

**GAINING ENTRY INTO A TEACHER PREPARATION PROGRAM  
IN THE COMMONWEALTH OF PENNSYLVANIA:  
ASSESSING THE MOST VALID PREDICTORS**

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## ABSTRACT

This study assessed the most valid predictors of success of students entering into an undergraduate teacher preparation program in the Commonwealth of Pennsylvania. Using existing institutional data from a small, private, urban university in Philadelphia, analyses of the data identified variables with the greatest predictive ability. The variables were then used to develop a prediction model that predicts performance on the Basic Skills Math Test and Basic Skills Reading Test.

The results of this study provide the university with an instrument to identify students most likely to pass the basic skills test and gain entry into the teacher preparation program. The results of this study also provide the Commonwealth of Pennsylvania support for using SAT scores as a measure of proficiency of basic skills in gaining entry into an undergraduate teacher preparation program.

Implications of the research on admissions practices, teacher preparation program development, and education reform are discussed in the recommendations.

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## DEDICATION

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## CHAPTER 1

### INTRODUCTION

Americans are enamored of numbers and fond of standardized measures of intelligence, aptitude, and proficiency in the workplace. Peter Saks (1999) goes so far as to say that we Americans have standardized minds. Further, he makes a number of points related to his claim about the fact that such measures are neither neat, tidy, nor fair, the most common claims for their use. And he is not alone. There is a plethora of studies that support Saks' contention that standardized measures are replete with problems. Among the scholars who address these problems are McNeil (2000), Kohn (2000), and Menken (2008). There are many more.

Standardized measures are used in many professions. For example, physicians have grading scales for concussions, although there are several different scales and little agreement on which to apply. There are certainly some situations in which standardization is appropriate. Again, in the medical field, having lab results that include ranges for tests can be quite useful. However, medicine and, perhaps, a few other fields, stand alone in the precision that they can bring to their profession; even their measures are subject to change despite the rigor with which they are determined. Even those fields, however, are beginning to yield to more nuanced measures. Again, in the case of concussions, doctors now look more closely at actual symptoms to determine the severity of a concussion. In fields in which practitioners do not interact in any direct way with other humans in a significant way (e.g., electricians, plumbers, etc.), standard measures

of proficiency may well be justified. However, it is not so clear that standardized measurements can be used with great confidence in fields that involve human interactions for measuring intelligence, aptitude, or competence. Education is one of those fields.

Sir Ken Robinson (2013), in one of the most popular TED talks with over five million views, makes the point that, although standardized tests have their place as diagnostic tools to support learning, our culture seems to see education as a mechanistic system, as if all we need are data to keep it moving along. But, he goes on to say that education is not at all a mechanistic system, it is a human system. And in a human system, not everything that counts can be counted.

Every human being lives in a dominant culture, and Americans are no exception. All that we do occurs in, and is influenced by, that cultural context. It is the result of the cultural context that our system of education selects (or deselected) future teachers.

It is common practice for colleges and universities to use standardized tests in the admissions process, creating high stakes for students applying to college and making test prep big business. Many parents hire private tutors, or enroll their children in test prep courses, to boost test scores. Such efforts increase the chances of admission into college giving a distinct advantage to those students. An unintended consequence of this is the decrease of chances for the students whose parents are unable to afford test prep creating a potential of bias in the testing.

Use of standardized testing for admissions and/or program entry has been discouraged due to lack of evidence supporting its predictive ability for student success (Shavelson, 2015). However, regardless of the research, standardized tests are used across the country by state departments of education to determine teacher education

program entry. Such a law went into effect in Pennsylvania on August 1, 2015. The Pennsylvania law, like many other states, uses test scores in determining entry into a teacher preparation program. Other factors for gaining entry into a Pennsylvania teacher preparation program include number of credits (no fewer than 48 and no more than 60) and GPA. The GPA requirements are 2.6 at the end of freshman year, 2.8 at the end of sophomore year, and 3.0 at the end of junior year. It should be noted that institutions do impose their own standards that might require a higher GPA for formal admittance into their teacher preparation program.

To rely on measurement of aptitude, or achievement, is to ignore the research that using combined factors for determining admissions is best practice. Of particular concern is the fact that laws governing education do not take into account what is known about cognitive development of young adults in college and, ergo, could be deselecting potentially qualified candidates from becoming teachers. The laws illustrate how an assumption about a test, in this instance that it will prevent unqualified candidates from entering into education or in some way increase teacher quality, can drive policy decisions with no research support.

Inherently, teacher preparation programs (both undergraduate and graduate, early elementary, middle level, and secondary) are controlled by state departments of education by way of each state's program approval process. In the state of Pennsylvania, a student wishing to enter into an undergraduate teacher preparation program must demonstrate proficiency of basic skills, defined as Reading, Writing, and Mathematics. However, a student with a bachelor's degree in an area outside of teacher certification wishing to enter a graduate teacher preparation program is not required to demonstrate proficiency in

basic skills. An assumption can be made that earning an undergraduate degree in a field outside of teacher education is, by its very nature, evidence that one is proficient in basic skills. Additionally, a conclusion might be drawn that non-education undergraduate degrees add value to basic skills while a teacher certification program degree does not. While the state only requires demonstration of basic skills proficiency, it should be noted that some institutions do require passing of Praxis II (content area test required for certification) for gaining entry into middle level and secondary education programs.

#### Statement of the Problem

On October 22, 2014, House Bill 1816 was signed into Pennsylvania's law by Governor Tom Corbett. The law states that no institution of higher education is permitted to admit a student who has not demonstrated proficiency of basic skills into a teacher preparation program (TPP) (HB 1816/ACT168 SEC 1207.3). Earning passing scores on either the Pre-service Academic Performance Assessment (Pearson) or Praxis Core Essentials (ETS) is considered demonstrating proficiency of basic skills. However, Pennsylvania Department of Education (PDE) has adopted a waiver policy: any student earning a minimum of 500 in each area on the SAT is waived from the basic skills tests.

Pennsylvania's Department of Education June 2, 2014 email update indicates that SAT scores predict college success while ETS reports that SAT scores only predict first year college success. Pennsylvania's Department of Education response to questions regarding research on the new policy of basic skills testing for program entry was that no research was done (Nancy Cheri, personal communication, March 12, 2015).

Given the waiver option, an assumption can be made that there is correlation between SAT scores and basic skills test scores. Bonett, Brown, and Gitomer studied the correlation between pre-service teachers' performance on the Praxis I (basic skills test) and the Praxis II (licensing test). The study found that there is a correlation between the two and that the basic skills tests do measure the necessary skills for future learning and certification testing (Bonett et al., 2011). Additionally, the study factored each pre-service teachers' college GPA into performance on the licensing tests. "The evidence is extremely consistent that the basic skills tests are more than an unnecessary obstacle for otherwise qualified and committed individuals" (Bonett et al, 2011, p 15). What the study did not account for was the value added of a college education that Shavelson referenced as it would relate to student performance on the Praxis I and a college education's contribution to student knowledge of basic skills and/or performance on the basic skills testing. At the time of Bonnet et al.'s study, students were permitted to take the test at any point throughout the teacher preparation program. The current law requires students to demonstrate proficiency prior to formal entry into a teacher preparation program, which is between forty-eight and sixty credits.

Looking at the research on the role of value added assessment has on improving teacher effectiveness might be helpful in analyzing the practice of using the basic skills testing requirement for entry into a teacher preparation program in the state of Pennsylvania. Furthermore, the state was unable to provide research, or evidence, to support that the new practice will improve teacher quality, increase program effectiveness, and/or positively contribute to the ongoing efforts of education reform.

Essentially, no rationale was provided for the new policy (Nancy Chervis, personal communication, March 12, 2015).

### Purpose of the Study

The purpose of this study was two-fold. First, to use existing, institutional data to test the most valid predictors of success for students entering into a teacher preparation program in the Commonwealth of Pennsylvania. According to the review of the literature, state teacher licensing has evolved to include the use of standardized testing in the admission of students into teacher preparation programs across the country. Specifically, tests that measure proficiency of basic skills. The second purpose of this study was to develop a prediction model (using multiple linear regression) to predict student performance on the basic skills test using the most valid predictors.

Pennsylvania's Department of Education's interpretation of the recent law has led to the use of SAT scores for demonstrating proficiency of basic skills to gain entry into a teacher preparation program. The literature indicates that using SAT scores in determining program admissions has been proven to be insufficient, discriminatory, and ineffective, and so calls the practice into question (College Board; Geiser, 2015; Gitomer et al., 1999; Mattern et al., 2012; Sacks, 2000; Schmitt, Kenney, Oswald, Pleskac, Billington, Sinha, & Zorzie, 2009; Zwick, 1999). It may be that the Higher Education Act of 1968, that includes federal accountability measures taken to ensure teacher quality and teacher preparation program effectiveness at the state level, influenced the law.

The Higher Education Act of 1968 includes federal accountability measures taken to ensure teacher quality and teacher preparation program effectiveness at the state level.

Those measures include changes in state funding. Given the possibility of loss of funding, it could be that the Higher Education Act of 1968 influenced the passing of House Bill 1816.

This study attempts to answer the question: Do High School GPA (HSGPA), SAT Verbal (SATV), SAT Math (SATM), Socioeconomic Status (SES), Year One College GPA (YR1GPA), Gender (GNDR), and Program Major (PRGM) singly and in combination correlate with Basic Skills Test Math (BSTM) and Basic Skills Test Reading (BSTV)? No research on the specific practice of using basic skills assessments as the requirement for entry into teacher preparation programs was found and so the literature is limited. The study will contribute to the literature by determining whether or not the SAT is a predictor of a measure of basic skills. That determination will provide evidence needed to support, modify, or abandon the SAT policy for teacher preparation program entry. Additionally, this study will provide institutions of higher education with a model of predicting student success in passing the basic skills tests, and may possibly influence admissions policies. Understanding the use of predictive analytics could then be applied to drive decisions to increase admissions, retention, and student success.

## DEFINITION OF KEY TERMS

Basic skills testing (BST): In education, this specifically refers to reading, writing, and mathematics. According to the state of Pennsylvania, SAT scores, ACT scores, Pre-service Academic Performance Assessment, Praxis Core Essentials, are all standardized tests that measure basic skills. The state defines the cut scores of demonstrating proficiency.

Council of the Accreditation of Educator Preparation (CAEP) – The only national accreditor of teacher preparation programs.

Institution of Higher Education (IHE): Institutions of higher education are post-secondary colleges or universities. In the state of Pennsylvania, institutions of higher education are prohibited from admitting any student into a teacher preparation program who has not demonstrated proficiency of basic skills.

Learning Management System (LMS): A learning management system is software used by institutions of higher education to understand student patterns of behavior.

Multiple Linear Regression (MLR): Multiple linear regression is a method of statistical analysis used to explain the relationship between one continuous dependent variable from two or more independent variables.

National Council on Teacher Quality (NCTQ) – NCTQ ranks teacher preparation programs across the country.

Pre-service Academic Performance Assessment (PAPA): The pre-service academic performance assessment is a standardized test of basic skills developed by Pearson. It is one option of testing available to students for demonstrating basic skills proficiency.

Praxis Core Essentials: The Praxis Core Essentials is also called Core Academic Skills for Educators and a standardized test of basic skills developed by ETS, Education Testing Services. It is one option of testing available to students for demonstrating basic skills proficiency. The Praxis Core Essentials replaced the Praxis I testing.

Praxis I: The Praxis I test is a standardized test of basic skills developed by ETS, Education Testing Services. It was an option of testing available to students for demonstrating basic skills proficiency. However, Praxis I has been replaced by the Praxis Core Essentials.

Teacher Preparation Program (TPP): Teacher preparation programs are programs approved by the state to prepare students for state licensing in multiple areas. For the purpose of this study, TPP refers to an undergraduate program for elementary, middle level, or secondary education unless otherwise noted.

## CHAPTER 2

### REVIEW OF THE LITERATURE

In 1983, *A Nation At Risk* drew attention to the test scores of children in the United States as compared to other countries across the globe. One of the findings included that those entering teaching were not at the top of their high school class or high achieving students. Recommendations in the report included holding higher standards for pre-service teachers and the programs that train them and placing a greater emphasis on content in areas of math and science in order to compete with other countries (A Nation At Risk, 1983).

The 10<sup>th</sup> Amendment of the Constitution of the United States states:

“The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.”

Therefore, each state is responsible for its own system of education, which includes teacher licensing. Therefore, the laws that apply to licensing teachers vary from state to state. Today, in many states, students are required to earn passing scores on basic skills tests (BST) in order to enter a teacher preparation program. However, until recently that has not been a requirement in Pennsylvania. While Pennsylvania has always required a form of basic skills testing for certification, it has never required it for program entry.

Governor Tom Corbett’s signing of HB 1816 in October, 2014 (prohibiting institutions of higher education (IHE) from admitting any student into an undergraduate teacher preparation program without having passed the basic skills test) reflects two areas

of concern: concern for teacher quality and concern for teacher preparation program quality.

Fraser (2007) asserts that policymakers "...talk of the importance of testing teachers and changing the process of licensure without any sense of the history of teacher testing and licensing, which has gone on in some form in this country since at least the 1830's, not always with happy results." The new Pennsylvania requirement comes at a time when assessment and use of standardized testing is being roundly criticized across the country. Some states go so far as to use student assessments, in the form of standardized tests, to assess teacher effectiveness in the classroom.

### History of Teacher Testing

Formal use of written testing for teacher certification (licensing) has been in place in the Commonwealth of Pennsylvania since 1834. Pennsylvania was the first state in the country to require formal (written) certification testing that focused on the basic skills. By 1867, most states had some form of testing requirement to qualify teachers but no formal training of teachers. Training would not happen for another thirty-five years (Ravitch, 2003).

The historical timeline of teacher education clearly shows the development of two distinct themes: a standardization of education and a formal process of teacher certification. In many ways, research shows that an increase in standardization of education influenced the certification process (Angrist & Guryan, 2004; 70 Cornell L. Rev. 494 1984-1985; Flippo, 1986; Sykes, 1984). The literature suggests that changes in

the certification requirements and process emerged in response to three shifts (Angus, 2001; Church & Sedlak, 1976; Larabee, 2008; Lucas, 1997; Sedlak, 2008):

1. A shift in control of teacher licensing
2. A shift in teacher demand
3. A shift in global positioning

The first two shifts, control of licensing and teacher demand, focused on meeting the needs of children and the education system. The third shift, global positioning, focused on how the children, within the education system, should/could meet the needs of society.

The first and third shifts, control of licensing and global positioning, both promoted higher standards for teachers. The second shift, teacher demand, resulted in lower standards for teachers. All three shifts centered on *what teachers should know* (teacher knowledge) within the context of the shift.

Specifically, the shift in control of teacher licensing led to the need to define *what teachers should know* and directly influenced and shaped the testing used in the credentialing process. The shift in global positioning was a response to “Sputnik”, the space satellite launched by Russia. The significance of Russia’s success of the space satellite, and concern that Russia was more advanced than the United States, was addressed in the publication of *A Nation At Risk*. Specifically, *A Nation At Risk* identified concern for teacher quality. This led to *what teachers should know* to include content area knowledge and influenced pre-service teacher standards. However, the shift in teacher demand was in response to the number of licensed teachers at a given time. With greater demand of teachers came lower standards for certification.

### *Shift in Control of Teacher Licensing*

The literature examined reveals evidence that the credentialing process was shaped and influenced by a shift in control of teacher licensing. The literature indicates that this shift in control was the result of a confluence of three cultural changes that influenced and shaped the credentialing process:

1. Social – community demand in teaching content over religious teachings, which reflected the early settlers break from England (Rury, 2004)
2. Political – larger community (beyond church members) involvement increasing from local to state to national and strong push to address (perceived) concerns in the quality of education
3. Economical – accountability of public funding and cost of training teachers: Common Schools (first public school system) and Normal Schools (teacher education)

This conclusion was synthesized from the following sources/research: Angus, 2001; D’Agostio et al., 2009; Fraser, 2007; Gitomer & Zisk, 2015; Larabee, 2008; Ogren, 2005.

The qualifications of a teacher during the Colonial Period were based on the individual “being of good moral character” (Fraser, 2007). And control by ministers ensured preservation of church teachings (Angus, 2001). By the 1800’s, in addition to one’s moral character, formal, written exams were required for licensing. This is where we see the introduction of basic skills testing (D’Agostio et al., 2009).

Over time, communities recognized that teachers, in addition to being of good moral character, needed basic skills. Assurance of teacher quality became a larger issue

and control of teacher licensing shifted from the local ministers/church authorities to local civil authorities (Angus, 2001). Along with these changes came the beginning of content knowledge as a requirement for obtaining a teaching license.

Initially, there was no standard test of measurement of a teacher's content/subject knowledge. Teacher candidates were asked content (basic skills) questions by local officials; if answered correctly, candidates were granted permission to teach. However, "...those conducting the interviews were often ill-equipped to evaluate the examinees' response..." (Gitomer & Zisk, 2015, p 2). The inconsistency in testing teacher selection requirements among communities raised concerns at the state level. As a result, taxpayer money was used and public funding went to Common Schools, the first public school system and advent of standardization in education (Angus, 2001).

A standardized school (Common School) used public funds. The use of public funds for schools led to teacher accountability and a focus on what teachers should be required to know (Angus, 2001). Accountability came in the form of formal teacher education, which was done at Normal Schools. Normal Schools were two year institutes that focused specifically on training students to be teachers (Larabee, 2008). The first Normal School opened in Massachusetts in 1839 and the first Normal School in Pennsylvania opened thirty years later in 1869 (Ogren, 2005).

The shift in teacher licensing from local communities to state officials began the standardization of teacher testing and teacher education. The state regulated who could teach in order to ensure teachers (in public schools) were qualified. Teachers received training in Normal Schools, institutes that provided approximately two years of teacher education, and were eventually required to earn a bachelor's degree.

### *Shift in Teacher Demand: Teacher Surplus to Teacher Shortage*

The shift in teacher demand represented society shifts (i.e. war, women in the workforce, etc.) and focused on a need within society. The concern was meeting the demands of “manning” classrooms and schools, not teacher quality or quality of education. Increased demand for teachers resulted in a decrease in teacher requirements and lower standards for certification. The decrease in demand for teachers resulted in an increase in standards and higher standards for certification.

With the control of teacher licensing shifting to the state level, fewer certificates were issued. By the early 1900’s, the demands for teachers grew because high school enrollment increased. The increase in student enrollment, coupled with fewer certified teachers, resulted in a teacher shortage and greater teacher demand, which, consequently resulted in lower standards.

### *Shift in Global Competition*

By the 1950’s, global positioning of the United States influenced what teachers should know; it was America’s level of competitiveness in the world market (specifically in the areas of mathematics and science) that drove this shift. This shift also seems to have had the greatest impact on the current system of education in the United States.

By the mid 1900’s, global positioning of the United States was perceived to decrease with the success of *Sputnik* and so the focus of this shift was, like the demand shift, not on quality of education, but rather on how the education system itself

would/should be used as the conduit to advance the US globally (and successfully) in areas of mathematics and science (*A Nation At Risk*, 1983).

To put this in context, it was post WWII and Americans were proud, proud of emerging strong from a depression and then from a world war. The economy was growing and the United States was seen as a world leader. However, tension was high with Russia and the Cold War had begun. Growing concern for communism and its threat to the free world was on the rise. Russia's success in launching the first satellite into space (*Sputnik*) launched the space race and clearly signified to the United States that Russia was more advanced, more successful. As a result, by 1983, under President Ronald Reagan, attention turned to the role of education in global positioning.

*A Nation At Risk* was a report published in 1983. It played a significant role in how education would be used in the world of global competition. The recommendations included higher standards for teachers, higher standards for math and science knowledge, and higher standards for the programs that train teachers (*A Nation At Risk*, 1983).

### Teacher Testing Across the Country

Gitomer and Zisk (2015) point out the impact of teacher testing and how that testing is developed. There are varying schools of thought concerning the art and science behind teaching. The ongoing debate of measuring teacher knowledge is compounded by the (general) debate on standardized testing; specifically, whether or not standardized testing should be used to measure student success and/or teacher effectiveness. For example, Gitomer and Zisk link assessment to potential use for teacher development and program development.

In the United States, under the 10<sup>th</sup> Amendment, each state is the certifying body of teacher licensing for the state. State departments of education determine certification requirements, standards, etc. for its state. Teachers must apply (separately) to each state in order to obtain a license within that state.

Although there is no national teachers' license, it should be noted that the Council of the Accreditation of Educator Preparation (CAEP) is the only national accreditor of teacher preparation programs (TPP). CAEP requires students entering a TPP to be from the top 1/3 of his/her high school class, with no lower than a 3.0 GPA. Any teacher preparation program wanting national accreditation must meet the minimum requirements regardless of the state accreditation requirements (CAEP website statement and Monk, 2015, p. 220). Licensed teachers are permitted to teach in the state where he/she is licensed to practice. This is important to include because the shift in requirements for entry into a teacher preparation program in the Commonwealth of Pennsylvania reflect the CAEP requirements for accreditation.

According to a 2014 report from the National Council on Teacher Quality (NCTQ), 31 states require a test of basic skills for entry into a teacher preparation program. This is up from 29 states in 2013, and 21 states in 2011. NCTQ identified the states of Delaware and Rhode Island as having the best practices for admission to a teacher preparation program. The NCTQ states, "For admission to teacher preparation programs, Rhode Island and Delaware require a test of academic proficiency normed to the general college-bound population rather than a test that is normed to only prospective teachers. Delaware also requires teacher candidates to have a 3.0 GPA or be in the top 50<sup>th</sup> percentile for general education coursework completed. Rhode Island also requires

an average cohort GPA of 3.0, and beginning in 2016, the cohort mean score on nationally-normed tests such as the ACT, SAT or GRE must be in the top 50<sup>th</sup> percentile. In 2020, the requirement for the mean test score will increase from the top half to the top third” (NCTQ, 2014).

The following table outlines specific testing requirements (including test type) for admission to teacher preparation programs:

**Table 2.1. State Testing Requirements**

| Test normed to college-bound population prior to admission to a TPP       | Test normed only to teacher candidates prior to admission to a TPP                                   | Test normed only to teacher candidates during or after completion of a TPP | Test not required                          |
|---|--|--|--|
| 13 states:<br>DC, DE, HI, LA,<br>MI, NC, NJ, NY,<br>RI, SC, TX, UT,<br>VA | 19 states:<br>AL, AR, CT, FL,<br>GA, IA, IN, KY,<br>MO, MS, NE, NH,<br>OK, OR, PA, TN,<br>WA, WI, WV | 12 states:<br>AK, CA, IL, KS,<br>MA, MD, ME, MN,<br>ND, NM, NV, VT         | 7 states:<br>AZ, CO, ID, MT,<br>OH, SD, WY |

As reported by the National Council on Teacher Quality (NCTQ), Pennsylvania testing is normed only to teacher candidates but the Council of the Accreditation of Educator Preparation (CAEP) identifies the best state practices as those that include testing normed to college-bound students (e.g. the SAT). Previous NCTQ reports cite

recommendations for increasing standards of admissions. Note that in addition to approved teacher preparation programs, there are 130 alternative routes to teacher certification in the United States. No research was found on a standard admissions process and/or requirements held for (or by) the alternative routes.

### *Teacher Testing in the Commonwealth of Pennsylvania*

Basic skills in “Education” are defined as: reading, writing, and mathematics (D’Agostio et al., 2009). Historically, the practice of basic skills testing in Pennsylvania had been that pre-service teachers were required to take and pass basic skills tests for certification at any time before, during, or upon completion of a teacher preparation program. That practice changed as a result of a new state law. As of August 1, 2015, students are prohibited from entering into a state approved undergraduate teacher preparation program without demonstrating proficiency of basic skills. Pennsylvania Department of Education (PDE), by way of its interpretation of the law, has adopted the practice of using SAT scores, ACT scores, or their own state-developed basic skills tests scores for demonstrating proficiency of basic skills and as a requirement for gaining entry into an undergraduate teacher education certification program. The basic skills tests are not required for post-baccalaureate certificates, graduate programs, or alternative certification programs.

Pennsylvania’s Department of Education determines entry into an undergraduate teacher preparation program when a student has earned a minimum of 48 credits, but not more than 60 credits. Students typically earn 30 credits per year and 48 – 60 credits are typically earned upon completion of sophomore year. It should be noted that courses

range in number of credits (i.e. math and science courses are sometimes 4 credits rather than 3 due to lab requirements) and so it is more likely than not that students will exceed the 60 credit limit at the end of sophomore year.

Prior to formal entry into a certification program, Pennsylvania’s Department of Education permits students to take foundational courses that are required by the state for certification but that do not include competencies required for certification. Specific foundational courses vary from program to program and from institution to institution.

The following table outlines the required scores for gaining entry into a teacher preparation program by way of SAT, ACT or a basic skills test (Pre-service Academic Performance Assessment or Praxis Core Essentials):

**Table 2.2. Pennsylvania Required BST Scores for Gaining Entry into a TPP**

|   | SAT | ACT<br>Combined<br>Scoring | PAPA | PAPA<br>Composite<br>Method | ETS | ETS<br>Composite<br>Method |
|---|-----|----------------------------|------|-----------------------------|-----|----------------------------|
| Reading                                     | 500 | ENG 22                     | 220  | 193                         | 156 | 148                        |
| Writing                                     | 500 | -                          | 220  | 192                         | 162 | 158                        |
| Mathematics                                 | 500 | 21                         | 197  | 197                         | 150 | 142                        |
| Minimum<br>Score for<br>Composite<br>Method | -   | -                          | -    | 686                         | -   | 475                        |

Pennsylvania’s Department of Education Basic Skills Testing Policy

On June 2, 2014, in an email update, Pennsylvania Department of Education announced the basic skills assessment policy:

“...a specific score achieved on the SAT assessment to meet the basic skills requirement. The recommended score was determined through consultation with

the office of Basic Education and the College Board, and considered to be in alignment with K-12 standards and college and career readiness expectations as well as predictors of college success.”

Pennsylvania’s Department of Education email update states that SAT scores predict college success. However, The National Center for Fair and Open Testing (2007) states that SAT scores only predict first year college success. Additionally, Shavelson (2015) specifically states that “...college does contribute to student learning” (p. 17) and discourages use of the SAT in determining college program entry.

The literature is limited on the practice of using basic skills assessments as a requirement for entry into teacher preparation programs. However, in Flippo’s 1986 article (p. 5), she offers guided questioning for using competency testing. The questioning is based on three areas:

1. Problems with the Quality of Teacher Education Programs and/or Students
2. Problems with the Selection Process of Teachers and Supply of Teachers
3. Problems with Public Image

No research was found (for Pennsylvania or any other state) on how the practice of using basic skills tests improves quality of teacher candidates or improves teacher preparation programs. That raises the question of whether the candidate selection process has anything to do with either teacher preparation or teacher quality. And if that is the case, why use basic skills tests at all? Why not use the SAT scores and either admit or not admit students into teacher preparation programs?

In a personal communication with Nancy Chervis (Pennsylvania Department of Education email March 12, 2015) she explained that the history behind the basic skills

tests started in May 1985 when "...the State Board of Education approved modifications of the standards governing teacher preparation programs. Testing was required beginning in 1987" and that "Chapter 49 of PA code 22 Pa. Code 49.18 requires first Instructional I certificates issued June 1, 1987 or after must demonstrate that they have successfully completed a teacher-certification exam in these four areas:

Basic Skills (writing, reading & mathematics)

General Knowledge (social studies, literature and fine arts, and science)

Professional Knowledge 0520 (instructional skills)

Specialization Area Tests (content tests)"

What remains unclear is why Pennsylvania's Department of Education was unable to provide any information as to how the basic skills tests relate to pre-service teachers, teacher preparation programs, or how they fit into the current education reform movement. Cheris stated that, "Studies may be possible in the future after teacher effectiveness data are collected." However, research will not be possible given no teacher graduating from an undergraduate teacher preparation program will be certified without meeting the basic skills tests requirement; a control group cannot be established.

#### *Basic Skills Tests and Licensing Tests*

Bonett, Brown, and Gitomer studied the correlation between pre-service teachers' performance on the Praxis I (BST) and the Praxis II (licensing test) using logistical regression. The study found that there is a correlation between the two and that the basic skills test does measure the necessary skills for future learning and certification testing (Bonett, et al., 2011). Additionally, the study included each pre-service teacher's college

GPA into performance on the licensing tests. “The evidence is extremely consistent that the basic skills tests are more than an unnecessary obstacle for otherwise qualified and committed individuals” (Bonett, et al, 2011, p. 15). The study did not account for any value added of a college education on student performance on the Praxis I and whether or not college coursework contributed to student knowledge of basic skills and/or performance on the basic skills tests. Students had been permitted to take the tests at any point throughout the program whereas now, under the new law, students must demonstrate proficiency prior to formal entry in the teacher preparation program.

Using a test that is normed to college bound students in a pre-test post-test analysis would be an interesting study to confirm Shavelson’s research on the value added of a college education. It would also provide information to Pennsylvania’s Department of Education as to whether or not using the test to gain entry into a teacher preparation program prior to completing college work eliminates potentially good candidates.

The practice of requiring basic skills proficiency for gaining entry into a teacher preparation program is unclear given meaningful measures of effectiveness cannot be conducted. Using research on the role that value added assessment has on improving teacher effectiveness might be helpful in analyzing the practice of using basic skills tests as a requirement in the Commonwealth of Pennsylvania.

## Standardized Testing

The SAT (norm-referenced test) measures basic skills as compared to the other test-takers in the group. The basic skills tests (criterion-referenced tests) measure proficiency of basic skills (reading, writing, mathematics) by the test taker's achievement on the test. It is important to note here that there is no national proficiency level determined for the basic skills tests; each state determines the proficiency level for its state. The SAT and basic skills tests are two different types of standardized tests measuring different things. The SAT measures how much an individual knows through comparison versus the basic skills tests measuring an individual's level of achievement. What is the purpose of requiring the basic skills tests? To measure one's performance of basic skills or to compare one's skills to a group? Not knowing the purpose of these tests, and the state's requirement to demonstrate proficiency, calls into question what is meant by proficiency.

Test validity refers to how well a test measures what it says it is measuring. Test reliability refers to a test's consistency in reporting results. Both norm-referenced and criterion-referenced tests can (and should) be valid and reliable when being used for assessment that drives policy. However, because tests are valid and reliable, it does not mean that the tests are comparable (Saks, 1999). For example, both the SAT and basic skills tests are valid and reliable but may not necessarily be comparable because the SAT is norm-referenced and the basic skills tests are criterion-referenced.

### *Basic Skills Tests as a Predictor*

The literature shows greater predictive ability of performance on certification tests when using a combination of predictors (Butler, 1990; Coker, 1988; Gitomer et al., 2011; Popovics, 1989). The combination includes success in reading, math, and GPA. More specifically, reading and math performance on the basic skills test does indicate higher performance on the certification tests (Gitomer et al., 2011; Popovics, 1989).

While research supports the basic skills tests as a predictive measure of performance on certification tests, no research on the basic skills tests as a predictor of teacher effectiveness (or teacher quality) was found (Gitomer, 2007). Halpert's research (2009) found no significant correlation between the basic skills tests and success in teacher preparation programs (specifically GPA), which supports Bunte's findings (1986) of no correlation between performance on tests and performance as a student teacher (Bunte, 1986; Halper, 2009).

Based on the literature review and research found on the basic skills tests, the policy governing entry into a teacher preparation program may lead to an unintended consequence. That unintended consequence is the deselecting of students from the pool of teaching candidates who might otherwise be successful in the classroom.

### *Use of SAT in the College Admissions Process*

Research identifies multiple issues surrounding the use of standardized testing in the college admissions process (Joint Hearing of the Senate Committee on Higher Education Admissions & Outreach, 1999; Mattern et al., 2012; Shavelson, 2015). Use of standardized tests in the college admissions process is a practice once thought to predict

student success in college. However, dating back to 1988, the College Entrance Examination Board warned against the use of such a practice. It specifically cautioned against "...using test scores as the sole basis for important decisions affecting the lives of individuals, when other information of equal or greater relevance and the resources for using such information are available" (College Entrance Exam Board, 2011, Appendix B, p. 15). The document goes on to say why using the same practice should be avoided for use in program entry (College Entrance Exam Board, 2011).

In 1990, Code et al. supports use of other variables in determining predicting graduation of student athletes. They specifically identify the high school GPA and number of math courses as better indicators (Code et al., 1990). Use of the SAT is not a valid indication of a student's academic ability and/or potential to succeed in college and beyond (Code et al., 1990).

In 1999, the Joint Hearing of the Senate Select Committee on Higher Education Admissions & Outreach and the Senate Committee on Education presented *The Danger in Overemphasizing The Use of Scholastic Assessment Tests (SATs) As A Tool For College Admission*. The hearing was in response to a noticeable (race) trend in college admissions (Joint Hearing, 1999). While the use of SAT scores in isolation does not predict success, Gitomer (1999) says that using a combination of SAT, high school GPA, and class rank is a better predictor of success.

### Research on the Use of Prediction Models

In higher education, analytics is used for admissions, retention, and academic intervention for the purpose of increasing institutional effectiveness and student success.

This practice could be used in admissions for college students wishing to enter a teacher preparation program.

Descriptive analytics tell a story while predictive analytics anticipate what likely will happen, a predicted basic skills test score for example. And prescriptive analytics use the other analytics to determine what course of action to use to influence outcomes, the effect of support services on student performance for example. Might there be (should there be) support services to increase student performance on the basic skills tests?

In studying students at risk, Barber and Sharkey use logistical regression to identify at risk students (with 90% accuracy) by looking at military status, degree level, financial aid, and credits earned. However, while seeing the value in analytics, they say that by using logistical regression, data were lost (Barber & Sharkey, 2012). Analytics is not full proof when developing models.

One factor that Tinto argues is critical, and far more effective in predicting student success, is student engagement. In addition to predictive variables, he identifies the need for an institution wide approach to meeting the needs of students (Tinto, 2006).

Commonly used analytics in higher education are done through Learning Management Systems (LMS). Understanding student activity and engagement can be measured, and student success predicted, using the LMS (Arnold & Pistilli, 2012; Fritz, 2013). These data have been found to be reliable predictors of student success (Smith, Lange, & Huston, 2012). The student patterns can alert advisors to struggling students, lead to intervention, and ultimately, positively influence student outcomes (Phillips, 2013). However, due to cost, using automated analytics systems as an alternative to conducting analytics in-house, is recommended by some (Bramucci & Gaston, 2012).

The study being conducted in this research project is to determine whether or not the SAT is a predictor of a measure of basic skills. Whether or not the SAT is a predictor of this prior to entry into a college and/or program would contribute to the data in a way that may lead to use of prescriptive analytics. For example, if the SAT mathematics is found to be a predictor of a measure of basic mathematics skills, perhaps a student identified as “not proficient” would be enrolled in a math course that would best meet his/her needs and strengthen his/her basic math skills. Regardless of whether or not the student enters an undergraduate teacher preparation program, and in my opinion more importantly, an institution of higher education has a moral obligation to provide admitted students with the tools needed to succeed in any major.

Whether or not the SAT is a predictor of a measure of basic skills is important because, otherwise, there is no basis for using the test to determine proficiency of basic skills. Depending on whether or not it is a predictor of a measure of basic skills, a prediction model can be developed that would serve students of all majors.

### Conclusion

Society’s need to define *what teachers should know* is demonstrated through the historical timeline of teacher education. The historical timeline also reveals evidence of a standardization of measuring that knowledge. The observed shifts of control of teacher licensing (local to state to federal), increase and decrease in teacher demand, and global positioning of the United States have all driven *what teachers should know*. Consequently, within the shifts, the standards of *what teachers should know* have changed. And sometimes not always for the good.

The accepted tests to demonstrate proficiency of basic skills are SAT, ACT, and basic skills tests (Pre-professional Academic Performance Assessment and Praxis Core Essentials); all tests are standardized tests, either norm-referenced or criterion-referenced, and are valid and reliable. While the literature indicates a correlation between basic skills tests and licensing tests, it is limited on the relationship between proficiency of basic skills and success in a teacher preparation program. Additionally, the SAT is only recently identified as a test to determine proficiency of basic skills with no evidence to support the practice.

Because proficiency of basic skills is required for gaining entry into an undergraduate teacher preparation program in the Commonwealth of Pennsylvania, an assumption can be made that there is a relationship; however, no research was found and Pennsylvania's Department of Education was unable to provide research to support the practice. Furthermore, and within the broader context of education reform, it seems policies governing teacher preparation programs would/should lead to an increase in teacher quality whereby the increase in quality of teacher leads to an increase in quality of education.

Pennsylvania's recent policy to include SAT scores for the purpose of demonstrating proficiency of basic skills has not been determined as a valid predictor of basic skills proficiency. This study attempts to identify the most valid predictors of success for gaining entry into a teacher preparation program at a small, liberal arts university in the city of Philadelphia. More specifically, I will test to see if a) there is a correlation between SAT scores and basic skills test scores (Praxis I) and b) if a prediction model can be developed using multiple linear regression for the purpose of

determining the validity of the practice of using the SAT as a test that demonstrates proficiency of basic skills.

## CHAPTER 3

### METHODOLOGY

#### Introduction

This study attempts to identify the most valid predictors of success for gaining entry into an undergraduate teacher preparation program using existing institutional data. It is quantitative research using a correlational study method. This study uses data from a non-probability (theoretical) sample population (no random assignment of variables) of students from a small, private, liberal arts university located in Philadelphia, PA.

The purpose of the study was to determine the most valid predictors, singly or in combination, and use those predictors to develop a prediction model that will determine the likelihood of passing the math and reading basic skills tests required of teacher preparation programs. Data were provided by the institution and then analyzed using multiple linear regression. The multiple linear regression (MLR) model was developed to predict performance on the basic skills tests. Correlation coefficients were calculated in order to identify the strength of relationship between variables.

#### Statistical Analysis

The following statistical tests were performed:

ANOVA – to determine if there are significant differences between the means of the independent variables

Binary Logistic Regression – to predict the probability of either Pass/Fail on the basic skills math test and basic skills reading test

Ordinary Least Squares (OLS) – regression model to predict the actual scores on the basic skills math test and basic skills reading test

Pairwise Deletion – to deal with the missing data

Pearson Correlations – to determine the strength of association between variables (Strong Positive, Strong Negative, Medium, Weak, No Correlation)

Significance 2-Tailed – to determine the strength of association between variables (Strong Positive, Strong Negative, Medium, Weak, No Correlation)

The Predictor Variables in the study are:

$x_1$  Gender (GNDR: Male, Female) – This is self-reported on the admissions application.

$x_2$  High School GPA (HSGPA) – The high school GPA is the final GPA reported by the high school.

$x_3$  Father's Education (FED) – This is self-reported on the admissions application.

$x_4$  Mother's Education (MED) – This is self-reported on the admissions application.

$x_5$  First Generation Status (FGS) – This is self-reported on the admissions application.

$x_6$  FAFSA – FAFSA completion.

$x_7$  SAT Verbal (SATV) – The SAT verbal is the score reported by College Board.

$x_8$  SAT Mathematics (SATM) – The SAT math is the score reported by College Board.

$x_9$  Socioeconomic Status (SES) – The university determines low socioeconomic status classification of an applicant if s/he receives a Pell Grant. There is no differentiation of low, middle, or high.

$x_{10}$  1<sup>st</sup> Year College GPA (YR1GPA) – Calculated once a student earns 30 credits.

$x_{11}$  Program Major (PRGM: Education program enrolled in – SEC ED, ML, ELED) – This is selected on the admissions application.

The Dependent Variables in the study are:

$y_1$  Basic Skills Mathematics (BSTM) – ETS Praxis I score reported by ETS.

$y_2$  Basic Skills Reading (BSTV) – ETS Praxis I score reported by ETS.

#### Research Question

Do High School GPA (HSGPA), SAT Verbal (SATV), SAT Math (SATM), Socioeconomic Status (SES), Year One College GPA (YR1GPA), Gender (GNDR), and Program Major (PRGM) singly and in combination correlate with Basic Skills Test Math (BSTM) and Basic Skills Test Reading (BSTV)?

#### Sample

The sample in this study consists of 243 subjects, male and female, between the ages 18 and 23, enrolled in an undergraduate Elementary, Middle Level, or Secondary Education teacher preparation program between 2005 and 2008 and graduating between 2009 and 2015. This sample was determined by their ability to meet the needs of the study. Undergraduate teacher preparation programs, until 2015, required basic skills testing for teacher licensing but not for program entry. This sample was enrolled in a teacher preparation program, took the SAT and took the Praxis I basic skills test. It should be noted that the only basic skills test until 2015 was the ETS Praxis I; the SAT

and ACT were not accepted (nor recognized by the state) as tests of basic skills and neither the Praxis I Core Essentials nor the Pre-service Academic Performance Assessment by Pearson were available. This study will use the Praxis I basic skills test.

Data for the study were collected from multiple sources by the University's Office of Institutional Research. The predictor variables: High School GPA, SAT Verbal, SAT Mathematics, Socioeconomic Status, Gender, and Program Major were collected from the University admissions application. The predictor variable 1<sup>st</sup> Year GPA was reported once 30 credits were earned by the student. The dependent variables, Basic Skills Mathematics Test (BSTM) and Basic Skills Reading Test (BSTV), were reported by ETS to the University.

Each student in this study submitted SAT scores for the purpose of college admissions. Each student took the Praxis I in order to apply for teacher licensing. Because passing the basic skills tests prior to entering the program was not required, students took the basic skills test (Praxis I) at any time before, during, or after completing the teacher preparation program.

This study will contribute to the literature by determining whether or not the SAT is singly, or in combination with other variables, a predictor of a measure of basic skills. That determination will provide evidence needed to support, modify, or abandon the SAT waiver policy for teacher preparation program entry. Additionally, this study will provide institutions of higher education with a model of predicting student success in passing the basic skills tests, and may possibly influence admissions policies. Understanding the use of predictive analytics could then be applied to drive decisions that could increase admissions, retention, and student success.

## CHAPTER 4

### RESULTS

#### Introduction

This study examined variables that correlate with the scores on the basic skills tests required for teacher certification in the Commonwealth of Pennsylvania. Variables included standardized measures of student aptitude and achievement as well as gender and socioeconomic status. Using multiple linear regression, and the most valid predictors of student success, a prediction model was developed to predict performance on the basic skills tests.

The data set was provided by the Office of Institutional Research at a mid-sized, private, urban university in Philadelphia, PA. The data were limited to students who entered as freshmen and graduated from the teacher preparation program at the undergraduate level between the years 2005 and 2015, transfer students were not included. A total of 243 subjects were included in the data set. Of the 243 subjects, all took the basic skills mathematics (non-verbal) assessment; 241 subjects took the basic skills reading (verbal) assessment.

Variables included in the data set were collected by the University from each student's application, which was used for admissions into the University. Other variables (basic skills tests scores) were reported directly to the University by Educational Testing Service (ETS). The basic skills test scores are required for Pennsylvania teacher certification and used by the University to verify candidate eligibility for certification.

The first part of this chapter includes the descriptive statistics of the data set and correlations. The second part of this chapter looks specifically at male and female ratios and program choice (major). The third part of the chapter discusses the variables identified as the most valid predictors of performance on each of the basic skills tests and results of the logistic regression and prediction model. Descriptive data on the sample are contained in Table 4.

**Table 4.1. Descriptive Statistics**

| Variables                         | N = 243 |
|-----------------------------------|---------|
| Gender:                           |         |
| Male                              | 17.4%   |
| Female                            | 82.6%   |
| Father Education:                 |         |
| High School                       | 4.3%    |
| Some College                      | 36.0%   |
| College Graduate                  | 46.9%   |
| Post Graduate Degree              | 4.1%    |
| Missing                           | 8.7%    |
| First Generation College Student: |         |
| Yes                               | 29.7%   |
| No                                | 70.3%   |
| Geographic Location:              |         |
| CA                                | 0.4%    |
| CT                                | 1.7%    |
| L                                 | 0.4%    |
| HI                                | 0.4%    |
| IL                                | 0.2%    |
| MA                                | 0.4%    |
| MD                                | 0.4%    |

|                                 |       |
|---------------------------------|-------|
| NJ                              | 29.1% |
| NY                              | 3.3%  |
| PA                              | 63.2% |
| VA                              | 0.4%  |
| Mother Education:               |       |
| High School                     | 0.4%  |
| Some College                    | 41.7% |
| College Graduate                | 45.9% |
| Advanced Degree                 | 2.5%  |
| Missing                         | 9.5%  |
| Completed the FAFSA:            |       |
| No                              | 7.9%  |
| Yes                             | 92.1% |
| Pell Grant Recipient:           |       |
| No                              | 73.8% |
| Yes                             | 26.2% |
| Program major:                  |       |
| Elementary                      | 68.6% |
| Middle Level                    | 1.7%  |
| Secondary                       | 29.8% |
| Passed both Basic Skills Tests: |       |
| Not Passed                      | 15.7% |
| Passed                          | 84.3% |
| Test type:                      |       |
| Reading Paper                   | 24.8% |
| Reading Computer                | 25.0% |
| Mathematics Paper               | 26.0% |
| Mathematics Computer            | 24.2% |

Examining the data reveals a disproportionate number of females to males in the overall population (82.6% and 17.4% respectively). Notably, a disproportionate number of females (78.8%) chose the Elementary program as compared to females who chose the Secondary program (19.8%). Only 1.5% of the females chose the MidLevel Program. Conversely, fewer males chose the Elementary program (20.2%) as compared to males who chose the Secondary program (77.4%). As above, only 2.4% of males chose the MidLevel Program. The majority of the population (92.3%) are residents from Pennsylvania (63.2%) and New Jersey (29.1%). Data on the SAT and Basic Skills tests are presented in Table 4.2.

**Table 4.2. Average Scores  
(SATM, SATV, High School GPA, First Year College GPA, BSTV, BSTM)**

| Variable                           | N = 243    |
|------------------------------------|------------|
| SATM                               |            |
| Mean                               | 523.50     |
| Range                              | 300 - 730  |
| SATV                               |            |
| Mean                               | 524.12     |
| Range                              | 370 - 760  |
| High School GPA                    |            |
| Mean                               | 3.45       |
| Range                              | 2.2 – 4.69 |
| First Year College GPA             |            |
| Mean                               | 3.29       |
| Range                              | 2.43 – 4.0 |
| Basic Skills Test Verbal (Reading) |            |
| Mean                               | 178.02     |
| Range                              | 157 - 187  |
| Missing                            | 2          |

|                               |           |
|-------------------------------|-----------|
| Basic Skills Test Mathematics |           |
| Mean                          | 179.12    |
| Range                         | 159 - 190 |

The major research question is as follows:

*Which variables, singly and in combination, predict performance on the Basic Skills Math Test and the Basic Skills Reading Test?*

The predictor variables used to answer this question are:

- Gender
- High School GPA
- Father's Education
- Mother's Education
- First Generation Status
- First Semester GPA
- FAFSA
- SAT Verbal
- SAT Math
- SAT Writing
- Student's program of study

To answer this question, Pearson correlations between the predictors and the Basic Skills tests in Reading and Math were computed. These correlations are presented in Table 4.3.

**Table 4.3. Correlations Between Predictor Variables and BST**

| Predictor Variable | Basic Skills Math N = 243 |      | Basic Skills Reading N = 241 |      |
|--------------------|---------------------------|------|------------------------------|------|
|                    | r                         | Sig. | r                            | Sig. |
| Gender             | -.131*                    | .041 | .052                         | .418 |
| High School GPA    | .297**                    | .000 | .338**                       | .000 |
| Father Education   | .133*                     | .048 | .156*                        | .024 |
| Mother Education   | .067                      | .320 | .096                         | .279 |
| FAFSA              | -.045                     | .487 | -.055                        | .398 |
| First Generation   | -.177**                   | .000 | -.142*                       | .027 |
| First Year GPA     | .427**                    | .000 | .479**                       | .000 |

|                 |        |      |        |      |
|-----------------|--------|------|--------|------|
| SAT Verbal      | .585** | .000 | .738** | .000 |
| SAT Mathematics | .788** | .000 | .536** | .000 |
| SAT Writing(a)  | .600** | .000 | .657** | .000 |
| Program Major   | .342** | .000 | .343** | .000 |

\*\*Correlation is significant at the 0.01 level (2-tailed)

\*Correlation is significant at the 0.05 level (2-tailed)

(a) The sample size for the SAT Writing was 135

Scoring Notes:

Gender: Male = 1; Female = 2

Father Education: Some Middle School = 1; High School = 2;  
Some College = 3

Mother Education: Some Middle School = 1; High School = 2;  
Some College = 3

FAFSA: No = 1; Yes = 2

First Generation: No = 1; Yes = 2

Program: Elementary and Middle Level = 1; Secondary = 2

As shown in Table 4.3 Correlations Between Predictor Variables and BST, students with higher scores on the Basic Skills Math test:

- Are males
- Have higher high school GPAs
- Have fathers with higher levels of education
- Are typically not the first in their family to attend college
- Have higher first year GPAs
- Have higher SAT Verbal, Math and Writing scores
- Are more typically Secondary Ed Majors

The same pattern is true for the Basic Skills Reading test with the sole exception that

there is no difference between males and females. To ascertain which variables, in

combination, predict the Basic Skills Test scores, two types of multiple regression were

conducted. The first used an ordinary least squares (OLS) regression model predicting the

actual scores on the two tests as the criterion variables with all of the variables listed in

Table 4.3 as the predictors. The model was run using pairwise deletion to handle missing

data. As an initial analysis, the regression model was checked to ascertain if there were

any problems with multicollinearity. This showed that the SAT Writing test had a VIF of

4.32. Since the usual cut-off for an adequate VIF is 3 or less, the SAT Writing was eliminated from the regression model. In addition, the FAFSA score also did not meet the minimal properties to be included in the model, so it was also removed. The results for Math are presented in Table 4.4 and the results for Reading are presented in Table 4.5.

**Table 4.4. Ordinary Least Square Regression Model for Math**

| Predictor Variable | Beta   | Sig. |
|--------------------|--------|------|
| Gender             | .116*  | .019 |
| High School GPA    | .079   | .123 |
| Father Education   | -.005  | .940 |
| Mother Education   | -.015  | .820 |
| First Generation   | -.076  | .372 |
| First Year GPA     | .080   | .123 |
| SAT Verbal         | .112*  | .050 |
| SAT Mathematics    | .669** | .000 |
| Major              | -.056  | .301 |

\*p<.05; \*\*p<.01

R = .812, Adjusted R<sup>2</sup> = .644

**Table 4.5. Ordinary Least Square Regression Model for Reading**

| Predictor Variable | Beta   | Sig. |
|--------------------|--------|------|
| Gender             | -.006  | .906 |
| High School GPA    | .042   | .458 |
| Father Education   | -.003  | .964 |
| Mother Education   | -.004  | .958 |
| First Generation   | -.007  | .943 |
| First Year GPA     | .149*  | .012 |
| SAT Verbal         | .617** | .000 |
| SAT Mathematics    | .019   | .765 |
| Major              | .088   | .142 |

\*p<.05; \*\*p<.01

$$R = .762, \text{ Adjusted } R^2 = .562$$

As shown in Tables 4.4 and 4.5, the variables, combination, that predict the Basic Skills Math test are gender, SAT Verbal and SAT Math. For Reading, the significant predictors are First Year GPA and SAT Verbal.

As a second way to answer the research question, the Basic Skills scores in math and reading were dichotomized into PASS/FAIL. As such, the appropriate analysis is a binary logistic regression. These results are presented in Table 4.6 and 4.7

**Table 4.6. Results of Binary Logistic Regression for Basic Skills Math**

| Predictor Variable | Wald     | Sig. | Exp(B) |
|--------------------|----------|------|--------|
| Gender             | 1.23     | .267 | 2.509  |
| High School GPA    | .027     | .869 | .909   |
| Father Education   | .972     | .324 | 1.699  |
| Mother Education   | .032     | .858 | 1.157  |
| First Generation   | .206     | .650 | 1.579  |
| First Year GPA     | 2.317    | .128 | 3.141  |
| SAT Verbal         | 3.677    | .055 | 1.009  |
| SAT Mathematics    | 19.285** | .000 | 1.025  |
| Program Major      | .500     | .480 | .571   |

\*\*p< .01

Nagelkerke R Square = .513

**Table 4.7. Results of Binary Logistic Regression for Basic Skills Reading**

| Predictor Variable | Wald | Sig. | Exp(B) |
|--------------------|------|------|--------|
| Gender             | .424 | .515 | .544   |
| High School GPA    | .175 | .675 | .778   |
| Father Education   | .635 | .426 | .547   |
| Mother Education   | .028 | .867 | .874   |
| First Generation   | .791 | .374 | .364   |

|                 |        |        |        |
|-----------------|--------|--------|--------|
| First Year GPA  | .924   | .336   | 2.325  |
| SAT Verbal      | 17.025 | .000** | 1.038  |
| SAT Mathematics | 1.500  | .221   | .993   |
| Program Major   | 5.76   | .016*  | 45.624 |

\*p<.05; \*\*p< .01

Nagelkerke R Square = .536

The results for the binary logistic are similar to, although not identical to, the results for the OLS regression. Specifically, for Math the only significant predictor is the SAT Math (although the SAT Verbal is close—p - .055). For Reading, the significant predictors are SAT Verbal and program.

### Follow-Up Analyses

As one way to check the strength of the two regression models, the students' actual scores on the two Basic Skills Tests were correlated with the scores predicted from the model. The correlations are presented in Table 4.8 and an additional way of viewing the relationship is presented in Table 4.9.

**Table 4.8. Correlations Between Predicted and Actual Praxis I Scores**

|                                      | r      | Sig  |
|--------------------------------------|--------|------|
| Predicted Praxis I Reading Score     | .758** | .000 |
| Predicted Praxis I Mathematics Score | .796** | .000 |

\*\*Correlation is significant at the .01 level

**Table 4.9. Prediction Model Results**

|  | Predicted Math Score<br>N = 243 | Predicted Reading Score<br>N = 241 |
|--|---------------------------------|------------------------------------|
| Within 5 Points of the<br>Actual Score | 86%                             | 87%                                |

|                                      |       |     |
|--------------------------------------|-------|-----|
| Within 10 Points of the Actual Score | 99.2% | 99% |
| More than 10 Points                  | <1%   | <1% |

The results in Tables 4.8 and 4.9 demonstrate that the regression models are valid predictors of the Basic Skills scores. As shown in Table 4.8, the correlations between the predicted scores and the actual scores are very high. As shown in Table 4.9, only 1% of the students have predicted scores more than 10 points away from their actual scores.

## CHAPTER 5

### DISCUSSION

#### Summary of Findings

This study used a quantitative approach to test the most valid predictors of success of students entering into a teacher preparation program in the Commonwealth of Pennsylvania. Once determined, the most valid predictors were used to develop a prediction model to predict student performance on the basic skills Reading and Mathematics tests, which are required by Pennsylvania's Department of Education for gaining entry into an undergraduate teacher preparation program. Analyses were conducted to answer the main research question: do the predictor variables singly and in combination correlate with the basic skills Reading and Mathematics tests.

Examination of the correlations reveals a student profile for students with higher scores on the basic skills math test. That student profile is: male, with a higher High School GPA, higher first year college GPA, higher SAT scores (including math, verbal, and writing); has a father with a higher level of education, is not typically a first generation college student, and is more typically a secondary education major. The only exception for the student profile of a student with higher reading test score is that there was no difference between male and female.

The data in the study indicate that the greatest predictors of performance that predict the Basic Skills Reading test are: First Year GPA and SAT Verbal. The data also indicate that the greatest predictors of performance on the Mathematics test are: gender,

SAT Verbal, and SAT Math. Additional analyses of the correlations between predicted scores and actual scores of the basic skills tests were performed and proven to be very high.

In order to answer the research question in another way, the basic skills test scores were dichotomized into PASS/FAIL. This revealed a slight difference than the ordinary least squares in that the only significant predictor of the basic skills math test is the SAT Math; the significant predictors of the basic skills reading test are SAT Verbal and program choice.

The regression models not only indicate valid predictors of both the basic skills math and reading scores, but that the correlations between the predicted scores and actual scores are very high.

### Discussion of Findings

Pennsylvania's Department of Education adopted a policy of using SAT scores for demonstrating proficiency of basic skills. The policy was in direct response to House Bill 1816 prohibiting institutions of higher education from admitting any student into an undergraduate teacher preparation program without having passed the basic skills tests. House Bill 1816 reflects policies of 32 other states requiring the test of basic skills for entry into a teacher preparation program (NCTQ, 2014) as well as recommendations put forth in the 1983 *A Nation At Risk* report to hold higher standards for pre-service teachers and the programs that train them. It should be noted that the NCTQ report identifies Rhode Island and Delaware as having the best practices for program entry. If Pennsylvania were to use SAT scores (rather than the ETS Praxis Core Essentials or

Pearson Pre-Service Academic Performance Assessment) as the standardized test for demonstrating proficiency of basic skills, it would be using a test that is normed to college bound students, not to prospective teachers. This practice, recognized by NCTQ as a “best practice”, could advance Pennsylvania as being one of the top three states in the country for best practices.

The results of this study provide the necessary data to determine potential success of students in gaining entry into the undergraduate teacher preparation program at the university. The prediction model can identify students at risk of not passing the required basic skills tests, and has great implications on policies regarding admissions, support services, and advising practices. Such a model would prove an opportunity for the university to better serve its students in the teacher preparation program as well as potentially serve students in other programs that require testing to gain entry (i.e. Nursing).

The data in this study support the research on standardized testing that reveals an imperfect system of performance accountability within a humanistic system. The study shows that standardized tests can predict performance and measure aptitude and competence of basic skills. The study does not provide data to indicate how proficiency of basic skills contributes to improving quality of pre-service teachers or the programs that train them.

The policy for gaining entry into an undergraduate teacher preparation program in the Commonwealth of Pennsylvania has been defined to be between 48 and 60 credits. As such, the policy does not take into consideration Shavelson’s research on the value added of a college education (Shavelson, . The data in this study consisted of reported

test scores of students permitted to take the basic skills test at any point during the program. At what point during the program the tests were taken was not reported and so the value added of a college education cannot be determined. However, Shavelson's research on the value added of a college education on teacher preparation programs could prove significant in terms of how undergraduate teacher preparation programs are designed (e.g. types of courses outside education that strengthen and build basic skills).

This study clearly shows that the SAT is a predictor of a measure of basic skills, but the results demonstrate that using a combination of predictor variables provides the greatest predictive ability in predicting scores on the basic skills tests. This supports Gitomer's 1999 findings of using a combination of variables (SAT, high school GPA, and class rank) as a better predictor of success as well as Bonett, Brown, and Gitomer's 2011 research that there is a correlation between pre-service teachers' performance on the Praxis I and Praxis II.

Previous studies on Pennsylvania's Department of Education SAT policy for gaining entry into an undergraduate teacher preparation program were not conducted. Based on this study, the results provide support for that policy. However, several recommendations regarding policies of undergraduate teacher preparation programs are suggested.

## Recommendations

The recommendations emerging from this study are classified into three general categories: state related policies, education reform efforts, and institutions of higher education policies and practices. Each recommendation has elements relating to one or more of those areas.

While the purpose of this study was to a.) identify the most valid predictors of success of students entering undergraduate teacher preparation programs in the Commonwealth of Pennsylvania and b.) develop a prediction model to predict scores on the basic skills tests, the implications reach far beyond gaining entry and extend into the philosophical, political, and economical debates that surround education policy and reform efforts in the United States today.

### Recommendation 1: Eliminate the Basic Skills Tests and Use SAT Scores to Determine Eligibility for Gaining Entry Into an Undergraduate Teacher Preparation Program

The results of this study provide the necessary evidence that SAT scores are in fact a measure of performance of basic skills. Therefore, it is recommended the state abandon use of the Basic Skills tests (Praxis I Core Essentials and Pre-service Academic Performance Assessment) for gaining entry into undergraduate teacher preparation programs and use the SAT scores for the purpose of demonstrating proficiency of basic skills.

This recommendation is two-fold. The first is the financial burden due to costly testing fees and additional tuition fees for students not admitted into the teacher preparation program.

**Table 5.1. Testing Fees**

|                | ETS Praxis Core Essentials | Pearson Pre-service Academic Performance Assessment |
|----------------|----------------------------|---|
| Reading        | \$90                       | \$37  |
| Math           | \$90                       | \$44  |
| Writing        | \$90                       | \$37  |
| Combined Tests | \$150                      | \$110   |

Because there is no limit on the number of attempts to pass the tests and there is no price differential for multiple attempts, testing fees can be costly. In addition to the testing fees, many students also opt for expensive test prep courses, much like students preparing for SATs, and many cannot afford the test prep courses.

Pennsylvania’s Department of Education permits students to take foundational courses prior to gaining entry into a teacher preparation program. However, for students not admitted into a program, the foundation courses already taken do not typically transfer to other majors. This results in additional tuition costs for the student and additional time at the university to earn an undergraduate degree.

Given the financial burden of higher education costs, coupled with the fact that enough data is available to determine proficiency of basic skills (as well as the likelihood of passing the basic skills tests) it seems reasonable to eliminate basic skills testing. The available data can determine proficiency of basic skills and eligibility for gaining entry into a teacher preparation program and prevent unnecessary costs to the students.

Second, this recommendation reflects how the results of this study, specifically the prediction model, can be used by institutions of higher education. The basic skills

tests do not offer any additional information than what the SAT scores can predict. The prediction model developed in this study uses a combination of predictor variables and could be used to determine a classification model of student proficiency levels of basic skills. Colleges would be able to identify areas of strength and weakness of admitted students, which would influence placement in courses that require proficiency in basic skills (i.e. math courses), and better serve the needs of the students.

This prediction model, which uses a combination of variables (data already available) to predict performance on the basic skills tests, is supported by the literature that determined greater predictive ability in using a combination of significant predictors (Butler, 1990; Coker, 1988; Gitomer et al., 2011; Popovics, 1989).

Taking into consideration the issues surrounding using SAT scores in the admissions process (Joint Hearing of the Senate Committee on Higher Education Admissions & Outreach, 1999; Matern et al, 2012; Savelson, 2015) it should be noted that this recommendation is not related to admissions of students into colleges, but rather a recommendation to use existing data and an instrument (the prediction model) to better serve the needs of admitted students. Using the prediction model could a.) provide opportunity to support students academically and/or b.) provide appropriate placement in courses allowing for greater student success. Future research at the university using the prediction model and attrition rates would be an interesting study.

#### Recommendation 2: Require Math Standards Within A Teacher Preparation Program Be Met Only by Math Courses taught within a Math Department

A noticeable theme emerging from the timeline of teacher education is that *what teachers should know* includes stronger math and science skills (A Nation At Risk, 1983).

This study revealed gender to be significant in predicting the basic skills math test scores. Therefore, this recommendation is that the state eliminate the practice of exceptions of education departments to count math courses developed within the education department and not housed within the math department. Education majors would be challenged to perform within a heterogeneous environment of college students, which is in line philosophically with the NCTQ recommendation that basic skills testing be normed to college-bound students. Basic courses in the arts and sciences, which are required for a degree, are populated by a diverse student population and so pre-service teachers would be among peers from multiple majors, not just other pre-service teachers, and that diversity would measure pre-service teacher performance against all college students.

A pre-test/post-test study would benefit the university by providing data on the value of courses (i.e. increase in proficiency) for students in many majors, not just education.

#### Limitations

There were several limitations in this study. One limitation was that no ethnicity data were reported. As a result, whether or not race is a predictor variable is unknown. Understanding the role of race, as noticed in *The Danger in Overemphasizing The Use of Scholastic Assessment Tests (SATs) As A Tool For College Admissions*, would contribute to understanding additional predictor variables of success of students in gaining entry into an undergraduate teacher preparation program. That information could then be added to the prediction model for greater accuracy of predicted scores.

Another limitation of the study is that the current basic skills tests, Praxis I Core Essentials and Pre-service Academic Performance Assessment were not used. There were too few students at the university that took the basic skills Praxis I Core Essentials and Pre-service Academic Performance Assessment limiting a sufficient sample size for the study. However, it should be noted that the university should now have enough data to apply the model to the current basic skills testing.

The final limitation is that students in this study were permitted to take the basic skills test at any point during the program. As a result, it is unknown if there is a value added from a college education.

#### Future Research

This study was performed at a mid-size, urban, liberal arts university in the Mid-Atlantic region of the United States. Given the limitation of data on the population, future research could be helpful by looking at the nominal measures of association between pairs of variables (i.e. race, gender, socioeconomic status) in a larger, more diverse population. And with multiple studies, a meta-analysis would provide Pennsylvania's Department of Education a.) a more accurate student profile of those gaining entry into teacher preparation programs in the Commonwealth of Pennsylvania and b.) opportunity for program development based on identification of areas strength and weakness of basic skills.

Using a test that is normed to college bound students in a pre-test post-test analysis would be an interesting study to confirm Shavelson's research on the value added of a college education. It would also provide information to the state of

Pennsylvania as to whether or not using the test to gain entry into a teacher preparation program prior to completing college work eliminates potentially good candidates from entering programs.

There are also implications in this study for future research at the university. One example is to use the prediction model to develop a strategic marketing plan (targeted recruiting efforts and efficient use of resources) followed by a study on the attrition rates. An advantage would be that the university could conduct a study on using the prediction model as it relates to other programs that require demonstration of proficiency of basic skills.

A study that considers the advantages and/or disadvantages of certifying teachers at the undergraduate level versus the graduate level could lead to a significant impact on education reform and teacher preparation programming in the Commonwealth of Pennsylvania.

Pennsylvania's Department of Education policy on admitting students with non-education undergraduate degrees into graduate and post-baccalaureate certification programs (basic skills tests not required) implies, by nature of the policy, there is a value added by a college education. This policy indicates support of Shavelson's assertion that there is value added by a college education.

CAEP requires students entering a teacher preparation program to be from the top 1/3 of his/her high school class and have a minimum 3.0 GPA (CAEP website statement and Monk, 2015, p 220). Providing students an opportunity to grow, mature, and strengthen basic skills at the undergraduate level could lead to and prove to increase the quality of pre-service teachers. Additionally, strategic recruitment efforts of students with

stronger academic backgrounds in college to enter teacher certification programs at the graduate level could be developed.

## Conclusion

The historical timeline of how teacher education and teacher testing has evolved continues today. The governing of *what teachers should know* (beginning with the basic skills tests for gaining entry into a program and the competency testing for certification), and the standards for the programs that train them, drives state and federal policy and sparks ongoing debates in education reform.

The shift in control of teacher licensing remains at the state level. However, accountability measures extend beyond the state to the federal level (e.g. Title II). Accountability at the federal level is a result of the economic impact of financial aid distribution to students entering higher education; Title II requires teacher preparation programs to report data of student performance and public report cards for each state are published based on that data. This reporting requirement is a mechanism by which the federal government can hold accountable the programs (and states that approve them) enrolling students who receiving government funding. The state report cards published by the federal government indicate a measure of success and can put pressure on states to ensure teacher preparation programs are effective and successful in producing qualified teacher candidates. Consequently, funding for students entering low performing programs could be threatened.

Pennsylvania's Department of Education, Institutions of Higher Education offering teacher preparation programs, and the federal government (by way of ESSA) share in the responsibility of producing quality teacher candidates for the basic education system (Prek-12). With responsibility comes accountability. Pennsylvania's Department of Education is responsible for setting standards and program requirements for all teacher preparation programs in the state; it is accountable for approving only programs that meet the requirements. Institutions of Higher Education must comply with state requirements and are accountable to both the state and federal governments through program documentation and data reporting. The federal government must exercise due diligence in distributing government monies (tax dollars).

This study only looked at one aspect of the complicated process for preparing high quality teacher candidates: the most valid predictors of success of students gaining entry into an undergraduate teacher preparation program in the Commonwealth of Pennsylvania. The analysis, from that one aspect, provides Pennsylvania's Department of Education with valuable data to use in the process that drives policy decisions. The prediction model developed provides the institution of higher education with a tool to make informed admissions decisions as well as has implications for strategic marketing and influencing course development to meet the needs of students.

From *what teachers should know*, to assessing that knowledge, to informing policy makers, this study reveals vital information that could change how existing data can be used to drive policy, decrease the financial burden to students, and raise questions about the alignment of policy with education reform efforts.

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**IRB NUMBER: 16-07-033-X***(Reference this # on all future correspondence to the IRB)*

Name of Investigator: **A. Michele Fowler, EdD**

Address of Investigator: **Department of Education**

Protocol Title: **What Are the Most Valid Predictors of Success for Students Entering into a State Teacher Preparation Program?**

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This is to certify that the above-referenced protocol, which does propose research activities involving human participants, was reviewed in accordance with La Salle University Institutional Review Board (IRB) guidelines for the protection for human participants.

**PROTOCOL INFORMATION:**

Application Type: **Initial Review**

Review Category: **Exempt from regulations, under 45 CFR 46.101 Category 4**

Protocol Action: **Exempt**

Protocol Expiration Date: **Not applicable; unless the protocol changes such that exemption criteria are no longer met**

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The IRB reviewed your research protocol and determined that it is exempt from the regulations.

- Plans to deviate from the protocol and/or supporting documents must be submitted to the IRB in writing as an *Amendment Request*.
- Report within 5 business days to the IRB any INJURIES or other UNANTICIPATED or ADVERSE events involving risks or harms to human research participants or others.
- When you complete the project, please submit the *Completion* form so we may update our files to have an accurate account of ongoing studies.

July 27, 2016  
Date

Diana P. F. Montague  
Signature, Chairperson, IRB

Diana P. F. Montague, PhD