
Eng 7213		Creative Writing			3	B
Eng 7503		Eng Language			3	B
Eng 7243		Principles Rhetoric and Style			3	A
Eng 7993		Sci Fiction Reading			3	B
Eng 7123		Research			3	B
Eng 7993		Science Fiction			3	A
Eng 7723		Beowulf			3	A
Eng 4983		Lit and Com			3	B
Eng 7993		Sci Fic Writing			3	A
Eng 8153		Hemingway and Faulkner			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
19	268	P	2.83	UT Austin	16	2003
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 325		Photos of First Gen			3	B
Eng 343		Backgrounds of Modern Lit			3	B
Eng 338		Amer Lit 1865 to present			3	B
Eng 379		Senior Seminar			3	B
Eng 321		Shakespeare			3	B
Eng 327		Eng Novel in 18th Cent			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
18	268	P	3.5	University of North Texas	5	2004
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3910		Spec Stud Lit			3	B
Eng 4600		Continental Euro Fiction			3	A
Eng 3923		Amer Jewish Writing			3	A
Eng 4430		Shakespeare			3	C
Eng 4400		Amer Fiction			3	A
Eng 4500		British Fiction			3	B
Eng 3140		Intro Creative Writing/Fiction			3	A
Eng 3450		Short Story			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
10	268	P	3.15	Southern Methodist University	24	2002
Major	Journalism					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3305		Brit Authors: Chaucer and Pope			3	C
Eng 3304		Contemporary Approaches to Lit			3	C
Eng 3307		Major Amer Authors			3	A
Eng 3392		Inter Fiction Writing			3	A
Eng 3391		Inter Poetry Writing			3	B
Eng 4323		Chaucer's Earlier Work			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
17	268	P	3.83	University of North Texas	10	2003
Major	Psychology					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3450		Short Story			3	A
Eng 3000		Analysis and Interpret			3	B
Eng 3430		Brit Lit to 1780			3	A
Eng 3440		Brit Lit from 1780			3	A
EDRE 5800		Reading Project			3	A
EDRE 5800		Writing Project			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
50	268	P	3.62	University of North Texas	21	2002

Major	English		
Course Number	**Course Name**	**Hours**	**Grade**
Eng 3140	Intro Creative Writing/Fiction	3	A
Eng 4430	Shakespeare	3	B
Eng 3810	Amer Lit Survey	3	A
Eng 3360	Classical Lit	3	B
Eng 3420	Brit Lit Survey	3	A
Eng 3912	Studies Amer Lit	3	B
Eng 4500	British Fiction	3	A
Eng 4400	Milton	3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
48	269	P	3.38	University of North Texas	12	2003

Major	English		
Course Number	**Course Name**	**Hours**	**Grade**
Eng 3140	Intro Creative Writing/Fiction	3	B
Eng 3450	Short Story	3	A
Eng 3410	Brit Lit Survey	3	B
Eng 4400	American Fiction	3	A
Ling 3060	Language Study	3	A
Eng 3420	Brit Lit Survey	3	B
Eng 3810	Amer Lit Survey	3	B
Eng 4430	Shakespeare	3	B
Eng 3910	Spec Studies Lit	3	B
Eng 4600	Cont European Fiction	3	A
Eng 3923	Amer Jewish Writing	3	A
Eng 4440	Milton	3	B
Eng 5510	Amer Lit 1830-1880	3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
4	270	P	3.76	Texas Tech	21	2001
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Lit 3300		Eastern Lit Tradition			3	A
Lit 3321		Shakespeare			3	B
Lit 3304		Advanced Comp			3	A
Lit 4345		The Modern Period			3	A
Lit 3312		19th century Novel			3	A
Lit 3340		Major Authors: Goethe, Schille			3	A
Lit 4348		Top Lit Studies: Fiction			3	A
Eng 5001		Research Methods English			3	B
Eng 5724		Modern European Fiction			3	B
Eng 6613		Romantic Literature and Critical Theory			3	B
Eng 5768		Literature/Culture and Postwar Britain			3	A
Eng 5908		Amer Lit at Mid 20th Century			3	B
Eng 6230		Poems of Pearl Manuscript			3	A
Eng 5705		Anglo Irish Literature			3	A
Eng 5535		18th century Novel			3	A
Eng 6805		Classic American Literature			3	A
Eng 7932		Recent American Fiction			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
5	270	P	4	University of Texas Arlington	5	2004
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3340		Hist Amer Lit			3	A
Eng 3344		Native Amer Lit			3	A
Eng 3352		Hist Brit Lit II			3	A
Eng 3362		Hist World Lit II			3	A
Eng 4301		His Dev Eng Lang			3	A
Eng 4333		Detective Fiction			3	A
Eng 3372		Comp Writing			3	A
Eng 4330		Inventive Modeling			3	A
Eng 4322		Victorians			3	A
Eng 4365		Children’s Lit			3	A
Eng 3371		Adv Exposition			3	A
Eng 3385		Bus Writing			3	A
Eng 4330		Poetry			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
23	270	P	3.33	University of North Texas	4	2003
Major	Composition and Language					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3912		Studies Amer Lit			3	B
Eng 3913		Studies World Lit			3	B
Eng 4430		Shakespeare			3	B
Eng 3140		Intro Creative Writing/Fiction			3	B
Eng 4400		American Fiction			3	A
Eng 4300		Modern Drama			3	A
Eng 4100		Adv. Fiction Writing			3	B
Eng 3150		Intro Creative Writing/Poetry			3	B
Ling 3060		Study of Language			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
27	270	P	4	University of North Texas	141	1992
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 5180		Prof Writing			3	A
Eng 5900		Spec Problems			3	A
Eng 5570		Teaching Eng Lang			3	A
Eng 5800		Literary Genres			3	A
Eng 5550		Studies in Teaching Comp			3	A
Eng 5530		Amer Lit 1920 to Present			3	A
Eng 5520		Amer Lit 1865 – 1914			3	A
Eng 5750		Bibliography Methods			3	A
Eng 5950		Thesis			3	A
Eng 5950		Thesis			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
26	272	P	3.88	University of North Texas	57	2000
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 4430		Shakespeare			3	A
Eng 4400		American Fiction			3	A
Eng 4020		Mod Eng Structure			3	B
Eng 3410		Brit Lit Survey			3	A
Eng 4180		Adv Tech Writing			3	A
Eng 3820		Amer Lit Survey			3	A
Eng 4500		British Fiction			3	A
Eng 4600		Cont. European Fiction			3	A
Eng 3140		Intro Creative Writing/Fiction			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
11	272	P	3.37	Midwestern State	5	2003
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3513		Advanced Grammar			3	C
Eng 3533		Theory and Comp			3	A
Eng 3703		American Lit and Life			3	B
Eng 3273		Poetry			3	A
Eng 4883		20th Century English/Lit			3	A
Eng 3203		Technical Writing			3	A
Eng 4513		History of Eng Lang			3	B
Eng 4623		American Romantic Movement			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
34	272	P	3.54	Texas State University	1	2005
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 5510		Amer Lit 1830-1880			3	B
Eng 5540		20th Century Brit Lit			3	A
Eng 5760		Scholarly Writing			3	A
Eng 5890		Studies in Amer Novel			3	C
Eng 5260		Studies in 19th Century Britain			3	A
Eng 5400		Studies Shakespeare			3	B
Eng 5810		Literary Criticism			3	A
Eng 5890		Studies in American Novel			3	A
Eng 3357		Eng Lit			3	A
Eng 3331		Lit of Black Amer			3	B
Eng 3338		American Novel			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
15	273	P	3.4	Texas A&M College Station	4	2000
Major	Journalism					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 361		Lit for Adolescents			3	B
Eng 374		Women Writers			3	A
Eng 5810		Literary Criticism			3	B
Eng 5520		Amer Lit 1865-1914			3	A
Eng 5800		Literary Genres			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
9	274	P	3.4	University of North Texas	9	2004
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3140		Intro Creative Writing/Fiction			3	B
Eng 4160		Adv. Expos Writing			3	A
Eng 4170		Principles of Rhetoric			3	B
Eng 4270		Adv. Poetry Writing			3	B
Eng 3410		Brit Lit Survey			3	C
Eng 3150		Intro Creative Writing/Poetry			3	A
Eng 3450		Short Story			3	A
Ling 3060		Language Study			3	B
EDRE 5800		Reading Project			3	A
EDRE 5810		Writing Project			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
49	274	P	3.85	Austin College	10	2003
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 38		Interpreting Lit			*1	A
Eng 54		The Romantic Lyric			*1	B
Eng 40		Women's Lit			*1	A
Eng 60		Loss, Narrative, and Post-Modern			*1	A
Eng 41		Creative Writing Poetry			*1	A
Eng 62		Race, Sex, Power			*1	A
Eng 96		Dept Honors Project			*1	A
Eng 60		Post Colonial Lit			*1	A
Eng 96		Dept Honors Project			*1	A

* 1 = 4 semester hours

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
35	274	P	3.36	University of North Texas	103	2002
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3140		Intro Creative Writing/Fiction			3	B
Eng 4160		Adv. Expos Writing			3	A
Eng 4170		Principles of Rhetoric			3	B
Eng 4270		Adv. Poetry Writing			3	B
Eng 3410		Brit Lit Survey			3	C
Eng 3150		Intro Creative Writing/Poetry			3	A
Eng 3450		Short Story			3	A
Ling 3060		Language Study			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
3	276	P	3.84	University of South Carolina	235	1985
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 464		Writing Workshop Poetry			3	B
Eng 600		Verse Composition			3	B
SCC 351		Prose/Lawrence and Joyce			3	B
Eng 288		Major Writers Brit Lit			3	A
Eng 466		Writing Workshop Fiction			3	A
Eng 428		Modern Amer Writers			3	A
Eng 437		Major Amer Poets			3	B
Eng 463		Theory of Lit Criticism			3	A
Lit 473		Rise of European Drama			3	A
SCC 451		Prose/Romantic Period			3	A
Eng 401		Chaucer			3	A
Eng 405		Shakespeare Tragedies			3	B
Eng 410		Restoration and 18th Century			3	A
Eng 451		Intro to Ling			3	A
Eng 5420		Creative Writing Poetry			3	A
Eng 5810		Literary Crit			3	A
Eng 4410		Chaucer			3	A
Eng 5030		Studies Medieval Lit			3	A
Ling 5590		Linguistics and Lit			3	A
Eng 5410		British Ren			3	A
Eng 5420		Creative Writing Poetry			3	A
Eng 5550		Studies in Teaching Comp			3	B
Eng 5820		Creative Writing Prose			3	A
Eng 5140		Form and Theory Poetry			3	A
Eng 5510		Linguistics and Lit			3	A
Eng 5800		Literary Genres			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
41	281	P	4	UT Austin	23	1976
Major	English and German					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3331		Beg Creative Writing-Poetry			3	A
Eng 4354		Writing Projects – Poetry			3	A
Eng 4354		Writing Projects Poetry II			3	A
Eng 4378		Women Writers			3	A
Eng 403		Hist Eng Lang			3	A
Eng 502		Teaching College Eng			3	A
Eng 453		Mod British Fic			3	A
Eng 530		19th Century Eng Lit			3	A
Eng 472		Shakespeare Ii			3	A
Eng 516		Restore 18th Century			3	A
Eng 459		Amer Fic of 20th Century			3	A
Eng 499		Reading Lit and Lang			3	A
Eng 499		Reading Lit and Lang II			3	A
Eng 510		Renaissance Studies			3	A
Eng 539		Modern Amer Lit			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
2	282	P	3.88	University of California Riverside	113	1993

Major	English		
Course Number	**Course Name**	**Hours**	**Grade**
Eng 103	Adv. Composition	4	B
Eng 117	Shakespeare Tragedy	4	A
Eng 185	Dickens	4	A
Eng 140	Studies Lit Genres	4	A
Ling 020	Lang and Linguistics	4	A
Eng 150	Chaucer	4	A
Eng 117	Shakespeare	4	A
Eng 132	Amer Lit Civ War 1914	4	A
Eng 155	Spenser	4	A
Eng 140	Studies Lit Genres	4	A
Eng 124	Female Novelistic Trad	4	A
Eng 266	Pro Sem 20th Cen Lit	4	A
Eng 261	Pro Sem Medieval and Ren	4	A
Eng 263	Pro Sem 17th Cent Lit	4	A
Eng 125	19th Cent	4	A
Eng 262	Pro Sem 16th Cent Lit	4	A
Eng 267	Pro Sem Victorian Lit	4	A
Eng 270	Pro Sem Amer Lit	4	A
Eng 260	Pro Sem Medieval Lit	4	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
12	288	P	3.88	St. Edwards	11	2003
Major	English Writing					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 3333		Desktop Publishing			3	A
Eng 4344		Advanced Writing Seminar			3	A
Eng 3336		Theories of Rhetoric and Comp			3	A
Eng 4342		Magazine Writing			3	A
Hons 4384		Topics in Lit and Film			3	A
Eng 3305		English Romantic Poets			3	A
Eng 4341		Literary Criticism			3	B
Eng 3306		Nonfiction			3	A
Eng 4350		Internship			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
30	288	P	3.4	UT Austin	276	1981
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 5040		Principles of Linguistics			3	A
Eng 5080		Teaching ESL			3	A
Eng 5330		Sociolinguistics			3	A
Eng 327		Eng Novel Defoe-Scott			3	C
Eng 349		Courtly Love			3	A
Eng 346		Lit Diff Disc Social Behavior			3	A
Eng 348		Modern Short Story			3	B
Eng 376		Intro to Women’s Studies			3	C
Eng 321		Shakespeare			3	A
Eng 360		English Grammar			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
31	289	P	4	Texas A&M	14	2002
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 374		Women Writers			3	A
Eng 339		African Amer Lit			3	A
Eng 361		Lit for Adolescents			3	A
Eng 301		Technical Writing			3	A
Eng 312		Shakespeare			3	A
Eng 4854		Directed Studies			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
47	295	P	3.5	University of North Texas	81	1998
Major	English					
Course Number		**Course Name**			**Hours**	**Grade**
Eng 4130		Great Books			3	C
Eng 4430		Shakespeare			3	B
Eng 4140		Great Books			3	B
Eng 3820		Amer Lit Survey			3	A
Eng 4010		Eng Lang in Amer			3	A
Eng 3100		Intro Creative Writing			3	A
Eng 3420		Brit Lit Survey			3	A
Eng 4600		Cont Euro Fiction			3	A

APPENDIX M

HISTORY PARTICIPANT INFORMATION

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
68	215	F	2.12	University of North Texas	5	2004
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4700		Texas			3	C
Hist 4390		Holocaust 1933-45			3	C
Hist 4490		American Revolution			3	C
Hist 4370		Cultural Mod Euro			3	B
Hist 4260		Topics in History			3	C
Hist 4090		Britain 1603-1832			3	C
Hist 4290		Cultural Med Euro			3	C
Hist 4880		U.S. Since 1929			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
85	218	F	2.75	University of Oklahoma	5	2004
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 3803		Era Russ Revolutions			3	C
Hist 3120		World at War 1940-1945			3	A
Hist 3763		E. Europe Since 1938			3	C
Hist 3770		Church/State E Eur			3	B
Hist 3383		Amer West			3	B
Hist 3883		Modern China to 1945			3	C
Hist 3463		Amer Mind to 1815			3	C
Hist 4973		Am Indian/Am West			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
86	227	F	3	Texas A&M Corpus Christi	40	2001
Major	Kinesiology					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4390		Topics in History			3	A
HIst 4341		Nazi Germany			3	C
HIst 3331		Texas History			3	B
Hist 3326		U.S. Since Second WW			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
70	229	F	2.71	University of North Texas	10	2002
Major	Psychology					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4440		African Am to 1900			3	D
Hist 4450		African Am Sn 1900			3	B
Hist 4260		Topics in History			3	B
Hist 4260		Slave/Free Atlantic World			3	C
Hist 4120		Conquests of Spanish America			3	A
Hist 2700		Texas			3	B
Hist 4010		Science Tech to Newton			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
58	235	F	2.77	UT Arlington	20	2002
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 3363		Texas to 1850			3	C
Hist 3334		U.S. 1920 to 1945			3	C
Hist 4367		Latin Amer History			3	C
Hist 4389		Studies in History			3	B
Hist 3324		Section Conflict			3	B
Hist 3334		U.S. 1920 – 1945			3	B
Hist 3372		U.S. Bus Hist I			3	B
Hist 4345		Tudor-Stuart			3	A
Hist 4359		Russian to 1855			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
78	237	F	3.37	University of North Texas	9	2003
Major	Political Science					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4300		French Revolution			3	A
Hist 4700		Texas			3	A
Hist 4070		World War II			3	B
Hist 4260		Nazi Germany			3	B
Hist 5110		U.S. Hist Antebellum Pol			3	A
Hist 5040		Britain Sn 1945			3	A
Hist 5100		Sem in U.S. Hist			3	B
Hist 5110		The Amer Rev			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
60	242	P	3.4	University of North Texas	10	2001
Major	General Studies					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4260		U.S. Aviation			3	B
Hist 4260		Auto in Amer Hist			3	B
Hist 361		History of Alabama			3	A
Hist 5110		Studies in U.S. Hist			3	B
Hist 5080		Sem Mod Eur Hist			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
54	242	P	3.8	Columbia College	5	2003
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 321		History of Modern U.S.			3	A
Hist 433		Topics			3	B
Hist 350		Amer Revolution			3	A
Hist 312		20th century Amer Dipl			3	A
Hist 381		History of Christianity			3	A
Hist 382		Christianity in Mod World			3	A
Hist 351		History of Amer Business			3	A
Hist 494		Historical Research Methods			3	A
Hist 342		American Civil War			3	A
Hist 333		Vietnam			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
84	242	P	3.5	UT Permian Basin	17	2002

Major	Humanities		
Course Number	**Course Name**	**Hours**	**Grade**
Hist 323	Renaissance	3	B
Hist 451	Hist Amer Thought	3	A
Hist 423	Urban America	3	A
Hist 439	Soviet Russia	3	A
Hist 458	National Leadership	3	A
Hist 474	Historic Preservation	3	A
Hist 476	Women Modern Amer	3	B
Hist 479	20th Century American Sn 1941	3	A
Hist 3371	Amer Minorities	3	B
Hist 4341	Early Amer History	3	B
Hist 4339	19th Century Russian Cul	3	B
Hist 4379	Great U.S. Leaders	3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
74	244	P	4	Concordia University	11	2003

Major	History		
Course Number	**Course Name**	**Hours**	**Grade**
Hist 3301	History of Mexico	3	A
Hist 3342	The American West	3	A
Hist 3321	International Relations Since 1919	3	A
HIst 3311	Texas History	3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
69	250	P	3.2	Texas A&M College Station	29	2001

Major History

Course Number	**Course Name**	**Hours**	**Grade**
Hist 438	19th Century England	3	A
Hist 331	Medieval Europe 300-1300	3	B
Hist 481	Seminar in History	3	B
Hist 411	Russia 1801-1917	3	B
Hist 404	World History Since 1500	3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
73	251	P	3.75	Hendrix College	1	2001

Major Economics and Business

Course Number	**Course Name**	**Hours**	**Grade**
Hist 5110	Mex/Am Cult	3	A
Hist 5110	U.S. History Antebellum Pol	3	A
Hist 5040	European Witch Hunts	3	B
Hist 5910	The Cold War	3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
72	254	P	3.25	Arizona State University	1	1978

Major Criminal Justice

Course Number	**Course Name**	**Hours**	**Grade**
His 303	American Culture History	3	B
His 351	England	3	A
His 361	U.S. to World Power	3	C
Hist 3020	Problems in U.S. Histoy	3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
61	254	P	3.87	University of Alabama	5	1989
Major	Clothing, Textiles and Design					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 5900		Europe 1815-1914			3	A
Hist 5470		Intro Museum Studies			3	A
Hist 5900		U.S. History Museums			3	A
Hist 4290		Cultural Med Eur			3	B
Hist 4380		Europe Witch Hunt			3	A
Hist 5900		Real the History of Old South			3	A
Hist 5480		App History Practicum			3	A
Hist 5900		Modern Britain Since 1830			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
52	254	P	3.38	University of North Texas	17	2002
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4260		Topics in History			3	B
Hist 4260		Topics in History			3	B
Hist 4700		Texas			3	B
Hist 4220		Renaissance			3	A
Hist 4260		Nazi Germany			3	B
Hist 4490		Amer Rev			3	C
Hist 4230		Age of Reformation			3	A
Hist 3760		Roman Civilization			3	B
Hist 4290		Cultural Med Eur			3	A
Hist 4570		Japanese History			3	B
Hist 4120		Conquests So Amer			3	A
Hist 4260		Topics in History			3	A
Hist 4300		French Revolution			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
79	257	P	3.5	University of North Texas	12	2003
Major	Computer Science					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4260		Topics in History			3	A
Hist 4370		Cultural Mod Europe			3	A
Hist 713		African Amer History			3	B
Hist 303		Modern Latin America			3	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
67	257	P	2.5	Criswell College	117	1994
Major	Biblical Studies					
Course Number		**Course Name**			**Hours**	**Grade**
Lect 404		Cultural Milieu of Modern Man			3	D
Lect 403		History of West Civil			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
59	259	P	2.84	Minnesota State University	25	2001
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 366		U.S. Const Hist I			3	C
Hist 367		U.S. Const Hist II			3	B
Hist 322		England II			3	B
Hist 301		East Asian			3	B
Hist 311		Scand Amer			3	B
Hist 401		Amer West			4	B
Hist 301		History of Ireland			3	B
Hist 366		History of Mexico			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
53	261	P	3.33	Hillsdale Free Will Baptist College	11	1995
Major	General Studies					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 333		U.S. Dipl Hist Since 1890			3	B
Hist 346		Latin America			3	B
Hist 366		Texas and Its History			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
55	261	P	3.57	University of North Texas	2	2003
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4110		British Empire			3	B
Hist 4070		World War II			3	B
Hist 4860		Civil War and Recon			3	A
Hist 4590		Modern Africa			3	B
Hist 4700		Texas			3	A
Hist 4260		Korea and Vietnam Wars			3	A
PSCI 4140		The Presidency			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
66	265	P	3.94	Southern Methodist University	9	1998
Major	Communication Arts and Advertising					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 3382		History of Mexico			3	A
Hist 4180		Col Mex and Span			3	A
Hist 4260		Gender/Sex in Early Mod Eur			3	A
Hist 4700		Texas			3	A
Hist 4480		Colonial America			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
51	266	P	3.4	University of North Texas	57	2000
Major	Social Work					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4260		Topics in History			3	B
Hist 4260		Topics in History			3	A
Hist 5110		Studies in U.S. History			3	B
Hist 5900		Special Problems			3	A
Hist 5900		Special Problems			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
82	266	P	3.62	UT Arlington	40	2001
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 3300		Study of History			3	B
Hist 3375		Ancient Rome			3	A
Hist 3364		Texas Since 1845			3	A
Hist 3373		U.S. Eco 1860 to present			3	B
Hist 4349		England 1848			3	A
Hist 3389		World War II			3	B
Hist 4301		Hist Geo and Cart			3	A
Hist 4385		Police History			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
81	267	P	3.75	Texas Tech	154	1990
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 3310		History of Texas			3	A
Hist 3340		Ancient Civilization			3	B
Hist 3365		Euro War			3	A
Hist 4308		Vietnam War			3	A
Hist 3346		The Age of Chivalry			3	A
Hist 4397		Research in History			3	A
Hist 3398		Mod Mid East			3	A
Hist 4398		Senior Sem in Hist			3	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
57	268	P	3.83	Midwestern State	7	2004
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 3833		Latin American History			3	A
Hist 4168		Contemporary America			3	A
Hist 4433		20th Century Europe			3	A
Hist 4543		Hist Middle East			3	A
Hist 3123		History of England			3	B
Hist 3133		World Religions and Culture			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
63	273	P	3.16	UT Austin	6	2003
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 5110		Studies in U.S. History			3	B
Hist 5110		Studies in U.S. History			3	B
Hist 5040		Studies in Modern Euro History			3	B
Hist 5110		Studies in U.S. History			3	A
Hist 5040		Studies in Mod Euro History			3	A
Hist 340		European Expansion			3	B
Hist 349		Surv Military History			3	C
Hist 331		History of the Ottoman			3	B
Hist 341		Modern Japan			3	B
Hist 355		Main Curr of America			3	B
Hist 350		Germany Sn Hitlor			3	A
HIst 356		Main Curr Amer Culture			3	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
62	274	P	3.67	Texas A&M College Station	21	2003
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 16-553		Exploration and Imperialism			3	B
Hist 16-423		African History			3	A
Hist 355		From Dem to Dictatorship			3	A
Hist 571		Graduate Topics in Modern Amer			4	A
HIst 575		Intro to Doc Studies			4	A
Hist 590		Graduate Reading			1	A
Hist 542		Renaissance in Euro Hist			4	A
Hist 543		Topics in Modern Euro Hist			4	A
Hist 590		Intro to World History			4	B
Hist 324		Eur Soc Industrial Age			3	A
Hist 439		20th Century England			3	A
Hist 429		The Roman Empire			3	A
Hist 331		Medieval Europe 300-1300			3	A
Hist 339		East Europe Since 1453			3	B
HIst 481		Seminar in History			3	A
Hist 463		Amer Foreign Relations			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
56	275	P	3.66	Roosevelt University	367	1973
Major	History and Russian					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 318		Eur Rev Trad			3	A
Hist 342		Russian Revolution			3	B
Hist 360		History of Modern China			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
75	277	P	2.72	Cornell	369	1973
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 303		History for Amer Relations			4	A
Hist 346		Old Regime and For Rev			4	B
Hist 372		Amer Civ Origins			4	B
Hist 393		Pre 19th Cen China History			4	C
Hist 473		Amer Rev 1963-1615			4	B
Hist 384		Amer For Relations			4	C
Hist 394		19th and 20th Century China			4	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
65	277	P	3.4	Texas A&M College Station	9	2003
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 406		Era of French Rev and Nap			3	B
Hist 410		Russian Hist to 1801			3	A
Hist 412		Soviet Union 1917 to present			3	B
Hist 485		Directed Studies			2	A
HIst 352		Modern East Asia			3	B
Hist 481		Seminar in Hist			3	B
Hist 445		History of Modern Mil Thought			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
80	272	P	2.57	University of North Texas	14	2003

Major Sociology

Course Number	**Course Name**	**Hours**	**Grade**
Hist 4070	World War II	3	C
Hist 4700	Texas	3	B
Hist 3650	Amer Leaders to 1865	3	C
Hist 4260	Topics in Hist	3	C
HIst 4410	International History U.S. from 1865	3	B
Hist 4260	Topics in History	3	B
Hist 4590	Modern Africa	3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
76	275	P	3.8	University of Wisconsin	268	1981

Major Library Science

Course Number	**Course Name**	**Hours**	**Grade**
Hist 57-360	History Modern China	3	A
Hist 61-371	History Journalism in U.S.	3	A
Hist 57-311	20th Century America	3	B
Hist 57-338	Eur 1920 to Present	3	A
Hist 4370	Cult Mod Euro	3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
83	279	P	3.75	UT Austin	7	1992

Major Radio, TV, Film

Course Number	**Course Name**	**Hours**	**Grade**
Hist 337	Germany in 20th Century	3	B
Hist 4440	African Amer to 1900	3	A
Hist 4190	Mexico Since 1810	3	A
Hist 3150	Hist Dev Mex-Am	3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
64	279	P	3.2	University of North Texas	42	2000
Major	Applied Arts and Sciences					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 3302		Latin American History			3	B
Hist 3331		Texas History			3	B
Hist 4260		Topics in History			3	A
Hist 4260		U.S. Aviation History			3	A
Hist 4370		Cultural Mod Euro			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
71	288	P	3.5	UT Austin	8	1991
Major	Business					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4260		Topics in History			3	B
Hist 4370		Cultural Mod Europe			3	A
Hist 4700		Texas			3	A
Hist 4260		Topics in History			3	B

APPENDIX N

LIFE SCIENCE PARTICIPANT INFORMATION

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
114	194	F	2.6	Stephen F. Austin	348	1975
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bio 341		Genetics			4	B
Agr 333		Animal Nutrition			3	B
Bio 309		Microbiology			4	B
Bio 345		Vertebrate Embryology			4	C
For 350		Forest Wildlife Mgmt			3	C
Bio 433		Ornithology			3	C

Subject	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad Year*
111	202	F	2.8	Texas Tech	11	2002
Course Number		**Course Name**			**Hours**	**Grade**
BIOL 3309		Pop Communities/Ecosystem			3	C
BIOL3301		Genetics			3	C
BIOL 4101		Biology Seminar			1	B
BIOL 3102		Experimental Genetics			1	A
BIOL 4101		Biology Seminar			1	A
BIOL 3120		Cell Biology			1	A
BIOL 3320		Cell Biology			3	B
ZOOL 4312		Animal Behavior			3	A
ZOOL 4407		National Hist. Vertebrates			4	A
BOT 3401		Plant Physiology			4	B
BIOL 3054		Principles of Bio I			4	C
BIOL 3004		Microbiology			4	B
BIOL 3064		Principles of Bio II			4	C
BIOL 3234		Comparative Anatomy			4	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
125	205	F	3.17	Samford University	20	2002
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bio 302		Mammalian Physiology			4	B
Bio 326		Environmental Science			4	B
Bio 303		Experimental Physiology			4	B
Bio 333		Genetics			4	B
Bio 300		Mental Illness			4	B
Bio 325		General Microbio			4	B
Bio 438		Bio Seminar			4	B
Bio 439		Bio Independent Study			1	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
124	216	F	3.36	Texas Woman's University	17	2005
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bio 4813		Molecular Cell			3	B
Zoo 4243		Mammalian physiology			3	B
Zoo 4241		Mammalian Physiology lab			1	B
Bio 4811		Mole cell			3	B
Bact 3113		General Micro biology			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
119	218	F	3.5	University of North Texas	5	2002

Major Biology			
Course Number	**Course Name**	**Hours**	**Grade**
Bio 4090	Parasitology	4	A
Bio 3800	Animal Physiology	3	B
Bio 3810	Animal Physiology Lab	1	B
Bio 3520	Cell Bio Lab	1	A
Bio 3510	Cell Bio	3	B
Bio 4930	Adv. Micro Metabolism	3	A
Bio 3450	Genetics	4	B
Bio 4750	Neuroscience	3	B
Bioc 3620	Elem Biochemistry	4	B
Bioc 4200	Immunology	4	B
Bio 4900	Special Problems	2	A
Bio 3000	Comparative Anatomy	4	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
121	229	F	4	University of North Texas	10	2003
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bio 4900		Special Prob			2	A
Bio 3810		Animal Phys Lab			1	A
Bio 3380		Med Bacteriology			4	A
Bio 4090		Parasitology			4	A
Bio 3450		Genetics			4	A
Bioc 3620		Elem Biochem			4	A
Bio 4300		Histology			4	A
Bio 3510		Cell Biology			3	A
Bio 3520		Cell Bio Lab			1	A
Bio 4770		Biotechnology			3	A
Bio 3800		Animal Physiology			3	A
Bio 4600		Forensic Biology			3	A
Bio 4900		Spec Probem			1	A

Subject	Test Score	Pass/Fail	Grade Point Average	University	Months Elapsed	Grad Year
109	244	P	3.025	University of North Texas	24	2002
Course Number		**Course Name**			**Hours**	**Grade**
BIOL 3450		Genetics			4	A
BIOL 4050		Animal Ecology			4	B
BIOC 4540		Biochemistry I			3	C
BIOC 4550		Biochemistry II			3	B
BIOC 4570		Bioc and Mol Bio Gen			3	C
BIOC 4580		B and MB of Gene Lab			2	A
BIOL 4090		Parasitology			4	A
BIOL 3800		Animal Physiology			3	C
BIOL3810		Animal Phys Lab			1	B
BIOL 3520		Cell Bio Lab			1	A
BIOL 4000		Plant Ecology			4	B
BIOL 4005		Vistas in Biol. Sciences			1	A
BIOL 5002		Bacterial Diversity and Physiology			3	C
BIOL 5110		Endocrinology			3	C

Subject #	Test Score	Pass/Fail	Grade Point Average	University	Months Elapsed	Grad. Year
123	246	P	2.82	UT Arlington	19	2002
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bio 3315		Genetics			3	C
Bio 3312		Immunobiology			3	B
Bio 3343		Gen mycology			3	B
Bio 3346		Human Anatomy			3	C
Bio 4312		Intro Virology			3	B
Bio 3182		Bas and Appl Bio			1	A
Bio 3309		Medical Terminology			3	A
Bio 3311		Medical Mycology			3	C
Bio 3327		Plant Science			3	B
Bio 4315		Gen Endocrin			3	B

Subject	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad Year*
112	246	P	3.50	University of North Texas	10	2002
Course Number		**Course Name**			**Hours**	**Grade**
BIOL 5430		Macromolecular Physical Chem			4	B
BIOL 5440		Cell Biology			4	B
BIOL 6141		Onco Genes			3	A
BIOL 6345		Molecular Bio and HIV/AID			3	A
BIOL 5410		Biochem			4	B
BIOL 5420		Molecular Bio and HIV/AID			4	B
BIOL 6129		Topics in Molecular Bio			3	A
BIOL 6142		Membrane Bio I			3	A
BIOL 3380		Med Bacteriology			4	B
BIOL 3450		Genetics			4	A
BIOL 4090		Parasitology			4	A
BIOL 3800		Animal Physiology			3	B
BIOL 3870		Animal Phys Lab			1	B
BIOL 4600		Forensic Lab			3	A
BIOL 3510		Cell Biology			3	A
BIOL 3520		Cell Bio Lab			1	A
BIOL 4200		Immunology			4	A
BIOL 4160		Tech/Micro Molec Bio			4	A
BIOL 4170		Tech/Micro Molec Bio Lab			2	A
BIOL 3000		Comparative Anatomy			4	A

Subject	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad Year*
110	249	P	2.4	University of North Texas	28	2001
Course Number		**Course Name**			**Hours**	**Grade**
BIOL 3450		Genetics			4	B
BIOL 3380		Med. Bacteriology			4	C
BIOL 3800		Animal Physiology			3	B
BIOL 3510		Cell Biology			3	C
BIOL 3520		Cell Biology Lab			1	B
BIOL 3350		Human Heredity			3	B
BIOL 3360		Heredity Lab			1	B
BIOL 4200		Immunology			4	B
BIOL 4600		Forensic Biology			3	C
BIOL 4090		Parasitology			4	B
BIOC 3620		Elem. Biochemistry			4	C
BIOL 4770		Bio Technology			3	C
BIOL 4900		Teratogen Internship			2	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
118	253	P	2.9	Oklahoma State University	17	2002
Major	Zoology					
Course Number		**Course Name**			**Hours**	**Grade**
Zoo 3204		Physiology			4	B
Zoo 3153		Evolution			3	C
Bio 3014		Cell and Molecular Bio			4	B
Bio 3034		General Ecology			4	B
Zoo 3115		Vertebrate Morphology			5	B
Micr 4134		Pathogenic Micro			4	B
Zoo 3104		Invertebrate Zoology			4	B
Zoo 4700		Undergrade Res Prob			1	B
Bio 4700		Genetics			4	B

Subject #	***Test Score***	***Pass/Fa il***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad Year***
108	255	P	3.58	University Of Maryland	264	1981
Course Number		**Course Name**			**Hours**	**Grade**
ANSC 221		Fund Animal Prod			3	A
ANSC 223		Sem Career and Cur Plan			1	A
ANSC 305		Compan Animal Care			3	A
ANSC 220		Systemic Animal Phys			4	B
ANSC 359		Advanced Horse Management			3	A
ZOOL 221		Compare. Vert Anatomy			3	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
117	259	P	3.2	UT Dallas	110	1995
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bio 3380		Medical Bacteriology			4	A
Bio 3800		Animal Physiology			3	C
Bio 3810		Animal Phys Lab			1	B
Bio 4090		Parasitology			4	B
Bio 3600		Hist and Biom Tech			4	A
Bio 4200		Immunology			4	B
Bioc 3620		Elem Biochem			4	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
116	266	P	3.5	University of North Texas	5	2003
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bio 4530		Virology			3	A
Bio 3450		Genetics			4	B
Bio 4600		Forensic Bio			3	C
Bio 3520		Cell Bio Lab			1	B
Bio 3380		Med Bacteriology			4	B
Bio 3510		Cell Biology			3	A
Bio 4050		Animal Ecology			4	A
Bio 4110		Endocrinology			3	B
Bio 4090		Parasitology			4	A
Bioc 3621		Elem Biochem			3	A
Bioc 3622		Elem Biochem Lab			1	A
Bio 4380		Aquatic Tox			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
122	272	P	3.71	University of North Texas	14	2005
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bio 3450		Genetics			4	A
Bio 4900		Teratogen Intern			3	A
Bio 3510		Cell Biology			3	A
Bio 4600		Forensic Bio			3	A
Bio 3520		Cell Bio Lab			1	B
Bio 3800		Animal Physio			3	B
Bioc 3620		Elem Biochem			4	A
Bio 3810		Animal Phys Lab			1	A
Bio 4900		Special Problems			1	A
Bio 4090		Parasitology			4	A
Bio 4400		Wetland Eco and Mgmt			4	A
Bio 4110		Endocrinology			3	C
Bio 5051		Community Ecology			3	A
Bio 5005		Proc mat for Scientists			3	A
Bio 6150		Scientific Community			3	A
Bio 5340		Molecular Biology			3	A
Bio 5905		Special Problems			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
115	274	P	3.52	University of North Texas	4	1999
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bioc 4560		Biochemistry Lab			2	B
Bio 3450		Genetics			4	B
Bio 3510		Cell Biology			3	B
Bio 4900		Special Problems			3	B
Bio 3520		Cell Bio Lab			1	A
Bio 4900		Special Problems			3	A
Bio 4910		Special Problems			3	A
Bio 4900		Special Problems			3	A
Bio 4910		Special Problems			3	A
Bio 4090		Parasitology			4	B
Bioc 4540		Biochemistry I			3	B
Bioc 4570		Bioc and Mol Bio Gen			3	B
Bio 5080		Radiation Safety			1	A
Bio 5040		Wetlands Ecology			3	B
Bio 5040		Sediment Toxicology			3	B
Bio 5040		Topics Water Research			1	A
Bio 5570		Aqua Insects in Amer			4	B
Bio 5040		Ecological Risk Assess			3	A
Bio 6220		Biostatistics			6	A
Bio 5040		PC Graphics			3	A
Bio 6390		Tech Environ Anat			4	A
Bio 5905		Animal Physiology			3	B
Bio 5380		Fund Aquatic Tox			3	A
Bio 6380		Environment Chem			4	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
113	276	P	2.7	Texas A&M College Station	19	2003
Major	Biomedical Sciences					
Course Number		**Course Name**			**Hours**	**Grade**
Gene 320		Biomedical Genetics			3	B
VTPB 405		Principles and Applied Biomed			5	B
ANSC 303		Prin of Animal Nutrition			3	C
VTPP 423		Biomedical Physiology			4	B
VAPH 305		Biomedical Anatomy			4	B
VTPP 427		Biomedical Physiology II			3	C
BICH 410		Comprehensive BICH I			3	C
VTPS 303		Med Communic International			3	A
BICH 411		Comprehensive BICH II			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
120	281	P	2.78	Trinity	93	1997
Major	Biology					
Course Number		**Course Name**			**Hours**	**Grade**
Bio 318		Evol, Ecol and Diversity of Life			3	B
Bio 319		Organismal Struct and Funct			3	B
Bio 320		Cellular and Molecular Bio			3	B
Bio 305		Genetics and Human Affairs			3	C
Bio 431		Microanatomy			4	A
Bio 424		Microbiology			4	B
Bio 432		Vertebrate Physiology			4	B
Bio 426		Vertebrate Zoology			4	B
Bio 442		Immunobiology			4	B

APPENDIX O

MATHEMATICS PARTICIPANT INFORMATION

Subject #	Test Score	Pass/Fail	Grade Point Average	University	Months Elapsed	Grad. Year
161	223	F	2.3	Prairie View A&M	186	1992
Major	Electrical Engineering					
Course Number		**Course Name**			**Hours**	**Grade**
Math 3073		Linear Alg			3	C
Math 4013		Diff Equations			3	C
Math 4174		Adv Math for Engr			4	B
Math 3013		Modern Alg			3	C

Subject #	Test Score	Pass/Fail	Grade Point Average	University	Months Elapsed	Grad. Year
142	226	F	3.166	Memphis State University	213	1982
Major	Computer Science					
Course Number		**Course Name**			**Hours**	**Grade**
MATH 3391		Differential Equations			3	B
MATH 4611		Statistical Methods			3	D
MATH 4791		Computer Architecture			3	A
MATH 4631		Probablility			3	A
MATH 521		Applied Linear Algebra			4	B
MATH 586		Prob. Theory Comm and Crl			4	A-

Subject #	Test Score	Pass/Fail	Grade Point Average	University	Months Elapsed	Grad. Year
140	230	F	4	Amberton University	26	2001
Major	Management					
Course Number		**Course Name**			**Hours**	**Grade**
Bus 3104		Statistical Analysis			3	A
Math 3013		Discrete Math			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
146	233	F	3.2	University of Central Arkansas	401	1970
Major	Information System Technology					
Course Number		**Course Name**			**Hours**	**Grade**
Math 4340		College Geom			3	B
Math 3355		Computer Program			3	A
Math 3321		Calculus IV			3	B
Math 4320		Intro Linear Algebra			3	C

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
162	233	F	2.75	University of North Texas	25	2003
Major	Business Administration					
Course Number		**Course Name**			**Hours**	**Grade**
Math 3103		Discrete Math			3	B
Math 3003		Principles of Stats			3	C
Math 3013		Number Theory			3	B
Math 3063		Diff Equations			3	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
154	235	F	2.79	Ohio University	32	2002
Major	Education major – Integrated Mathematics					
Course Number		**Course Name**			**Hours**	**Grade**
Math 300		History of Math			4	C
Math 306		Foundations of Math I			4	B
Math 314		Elem Abstract Alg			4	C
Math 330		Foundations of Geom			4	B
Math 320		Teach Math in Sec Schools			5	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
157	238	F	2.0	Texas A&M Commerce	11	2004

Major Mathematics

Course Number	**Course Name**	**Hours**	**Grade**
Math 331	Discrete Mathematics	3	C
Math 426	History of Mathematics	3	C
Math 437	Elementary Number Theory	3	C
Math 334	Intro Abstract Alg	3	C
Math 401	Intro to Math Stats	3	C
Math 314	Calculus IV	3	C
Math 321	College Geometry	3	C
Math 335	Linear Algebra	3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
156	238	F	2.82	University of Washington	2	2004

Major Mathematics

Course Number	**Course Name**	**Hours**	**Grade**
Math 307	Intro to Diff Equations	3	B
Math 308	Matrix Algebra	3	C
Math 394	Probability	3	B
Math 308	Matrix Algebra	3	B
Math 395	Probability Ii	3	A
Math 354	W-Math Enrichment	5	B
Math 411	Intro Modern Algebra Teaching	3	B
Math 355	Math Enrichment	5	B
Math 412	Intro Modern Alg Teaching	3	B
Math 381	Intro Prob and Stat	5	B
Math 444	Geometry for Teachers	3	C
Math 445	Geometry for Teachers	3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
152	238	F	3.03	Texas Christian University	22	1999
Major	Mathematics					
Course Number		**Course Name**			**Hours**	**Grade**
Math 30524		Calculus III			4	B
Math 30224		Intro Linear Algebra			4	A
Math 30613		Intro Diff Equations			3	A
Math 50503		Intro Real Analysis			3	C
Math 30803		Elements of Prob and Stats			3	B
Math 40073		History of Math			3	B
Math 40970		Intro Partial Diff Equations			3	B
Math 50253		Abstract Alg I			3	C
Math 50623		Applied Math I			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
143	238	F	2.0	University of North Texas	20	2002
Major	Mathematics					
Course Number		**Course Name**			**Hours**	**Grade**
Math 3410		Diff Equ I			3	C
Math 3740		Vector Calculus			3	C
Math 3350		Numerical Analysis			3	B
Math 4610		Probability			3	D
Math 3510		Abstract Algebra			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
155	254	P	2.45	Austin College	22	2002
Major	Mathematics					
Course Number		**Course Name**			**Hours**	**Grade**
Math 52		Ordinary Diff Equ			4	B
Math 72		Modern Algebra			4	C
Math 81		Applied Analysis			4	C
Math 82		Real Analysis			4	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
151	254	P	2.67	California State University – Long Beach	337	1976
Major	Mathematics					
Course Number		**Course Name**			**Hours**	**Grade**
Math 323		Numerical Program			4	C
Math 317		Intro Abstract Math			3	D
Math 360		Fund Concepts Analysis			3	A
Math 310		History of Math			3	B
Math 346		Linear Algebra			3	A
Math 355		College Geometry			3	B
Math 460		Adv. Calc I			3	B
Math 440		Number Theory I			3	B
Math 460		Adv Calc II			3	C
Math 444		Intro Higher Alg			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
158	267	P	3.8	Wheaton College	317	1977
Major	Mathematics and Physics					
Course Number		**Course Name**			**Hours**	**Grade**
Math 50		Vector Calc			4	A
Math 41		Algebra I			4	A
Math 51		Analysis I			4	A
Math 63		Probability and Stat			4	A
Math 52		Analysis II			4	A
Math 61		Num Analysis			4	B
Math 69		Mathematical Physics			4	A
Math 72		Complex Analysis			4	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
141	270	P	1.7	UT Austin	208	1985
Major	Economics					
Course Number		**Course Name**			**Hours**	**Grade**
Math 427		Adv Cal for App I			4	C
Math 340		Matrices and Matrix Calculations			3	D
ME 335		Prob and Stats for Engineering			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
159	270	P	4	Texas Tech University	20	1992
Major	Business Adminstration					
Course Number		**Course Name**			**Hours**	**Grade**
Math 5313		Geometry in the Classroom			3	A
Math 5203		Problem Solving in Secondary			3	A
Math 5900		Algebra in Classroom			3	A
Math 5900		Math Manipulations			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
160	270	P	3.30	U.S. Naval Academy	209	1987
Major	Mathematics					
Course Number		**Course Name**			**Hours**	**Grade**
SM 331		Advanced Calculus			4	A
SM 362		Modern Algebra			3	C
SM 332		Advanced Calc II			4	B
SM 411		Complex Analysis			3	A
SM 315		Intro Partial Diff Equation			3	B
SM 425		Adv Num Analysis			3	B
SM 259		Mathematical Logic			3	A

Subject #	Test Score	Pass/Fail	Grade Point Average	University	Months Elapsed	Grad. Year
163	273	P	3.4	Wittenberg University	154	1991
Major	Mathematics					
Course Number		**Course Name**			**Hours**	**Grade**
Math 360		Linear Algebra			4	B
Math 460		Senior Seminar			1	B
Math 365		Abstract Algebra			4	A
Math 460		Senior Seminar			1	B

Subject #	Test Score	Pass/Fail	Grade Point Average	University	Months Elapsed	Grad. Year
153	275	P	3.36	Rochester Institute of Technology	289	1987
Major	Computer Science					
Course Number		**Course Name**			**Hours**	**Grade**
Math 5900		Special Problems			3	A
Math 5900		Special Problems			3	A
Math 5900		Special Problems			3	A
Math 351		Probability			4	B
Math 411		Fluid Mechanics			4	C
Math 407		Linear Algebra			4	B
Math 309		Statistics			4	A

Subject #	Test Score	Pass/Fail	Grade Point Average	University	Months Elapsed	Grad. Year
150	275	P	2.7	Washington University	293	1979
Major	Computer Science					
Course Number		**Course Name**			**Hours**	**Grade**
SSM 309		Matrix Algebra			3	C
SSM 325		Engineering Stats			3	B
SSM 317		Engineering Math			4	B

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
147	275	P	4	University of Michigan Ann Arbor	187	1986
Major	Industrial Operations and Engineering					
Course Number		**Course Name**			**Hours**	**Grade**
Stat 402		Stat Data and Analysis			4	A
IOE 310		Intro Optim Meth			3	A
IOE 365		Beginning Stat			4	A
IOE 466		Stat Qual Control			3	A
IOE 560		Bayesian Dec Analysis			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
164	278	P	3.66	Texas A&M College Station	60	1998
Major	Psychology					
Course Number		**Course Name**			**Hours**	**Grade**
Math 451		Theory of Ordinary Diff Equ			3	B
Math 325		Math of Interest			3	A
Math 411		Math Probability			3	A

Subject #	***Test Score***	***Pass/Fail***	***Grade Point Average***	***University***	***Months Elapsed***	***Grad. Year***
144	278	P	2.44	Youngstown State	289	1982
Major	Computer Science					
Course Number		**Course Name**			**Hours**	**Grade**
Math 725		Matrix and Linear Algebra			4	C
Math 760		Numerical Analysis			4	B
Math 315		Analysis Geometric and Calculus III			5	B
Math 301		Differential Equations			3	C
Math 302		Advanced Calculus			3	B
Math 304		Statistics for Engineers			3	B
Math 423		Intro Complex Variables			3	C

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
149	286	P	3.7	UT Austin	257	1982
Major	Aerospace Engineering					
Course Number		**Course Name**			**Hours**	**Grade**
Math 427		Adv Calculus for App I			4	A
Math 427		Adv Calculus for App II			4	B
Math 362		Probability I			3	A
Math 378		Intro to Math Stat			3	C
Math 393		Integral Transforms			3	A
Math 393		Integral Transforms			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
148	289	P	3.38	Valparasio University	70	1995
Major	Physics and Mathematics					
Course Number		**Course Name**			**Hours**	**Grade**
Math 350		Diff Equ			3	B
Math 330		Fourier Series and Bound			3	A
Math 434		Intro Complex Variables			3	B
Math 461		Abstract Alg I			3	C
Math 322		Optimization			3	B
Math 451		Analysis I			3	B
Math 538		Intro Euclid Geometry			5	A
Math 550		Intro to Typology			5	A
Math 502		Tensor Analysis			3	A
Math 539		Intro Euclid Geometry II			5	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
145	292	P	3.36	Georgia Institute of Technology	277	1983
Major	Engineering					
Course Number		**Course Name**			**Hours**	**Grade**
Math 3307		Calculus IV			5	B
Math 3308		Calculus V			5	C
Math 3309		Diff Equ			5	A

APPENDIX P

SOCIAL STUDIES PARTICIPANT INFORMATION

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
137	230	F	3.25	Oklahoma State	29	2001
Major	Secondary Education with concentration in Social Studies					
Course Number		**Course Name**			**Hours**	**Grade**
Soc 3223		Social Psychology			3	B
Hist 4533		Blacks in America			3	A
Hist 3783		New South			3	B
Soc 4723		Marriage and Family			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
128	232	F	3.625	Southern University	122	1995
Major	Political Science					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 311		Black American History			3	A
Pols 320		Public Administration			3	A
Pols 351		Const Law			3	B
Pols 402		Black Politics			3	B
Pols 411		Intro to Law			3	B
Pols 432		Comparative Gov			3	A
Pols 483		Adv Sem in Pol Sci			3	A
Psyc 370		Psychology of Sexuality			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
138	245	P	3.14	University of Southern Mississippi	133	1992
Major	Coaching and Sports					
Course Number		**Course Name**			**Hours**	**Grade**
Soc 315		The Family			3	B
Hist 448		The Amer Rev			3	B
PS 301		State and Local Politics			3	B
Hist 488		Methods of Social Studies			3	B
Hist 315		Studies Euro Hist			3	A
Ghy 325		App Phy Geog			3	B
Hist 341		Miss History			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
131	246	P	3.16	University of Montevallo	69	1998
Major	Social Sciences					
Course Number		**Course Name**			**Hours**	**Grade**
Geog 331		Human Geography			3	B
Hist 485		Senior Seminar			3	B
Soc 331		Marriage and Family			3	A
Hist 310		Intro to History Studies			3	B
Pos 370		Methods of Res in Social Sciences			3	C
Pos 320		Political Film			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
134	250	P	3.57	Arizona State	13	1978
Major	Criminal Justice					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 303		Amer Cultural History			3	B
Hist 351		England			3	A
Hist 3070		Hist Problems in U.S. Hist			3	A
Soc 329		Criminology			3	B
Econ 301		Contemporary Econ Problems			3	A
PLSI 302		Current Issues in National and State			3	A
Econ 312		Macroeconomics			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
130	254	P	3.42	University of North Texas	36	2000
Major	Sociology					
Course Number		**Course Name**			**Hours**	**Grade**
Soci 4340		Soc Psychology and Behavior			3	A
Soci 3000		Marriage and Family			3	A
Soci 4000		Sociological Theory			3	B
Soci 4260		Sociology of Sexuality			3	B
Soci 4870		Social Research			3	C
Soci 4880		Quant Method Soc Research			3	A
Soci 4350		Community Org			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
126	255	P	3.57	Angelo State	19	2003
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Govt 3332		Dev of Am Pol Theory			3	C
Govt 4351		U.S. Foreign Policy			3	A
Gov 4302		Amer Const Law			3	B
Hist 3302		Amer Hist 1690-1789			3	A
Hist 3340		Eng Hist 1690-1789			3	A
Hist 4310		Am Cultural Heritage			3	A
Hist 3341		Eng History after 1714			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
129	259	P	3.22	University of Arizona	202	1980
Major	Public Administration					
Course Number		**Course Name**			**Hours**	**Grade**
Geog 3		Physical Geography			3	B
Econ 3		Principles Economics			3	C
Geog 3		Physical Geography			3	B
Soc 88		Sociology Education			3	A
Soc 342		Criminology			3	B
Soc 461		Minority Groups			3	B
Pol 435		Public Opinion and Vote Behavior			3	A
Pol 471		Law and Civil Liberties			3	B
Soc 341		Juvenile Delinquent			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
139	264	P	2.96	UT Dallas	129	1993
Major	Interdisciplinary Studies					
Course Number		**Course Name**			**Hours**	**Grade**
Soci 3371		Changing Sex Roles			3	C
Eco 4340		Labor Economics			3	B
Gov 3303		Const. Law			3	A
Psy 3333		Behavioral Change			3	B
Soc 3300		Social Analysis			3	C
Psy 3362		Cognitive Dev			3	B
Soc 3302		Social Equality			3	B
Psy 3332		Social and Personality			3	A
Hist 3381		Reflections on Amer Identity			3	B

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
136	266	P	3.55	University of Houston Clearlake	7	2003
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4133		Civil War and Reconstruction			3	A
Govt 4535		Political Philosophy			3	B
Hist 4336		Modern Europe			3	A
Hist 4034		The New South			3	A
Hist 4931		The U.S. West			3	B
Pols 4133		Civil Liberties in America			3	B
Pols 4531		Public Administration			3	A
Hist 4334		Revolutionary Europe			3	A
Pols 3532		Policy Making Process			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
135	269	P	2.87	University of North Texas	33	2002
Major	Social Science					
Course Number		**Course Name**			**Hours**	**Grade**
Psci 4700		Political Corruption			3	B
Hist 4860		Civil War and Recon			3	C
Psci 3810		Intern Relations			3	B
Geog 4210		Urban Geography			3	B
Geog 3750		Sub-Saharan Africa			3	C
Hist 4640		U.S. Military to 1815			3	B
Hist 4260		Topics in History			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
133	269	P	3.9	University of North Texas	10	2003
Major	Sociology					
Course Number		**Course Name**			**Hours**	**Grade**
Soci 4000		Sociological Theory			3	A
Soci 4540		Race and Ethnic Minorities			3	A
Soci 4870		Social Research			3	A
Soci 3000		Marriage and Family			3	A
Soci 3600		Multiracial Family			3	A
Soci 3330		Social Stratification			3	A
Soci 4450		Family Later Life			3	A
Psyc 3640		Psy Marital Adjust			3	B
Soci 4880		Quant Meth Social Research			3	A
Soci 3550		Collective Behavior			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
132	271	P	3.38	University of North Texas	62	1999
Major	History					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 4580		Africa to 19th Cent			3	A
Hist 4350		Age of Dictators			3	B
Hist 4440		Afro Amer History and Culture			3	B
Hist 4260		Topics in History			3	B
Hist 4070		World War II			3	C
Hist 4450		African Am Since 1900			3	B
Soci 5236		Rel and Global Change			3	A
Soci 5334		Social Stratification			3	A
Soci 5337		Complex Org			3	A
Soc 5210		Intro Social Strat			3	A
Soci 6500		Race/Class/Gender			3	B
Soci 6200		Multivariate Analysis			3	B
Soci 5450		Population and Society			3	A

Subject #	*Test Score*	*Pass/Fail*	*Grade Point Average*	*University*	*Months Elapsed*	*Grad. Year*
127	277	P	4	Northeastern University	17	1994
Major	Criminal Justice					
Course Number		**Course Name**			**Hours**	**Grade**
Hist 445		U.S. History Civil War			3	B
Psci 4630		Military in Politics			3	A
Hist 4490		American Revolution			3	A
Hist 4700		Texas			3	A

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