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STANDARDIZED TESTS AND GPA AS PREDICTORS OF ACADEMIC SUCCESS  
OF PHYSICAL THERAPIST ASSISTANT STUDENTS ENROLLED IN PROGRAMS  
AT  
TENNESSEE BOARD OF REGENTS COMMUNITY COLLEGES

by

Patricia J. Easley

A Dissertation

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Education

Major: Higher and Adult Education

The University of Memphis

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## **Dedication**

I dedicate this body of work to my family. First to my husband, Clay, you are not only my editor-in-chief but my sounding board, my shoulder to lean on, my coach and my best friend. I have no doubt that I could not have conquered this mountain without your constant love and support; you carried me at times, and for that, this dissertation is “ours” not mine alone. You have taught me so much about myself, and allowed me to see my potential for success. You sparked a sense of belonging in me and helped me realize that I could indeed pursue my Doctorate. Neither is this section large enough, nor are my words adequate, to express my gratitude. “Thank you” will have to do.

To our children, Chris, Kacy, Will, Anna, and Briggs: you have been an inspiration to me throughout this journey whether you realized it or not. I wanted, more than anything, to be an example to each of you; an example of the importance of an education and to model, for you, a never quit mentality. Remember to always: “stick to your task until it sticks to you, (as) beginners are many but enders are few. Special thanks go to Briggs who sacrificed the most through all of this. Thank you for understanding all the times I had to say “no” because I had to attend to my studies. It is finally over!

To my parents, Mom and Daddy J, your prayers, support, and belief in me meant more than you could ever know and I can’t thank you enough. A huge thanks goes to my sister, and number two biggest fan (second only to Mom), Leanne, for cheering me on to victory every step of the way. And last but not least, to my in-laws, Harry and Norma, thank you for all of your support; you are the best in-laws a person could ever have!

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I must also acknowledge all of the program directors of the PTA programs in Tennessee who participated in this study. Thank you all so much for agreeing to participate and for all of your hard work in gathering and submitting the data in a timely manner.

And finally, I would be remiss if I did not acknowledge my own PTA program director, mentor and friend, Dr. Jane David. Your example of leadership has been an inspiration to me. I have much respect for you and the professional and educational legacy that you have created. And to Amy, my co-worker, confidant and friend, thank you for all the times you let me vent and for all of your words of encouragement. They meant more than you know.

## **Abstract**

Easley, Patricia Jane. Ed.D. The University of Memphis. May, 2016. Standard Test and GPA as Predictors of Academic Success of Physical Therapist Students Enrolled in Programs at Tennessee Board of Regents Community Colleges. Major Professor: Jeffrey Wilson, PhD

Physical Therapist Assistant programs have more applicants than available seats, making them highly competitive programs to gain admission into. The community colleges that offer these programs are facing unprecedented challenges including the Complete College Agenda, outcomes-based funding, open-enrollment policies and high attrition rates. Given these conditions, a trend is emerging for program directors to institute some sort of standardized testing in order to select applicants whom the programs are most likely to retain and who will ultimately be successful on the licensure exam. This study examines the predictive validity of four standardized test, the Nelson Denny Reading Assessment (NDRA), the American College Testing (ACT), the Test for Essential Academic Skills (TEAS) and the Health Education Systems Incorporated (HESI). These scores were compared to the predictive validity of the students' cumulative pre-program GPAs in order to interpret which academic factor makes a better predictor of student success. The study revealed that GPA was only statistically significant in two of the cases and it also revealed that the NDRA and the HESI Reading Comprehension tests were the top two predictors of retention and first-time pass success, respectively.

*Keywords:* Academic Success, Attrition, Community College, Physical Therapist Assistant, Standardized Testing

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## **Chapter 1**

### **Introduction**

Researchers and leaders in higher education have recognized the essential role community colleges have played through the years in America's economy. For example, community colleges have long been considered open enrollment institutions serving the non-traditional displaced worker (AACC, 2015). Community colleges, however, are now facing unprecedented challenges such as the Complete College America (CCA) agenda which calls for community colleges in America to increase the number of students completing a degree or other credential by 50% - to 5 million students by the year 2020. There has been a plethora of research conducted regarding retention and degree completion (Astin, 1975, 1991; Bean, 1980; Pascarella & Terenzini, 1991, 2005; Tinto, 1975, 1993; Tinto & Pusser, 2006). This research is now gaining attention, once again, as the demand for a skilled and highly trained workforce increases in the U.S. (Bailey & Alfonso, 2005; Goldrick-Rab, 2010; Goodman & Pascarella, 2006). In addition, demands for accountability (out-comes based funding formulas) from state and federal governments has placed pressure on community colleges to increase retention and graduation rates (Baily & Alfonso, 2005; Ewell, 2011; Kuh, Kinzie, Buckley, Bridges, & Hayek, 2007).

As part of increased efforts to reform higher education in America, President Obama has challenged community colleges to play a major role in educating citizens to the tune of an additional 5 million students who graduate with some type of credential (degrees, certificates, etc.) by the year 2020 (CCA, 2015). This is a difficult task for the community college because as an open-enrollment institution, students are not required to have a

minimum ACT score to be admitted. President Obama further challenges all Americans by setting a goal for our nation to, by the year 2020, once again have the highest proportion of college graduates in the world. Currently, the United States lags behind many nations such as South Korea, Canada and Japan to name a few. In order for community colleges in the state of Tennessee to do their part in meeting the challenges of President Obama's postsecondary credential initiative, its leaders must look closely at the institutional programs' admissions criteria in order to determine how well these factors predict student retention and success.

Porchea, Allen, Robbins, and Phelps (2010) conducted a study in order to determine how well the following five variables predict outcomes of Community College Students: 1) academic preparation, 2) psychosocial, 3) socio-demographic, 4) situational, and 5) institutional factors. The primary focus of their research was to look at student characteristics that predict enrollment and degree outcomes for community college students and how variable the predictive value of each characteristic was based on the specific outcome (Porchea et al., 2010). By examining the effects of student (academic preparation, psychosocial, socio-demographic, and situational) and institutional characteristics on long-term enrollment outcomes, Porchea et al. (2010) were able to discover the implications for identifying at-risk students. This, in return, yielded their recommendations for tailoring efficient intervention strategies for improving outcomes.

The Porchea et al. (2010) study took a sample of students who entered community college in the fall of 2003 and followed them through the spring of 2008. The entire sample of 4,481 students from 21 different community colleges participated in the Student Readiness Inventory (SRI) validity study. The researchers used data from the

National Student Clearinghouse (NSC) in order to track the sample's enrollment, degree, and transfer outcomes during the five academic years. They then categorized the sample by defining five outcomes groups: 1) obtained a degree or certificate from a community college and transferred to a four-year institution, 2) obtained a degree or certificate from a community college and did not transfer to a four-year institution, 3) did not obtain a degree or certificate from a community college and transferred to a four-year institution, 4) did not obtain a degree or certificate from a community college, did not transfer to a four-year institution, but still enrolled at a community college during fifth year, and 5) did not obtain a degree or certificate from a community college, did not transfer to a four-year institution, and no longer enrolled during fifth year.

These five outcome groups are mutually exclusive and therefore the researcher chose to use a multinomial logit statistical model for data analysis. This method is used when the researcher's purpose is to predict the probability of the different possible outcomes of a categorically distributed dependent variable when the independent variable is constant (Creswell, 2014). The results concluded that the most prevalent outcome was dropout at an astounding 48% of the sample. Porchea et al. (2010) further concluded that a mere 8% of the sample obtained a degree from the community college and went on to a four-year institution and only 11% obtained a terminal degree (did not go on to a four-year institution). Still, the findings further revealed that the higher the high school GPA and standardized achievement test score the higher the probability of obtaining a degree or transferring and the lower the probability of dropping out (Porchea et al., 2010).

As a result of the work already done, this study and the implications of the results are relevant to community colleges in the United States. The Porchea et al. (2010) study was

timely in that it revealed the issues that brought about the need for legislative initiatives such as the Complete College Agenda, a non-profit organization established in 2009 which calls for increasing the educational attainment in the United States. Programs within the community college system, such as allied health programs, need to identify the at risk population early rather than when it is too late and they have dropped out or failed out simply because they were at-risk due to being unprepared for college. The question remains: how do we identify those at-risk and further how do we better predict those who can be successful? This study intends to identify whether cumulative Grade Point Average (GPA) or standardized tests scores better predict the retention and success rates of a cohort of Physical Therapist Assistant students enrolled in community colleges in the state of Tennessee.

### **Background of the Study**

The majority of the students enrolled in allied health programs at community colleges are considered at-risk either due to their low socioeconomic status (SES), and/or their perceived under-preparedness for college, not to mention their part-time/non-traditional status. The American Association of Community Colleges (AACC) (2014a) reported that 72% of all students attending a community college receive some form of financial aid; 62% of this aid was Federal Student Aid such as Federal Pell Grants. One might ask: How does low SES correlate with being at risk to complete college? One of the reasons is that lower SES students often have reading deficits. Previous research focused on the high risk of reading deficiencies amongst students from low SES background. One such study conducted by Hagans and Good (2013) revealed that a gap existed between the reading skills of 25 first graders from lower SES backgrounds and those of 25 first

graders from middle-high SES backgrounds. This gap was found even after intervention to raise phonological awareness skills. Aikens and Barbarin (2008) found that a child's initial reading skills are directly affected by SES status due in part to stressful parents creating a negative literacy environment at home; this was also linked to the number of books that the parents owned. To further aggravate the problem, the majority of the schools in lower SES areas are under resourced.

This problem is directly related to yet another significant issue facing the allied health student and that is being unprepared for college level course work. The U.S. Government Accountability Office (2013) cites that approximately 42% of community college students are underprepared for college-level course work and as a result are required at least one remedial education course. To add, the American Association of Community Colleges (AACC) cite the percentage of students who enrolled in at least one remedial course at the Community college where this study took place was 72% (Fast Facts, AACC, 2014b). Researchers also estimate that "fewer than 25% of developmental education students will complete a degree or certificate" (U.S. Government Accountability Office, 2013, Para. 3). This is not a problem exclusive to the community college as students enrolled in four-year colleges and universities who required remediation are more likely to drop out of college (Attewell, Lavin, Domina, & Levey, 2006; Bettinger & Long, 2004, 2005b). Consequently, being underprepared for college thereby puts the student into an at-risk category.

Another reason that a student might be considered at-risk is increased age and or enrollment status. The majority of allied health students are considered "non-traditional". The average age of the community college student is 28 with 30% being 21 or younger,

57% being 22-39 years old and 14% being older than 40 years of age (AACCC, 2014a). The U.S. Department of Education's Institute of Education Sciences (IES) (2014) reported that although it is controversial as to what exactly constitutes a non-traditional student, age, specifically over the age of 24, has been found to be the defining characteristic for this population. According to a report from the Complete College America (2011), *Time is the Enemy*, 75% of college students are juggling jobs and families while attending school part time. The report further reveals that it is rare for a part time student to complete; in fact, no more than a quarter ever make it to graduation.

### **Statement of the Problem**

Allied Health students enrolled in Tennessee Board of Regents (TBR) community colleges face multiple challenges regarding attrition in today's higher education environment. Many of these students are considered at-risk which decreases their chances for success in higher education. Considering that an outcome-based funding formula is now being used to fund colleges and universities in Tennessee, decreased student success and retention equals decreased funding. Decreased funding means programs get cut and people lose jobs. Though much research exists on predicting student attrition at four year institutions (Knoell 1960, Pascarella & Terenzini, 1979, Tinto, 1993); there is little research regarding the prediction of student attrition at community colleges (Bean & Metzner 1985, Porchea et al., 2010). Further, a gap exists in the literature regarding student attrition specific to Allied Health programs; therefore, there is a need for information regarding student assessment and predicting the attrition rates of this student population.

## **Purpose Statement**

The purpose of this study is to determine the predictive validity of academic factors of a cohort of allied health students, specifically, Physical Therapist Assistant (PTA) students enrolled at Tennessee Boards of Regent's (TBR) community colleges in Tennessee by evaluating the correlation of these factors with this cohort's retention rates and first-time pass rates on the National Physical Therapy Exam (NPTE).

## **Research Questions**

In order to achieve the purposes of this study, the research questions are as follows:

1. What is the correlation between GPA and Nelson Denny Reading Assessment (NDRA) test scores on PTA student retention?
2. What is the correlation between GPA and NDRA test scores on PTA student first-time pass success on the NPTE?
3. What is the correlation between GPA and American College Test (ACT) scores on PTA student retention?
4. What is the correlation between GPA and ACT scores on PTA student first-time pass success on the NPTE?
5. What is the correlation between GPA and Test of Essential Academic Skills (TEAS) scores on PTA student retention?
6. What is the correlation between GPA and TEAS scores on PTA student first-time pass success on the NPTE?
7. What is the correlation between GPA and Health Education Systems Incorporated (HESI) test scores on PTA student retention?

8. What is the correlation between GPA and HESI test scores on PTA student first-time pass success on the NPTE?

These research questions will help understand the predictive validity of cumulative GPA and of the standardized tests under study thus enabling program directors in competitive Allied Health programs better predict student retention and success.

### **Significance of the Study**

To understand the significance of better predicting student success in competitive Allied Health programs such as PTA programs at TBR community colleges one must first understand “performance” based or “outcomes” based funding that the state of Tennessee has recently implemented. Many states in the nation already use this type of funding formula. According to the National Conference of State Legislatures (2015), there are thirty states that have adopted this type of funding formula. They are: Arizona, Arkansas, Florida, Illinois, Indiana, Kansas, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, New Mexico, Nevada, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming. All of these states have funding formulas in place that allocate at least some amount of funding based on performance and outcomes. Colorado, Georgia, Iowa, and South Dakota are in the process of transitioning to some type of performance funding; this means that the legislature or governing board has approved a performance funding program but the details have not been worked out yet (NCSL, 2015).

The Tennessee Higher Education Commission’s (THEC, 2010 a) five-year revision to the Performance Funding Program’s most recent “outcomes-based funding formula” was

written in part as a result of the Complete College Tennessee Act (CCTA) of 2010.

CCTA is a higher education reform with an agenda to assist Tennesseans in becoming better educated and/or vocationally trained within the restrictions of the state's decreased fiscal support for higher education. The reform is linked directly with ongoing national reform to improve access to higher education for all Americans. The CCTA hopes to help Tennessee meet the projected national average in educational attainment by 2025.

Prior to 2010, funding for public institutions of higher education in the state of Tennessee continued to include enrollment as a means of determining allocations. The new funding formula no longer includes enrollment data but rather focuses primarily on quality assurance and the establishment of institutional mission statements or profiles, which distinguish each institution by degree level, program offerings and student characteristics (THEC, 2010b). With this formula, institutions are rewarded for outcomes that further the educational attainment and productivity goals of the state of Tennessee's Master Plan (THEC, 2010c).

The outcomes chosen for the formula are broad and represent various types of institutions, which range from research-based four year universities to community colleges which train the bulk of the workforce. One cannot compare the performance of four-year universities with that of community colleges because they have very different missions and often serve very different student populations. With this new formula, the outcomes are weighted based on the missions of the institutions themselves; thus, institutions with similar missions are grouped together. This new formula is productivity-based without the use of a benchmark or annual target and, therefore, does not punish an institution if it fails to reach an arbitrary benchmark. The outcomes-based formula

spreads incentives across many more variables than past performance based funding formulas did, thus, according to THEC, making it more stable, objective and fair (THEC, 2010c).

Within the new THEC outcomes-based funding formula, the outcome that weighs the greatest for both the community college and the four-year university is graduation and job obtainment. With this being the case it would stand to reason that Allied Health programs must find the best possible predictors of success for use as their admissions criteria so that community colleges can have better outcomes. In order to do this studies must be conducted regarding the assessment of student outcomes and the predictive validity of the admission criteria being used in Allied Health programs at institutions in states where outcomes-based funding is being used.

The National Commission on Excellence in Education's (1983) report, *A Nation at Risk*, could have been a catalyst that triggered the accountability and reform movement that we now see happening in higher education in the United States of America. The report highlighted the significance of testing by stressing that there should be a shift away from focusing on merely diagnosing a student's strengths and weaknesses and toward the use of benchmarks for potential competence and achievement. More recent reports continue to demonstrate that standardized testing is an essential element of assessment and accountability with results that are being used by policy makers as indicators of the overall effectiveness of higher education (NCES 2011).

All four of the PTA programs participating in this study use some form of standardized testing. Those tests used are the NDRA, the ACT, the TEAS and the HESI. This study determined the predictive value of these standardized tests on the retention

and success of Physical Therapist Assistant (PTA) students at TBR community colleges. The study also evaluated the predictive validity of student pre-admission cumulative GPAs. The information gained from this study can be used by other allied health programs in other states whose funding formula has an outcomes-based component. By administering standardized tests to determine critical thinking skills the probability of success can be better predicted and program curriculum can be modified to better serve the demands of licensure exams (such as the NPTE used for Physical Therapist Assistant candidates) which are required for allied health certifications. The unique contribution of this study is the review of academic factors and their relationship to student performance on national Physical Therapy licensing exams.

This study strongly underscores the importance of allied health program faculty availing themselves of data associated with standardized testing that predicts student retention and success. Data from these tests can be used in allied health programs (such as PTA) to identify student success. Student success is vital to the growth and vitality of the community college which, for the state in which this study was conducted, is crucial given that Tennessee's funding formula is now outcomes-based. If students are not retained and do not succeed, institutions lose money and harm their reputations. Programs can be eliminated and jobs can be lost. With all of this at stake, allied health programs need a solid predictor of success and this study provides the data to either prove these standardized tests as those predictors or prove that further studies in this area are needed (having eliminated these tests as one possible predictor).

## **Theoretical Framework**

The theoretical framework for this study was based on Astin's (1991) Inputs-Environments-Outputs (I-E-O) assessment model. Astin's model reveals that outputs are such things as degrees earned, certifications passed, job's obtained, etc. and that these must never be evaluated independently but in relationship with inputs. According to Astin, inputs are student ability, gender, age, SES, major, etc. Astin's model further reveals that this data is limited when looked at independently of the environment. According to Astin, environments include such things as programs, courses, facilities, faculty, peer groups, etc. Astin's model ascertains that the accurate assessment of student outcomes requires input, output, and environmental data.

Astin (1991) stated that inputs are personal qualities, such as talent and ability, which the student brings to the educational program upon application. This study included the inputs of the students' pre-requisite GPA, and Standardized Test Scores (NDRA test scores, ACT test scores, TEAS test scores, and HESI test scores).

The environment refers to that which the student experiences and for this study was via Physical Therapist Assistant programs at TBR community colleges. The PTA programs strive to support the physical therapy needs of the state of Tennessee and with the baby-boomers now getting older this creates a greater need for licensed PTAs. The curriculum provides students with the knowledge and experience to be competent entry-level physical therapist assistants who are successful with the NPTE, state licensure, and work under the supervision of a physical therapist. Upon completion of these programs graduates will have a self-directed plan for personal and professional development and be

leaders within the community and the profession. For this research, academic and non-academic variables will be statistically analyzed to determine if there is a correlation between these factors and retention and NPTE scores. Findings from this study may influence the PTA Programs (e.g., curriculum, course content, instructional methodologies, student support intervention) and, hence the PTA environment.

The I-E-O outputs considered in this study included successful completion of the PTA Program and first time pass rates on the NPTE. If it is proven that standardized tests scores which reflect critical thinking skills positively influences student outcomes, the PTA Program will be impelled to act and make programmatic changes that will lead to improved student outcomes.

### **Assumptions**

The following basic assumptions were necessary for this study:

1. The secondary data that was collected will be valid data.
2. The program directors were willing to participate and submit honest responses.

### **Limitations**

The limitations for this study are as follows:

1. This study focused on a select number of academic factors that may predict student success but there are many other variables that can influence academic success such as attendance, life events, number of hours spent studying, number of hours a student works in addition to attending school, role strain, and support system, etc.

2. The small number of subjects that the study found that did not retain or did not succeed on the NPTE were a factor that posed some methodological problems in statistical analysis.

### **Delimitations**

The delimitations for this study are as follows:

1. This study focused on community colleges in only one state in the United States of America.
2. This study was conducted at both rural and urban community colleges.

### **Definition of Terms**

There are words and terms used in this study that require definition for understanding of their implications. These words and terms are as follows:

**Allied Health Program Students.** Students enrolled in courses for credit who are recognized by the institution as seeking a degree or other formal award in a health-related occupational program excluding Nursing.

**American College Testing (ACT).** A curriculum- and standards-based educational and career planning tool that assesses students' academic readiness for college.

**Attrition.** The reduction in numbers of students attending courses as time goes by.

**Complete College Tennessee Act (CCTA).** A comprehensive reform agenda that seeks to transform public higher education through changes in academic, fiscal, and administrative policies at the state and institutional level.

**Full-Time Student.** A student enrolled for 12 or more semester credits, or 12 or more quarter credits, or 24 or more contact hours a week each term.

**Graduation Rate.** The rate required for disclosure and/or reporting purposes under the Student Right-to-Know Act.

**Health Education Systems Inc. (HESI) test.** A standardized admissions test that consists of seven academic exams and a personality profile/learning style inventory. It is often used to determine the ability of potential students to adjust to a health-related program.

**National Physical Therapy Exam (NPTE).** A federal exam that is required to be taken by every physical therapist assistant or physical therapist who wishes to practice in the field of Physical Therapy. The test is meant to test the competency of the candidate who has graduated in this career field.

**Nelson Denny Reading Assessment (NDRA) test.** A diagnostic exam developed in 1929 by M.S. Nelson & E.C. Denny designed to screen incoming college students for their current level of reading skills.

**Non-Traditional Aged.** Category of college student aged 25 to 65 years of age.

**Outcomes-based Funding.** A new funding formula adopted by the Tennessee Board of Regents that no longer includes enrollment data but rather focuses primarily on quality assurance and the establishment of institutional mission statements or profiles, which distinguish each institution by degree level, program offerings and student characteristics. With this formula institutions are rewarded, in part, for the production of outcomes that further the educational attainment and productivity goals of the state master plan.

**Part-Time Student.** A student enrolled for either 11 semester credits or fewer, or 11 quarter credits or fewer, or fewer than 24 contact hours a week each term.

**Retention.** Ability of an institution to retain a student from admission through graduation. For this study it would mean freshman to senior retention.

**Tennessee Board of Regents (TBR).** A higher education system that consists of 46 institutions with a combined annual enrollment of over 200,000 students. The mission is to educate more Tennesseans in order to provide Tennessee with the workforce it needs for sound economic development.

**Test of Essential Academic Skills.** A standardized, multiple choice exam for students applying for nursing school in the USA. It is often used to determine the ability of potential students to adjust to a nursing program.

**Traditional Aged College Student.** Category of college student 18 to 24 years of age.

**Two –Year Institution.** A postsecondary institution that offers programs of at least 2 but less than 4 years' duration; includes occupational and vocational schools with programs of at least 1,800 hours and academic institutions with programs of less than 4 years, does not include Bachelor's degree-granting institutions where the baccalaureate program can be completed in 3 years.

## Chapter 2

### Literature Review

This study focused on exploring academic factors as predictor variables of retention and success of a sample of Physical Therapist Assistant (PTA) students in the state of Tennessee. This chapter reviews the literature regarding the predictive validity of standardized tests and GPAs; defines retention and success for the PTA students enrolled at community colleges in the state of Tennessee; and presents the model that frames this study, Alexander Astin's I-E-O Assessment Model (1991, 2012).

#### **Predictive Validity of Academic Variables**

**Predictive Validity of Standardized Tests.** Assessment and accountability in higher education are both hot-button and highly debated topics. The debate regarding high-stakes testing and the equity of admissions processes is at the heart of the accountability movement in today's higher education environment (Koretz, 2008; Linn, 2000).

Historically and due, in part, to the methodological rigor of standardized tests, they have been seen as a valid measure in assessing student ability. On the contrary, High School Grade Point Average (HSGPA) has often been viewed as an untrustworthy criterion due, in part, to the vast differences in grading standards (Camara, 2003). It is not atypical for an allied health program director to have the majority of applicants report either a HSGPA or first-year college GPA equal to 4.0, thereby causing grades to be a less likely factor in differentiating students (Kwan, Childs, Cherryman, Palmer, & Catton, 2009; Platt, Turocy, & McGlumphy, 2001).

Allied health programs such as PTA are confronted with the need to assess an applicant's ability to succeed. Admissions decisions are critical due to the academic rigor

of the program itself, the limited program capacity, and the competitiveness that this creates. PTA program directors must do a comprehensive review of the student's abilities including a review of the student's standardized test scores. Exactly how much value-added-ness these scores offer has been a concern for educators and, therefore, much research exists regarding the usefulness of admissions test-scores. A review of much of this research is presented next.

A study of the predictive validity of the Pharmacy College Admission Test (PCAT) was conducted by Meagher, Lin, and Stellato (2006). The study included students from eleven colleges. The independent variables included in the study were PCAT test scores, pre-program cumulative GPA, and pre-program math and science GPAs. The dependent variables were 1 – 4-year GPA and graduation rates. The researchers found that PCAT scores provided incrementally better predictive value than pre-admission GPA. A similar study conducted by Kuncel et al. (2005) found that the correlation between PCAT scores and sub-scale scores on the pharmacy licensing examination was stronger than the correlation between pre-pharmacy GPA and sub-scale pharmacy licensing examination scores.

Denton et al. (2009) conducted a study in order to answer the following research questions: 1) What academic and biographic variables of program applicants relate to successful admission into the certificate program? 2) What academic and biographic variables of program candidates relate to successful program completion and certification? Denton et al. (2009) sampled 170 teacher certificate program applicants. The predictor variables under study were the applicant's undergraduate grade point average, the applicant's Texas Examination of Educator Standards (TExES) Content

Score, semester hours in content field, and number of years since undergraduate degree was conferred. They chose the following biographical variables to access: ethnicity; gender; highest academic degree and career status.

The researchers conducted a descriptive statistical analysis of the academic and biographical variables for the sample in order to identify profiles for success. They also used discriminant analyses to determine “whether biographic and academic profiles could be identified to predict both successful program admission and completion to become a certified secondary teacher” (Denton et al., 2009. p. 222). They found that the TExES content criterion score was the most influential variable in predicting both successful admissions and completion. This is not at all unexpected considering that the TExES is a standardized test used to “measure the requisite knowledge and skills that an entry level teacher in the certification area is required to possess” (Denton et al., 2009, p. 218).

Adebayo (1993) tested the predictive value of standardized admissions test scores and certain student demographics on the academic success of re-entry non-traditional students. The author specifically set out to determine whether Nelson Denny test scores could be used to detect at-risk student populations. The data included student entrance test scores on the Nelson Denny (both vocabulary and comprehension scores were considered as well as total score). The demographic variables were as follows: age, sex, marital status, number of children; years since last attending school before current enrollment; GPA; number of high school credits; previous college attendance; and ethnic background. These were then categorized into institutional variables and non-institutional variables.

The sample was composed of 60 non-traditional students; 14 were males and 46 were females. The author used a multiple regression analysis in order to find the correlations between the dependent and independent variables. With a significance level of  $p = .001$  and a standard deviation of 1.79, the study revealed a moderate positive correlation between Nelson Denny scores (vocabulary, comprehension score) ( $r = .38$ ) and retention rates as well as a high positive correlation between total Nelson Denny scores ( $r = .93$ ) and academic success. Those who cannot comprehend what they have read are not successful in programs such as the ones under study.

Fike and Fike (2008) studied 9,200 first-time college students enrolled in a community college over four years in order to analyze predictors of retention. The independent variables included student age; gender; ethnicity; whether or not the student was taking either a developmental course or an Internet-based course; whether or not the student participated in a student support services program; whether the student received financial aid; the level of education of the students' parents; the number of semester hours enrolled in; and number of semester hours dropped each semester. This was a quantitative, retrospective study with two dependent variables to assess retention: 1) first-year fall semester to first-year spring semester retention and 2) first-year fall semester to second-year fall semester retention. The descriptive statistics used were multivariate logistic regression models with control for relevant confounders such as student demographic variables. The level of significance was set at .05. The positive predictors of fall-to-spring retention (ordered from strongest to weakest) were:

passing a developmental reading course; taking Internet courses; not taking a developmental reading course; participating in a student support services

program; passing a developmental writing course; passing a developmental mathematics course; receiving financial aid; father having some college education; mother having some college education; and the number of semester hours enrolled in the first fall semester. (Fike & Fike, 2008, p. 74)

The researchers further revealed that the variables that “reduce(d) the odds of fall-to-fall retention include(d) not taking a developmental mathematics course and semester hours dropped in the first fall semester” (Fike & Fike, 2008, p. 74). The study concluded that the most statistically significant predictor variable of retention was passing a developmental reading course. The researchers suggested that “college-level reading comprehension and reading strategies were essential for students to be able to read and understand their college-level textbooks” (Fike & Fike, 2008, p. 76).

Admission testing has the single purpose of identifying students who are most likely to be successful in college. Though these studies have yielded a strong correlation between student success and standardized test scores, they cannot rule out the validity of GPA altogether. In the following section the writer will provide a review of the literature regarding the use of GPA as the single predictor of student success.

**Predictive Validity of Grade-point Average.** Grade inflation is a significant issue in the U.S. Between the years of 1991 and 2003, the mathematics GPAs of high school students taking the ACT exam rose from 2.80 to 3.04. This same populace of high school students’ average scores on the math portion of the ACT, however, rose only slightly, from 20.04 to 20.55 on a 36-point scale. Likewise, average English GPAs jumped from 3.04 to 3.29, whereas ACT English scores merely budged from 20.22 to 20.44. Therefore,

ACT concluded that the higher GPAs reflected grade inflation rather than an increase in achievement (Woodruff & Ziomek, 2004).

Almost two times as many high school students reported earning a 4.0 GPA in 2006 as in 1992 (32.8% versus 18.3%) (Twenge & Campell, 2011). According to Schmidt (2007), two federal reports found that the performance of U.S. high school students on the reading portion of the National Assessment of Educational Progress (NAEP) had declined between 1992 and 2005. This same study found that high school students reported receiving higher grades (GPAs rose from 2.68 in 1990 to 2.98 in 2005) and taking tougher classes (the percentage of students who said they took college-preparatory classes rose from 5 to 10%). The question then remains: does GPA truly reflect the scholastic ability of students?

A study of note conducted by Newton, Smith, Moore, and Magnan (2007) examined 164 nursing students to determine the correlation between a student's cumulative GPA in four first-semester nursing courses with the predictor variables of scholastic aptitude and nursing aptitude. The researchers defined scholastic aptitude as the student's pre-program grade-point average (PGPA) in seven courses (anatomy, biology, biochemistry, composition I, composition II, and physiology). The researchers defined nursing aptitude as the student's composite score on the Assessment Technologies Institute (ATI) Test of Essential Skills (TEAS). The researchers found that PGPA accounted for 15.4% of the variance in the student's first-semester grades. When the TEAS scores were added into the model the researchers found that TEAS scores accounted for 4.8% of the variance. The researchers concluded that both PGPA and TEAS scores were valid predictors of

first-semester success and should therefore be considered as admissions criteria (Newton et al., 2007).

A study conducted by Kuncel and Hezlett (2007) reviewed the validity of the Graduate Record Examination (GRE), the Law School Admissions Test (LSAT), the Medical College Admissions Test (MCAT), the Pharmacy College Admissions Test (PCAT), the Miller Analogies Test (MAT), and the Graduate Management Admissions Test (GMAT). The study determined the correlation between these graduate and professional program test scores and student success as measured by first-year GPA and graduate program GPA. The study revealed that: the standardized tests were effective predictors of performance in graduate school; both tests and undergraduate grades predicted academic outcomes; standardized admissions tests predicted student success better than prior college academic record; and the combination of tests and grades yielded the most accurate prediction of success (Kuncel & Hezlett, 2007, p. 1080).

One study conducted by Nobel and Sawyer (2002) examined the predictive validity of the ACT composite score combined with HSGPA on college freshman year-end GPA. The researchers found was that although both composite ACT and HSGPA were predictive of first-year grades, HSGPA was more accurate than ACT composite at first-year GPA ranges of 2.00, 2.50, and 3.00. When the researchers applied a multiple predictor model they found that ACT composite score plus HSGPA the strongest predictor of all.

It appears from the research that using GPA as a single indicator of scholastic ability is of limited value; however, using it in combination with standardized tests scores is a much more accurate predictor of student success. The research is also clear that

admissions tests alone are not completely valid predictors of academic success either. The research on admissions testing for both undergraduate and graduate professional programs supports that admissions tests: (1) are predictive of academic performance to some degree; (2) provide some value-added-ness to the admissions process; and (3) when combined with GPA, prediction is improved and is, therefore, more beneficial than using GPA alone (Linn, 1990; Nobel, 2003; Sawyer, 2007; Zwick, 2002). These findings assert the predictive validity of standardized tests.

### **Extensive Definition of Retention and Success for the PTA Student**

Pascarella and Terenzini (1991) provide educators with a concise summary of the literature concerning retention and ascertain that students become more focused and goal oriented as they persist through college. The evidence further reveals that a college senior is more equipped and ready for the workforce than is a sophomore or junior. These facts put the community college student at a disadvantage compared to the student at a four-year institution.

At the core of retention literature is Vincent Tinto's model of student departure. Tinto's theory has guided many empirical studies of student retention. This model postulates that students enter college with not only individual attributes but also with family attributes. These attributes contribute to their intent to remain at college and complete. Students then have the task of merging these intentions with the academic and social intentions of the university which influence their ongoing goal. This model has since evolved to also include influence from outside the university (Tinto 1975, 1993; Tinto & Pusser, 2006). Tinto's (1975, 1993) model of student departure further explains that student departure is a longitudinal process in that it occurs over the college life of a

student which is constantly evolving as the intervening variables evolve. As a student transitions through a four-year college experience his/her expectations, motivations and even commitments change thus impacting his/her decision to remain in college. The longer a student is in college the more strongly said student is integrated which in turn increases the likelihood that he/she will persist and complete. If then, all factors being equal, a student is only in college for two years as opposed to four, the student is less likely to persist because the student is not as strongly integrated. Again, this puts the community college student at a disadvantage. It is critical to note that both student and institutional characteristics vary between two-year and four year institutions (Bailey & Alfonso, 2005; CCCSE, 2010; Fike, 2008; Goldrick-Rab, 2010; Miller, Pope, & Steinmann, 2005; Tinto, 1975; Wild & Ebbers, 2002). Other than the fact that community college students do not have the same number of years for complete integration to occur, there are three distinct factors that can and do make it more difficult for the typical community college student to persist and complete, they are: 1) being of low-SES; 2) being non-traditional college students; and 3) being under-prepared for college (Bean & Meztner, 1985; Boggs, 2011; NCES 2011, *Condition of Education*).

**Low-SES.** According to the American Psychological Association (APA) (2015) socioeconomic status (SES) is defined as the measurement of an individual's or families' educational attainment, income and occupation. This status is usually conceptualized as one's social standing or class as compared to a particular society or group as a whole. The concept of SES is commonly viewed via a social class lens and therefore privilege, power and control are emphasized. Also, according to the research conducted by the APA

examinations of SES as a gradient or continuous variable have revealed inequitable allocations of resources.

Research shows that success rates of low-income students lag significantly behind mid – high income students (Gonzalez, 1996; Gonzalez & Szecsy, 2002; Harvey, 2001; Institute for Higher Education (IHEP), 2001; Swail, 2003). This is due, in part, to inequitable allocations across school districts and in homes which results in learning experiences and materials that are greatly lacking (Jones & Watson, 1990; Lockard, Abrams, & Many, 1997; Piller, 1992; Resta, 1992).

A great deal of research has been done and concludes that low-SES students grow up in environments that are not conducive to support success in higher education (Pascarella et al., 2004; Rendon, Garcia, & Pearson, 2004; Rendon, Jalomo, & Nora, 2000; Zwerling & London, 1992). Rendon et al. (2000) found that though Tinto's (1975, 1987) model of student persistence created a foundation, much more work is needed to understand how, for example, class can impact retention for diverse students in diverse institutions. Many are first-generation college attendees from schools that had low expectations of them (on vocational and other technical tracks rather than college preparatory tracks). This further sets the low-SES populace up for poor attrition rates. Zwerling and London (1992) found in their research of first generation college students that it was very difficult for the students to bridge the gap between life at college and life at home. For these students there is a significantly different culture when comparing their home life with their life in academia.

According to the Tennessee Higher Education Commission (2013), the total enrollment for Tennessee's colleges and universities for the year was 400, 908 students.

A total of 58,656 of these students enrolled at a community college which is 22% of the state's total enrollment. An astounding total of 47, 835 of the students enrolled at TBR community colleges were eligible for Federal Pell Grants (THEC 2013). Provasnik and Planty's (2008) research concluded that of the approximately 7.5 million students enrolled in American two-year colleges in the fall of 2009, 44% were from low-SES households. Further research has found that only 37% will bypass remediation compared to 75% of the mid-high- SES student populace (Provasnik & Planty, 2008; Wirt et al., 2004). For the open-enrollment community college serving the low-SES populace, positive outcomes are well below 50%; in fact, a mere 13% of students enrolled in community colleges in the U.S. graduate within two years and only 27% graduate within four years (NCES, 2011).

**Non-traditional students.** The majority of the students attending community colleges are considered “non-traditional”. The average age of the community college student is 28 with 30% being less than or equal to 21, 57% being 22-39 years old and 14% being older than 40 years of age (AACC, 2014 a). This then begs the question: What exactly what constitutes a nontraditional student? Research teams such as Bean and Metzner (1985), Cleveland-Innes (1994), and Hurtado and Kurotsuchi (1996) found that although it is controversial as to what exactly constitutes a non-traditional student, age (especially being over the age of 24) has most often been the defining characteristic. Jones and Watson (1990) deemed the non-traditional population as being majority women, minorities, adults and part-time students and characterize this population as “at-risk”.

According to the Advisory Committee on Student Financial Assistance (2012), non-traditional students are defined as having one or more of the following characteristics that

cause them to be at risk: working full-time, raising a child as a single parent, and lacking a traditionally earned high school diploma. These factors cause hardships for the non-traditional student that the traditional student typically does not have to deal with.

The issue of academic success of re-entry non-traditional students is of serious concern as non-traditional students are likely going to be in the majority in not only our community colleges but our four-year institutions. According to the National Center for Educational Statistics (2010), the percentage of non-traditional students at colleges and universities in America is up to 38% and is projected to increase another 30% by the year 2019. This population brings with them lots of perceived baggage such as full-time jobs, maternal or paternal responsibilities, reading or other deficits which can reduce their ability to matriculate and be successful.

**Under-prepared for college.** The Tennessee Higher Education Commission or THEC (2013) reported that approximately two-thirds of the entering college freshman will require some form of remediation. The Tennessee Board of Regents (TBR) defines an under-prepared student as someone who has an ACT sub-score of less than 19 in English, 18 in Reading, or 19 in Math or the equivalent Compass score.

An issue facing the community college student is being unprepared for college level course work. As reported earlier, 42% of students entering a community college have remedial and developmental needs and fewer than 25% of these will complete (U.S. Government Accountability Office, 2013). Unfortunately, the students at the community colleges where this study will take place are no exception to this trend as a staggering 73% of first time freshmen in the fall of 2012 enrolled in at least one Remedial and Developmental course (THEC, 2013).

A high percentage of these students have to remediate. Three-fifths of the student body in community colleges require at least 1 year of remediation (Adelman, 2005; Horn & Berger, 2004). This is a relevant statistic due to the fact that as the number of required developmental courses increases, the odds of the student dropping out of college increases (Burley, Butner, & Cejda 2001). Remediation is big business, costing billions of dollars annually (Bettinger & Long, 2005; Camera, 2003; Institute for Higher Education (IHEP), 1998). The concern remains: are American colleges getting a good return on their investment? Studies show that students who require remediation were unsuccessful on several outcomes measures when compared to those students who enrolled directly into college level courses (Bettinger & Long, 2005; Calcagno & Long, 2008; Martorell & McFarland, 2009).

Bettinger and Long (2005) found that when a student needs remedial courses it not only extends the time to degree but can also have a negative impact on that student's outcomes such as affecting his/her choice of major, his/her attrition rate and inevitably labor market return. Calcagno and Long (2008) found that remediation may promote persistence early in the students' academic endeavors but to the contrary remediation did not help the students under study ultimately make progress toward a degree. These are vital statistics for the states where the funding formula is performance based.

The need for remediation is not exclusive to the non-traditional student population. According to data released by the National Center for Education Statistics, 26% of the first-time freshmen who enrolled in college between the years of 2007 - 2008 were under-prepared for college.

According to Lesley (2001), in order for remedial students to thrive in the world of academia they must get beyond the lower level drill practice that currently makes up the developmental course curriculum. It is critical that the student “learn to read analytically, beginning with their own circumstances of tracking, social stratification, and marginalization” (Lesley, 2001, p. 189). As a chair of a committee to identify problems afflicting developmental reading courses at her university, Lesley was appointed as coordinator for Reading 100. She quickly realized that the course’s “curriculum followed an illogical practice of teaching lower level drill activities and then expecting students to write a research paper” (Lesley, 2001, p. 181). The students were not required to do any reading that would prepare them to write such a paper; thus the course was not reflective of the interconnection that exists between reading and writing.

Lesley began a study with the following research questions: (1) what happens when students enrolled in a basic reading course experience critical literacy (reading and writing conscientization) as an entrance into academic modes of discourse? (2) To what extent do the students enrolled in this course construct or begin to construct themselves as readers and writers through the means of critical reflection and critical literacy pedagogy? She collected data via qualitative interpretive methods by conducting interviews with students who were enrolled in developmental reading and writing courses. What she found was that critical literacy is a process that must be mastered before the developmental learner is introduced to college level academia where “complex questions and analysis of answers drive inquiry in every discipline” (p. 189). From her experience, Lesley concludes that reading and writing conscientization (critical literacy) “fosters

critical questioning and thinking and thus enhances students' comprehension skills in reading" (p. 189).

Standardized tests such as the Nelson Denny Reading Assessment test, the Academic College Testing exam, the Test of Essential Academic Skills, or the Health Education Services Inc. exam may be valid predictor variables of Physical Therapist Assistant student performance and may therefore assist programs in predicting those students with the reading comprehension and critical thinking skills that are necessary to successfully complete the process of becoming a licensed PTA. Tinto's (1975, 1993) model of student departure does not sufficiently frame the study at hand. Astin's (1991, 2012) Input-Environment-Output (I-E-O) is a more appropriate frame for this study in that it takes into account the student attributes that contribute to retention.

Astin's (1991, 2012) retention model explains the effects that college environments have on student outcomes and further asserts that student attribute (inputs) carry a significant weight in predicting degree completion. Astin's Input-Environment-Outcome (IEO) model was chosen as the retention theoretical framework for the study in order to gain a better understanding of retention, student characteristics and student success outcomes. Astin's model is described at length later in this chapter.

In order for the reader to understand retention within the research setting of this study, the writer provides the following definition: retention is defined by the THEC (2010) as the ability of an institution to retain a student from admission through graduation. Student success, for the student in Tennessee, is addressed at length in the Complete College Tennessee Act of 2010. This section will detail what defines success for the student at a TBR community college as well as what defines success for the PTA student.

**Community College Student Success.** THEC's five year revisions to the Performance Funding Program's most recent "Outcomes-based Funding Formula" was written in part as a result of the Complete College Tennessee Act (CCTA) of 2010. CCTA is a higher education reform with an agenda to assist Tennesseans in becoming better educated and/or vocationally trained within the restrictions of the state's decreased fiscal support for higher education. The reform is linked directly with ongoing national reform to improve access to higher education for all Americans. The CCTA hopes to help Tennessee meet the projected national average in educational attainment by 2025 (THEC, 2010 a).

Prior to 2010, funding for public institutions of higher education in the state of Tennessee continued to include enrollment as a means of determining allocations. The new funding formula no longer includes enrollment data but rather focuses primarily on quality assurance and the establishment of institutional mission statements or profiles, which distinguish each institution by degree level, program offerings and student characteristics (THEC, 2010 b). With this formula institutions are rewarded for producing the outcomes that help achieve the educational master plan of the state of Tennessee (THEC 2010 c).

The outcomes chosen for the formula are broad and represent various types of institutions, from research-based four year universities to community colleges which train the workforce. The outcomes measures included in the community college formula are: student progression, measuring the accumulation of credit hours at 12 hr., 24 hr, and 36 hr; work force training, which accounts for any training that the community college provides to local industry; dual enrollment students, which gives partial funding for this

populace; associate degrees and certificates granted, which is the heaviest weighted category in the funding formula; awards per 100 full-time equivalent (FTE); job placements; transfers out with 12 credits; and in non-credit remedial and developmental courses required of the majority of community college students.

One cannot compare the performance of universities with that of community colleges as these two institutions of higher education have very different missions and often serve very different student populations. With this new formula, the outcomes are weighted based on the missions of the institutions themselves; thus, institutions with similar missions are grouped together. This new formula is productivity-based without the use of a benchmark or annual target and, therefore, does not punish an institution if it fails to reach an arbitrary benchmark. The outcomes-based formula spreads incentives across many more variables than past performance-based funding formulas did; this change, according to THEC, makes the new formula more stable, objective and fair (THEC, 2010 c).

Success for the student enrolled in TBR community colleges aligns with the outcomes noted in the outcomes-based funding formula and can be, but is not limited to, such academic achievements as completing remedial and developmental courses successfully, completing work force development training or receiving a certificate, and, for some, receiving an associate's degree. Receiving an associate's degree is not a typical positive outcome for the community college student as THEC (2013) reports a six-year graduation rate for its TBR community colleges of merely 28.9% of the 3,425 headcount for the fall of 2007 cohort that it was reporting. Success for the PTA student is much more stringently defined and does include receiving an associate's degree.

**PTA Student Success.** According to the American Physical Therapy Association (APTA) (2015 a), the physical therapist assistant is a technically educated health care provider who assists the physical therapist in the provision of physical therapy. The physical therapist assistant is a graduate of a physical therapist assistant associate degree program accredited by the Commission on Accreditation in Physical Therapy Education (CAPTE). The PTA receives an Associates of Applied Science degree and is afterward eligible to sit for the National Physical Therapy Education's (NPTE) licensing exam.

The Federation of State Boards of Physical Therapy (FSBPT), whose mission is to protect the public by providing service and leadership that promote safe and competent physical therapy practice, is responsible for the administration of the NPTE. The NPTE is designed to assess the PTA candidate's basic entry-level competence after graduation from an accredited program or from an equivalent non-accredited program. The NPTE is a computerized licensure examination consisting of four sections with a total number of 200 multiple choice questions, 50 of which are not scored but rather used to determine the validity of the questions themselves for inclusion at a later date. Scoring for the NPTE ranges from 200-800. The minimum passing score for the PTA exam is 600 (APTA, 2015 b).

A PTA student is not considered successful until he or she has both received a degree and passed the NPTE. In fact, THEC, CAPTE, FSBPT, and the APTA will only consider *first-time* pass rates on the NPTE as being successful. Of the total number of students from the six TBR PTA programs under study who took the NPTE in 2013, THEC reported a first-time pass rate of 89%. The six programs accepted 165 students for the graduating class of 2013. Of these, 132 students matriculated and were eligible to sit for

the NPTE; resulting in a retention rate of 80% for the year 2013. Of the 132 students who sat for the NPTE in 2013, 15 did not pass. Of the 165 accepted PTA students, only 117 were successful leaving 48 students without a license either because they did not retain or they did not pass the NPTE.

For nearly two decades, there has been a push for more accountability and transparency in higher education in America while simultaneously increasing access to higher education. National and state level policy-makers are placing increasing pressure on higher education leaders to produce more highly educated graduates to meet the demands of the skilled workforce in today's competitive global economy (Gladieux, Kings, & Corrigan, 1999). PTA and other allied health programs must take a closer look at student assessment as a means of selecting students for their highly competitive seats who can both matriculate and also be successful on such high-stakes exams as the NPTE. Because of this pressure, and because of the strict definition of success for allied health students, PTA and other allied health programs must admit only those students most likely to both graduate and pass licensing exams on the first attempt. In order to properly assess those applicants, these programs need to know which predictors of retention and success are the most accurate. Finding the right assessment model to follow is a key component in ensuring that this process is done accurately.

### **Astin's I-E-O Assessment Model for Higher Education**

Astin (2012) writes that his doctoral training was in psychology and his early employment setting was in clinical counseling. He learned in that environment to view human behavior in a developmental framework; for example, a person comes to a counselor seeking help and the counselor strives to work with him or her in a way that is conducive to improving the patient's condition. So, then, how is treatment success

judged? Because of the variability in patient condition upon arrival, efficacy of treatment cannot be merely judged simply in terms of outcomes. This realization was the basis for Astin's educational research to come.

In 1962-1963, Astin conducted his first educational research with the intent to determine Ph.D. productivity. His research question was simply this: "could a college's output of Ph.D.s be explained simply in terms of its initial input of talented freshmen?" (Astin, 2012, p. 18). He found that by taking student inputs into account the colleges that were considered highly productive were actually under-producing PhDs when compared with those institutions with more modest outputs. The so called under-producing colleges were actually producing more PhDs than expected. This contradicted the results of a study conducted in 1952 and a follow-up study conducted in 1953 by Knapp and Goodrich, who both found that the variance in PhD productivity was due to the larger libraries, smaller student-faculty ratios and more faculty who themselves had PhDs (Astin, 2012).

Astin (2012) asserts from his early studies three valuable lessons regarding assessment in higher education. First, simply measuring output alone does not reveal much about the educational impact or educational effectiveness in developing talent. Outputs must always be evaluated in terms of inputs. This is especially crucial in today's higher education climate because each institution in the system differs greatly in the types of students who enroll. Second, any output measure (such as Ph.D. productivity) cannot be determined by a single input measure (such as student ability). Even in his earlier studies Astin determined that other input variables such as student's sex or major field of study are also important. Third, even if one has a variety of input and output data one still lacks

an overall understanding of the educational process if one fails consider the college environment. Hence, it is more important to know *why* a college over-produces or under-produces PhDs than to merely know that it does so.

Astin's earlier studies determined that educational assessment projects are not complete until they include data on student inputs, student's outcomes, and the educational environment. Outcomes refer to student success or talent that is trying to be developed. Inputs refer the personal attributes that a student possesses (initial level of developed talent at the time of entry). Environments refers to the experiences of the student during the educational process (Astin,2012).

One thing of note concerning Astin's I-E-O model is that he places no intrinsic value on the inputs, outputs and environments themselves; rather, he asserts that how we assign labels depends solely on which aspect of the model we choose to study or on what question we were trying to answer (Astin, 2012). Within the context of this study the researcher has the intention of evaluating the usefulness of standardized test scores and pre-program GPA in program admissions. These are input variables which are being measured against the outcomes of program retention and first-time pass rates on the NPTE while the institutional profiles provide the environmental component. The three informational components of Astin's model are discussed at length in the next three sections of this chapter.

**Assessing Outcomes.** The outcomes assessment variable is generally considered the most important by educators and researchers. This is especially the case in the state in which this study takes place as colleges are universities are now being funded based on

outcomes. In research, outcomes are the dependent variables (criterion variables, output variables), whereas inputs and environments are considered the independent variables.

Astin (2012) identifies two types of outcomes: cognitive and affective. Cognitive outcomes are those that pertain to knowledge obtained and affective are those that pertain to the feelings, attitudes, and values of the students. The outcomes measured in this study are cognitive. Type of outcomes then reflects what is being assessed. The second dimension Astin recommends is the assessment of how the outcome is being assessed, which he identifies as data type. The two data types Astin explains are psychological and behavioral; the former reflects the internal traits of the student and the latter reflects the observable activities of the student. The data type used in this study is both psychological and behavioral, i.e., degree attainment (behavioral), first-time pass success on the NPTE (psychological).

The final dimension that Astin (2012) presents regarding outcomes assessment is that of time. He defines short-term assessment as that occurring while in college. The researcher in this study is assessing whether the student completed college or dropped out; either would be considered a short-term outcome. Long-term outcomes are, as Astin (2012) defines, those that are measured after college. For this study, the long-term outcome is first-time pass success on the NPTE, which the student doesn't have the opportunity to sit for until a minimum of three months after graduation.

Defining and measuring outcomes of higher education programs such as the ones under study is essential for program assessment; however, outcomes assessment cannot be the only factor considered. According to Astin's model, it must be accompanied by a look at the student's inputs.

**Assessing Student Inputs.** Input data should be included in any application of Astin's I-E-O model for two reasons: "(1) inputs are always related to outcomes; and (2) inputs are almost always related as well to environments" (Astin, 2012, p. 69). For most outcomes assessments a student input of a pre-test score is correlated with a post-test score (outcome). For the outcomes measure used in this study, however, there exists no pre-test parallel to the NPTE. The outcome variables in this case are dichotomous. In this case it is crucial that the researcher consider what input variables are most likely to be strongly correlated with the dependent variable. Astin (1971) asserts that in this case GPA and standardized test scores are generally found to be the best input predictors.

Student input measures are typically fixed. Fixed input measures are those that cannot be changed or varied such as demographics; these are considered stable variables. There are some invariant input measures, that though fixed are somewhat unstable in nature in that they can change slightly over time and could include the student's cognitive functioning, values, self-ratings, educational background, etc. The student inputs used in this study are invariant, specifically of a cognitive functioning nature in that they are pre-program GPA and standardized test scores.

**Assessing the Environment.** The environmental assessment piece in the I-E-O model is the most difficult and intricate of all, and according to Astin (2012), is the most neglected. The environment component includes programs, personnel, curricula, teaching methodologies and practices, and facilities. There are two types of measures used to assess the environment: the overall characteristics of the total institution e.g., its size and selectivity; and educational experiences within the institution, e.g., participation in remedial education, being a member of a particular student organization, etc. The former

provides variables between institutions and the latter provides variables with an institution. Due to the research setting of this study, the former was used as the researcher is comparing data among four institutions. Most of the published research that contrasts institutions did so using structural characteristics of institutions: size, selectivity, type of control (public vs. private), highest degree offered, gender, level of training of faculty, student-to faculty ratio, student body composition (demographics), and/or geographic region. Similarly, a complete environmental assessment of each community college participating in the study will be presented in the Research Setting section of the Methodology chapter to follow.

With any assessment theory comes the responsibility of knowing how best to use it; i.e., the responsibility of making sure that there is a practical application of the assessment data that has been collected. This study outlines the practical application of the results of the data assessment in its Conclusion chapter.

This chapter has provided the reader with a literature review that spells out the significance of this study. The writer included literature regarding the variables used in this quantitative study: GPA and Standardized Test. These variables have been studied in other areas of academia with mixed results. The writer also provided the reader with literature regarding what defines retention and success for the allied health PTA student enrolled at TBR community colleges. This literature review revealed the current pressure that program directors and faculty feel to produce better outcomes. The chapter ended with an in-depth review of the theoretical framework for this study, Astin's I-E-O model. The reader should now have an understanding of the necessity and timeliness of this study. Presented in the next chapter is the methodology used in this study.

## **Chapter 3**

### **Methodology**

#### **Research Design**

Creswell (2014) writes that quantitative research tests theories that explain or answer research questions. Further, Creswell defines two types of correlational design used in quantitative studies. The type of correlational design that was utilized in this study was correlational in design. This type of correlation is used by researchers when the purpose of the study is to predict certain outcomes in one variable from another variable.

According to Creswell, prediction designs involve two types of variables: a predictor variable and a criterion variable. The predictor variable is utilized to make a forecast or prediction, whereas, the criterion variable is the anticipated outcome that is being predicted.

This correlational study is a retro-active, quasi-experimental, predictive quantitative study utilizing inferential statistics with a factorial design using data obtained from both a nominal and ratio scale. This study focused on the predictive value of the Nelson Denny Reading Assessment (NDRA), the American College Testing (ACT), the Test for Essential Academic Skills (TEAS), and the Health Education Systems Incorporated (HESI) test used in Associate of Applied Science allied health programs, specifically, PTA programs in Tennessee. The data that was obtained for this study was secondary data that was first obtained and recorded by each program director and/or program admissions committee. The data for this study will be assessed from each individual institution rather than as a composite due to the fact that no two institutions use the same admissions criteria. Students are accepted or denied admissions to PTA programs based,

in part, on the results of these admissions tests and the student's cumulative GPA. By evaluating the existing data statistically per institution, the researcher hoped to make an inference on the population based on the sample results, hence helping programs in this state, and others, choose admissions criteria that better predict outcomes. The new outcomes-based funding formula, combined with community colleges' open enrollment policies and the high attrition rates at those institutions, prompted the need to research potential predictor variables of the current PTA programs admissions criteria.

### **Research Questions**

In order to achieve the purposes of this study of the predictive validity of GPA and Standardized Test scores, the research questions are the following:

1. What is the correlation between pre-admission GPA and Nelson Denny Reading Assessment (NDRA) test scores on PTA student retention?
2. What is the correlation between pre-admission GPA and NDRA test scores on PTA student first-time pass success on the NPTE?
3. What is the correlation between pre-admission GPA and American College Test (ACT) scores on PTA student retention?
4. What is the correlation between pre-admission GPA and ACT scores on PTA student first-time pass success on the NPTE?
5. What is the correlation between pre-admission GPA and Test of Essential Academic Skills (TEAS) scores on PTA student retention?
6. What is the correlation between pre-admission GPA and TEAS scores on PTA student first-time pass success on the NPTE?

7. What is the correlation between pre-admission GPA and Health Education Systems Incorporated (HESI) test scores on PTA student retention?
8. What is the correlation between pre-admission GPA and HESI test scores on PTA student first-time pass success on the NPTE?

### **Hypothesis**

The hypothesis proposed in this study was that the NDRA, the ACT, the TEAS, and the HESI, would predict student retention and first-time pass success on the NPTE as well as, or better than, the student's cumulative GPA. The null hypothesis was that there was no statistical significance between the predictor variables used as admissions criteria in PTA programs at Tennessee Board of Regents community colleges.

This study makes its hypothesis based on what is understood about the typical community college students and standardized tests that determine reading comprehension and critical thinking skills. Students enrolled in community colleges face the challenges of an "at risk" population, being non-traditional, or lower-SES status, or under-prepared for college. Often this populace faces all three challenges (U.S. Government Accountability Office, 2013). With the new funding formula for Tennessee being outcomes-based, valid research is necessary to determine the factors that best predict PTA student retention and success.

### **Research Setting**

This study took place in Tennessee and gathered secondary data from Program Directors of PTA programs housed at community colleges governed by the Tennessee Board of Regents (n = 6). The Tennessee Higher Education Commission (THEC) was established by the Tennessee General Assembly in 1967 with a purpose of achieving

unity in higher education in the state of Tennessee. THEC is the coordinating agency for higher education in the state of Tennessee. Tennessee is different from many states in the nation in that it has two individual public systems of higher education, the University of Tennessee (UT) system and the Tennessee Board of Regents (TBR) system. Within these two systems are nine public universities, 13 two-year institutions, 27 technology centers, and 2 special purpose institutions. Currently within the classrooms of these institutions nearly 245,000 students are educated.

The Commission is composed of nine lay members, with each serving six year terms, representing congressional districts of the State; three Constitutional Officers who are ex-officio voting members (Comptroller of the Treasury, State Treasurer, and Secretary of State); two student members; and, serving as an ex-officio non-voting member, the Executive Director of the State Board of Education. THEC seeks to improve access to higher education and is currently focusing its mission in an effort to support the state's completion agenda (Tennessee Higher Education Commission [THEC], *Fast Facts*, 2013).

Written in part as a result of the Complete College Tennessee Act (CCTA) of 2010, THEC created a five-year revision to the Performance Funding Program's most recent Outcomes-based Funding Formula. Within this formula the outcome that weighs the greatest for both the community college and the four-year university is graduation and job obtainment. With this being the case, it is critical that PTA programs find the best possible predictors of success for use as their admissions criteria.

## **Institutional Profile**

Four TBR institutions participated in this study. For the purpose of complying with IRB the institutions will be referred to as Institution A, Institution B, Institution C, and Institution D.

Institution A, as reported by its Research and Accountability Office (2014), *Fast Facts*, is located in a rural area and serves fourteen counties which, too, are rural. The FTE for fall 2014 of Institution A was 4,924 students (60% enrolled part-time and 40% enrolled full-time), of those 3,243 were degree seeking. The demographics for Institution A for the fall of 2014 were as follows: 63% female, 37% male; 78% traditional, 22% non-traditional; the average ACT composite score was 18.65; 76% were Caucasian, 16% African American, and 8% other. Of the 4,924 students enrolled in the fall of 2014, 76.9% enrolled in traditional lecture/lab courses while 16.6% enrolled in on-line courses, 5.3% took video courses and 1.2% took Regents Online Degree Program (RODP) courses. The fall-to-fall retention rate for full-time students was reported to be 43.2% for 2012, whereas, fall-to-fall retention for part-time students for this same year was 27.4%. Institution A reports a three-year graduation rate for first-time degree seeking freshman of 10% (2010) and a six-year graduation rate for first-time degree seeking freshman of 26.8% (2007). For an overview of the demographics for Institution B see Table 2.

Table 1  
*Demographics of Institution A*

<u>Enrollment</u>	<u>Gender</u>	<u>Age</u>	<u>Race</u>	<u>Outcomes</u>
PT FT Total	M F	T NT	C AA O	Grad. Rates
60% 40% 4,924	63%F 47%M	78% T 22%NT	76% C 16% AA 8% O	three-year 10% six-year 26.8%

*Note.* PT = Part Time; FT = Full Time; Grad. Rates = number or percentage of students who graduated; F = female; M = male; T = traditional; NT = non-traditional; C = Caucasian; AA = African American; O = other

Institution A’s PTA program’s admission criteria for the year 2014 as reported by the program director per the program’s website were as follows: Students must have completed high school algebra I and II or its equivalent remedial courses; students must have had high school biology or one semester of college biology; students must have a cumulative pre-program GPA of 2.5 and have made a “C” or better in all pre-requisite courses. Additional math and science is strongly encouraged but not required but if a student has additional 4 credit hour math or science courses points are awarded if the student made a “C” or better. In addition to these admission requirements students who have taken some or all of the pre-requisite degree courses earn quality points for having done so. These points go into a rubric which ranks students based on their pre-requisite GPA’s. Points are also awarded for pre-requisite science GPA. The highest ranked students then have an opportunity to write an essay and have an interview in order to earn additional points. These points are added to the students sub-score and the highest ranked students get into the program. Institution A admits 24 students per year. Institution A does not use a standardized test at this time but does give its incoming students the Nelson Denny Reading Assessment test at orientation as a means of placement and as a

way of identifying those who may be at risk so that the appropriate supplemental instruction can take place to help ensure student success.

Institution B, according to its Accountability Office is located in a metropolitan area services 12 counties, some urban some rural. Institution B reported an FTE for 2013 of 11,482 students. Institution B’s average age is 24 years old. As reported for Fall 2013, 42% enrollment was full-time, 39% were male, 61% female, 81% Caucasian, 9% African American, 4% Hispanic, 1% Asian, and 5% other. Institution B did not report an average ACT score for its students nor did it report a three-year or six-year graduation rate, however, Institution B reported the following percentages of degrees awarded for the year 2013: Associate of Arts/Associate of Science 38%; Associate of Applied Science 27%; and Certificates 35%. For a synopsis of the demographics for Institution B see Table 2.

Table 2  
*Demographics of Institution B*

<u>Enrollment</u>			<u>Gender</u>		<u>Age</u>		<u>Race</u>				<u>Outcomes</u>		
PT	FT	Total	M	F	T	NT	C	AA	H	A	O	Grad. Rates	
58%	42%	11,482	61%	39%	N/R		81%	9%	4%	1%	5%	three-year	16%

*Note.* PT = Part Time; FT = Full Time; Grad. Rates = number or percentage of students who graduated; N/R = not reported; F = female; M = male; T = traditional; NT = non-traditional; C = Caucasian; AA = African American; H = Hispanic; A = Asian; O = other

Institution B, unlike Institution A, has a one-plus-one program in that all of the pre-requisite courses must be completed in the first year prior to application for the second year. The admissions requirements, however, are similar. Students must have a “C” or better in all pre-requisite course work and admission is based on pre-requisite GPA. Institution B does not, however, have an essay portion nor does it hold scored interviews,

rather the program director accepts letters of reference which quantifiably rank applicants. Institution B does not use a standardized test in the admissions ranking process but did report pre-admissions ACT scores for use in this study. These scores are collected during the admissions process if available.

As reported by the Office of Effectiveness and Research (2015), Institution C is located in a Metropolitan area serving six counties which are a mix of rural and urban. Institution C had a 2015 a headcount of 12,661 students and an FTE of 5,982. Although this institution did not report a three-year or six-year pass rate it did report that the number of degrees awarded for the year 2015 was 1,264. Institution C reported the following demographics for the year 2015: 41% male and 59% female; 76.8% Caucasian; 14% African American; 3.9% Hispanic; 2.7% multi-race; 1.7% Asian; .9% other; 68% of the students were 25 years-old or under while 32% were over the age of 25 years. A complete run down of the demographics for Institution C can be found in Table 3.

Table 3  
*Demographics of Institution C*

<u>Enrollment</u>			<u>Gender</u>		<u>Age</u>		<u>Race</u>					<u>Outcomes</u>	
PT	FT	Total	M	F	T	NT	C	AA	H	MR	A	O	Grad. Rates
N/R	N/R	12,661	59%	41%	68%	32%	76.8%	14%	3.9%	2.7%	1.7%	0.9%	three-year 10%

*Note.* PT = Part Time; FT = Full Time; Grad. Rates = number or percentage of students who graduated; N/R = not reported; F = female; M = male; T = traditional; NT = non-traditional; C = Caucasian; AA = African American; H = Hispanic; MR = multi-race; A = Asian; O = other

According to information found per the institution’s website, Institution C’s PTA admission criteria are based on a points system. Points are awarded as follows: Science GPA—high school GPA if no college credit has been completed; Program GPA—from college support courses for the Physical Therapist Assistant Degree (if a minimum of six

credits has been completed) or high school GPA (if no college credit has been completed); TEAS scores—Student's composite score is used in a formula to determine points awarded. A higher composite score leads to more points in this category; Current work experience as a PT technician or aide; Number of program science courses (BIOL 2010, 2020 or PHYS 1030) which have already been completed. (Science courses taken prior to admission into the Physical Therapist Assistant Program must be passed with at least a “C” grade and must be taken within a five-year limit to qualify for points in the application process or to satisfy program course requirements.)

Institution D is located in a rural area serving ten counties. According to the AACC (2016), Institution D had a total enrollment of 6, 265 students in the fall of 2013 with 49.4% enrolled part-time and 50.6% enrolled full-time. The demographics for Institution D were reported by the AACC (2016) for the year 2013 as follows: 38.7% male; 61.3% female; 92.8% Caucasian; 2.1% African American; 0.7% Asian; 2.2% Hispanic; and 2.0% other. Institution D had an average ACT score of 19.4 for the year 2013. Institution D reported a Fall-to-Fall retention rate for the year 2013-2014 of 55.6%. Institution D awarded 866 Associate Degrees during the 2013-2014 academic years giving them a graduation rate of 13.8%. See Table 4 for a complete synopsis of the demographics for Institution D.

Table 4  
*Demographics of Institution D*

<u>Enrollment</u>			<u>Gender</u>		<u>Age</u>		<u>Race</u>			<u>Outcomes</u>	
PT	FT	Total	M	F	T	NT	C	AA	H	A	Grad. Rates
49.4%	50.6%	6,265	38.7%	61.3%	N/R		92.8%	2.1%	2.2%	0.7%	three-year 13.8%

*Note.* PT = Part Time; FT = Full Time; Grad. Rates = number or percentage of students who graduated; N/R = not reported; F = female; M = male; T = traditional; NT = non-traditional; C = Caucasian; AA = African American; H = Hispanic; A = Asian

Ranking for PTA applicants at Institution D is based upon: the scores from the HESI admissions test; the student's overall GPA in all required general education and prerequisite courses; the student's observation/employment experience - minimum of 30 observation hours, or 3 months full-time employment in a physical therapy setting; the student's first grades received in required Biology courses; and the student's interview score conducted by practicing physical therapist and physical therapist assistants.

It is important to note that no two programs are using the same admissions criterion. Not only is the selection of applicants not standardized the PTA programs themselves have very different curriculum. For example, Institutions B and D have a one-plus-one layout meaning that all pre-requisite and general education courses are completed the first year and all PTA specific courses are completed the second year; whereas, Institutions A and C integrate courses and the program length is two years with the PTA courses beginning in year one of the program. Through its articulation and transfer initiatives, TBR wants to assure the seamless transfer of courses among institutions. In taking steps toward this initiative they have created what is known as Tennessee Transfer Pathways. Part of this process is to create a common core among allied health programs such as PTA. This is in the early stages of development but will eventually affect programs across the state. Once programs have similar curriculums it stands to reason that they would then have standardized admissions processes as well. This study is timely in that it will produce data that can help in the selection of admission criterion.

## **Population**

The population for this study consisted of PTA students who have successfully enrolled in PTA programs at community colleges in the state of Tennessee. There are six Tennessee Board of Regents (TBR) community colleges in the state of Tennessee that have PTA programs. These programs combined produce a maximum of 165 graduates per year and the number of graduates is dependent upon retention. The study focuses on the past three years of graduates; therefore, the total population is 495 students.

## **Sample**

The participants in this study were purposefully selected from PTA programs throughout the state of Tennessee making the sample nonprobability in nature. Creswell (2014) describes nonprobability as the researcher having the ability to make a judgement call that all members of a population will be represented in the sampling. This type of sampling process occurs when participants of the study are selected based on availability and is often called purposeful sampling. One reason that a purposeful sample was best for this study is that it allowed control to be taken to ensure that the multitude of intervening variables that could have influenced the results of the study were eliminated; for example, only those students who did not matriculate due to academics were selected for the study. In addition, the population must be purposefully sampled so that representation from the West, Middle and East grand divisions of the state were included. There was also a need to obtain data from all possible independent variables (standardized test scores and GPAs) as no two programs currently use the exact same admissions criteria; this can best be accomplished by purposefully sampling the population. The participants were students who accepted admissions and attended two-year PTA courses in a TBR community

college. The program directors sent the data for graduates from the previous three years. The sample size was: Institution A, n = 135; Institution B, n = 136; Institution C, n = 96; Institution D, n = 60.

### **Data Collection**

IRB approval was granted to conduct this study. Secondary data was collected from each participating school via responses from the program directors. The program directors collected student test scores and GPA data from program admissions applications. The program directors also retrieved retention and degree completion information from the Banner System, a data bank used by all TBR member institutions. The program director extracted NPTE first time pass rate information from the NPTE data bank. The researcher sent out a request for the data via email with a specific deadline for data submission. Data was entered, by the respective program directors, into an excel spreadsheet as follows: Column A = Cumulative GPA upon admission (to the nearest tenth); Column B = NDRA score upon admission (when applicable); Column C = ACT score upon admission (when applicable); Column D = TEAS Score upon admission (when applicable); Column E = TEAS Score upon admission (when applicable); Column F = Retention (0 = yes, 1 = no); Column G = First time pass rate on the National Physical Therapy Exam (0 = pass, 1 = fail). Student identification was protected, according to the Family Educational Rights and Privacy Act (FERPA), by assigning a numerical identifier that was unique to each student. The University of Memphis IRB Administrator determined that the researcher was not conducting human subjects' research and 45 CFR 46 does not apply (see Appendix A).

## **Independent Variables**

The independent variables were the various admissions criteria used by each program (academic factors). The academic factors included the NDRA test scores (X1), ACT scores (X2), TEAS test scores (X3), the HESI test scores (X4, X5, X6), and cumulative pre-program GPAs (X7).

The NDRA is a standardized test used to determine a college student's reading ability. It consists of two parts: Comprehension and Vocabulary. Both components are timed. There are a total of 20 min allotted for the comprehension part and 15 min allotted for the Vocabulary part. The comprehension section consists of five to eight passages the student must read and 36 to 38 multiple choice questions that must be answered based on the readings. The vocabulary section consists of 80 to 100 multiple choice vocabulary questions. Scoring for the NDRA is broken down between the sections and is also given as a composite score and is reflected as a grade level numerically; e.g., scoring an 11.2 indicates that the student is reading at a level indicative of 2 months into the 11<sup>th</sup> grade. The bench mark for a high school graduate would then be a score of 12; therefore, this score was the hypothesized value used in determining the predictive validity of the NDRA.

The ACT is a standardized test consisting of four multiple-choice sub-tests: English, mathematics, reading, and science. The English section has 75 questions and measures standard written English and rhetorical skills. It is timed at 45 min. The mathematics portion of the test is timed at 60 min and is 60 questions in length. It measures mathematical skills students have acquired in courses taken up to the beginning of the 12<sup>th</sup> grade. The Reading section, which measures reading comprehension, consists of 40

questions for 35 min of total time. Finally, the science portion is also 40 questions in length and is timed at 35 min. This portion of the test measures interpretation, analysis, evaluation, reasoning, and problem-solving skills that are required in the study of natural sciences (ACT, 2015). The minimum ACT score for a college student that does not require remediation is a composite score of  $\geq 19$  therefore, this score was the hypothesized value used in determining the predictive validity of the ACT.

The TEAS is a standardized admissions test used by many allied health programs to evaluate potential candidates for admission. The TEAS test was developed by the Assessment Technologies Institute (ATI) and is intended, specifically, to be a predictor of a student's success in nursing school. The TEAS test assesses a student's in reading, math, science and English and language usage.

The TEAS test is a multiple choice exam consisting of four sections. The reading section has a time limit of 58 min and has 42 questions. The mathematics has 30 questions and a time limit of 51 min. The science portion of the test has 48 questions with a time limit of 66 min. The English/language usage portion of the test has a time limit of 34 min and has 30 questions. In order to be categorized as "Proficient" an overall score of 58.6% is necessary on the TEAS test. Proficient scores generally indicate a moderate level of overall academic preparedness necessary to support learning of health-related content. An overall TEAS test score of  $\geq 58.7\%$  was the hypothesized value used in determining the predictive validity of the TEAS test (ATI, 2014).

The HESI test is a standardized admissions test that consists of seven academic exams and a personality profile/learning style inventory. The test has a time limit of 5 hr and 25 min to complete. The seven academic areas that are assessed are as follows: Reading

Comprehension; Vocabulary and General Knowledge; Grammar; Basic Mathematics skills; Biology; Chemistry; and Anatomy and Physiology. The Personality Profile and Learning Style Inventory help classify the student as an introvert or extrovert and assess the student's preferred style of learning. Though the benchmark for this test varies, most educators view a score of 850 as a benchmark score that will accurately predict success on national licensing exams. The PTA program under study that administers the HESI only administers the Reading Comprehension, the Vocabulary and General Knowledge, and the Mathematics components of the exam. The max score that a student can make on each of these sections is 100. The researcher conducted statistical analysis of each individual section and, therefore, the hypothesized value that was used in determining the predictive validity of the HESI test was a score of 100. (HESI, 2015)

The cumulative GPA is defined as the combined grade point average of all of the college level course work that a student has completed at the point of making application into a PTA program. This value was calculated by the student's program director or members of the admissions committee, and was expressed using a 0.0 – 4.0 scale. Any student who applies to any of TBR PTA programs under study must have a minimum cumulative GPA. The minimum varies per institution but most commonly is a 2.5. The higher the student's GPA, the more points he/she earns on the admission's rubric. Therefore, the hypothesized value used for this study for the predictive validity of cumulative GPA was a 4.0.

## **Dependent Variables**

The dependent variable (Y) for the study was dichotomous in nature: did the students matriculate through the program and, if so, did the students pass the National Physical NPTE on the first attempt?

## **Data Analysis**

Quantitative designs have been around since the late 19th century as a means for positivists (usually in the field of psychology) to inquire via true experiments, quasi-experiments, applied behavioral analysis, and single-subject experiments. This inquiry can be done with casual-comparison research which allows the researcher to compare two or more groups with one independent variable. It can also be done using correlational inquiry; with this methodology the researcher compares the relationship between two or more variables. Researchers can also utilize factorial designs and repeated measures designs to explore more complicated inquiries. With factorial designs, for instance, the researcher can choose to compare the effects of each independent variable on the outcome or dependent variable and/or compare the interaction of the independent variables on the outcome or dependent variable. This study utilized a correlational design due to the need to compare the relationship between two or more variables (NDRA scores, ACT scores, TEAS scores, HESI scores and cumulative GPAs) against an outcome (Retention/First time NPTE Pass Rate); (Creswell, 2014; Hinkle, Wierma, & Jurs, 2003).

In order to answer the research questions posed in this study, the positivist theory was implemented. Inferential statistics were utilized with a correlational design using data obtained from both a nominal and ratio scale. An independent samples T-test was run on

each independent variable using the Statistical Package for the Social Science version 23 (SPSS 23). In order to determine the correlation between the cumulative pre-admission GPA, the NDRA, the ACT, the TEAS, and the HESI tests used in Associate of Applied Science PTA programs in Tennessee the researcher calculated the Pearson product-moment correlation coefficient. The Pearson product-moment correlation coefficient is defined by Hinkle et al. (2003) as the index of the linear relationship between two variables, meaning that it is the average cross-product of the standard scores of two variables and is known as the Pearson  $r$ . By determining Pearson  $r$  for each independent variable the researcher will be able to determine which variable has the strongest correlation with the two dependent variables.

### **Validity and Reliability**

When interpreting a casual- comparison analysis or correlational analysis the researcher relied on the use of estimation. Interpretation requires determining the confidence interval (CI) or margin of error. A confidence interval of + or - 5% means that + or - 95% of the sample represents the population. This requires the researcher to draw "conclusions from the results" (Creswell, 2014, p. 163). For casual-comparison analysis the researcher ran t-tests. T-tests are run to compare two things at one time. A t-test was run on the data set to determine whether the independent variables are similar. T-test was performed with the use of SPSS software (version 23). A Pearson's correlation was conducted for all variables to determine how highly correlated the independent variables were to the dependent variable.

In conclusion, PTA programs have more applicants than available seats, making them highly competitive programs to gain admission into. The community colleges that offer

these programs are facing unprecedented challenges including the Complete College Agenda, outcomes-based funding, open-enrollment policies and high attrition rates. Given these conditions, a trend is emerging for program directors to institute some sort of standardized testing in order to select applicants whom the programs are most likely to retain and who will ultimately be successful on the licensure exam. This study examined the predictive validity of four standardized tests: the Nelson Denny Reading Assessment test, the American College Test, the Test of Essentials Skills test, and the Health Education Systems, Inc. test.

## Chapter 4

### Results

This study intended to identify whether cumulative pre-admission GPA or standardized tests scores better predict the retention and success rates of a cohort of Physical Therapist Assistant students enrolled in community colleges in the state of Tennessee. The study analyzed four institutions' pre-admissions data. Though some methodological issues existed and true prediction via logistic regression could not be performed due to the dichotomous dependent variables not having a near 1:1 ratio; correlational analysis (Pearson product-moment correlation coefficient) were used and did, in the majority of the cases, identify that stronger correlations existed between the standardized tests (NDRA, ACT, TEAS, HESI) and retention and first-time pass success than with cumulative pre-admission GPA and retention and first-time pass success. All correlation coefficients proved to have little if any correlation and this was probably due, in part, to the small sample size. Had the sample size been larger the correlations would have likely been larger as well. Table 5 gives the reader a concise explanation of the effect size that was used in determining the results of this study (Hinkle et al., 2003).

Table 5  
*Interpreting Size of Correlation Coefficient*

Size of Correlation	Interpretation
.90 to 1.00 (-.90 to -1.00)	Very high positive (negative) correlation
.70 to .90 (-.70 to -.90)	High positive (negative) correlation
.50 to .70 (-.50 to -.70)	Moderate positive (negative) correlation
.30 to .50 (-.30 to .50)	Low positive (negative) correlation
.00 to .30 (-.00 to -.30)	Little if any correlation

### Results for Pre-admission and NDRA

The following were the results from the data collected regarding the NDRA scores and pre-admission cumulative GPAs of the students participating from Institution A. With

regard to research question one, an independent samples t-test showed that the difference between pre-admission cumulative GPAs of PTA students who retained and those who failed out ( $N = 135$ ,  $M = 3.3710$ ,  $SD = .3605$ ) and the hypothesized value ( $\mu = 4.00$ ) was not statistically significant,  $t(133) = .793$ ,  $p < .05$ ,  $r^2 = .0047$ . This means that merely .47% ( $r^2 = .0047$ ) of the variance in GPA of this cohort could be explained by whether or not the student retained.

With regard to research question two, an independent samples t-test showed that the difference between pre-admission cumulative GPAs of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 135$ ,  $M = 3.3710$ ,  $SD = .3605$ ) and the hypothesized value ( $\mu = 4.00$ ) was not statistically significant,  $t(119) = 1.333$ ,  $p < .05$ ,  $r^2 = .0147$ . With regard to research question one, an independent samples t-test showed that the difference between NDRA scores of PTA students who retained and those who failed out ( $N = 135$ ,  $M = 14.3356$ ,  $SD = 2.5896$ ) and the hypothesized value ( $\mu = 18$ ) was statistically significant,  $t(133) = 3.923$ ,  $p < .05$ ,  $r^2 = .1037$  which explains that little, if any, correlation exists between the variable. With regard to research question two, an independent samples t-test showed that the difference between NDRA scores of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 135$ ,  $M = 14.3356$ ,  $SD = 2.5896$ ) and the hypothesized value ( $\mu = 18$ ) was statistically significant,  $t(119) = 4.936$ ,  $p < .05$ ,  $r^2 = .1699$  which means that little, if any, correlation exists between the variables. This can be interpreted as only 1.47% ( $r^2 = .0147$ ) of the variance in GPA could be explained by whether or not the student passed the NPTE on the first attempt; whereas, 10.37% ( $r^2 = .1037$ ) of the variance in NDRA scores could be explained by whether the student

retained or failed out and 16.99% ( $r^2 = .1699$ ) of the variance in NDRA scores could be explained by whether or not the student passed the NPTE on the first attempt. Though NDRA had a very low correlation it still had a stronger correlation when compared to the same group of students' cumulative pre-admissions GPA. The results for RQ 1 and RQ2 are presented in Table 6.

Table 6  
*The Correlation between Pre-admission Cumulative GPA and NDRA on Student Retention and NPTE First-time Pass Success when  $p < .05$ .*

Dependent variable	Retention	NPTE first-time pass success
	M	M
	SD	SD
	t(df)	t(df)
	$r^2$	$r^2$
Independent variable		
GPA	3.3710	3.3710
	.36054	.36054
	.793(133)	1.333(119)
	.0047	.0147
NDRA	14.3356	14.3356
	2.5896	2.5896
	3.923(133)	4.936(119)
	.1037	.1699

*Note.* M = Mean; SD = Standard Deviation; t = t-test; df = degrees of freedom;  $r^2$  = Pearson's correlation.

### **Results for Pre-admission and ACT**

The following were the results from the data collected from Institution B regarding the ACT scores and pre-admission cumulative GPAs of the participants. With regard to research question three, an independent samples t-test showed that the difference between pre-admission cumulative GPAs of PTA students who retained and those who failed out ( $N = 136$ ,  $M = 3.4408$ ,  $SD = .3544$ ) and the hypothesized value ( $\mu = 4.00$ ) was not

statistically significant, in fact, there was a negative correlation between the two variables,  $t(136) = -1.616, p < .05, r^2 = -.0195$ . What this means is that a negative correlation exists between GPA and retention ( $r^2 = (-).0195$ ) and only .63% ( $r^2 = .0063$ ) of the variance in GPA could be explained by whether the student passed the NPTE on the first attempt.

With regard to research question four, an independent samples t-test showed that the difference between pre-admission cumulative GPAs of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 136, M = 3.3415, SD = .3542$ ) and the hypothesized value ( $\mu = 4.00$ ) was not statistically significant,  $t(125) = 0.895, p < .05, r^2 = .0063$ . With regard to research question three, an independent samples t-test showed that the difference between ACT scores of PTA students who retained and those who failed out ( $N = 134, M = 18.5682, SD = 2.7444$ ) and the hypothesized value ( $\mu = 19$ ) was not statistically significant,  $t(134) = 2.234, p < .05, r^2 = .0359$ . For research question four, an independent samples t-test showed that the difference between ACT scores of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 134, M = 14.3356, SD = 2.5896$ ) and the hypothesized value ( $\mu = 19$ ) was statistically significant,  $t(125) = 5.729, p < .05, r^2 = .2079$  which, though considered to be a little correlation, was significantly higher than GPA. What this means is that 20.79% ( $r^2 = .2079$ ) of the variance in ACT score could be explained by whether or not the student passed the NPTE on the first attempt and 3.59% ( $r^2 = .0359$ ) of the variance in ACT score could be explained by whether or not the student retained which proves that, in this cohort, the standardized test

(ACT) had a much higher correlation with student retention and NPTE success than did the students' GPA. The results for RQ3 and RQ4 are presented in Table 7.

Table 7  
*The Correlation between Pre-admission Cumulative GPA and the ACT on Student Retention and NPTE First-time Pass Success when  $p < .05$ .*

Dependent variable	Retention	NPTE first-time pass success
	M	M
	SD	SD
	t(df)	t(df)
	r <sup>2</sup>	r <sup>2</sup>
Independent variable		
GPA	3.3415	3.3415
	.3544	.3542
	-1.616(136)	.895(125)
	-.0195	.0063
ACT	18.5682	14.3356
	2.7444	2.5896
	2.234(134)	5.729(125)
	.0359	.2079

*Note.* M = Mean; SD = Standard Deviation; t = t-test; df = degrees of freedom; r<sup>2</sup> = Pearson's correlation.

### **Results for Pre-admission and GPA & TEAS**

The following were the results from the data collected regarding the TEAS scores and pre-admission cumulative GPAs of the students participating from Institution C. RQ 5: What is the correlation between pre-admission GPA and Test of Essential Academic Skills (TEAS) scores on PTA student retention? RQ 6: What is the correlation between pre-admission GPA and TEAS scores on PTA student first-time pass success on the NPTE? With regard to research question five, an independent samples t-test showed that the difference between pre-admission cumulative GPAs of PTA students who retained and those who failed out ( $N = 96$ ,  $M = 3.4533$ ,  $SD = .3557$ ) and the hypothesized value ( $\mu$

= 4.00) was not statistically significant,  $t(94) = .667, p < .05, r^2 = .0047$ . What this means is that only .47% of the variance in GPA of this cohort could be explained by whether or not the student retained ( $r^2 = .0047$ ). With regard to research question six, an independent samples t-test showed that the difference between pre-admission cumulative GPAs of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 96, M = 3.4533, SD = .3557$ ) and the hypothesized value ( $\mu = 4.00$ ) was statistically significant,  $t(86) = 3.449, p < .05, r^2 = .1215$  which is a little effect size. This is interpreted as 12.15% of the variance in GPA can be explained by whether or not the student passed the NPTE on the first attempt ( $r^2 = .1215$ ). With regard to research question five, an independent samples t-test showed that the difference between TEAS scores of PTA students who retained and those who failed out ( $N = 96, M = 80.4052, SD = 7.9212$ ) and the hypothesized value ( $\mu = 100$ ) was statistically significant,  $t(87) = 1.392, p < .05, r^2 = .0201$  which exhibits little correlation between the variables. This means that 2.01% ( $r^2 = .0201$ ) of the variance in TEAS scores can be explained by whether or not the student retained. With regard to research question six, an independent samples t-test showed that the difference between TEAS scores of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 96, M = 80.4052, SD = 7.9212$ ) and the hypothesized value ( $\mu = 18$ ) was statistically significant,  $t(86) = 3.056, p < .05, r^2 = .0979$  again, this value falls under the little correlation coefficient value.

This is interpreted as 9.79% of the variance in TEAS scores can be explained by whether or not the student passed the NPTE on the first attempt ( $r^2 = .0979$ ). The results for RQ4 and RQ5 are presented in Table 8.

Table 8

*The Correlation between Pre-admission Cumulative GPA and the TEAS on Student Retention and NPTE First-time Pass Success when  $p < .05$ .*

Dependent variable	<u>Retention</u>	<u>NPTE first-time pass success</u>
	M	M
	SD	SD
	t(df)	t(df)
	r <sup>2</sup>	r <sup>2</sup>
Independent variable		
GPA	3.4533 .3577 .667(94) .0047	3.4533 .3577 3.449(86) .1215
TEAS	80.4052 7.9212 1.392(87) .0201	80.4052 7.9212 3.056(86) .0979

*Note.* M = Mean; SD = Standard Deviation; t = t-test; df = degrees of freedom; r<sup>2</sup> = Pearson's correlation.

### **Results for Pre-admission and HESI**

The following were the results from the data collected regarding the HESI scores and pre-admission cumulative GPAs of the students participating from Institution D. RQ 7: What is the correlation between pre-admission GPA and Health Education Systems Incorporated (HESI) test scores on PTA student retention? RQ 8: What is the correlation between pre-admission GPA and HESI test scores on PTA student first-time pass success on the NPTE? With regard to research question seven, an independent samples t-test showed that the difference between pre-admission cumulative GPAs of PTA students who retained and those who failed out ( $N = 60$ ,  $M = 3.6600$ ,  $SD = .2532$ ) and the hypothesized value ( $\mu = 4.00$ ) was statistically significant,  $t(58) = 2.502$ ,  $p < .05$ ,  $r^2 = .0974$  which is a little effect size. In this case the students' pre-admissions cumulative

GPA did correlate with retention in that 9.74% ( $r^2 = .0974$ ) of the variance in GPA could be explained by whether or not the student retained. With regard to research question eight, an independent samples t-test showed that the difference between pre-admission cumulative GPAs of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 60$ ,  $M = 3.6600$ ,  $SD = .2532$ ) and the hypothesized value ( $\mu = 4.00$ ) was not statistically significant,  $t(53) = .034$ ,  $p < .05$ ,  $r^2 = .00002$ . In this case the students' pre-admission cumulative GPA did not correlate with student success on the NPTE as merely .0002% ( $r^2 = .00002$ ) of the variance in GPA could be explained by whether or not the student was successful on the NPTE on the first attempt.

With regard to research question seven, an independent samples t-test showed that the difference between HESI Vocabulary and General Knowledge scores of PTA students who retained and those who failed out ( $N = 60$ ,  $M = 86.8167$ ,  $SD = 4.9625$ ) and the hypothesized value ( $\mu = 100$ ) was statistically significant,  $t(56) = 2.352$ ,  $p < .05$ ,  $r^2 = .0870$  which is a medium effect. With regard to research question eight, an independent samples t-test showed that the difference between HESI Vocabulary and General Knowledge scores of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 60$ ,  $M = 86.8167$ ,  $SD = 4.9625$ ) and the hypothesized value ( $\mu = 100$ ) was statistically significant,  $t(56) = 1.767$ ,  $p < .05$ ,  $r^2 = .0528$  which has a little positive correlation.

With regard to research question seven, an independent samples t-test showed that the difference between HESI Reading Comprehension scores of PTA students who retained and those who failed out ( $N = 60$ ,  $M = 92.1167$ ,  $SD = 4.3260$ ) and the hypothesized value

( $\mu = 100$ ) was statistically significant,  $t(58) = 1.146$ ,  $p < .05$ ,  $r^2 = .0221$  which has a little positive correlation. With regard to research question eight, an independent samples t-test showed that the difference between HESI Reading Comprehension scores of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 60$ ,  $M = 92.1167$ ,  $SD = 4.3260$ ) and the hypothesized value ( $\mu = 100$ ) was statistically significant,  $t(56) = 3.682$ ,  $p < .05$ ,  $r^2 = .2276$  which is a little effect size. These results were the most statistically significant of the study as 22.76% of the variance in HESI Reading Comprehension scores by whether or not the student passed the NPTE on the first attempt.

With regard to research question seven, an independent samples t-test showed that the difference between HESI Mathematics scores of PTA students who retained and those who failed out ( $N = 60$ ,  $M = 90.2500$ ,  $SD = 5.6286$ ) and the hypothesized value ( $\mu = 100$ ) was statistically significant,  $t(56) = 1.1910$ ,  $p < .05$ ,  $r^2 = .0247$  which has little correlation. With regard to research question eight, an independent samples t-test showed that the difference between HESI Mathematics scores of PTA students who passed the NPTE on the first attempt and those who failed the NPTE on the first attempt ( $N = 60$ ,  $M = 90.2500$ ,  $SD = 5.6286$ ) and the hypothesized value ( $\mu = 100$ ) was statistically significant,  $t(56) = 2.1910$ ,  $p < .05$ ,  $r^2 = .0789$  which is has a little correlation coefficient. The results for RQ6 and RQ7 are presented in Table 9.

Table 9  
*The Correlation between Pre-admission Cumulative GPA and the HESI on Student Retention and NPTE First-time Pass Success when  $p < .05$ .*

Dependent variable	<u>Retention</u>	<u>NPTE first-time pass success</u>
	M	M
	SD	SD
	t(df)	t(df)
	r <sup>2</sup>	r <sup>2</sup>
<hr/>		
Independent variable		
GPA	3.6600 .2532 2.502(58) .0974	3.6600 .2532 .034(53) .00002
HESI VGK	86.8167 4.9624 2.352(56) .0870	80.8167 4.9624 1.767(56) .0528
HESI RC	92.1167 4.3260 1.146(58) .0221	92.1167 4.3260 3.682(56) .2276
HESI M	90.2500 5.6286 1.1910(56) .0247	90.2500 5.6286 2.1910(56) .0789

*Note.* M = Mean; SD = Standard Deviation; t = t-test; df = degrees of freedom; r<sup>2</sup> = Pearson's correlation. HESI VGK = Vocabulary and General Knowledge; HESI RC = Read Comprehension; HESI M = Mathematics.

The variables that proved to be the most statistically significant were as follows: 1) the cumulative pre-program GPAs from Institutions C ( $r^2 = .1215$ ) and D ( $r^2 = .0979$ ) these were when predicting first-time pass success on the NPTE only (GPA was not statistically significant in predicting retention); 2) the HESI Vocabulary and General Knowledge scores from Institution D ( $r^2 = .0870$ ) as a predictor of retention and the HESI Reading Comprehension scores from Institution D ( $r^2 = .2276$ ) as a predictor of

first-time pass success on the NPTE; the ACT scores from Institution B ( $r^2 = .2079$ ) as a predictor of first-time pass success on the NPTE; the TEAS scores from Institution C as predictors of first-time pass success and as predictors of retention, ( $r^2 = .0979$ ) and ( $r^2 = .0974$ ) respectively; and finally the NDRA scores from Institution A as predictors for both first-time pass success on the NPTE and retention, ( $r^2 = .1699$ ) and ( $r^2 = .1037$ ). The best overall predictor of retention was the NDRA score ( $r^2 = .1037$ ) and the best overall predictor of first-time pass success on the NPTE was the HESI Reading Comprehension score ( $r^2 = .2276$ ). The second best overall predictor of retention was the TEAS score ( $r^2 = .0974$ ) and the second best overall predictor of first-time pass success on the NPTE was the ACT score ( $r^2 = .2079$ ).

Of interest to the researcher was the fact that the strongest correlation of both student retention and first-time pass success on the NPTE had to do with assessing a student's reading comprehension abilities. These results mirror many other studies regarding the significance of reading comprehension skills and success in college (Chambers, Munday, & Sienty, 1999; Eckert, 2008; Falk-Ross, 2001; Fike & Fike, 2008; Lesley, 2001; Neddenriep, Fritz, & Carrier, 2011; Zhang, 2011).

### **Hypothesis**

The hypothesis proposed in this study was that the NDRA, the ACT, the TEAS, and the HESI, would predict student retention and first-time pass success on the NPTE as well as, or better than, the student's cumulative GPA. The null hypothesis was that there was no statistical significance between the predictor variables used as admissions criteria in PTA programs at Tennessee Board of Regents community colleges.

Regarding RQ1: What is the correlation between pre-admission GPA and Nelson Denny Reading Assessment (NDRA) test scores on PTA student retention?

And RQ2: What is the correlation between pre-admission GPA and NDRA test scores on PTA student first-time pass success on the NPTE? the researcher rejects the null hypothesis because only .47% ( $r^2 = .0047$ ) of the variance in GPA of this cohort could be explained by whether or not the student retained and only 1.47% ( $r^2 = .0147$ ) of the variance in GPA could be explained by whether or not the student passed the NPTE on the first attempt; whereas, 10.37% ( $r^2 = .1037$ ) of the variance in NDRA scores could be explained by whether the student retained or failed out and 16.99% ( $r^2 = .1699$ ) of the variance in NDRA scores could be explained by whether or not the student passed the NPTE on the first attempt.

The null hypothesis was also rejected for RQ 3: What is the correlation between pre-admission GPA and American College Test (ACT) scores on PTA student retention?

The null hypotheses were rejected for RQ 4: What is the correlation between pre-admission GPA and ACT scores on PTA student first-time pass success on the NPTE? The researcher found a negative correlation between GPA and retention ( $r^2 = (-).0195$ ) and only .63% ( $r^2 = .0063$ ) of the variance in GPA could be explained by whether the student passed the NPTE on the first attempt. The researcher found that 20.79% ( $r^2 = .2079$ ) of the variance in ACT score could be explained by whether or not the student passed the NPTE on the first attempt and 3.59% ( $r^2 = .0359$ ) of the variance in ACT score could be explained by whether or not the student retained.

With regard to RQ 5: What is the correlation between pre-admission GPA and Test of Essential Academic Skills (TEAS) scores on PTA student retention?; and RQ 6: What is

the correlation between pre-admission GPA and TEAS scores on PTA student first-time pass success on the NPTE? the researcher rejects the null hypothesis concerning GPA and retention because only .47% of the variance in GPA of this cohort could be explained by whether or not the student retained ( $r^2 = .0047$ ); the researcher, however, fails to reject the null hypothesis concerning GPA and first-time pass success as 12.15% of the variance in GPA could be explained by whether or not the student passed the NPTE on the first attempt ( $r^2 = .1215$ ). The researcher, again, fails to reject the null hypothesis regarding TEAS and retention because merely 2.01% ( $r^2 = .0201$ ) of the variance in TEAS scores could be explained by whether or not the student retained. The null hypotheses is rejected with regards to TEAS scores and NPTE first-time pass success as 9.79% of the variance in TEAS scores can be explained by whether or not the student passed the NPTE on the first attempt ( $r^2 = .0979$ ).

RQ 7: What is the correlation between pre-admission GPA and Health Education Systems Incorporated (HESI) test scores on PTA student retention? RQ 8: What is the correlation between pre-admission GPA and HESI test scores on PTA student first-time pass success on the NPTE? RQ7 and RQ8 yielded mixed results as the researcher both fails to reject and rejects the null hypothesis. The researcher fails to reject the null hypothesis concerning GPA and retention as 9.74% ( $r^2 = .0974$ ) of the variance in GPA could be explained by whether or not the student retained. The researcher reject the null hypothesis regarding GPA and NPTE first-time pass success because merely .0002% ( $r^2 = .00002$ ) of the variance in GPA could be explained by whether or not the student was successful on the NPTE on the first attempt. The HESI Reading Comprehension Exam proved to be the most statistically significant causing the researcher to reject the null

hypotheses by explaining 22.76% of the variance in HESI Reading Comprehension scores by whether or not the student passed the NPTE on the first attempt.

### **The Environment**

The environmental assessment piece in the I-E-O model is the most difficult and intricate of all, and according to Astin (2012), is the most neglected. This is likely the difficulty in assessing the environmental factors as was the case in this study. The environment of the institutions participating in this study had many common detonators. They were all open enrollment TBR community colleges; they all enroll majority female Caucasian students; they all enroll on average more part-time students than full-time students; and finally, they all have three-year graduation rates of less than 20%.

When comparing the institutions' environmental factors with the results of the study, the researcher found it interesting that the two institutions where GPA proved to have a positive and statistically significant correlation, though in the same region of the state, were in very different settings; one was in an urban setting and one in a rural setting. Also of note was the fact that the two institutions who had the most statistically significant findings regarding the correlation between standardized test scores and retention and first-time pass success on the NPTE were housed in very different settings, again, one was in an urban area and one in a rural area. One can infer from this finding that the setting of the community college has very little effect on student outcomes.

A comparison of the institutional profiles for the institutions who participated in this study is located in Table 10.

Table 10  
*Institutional Profiles of the Institutions Participating in this Study*

Institution	Enrollment			Demographics			Outcomes		Admissions Criteria			
	PT	FT	Total	Gender	Age	Race	Grad. Rates		GPA	ST	Vol. Hrs.	IS
A	60%	40%	4,924	63%F 47%M 78% T 22%NT 76% C 16% AA 8% O			three-year 10% six-year 26.8%		2.5	N/A	24 hrs.	25
B	58%	42%	11,482	61%F 39%M N/R 81%C 9%AA 4%H 1%A 5%O			three-year 16%		2.0	N/A	N/A	N/A
C	N/R	N/R	12,661	59%F 41%M 68%T 32% NT 76.8%C 14%AA 3.9%H 1.7%A 2.7%MR 0.9%O			three-year 10%		2.5	TEAS	N/A	N/A
D	49.4%	50.6%	6,265	61.3% F 38.7% M N/R 92.8% C 2.1%AA2.2%H 0.7%A			three-year 13.8%		2.5	HESI	30 hrs.	50

*Note.* PT = Part Time; FT = Full Time; Grad. Rates = number or percentage of students who graduated; GPA = the minimum pre-admission cumulative grade point average used in the admissions process; Vol Hrs. = number of volunteer hours required to apply to the PTA program; IS = maximum interview score; N/A = not applicable; N/R = not reported; F = female; M = male; T = traditional; NT = non-traditional; C = Caucasian; AA = African American; H = Hispanic; A = Asian; MR = multi-race; O = other; NDRA = Nelson Denny Reading Assessment; ACT = Academic College Testing; TEAS = Test of Essential Skills; HESI = Health Information Systems Inc.

### Summary

This chapter presented the statistical results of this study. The results, though mixed, overall rejected the null hypothesis finding that there is a statistically significant stronger correlation between standardized tests and the dependent variables of retention and first-time pass success on the NPTE than the correlation between GPA and the dependent variables. Most educators continue to debate over the use of admissions tests and this debate is not going away any time soon. The members of the National Association of

Admission Counseling issued a report in 2008 in which they strongly urged post-secondary institutions to consider the use of admissions testing. The report suggests that institutions and programs within the institutions conduct their own validity research on the current admissions criteria, such as the research and statistical analysis in this study.

Programs, such as those in allied health, need to develop an admissions process that is unbiased, predictive, and efficient. Additionally, the admissions process should effectively maximize the selection of students who are most likely to achieve their educational goals. The program's admissions process must also contribute to the achievement of the institution's overall goals, which for the state in which this study was conducted means improving outcomes.

## **Chapter 5**

### **Summary of Findings and Discussion**

#### **Summary of Findings**

This study strongly underscored the need for allied health program directors to avail themselves of the data regarding standardized tests as admissions criteria. Cumulative GPA alone is not a valid predictor of retention or of student success on national licensing exams such as the NPTE. In highly competitive allied health programs in which there are more applicants than available seats, gaining admission is a challenge. Furthermore, once admission is gained, matriculating, graduating, and passing a licensing exam are additional hurdles that students must overcome. The community colleges that offer these programs are facing unprecedented challenges including the Complete College Agenda, outcomes-based funding, open-enrollment policies, and high attrition rates. Given these conditions, a trend is emerging for program directors to institute some sort of standardized testing in order to select applicants whom the programs are most likely to retain and who will ultimately be successful on the licensure exam (Camara, Kimmel, Scheuneman & Sawtell, 2003; Koretz, 2008; Kwan, Childs, Cherryman, Palmer, & Catton, 2009; Linn, Davis, & Gronlund, 2000; Platt, Turocy, & McGlumphy, 2001).

This study found that two standardized tests, specifically the NDRA and the TEAS had the strongest correlation (when compared to GPA) in predicting the outcome of retention of a community college population of PTA students. This study also found that two standardized tests, specifically the HESI Reading Comprehension test and the ACT, had the strongest correlation (when compared to GPA) in predicting the outcome of first-time pass success on the NPTE of a community college population of PTA students.

## **Discussion**

Allied health students enrolled in community colleges face multiple challenges towards persistence in today's higher education environment. Many of these students are considered at-risk (i.e., being low-income, non-traditional, enrolled in remedial education), which decreases their chances for completion. Given Tennessee's outcome-based funding formula, it is critical that community colleges focus on supporting students' academic progress or face decreased funding for programs, such as allied health.

As illustrated by this study, community college leaders should implement better ways of using standardized tests, such as the NDRA, the ACT, the TEAS, and the HESI, as a means of placement or benchmarking students into academic programs. While standardized testing is not generally perceived as an accurate measure of success, findings from this study posit otherwise. Thus, it is important that community college leaders to consider standardized test results as a mechanism for inclusion rather than exclusion.

In the halls of the 13 community colleges in Tennessee walks a diverse group of students. These students are of different ages, races and genders. According to the American Association of Community Colleges (AACC) (2015), there are 39,338 students enrolled full-time at community colleges in the state of Tennessee. There are approximately 39,094 students enrolled part-time at community colleges in Tennessee. Of the total enrolled, 63% are female and 34% are male, 76% are white non-Hispanic, 18% are black non-Hispanic, 2% are American Indian/Alaskan native, 2% are Hispanic, and 1% are Asian. Of the part-time enrollment populace, 5.6% are 17 years of age and

younger, 20.8% are 18 to 21 years of age, 32.0% are 22 to 29 years of age, 22.4% are 30 to 39 years of age and 19.1% are 40 years and older. Of the full-time enrolled populace 0.9% are 17 years and younger, 56.3% are 18 to 21 years of age, 25.8% are 22 to 29 years of age, 11.7% are 30 to 39 years of age and 5.4% are 40 years of age and older. The total financial aid awarded to students enrolled at community colleges in the state of Tennessee in 2014 was 86.22 million dollars (AACC, 2015, *State Results*). Though diverse, this population has one thing in common: they have a dream.

In order to help make these dreams become realities, community college leaders must engage students early and continue to engage them throughout their educational journey. Tinto's (1975, 1993) theory on student departure reveals that inclusion evolves over time and for the community college student there is not much time for this evolution to take place. Pascarella and Terenzini (2005) identified that, "a student's total level of campus engagement, particularly when academic, interpersonal and extracurricular involvements are mutually reinforcing provides the greatest impact towards student's retention, matriculation and completion" (p. 647). One way for community college leaders to ensure that they are on the right path toward student engagement, having a growth mindset and identifying and assessing the cognitive factors that can affect student success is by being members of "Achieving the Dream (ATD)". Created in 2004 by the Lumina Foundation, this initiative uses dozens of theories to make a long-term, sustainable difference in improving student success for the community college student. By implementing rational connections between curriculum and career, by offering supplemental instruction rather than isolating an under-prepared student, and by incorporating learning communities and service learning projects, "(a)chievement gaps

close. Momentum builds. Lives change. Neighborhoods flourish” (ATD, 2015).

Community colleges can make a difference in the lives of their students and thus make a difference in their communities and in the world.

This study has provided the quantitative data to prove that standardized tests can help community college leaders place students into programs where they can achieve their dreams. It is the responsibility of all community college program directors to identify which program is best suited for an individual student. Standardized testing is one way to help students navigate their way into the appropriate career path. Program directors are obligated to help students succeed rather than set them up for failure; placement tests are one way to ensure that students can ultimately succeed. The sooner we get these students engaged and involved, the better their chances of success will be.

### **Recommendations for Future Studies**

If the community college is to improve retention it must begin to explore ways to validate the various cultural and social values of its learners. This was, in fact, a limitation of this study. This study, being only quantitative in design, did not consider all of the many other variables that can and do affect student retention and success such as the various cultural and social values of the participants themselves. This study would have been more in-depth had it included a qualitative component. By interviewing students who did not matriculate or who were not successful on the NPTE, the researcher could have gained a better understanding as to *why* this was the case.

Often failure is not merely a matter of academic struggle; some students simply do not transition well into the world of academia. O’Donnell and Tobbell (2007) investigated the transition of the adult learner into higher education (HE) via a specific program

designed to assist in the transition. There were seventeen subjects: 12 females and 5 males. Their ages ranged from 23 – 57 years and they came from diverse socioeconomic backgrounds. The study did not reveal the subjects' races. This study was a qualitative study in which the method for gathering data consisted of semi-structured interviews.

The subjects studied were all adult learners enrolled in a program, “An Introduction to University Study for Mature Students”, at a university in U.K. The study was designed to explore the learners in terms of learning, participation in practices, and identity. The study revealed three major themes: 1) peripheral participation, 2) academic practices, and 3) belonging. Researchers found that the subjects felt as though they were on the outside of HE looking in (Peripheral Participation). The physical location of the class added to this feeling as did their limited access to the universities' services. In terms of the learners' academic practices, the researchers found that the subjects learned by doing, that HE required independent study of the subjects, and that much of university learning was informal and via collaborative dialogue resulting in the learner coming to his or her own understanding of the subject matter. Lastly, the researchers revealed that identity had a direct correlation with a sense of belonging and that one's preconceived notions regarding HE influenced whether one felt as if he/she truly belonged or was indeed an outsider. Labeling was also a significant part of identity. By saying “I am a student”, the subjects felt more of a sense of belonging via identity and therefore felt more and more comfortable participating in a HE environment.

The researchers concluded from their study that though participants felt as if they were on the periphery of the learning community they also felt a sense of belonging due to

their “student” identity. Their academic practices, such as learning via engaged dialogue, were essential in their transition into the HE environment.

Walton and Cohen (2007) found that if a student does not feel a sense of belonging in a new social and/or academic setting this will indeed negatively impact that student’s retention and ultimate success. If any change is to take place within the community college system, it must begin from within. Higher education is in need of change and many individuals in higher education today are reluctant to change. With the shift away from funding based on fall enrollment toward funding based on outcomes that public institutions of higher education are facing in the state of Tennessee, one can clearly see the importance of a solid curriculum that fosters learning and leads to positive outcomes. Studies are needed regarding the curriculum that is being used in community colleges. Is the curriculum designed to foster success for the typical community college student?

According to Altbach et al. (2011), “The need for curriculum reform can be understood as emanating from changes in the broader society, such as scientific advancement, evolving conceptions of knowledge, changing student demographics, and, more recently, labor market demands” (p. 409). Couple these needs for curricular reform with the changes in the way in which institutions of higher education are being funded as well as with the advances in technologies and one would conclude that a change in the curriculum at the community colleges in Tennessee is necessary. It was evident from the Institutional Profile conducted for this study that no two institutions in Tennessee have the same curriculum or admissions requirements. This study is timely in that both curriculum and admissions criteria can be reviewed; the data from this study will assist program directors in this review and in making the subsequent changes that will improve

both student retention and first-time pass success rates on the NPTE. Such changes should include using one of statistically significant indicators of student retention and success (NDRA, ACT, TEAS, HESI) along with pre-admissions cumulative GPA as the admissions criteria. These scores will also help benchmark the students who might need some supplemental learning support while in the program and the programs could then include such supplemental materials in the current curricula.

In order to have an understanding of where allied health programs need to go in terms of curricular changes they must have some historical perspective regarding curriculum in higher education. Altbach et al. (2011) gives a thorough historical perspective of the ever-evolving, “pendulum swinging”, curriculum in American higher education (p. 409). The authors provide an overview of curricular reform of American colleges, focusing on three major tensions: 1) prescription and election; 2) stability and growth; and 3) conservation and innovation.

The curriculum of the first colleges and universities in America was highly influenced by the English. There was one curriculum for all students and it was designed specifically to train individuals for careers in either law or the clergy; this curriculum that promoted both logical and critical thinking. It was during this era that students developed literary societies as a means of fulfilling any extracurricular interests they had. The professors also held weekly “extracurricular” lectures covering topics of interest of the student body. These sparked the emergence of new topics that would eventually end up in an ever evolving curriculum; “courses in physics, anatomy, chemistry, and more advanced mathematics were added to the final two years of the college curriculum” (Altbach et al.,

2011, p. 411). Thus began the students' expectations of a well-rounded education full of diverse ideas yet with rational connections between curriculum and career.

These expectations led to much growth within the academy. New modes of instruction became necessary for such advanced knowledge to be gained. Laboratory sections became necessary and the subject partition became more and more specialized. According to Altbach et al. (2011), "further growth in the higher education curriculum has resulted from inter-disciplines, the integration of two or more disciplines to form a new content area or mode of inquiry" (p. 419). With the advancement of technologies, the academy in America has seen, in recent years, many more opportunities for non-traditional or experimental learning. Altbach et al. refers to such experimental education as on-line learning, service-learning projects and learning communities, and supplemental instruction opportunities.

The retention tactic that Altbach et al. (2011) refers to as "supplemental instruction" (SI) involves expanding curriculum by providing supplemental materials to the student who is struggling in the classroom. These supplements are often helping students achieve their "basic skills" and they ultimately might make just enough difference to decrease dropout rates and improve outcomes. This type of supplementation occurs while the students are enrolled in college credit courses and would keep them from being segregated as they are currently in remedial and developmental courses. By being enrolled in a college level course with their peers, students would not feel targeted by stigma or negative stereotypes (Walton & Cohen, 2007). This would also decrease the time to completion for this populace. Studies have shown that with this type of supplementation, students are more likely to persist in their college courses, thus

increasing retention (Arendale, 1994; Astin, 1987; Henson & Shelley, 2003; Webster & Dee, 1997; Webster & Hooper, 1998). Allied health program directors can use one of the standardized tests presented in this study to help identify the incoming students who might need SI and provide these learning opportunities as necessary throughout the program length. This would not only ensure retention but potentially first-time pass success on national licensing exams.

According to Altbach et al. (2011), curriculum reform must be aimed at “improving student persistence and graduation rates, particularly at community colleges and public comprehensive universities” (p. 424). Another way that community colleges can do this is with the use of learning communities. With this methodology, students enroll and matriculate through their majors and programs of study together as a community. Instead of each student randomly taking required courses, the communities take specific courses at specific times throughout the program, thereby allowing them to lean on each other for support and to increase their chances of being successful. This concept is not brand new to the academy. Lenning and Ebbers (1999) conducted extensive research regarding the powerful potential of learning communities within higher education. According to Lenning and Ebbers (1999), student learning communities are defined as “relatively small groups of students (and faculty) working together to enhance students' learning and to help students become well-rounded, broad-based individuals” (p. 22). Lenning and Ebbers (1999) go on to express the need for large universities to foster a sense of belonging, “to create a sense of place and to help students develop small communities within the larger whole” (p.17). This sense of belonging and these support structures are vitally important. If allied health students, for example, were placed in learning

communities upon arrival at the community college, they could matriculate through their pre-requisites together. They could take their placement tests as a group and, if needed, undergo remediation together. Allied health programs could benefit from more research on the use of learning communities and supplemental learning.

### **Final Thoughts and Consideration**

The purpose of this study was to determine the predictive validity of academic factors of a cohort of allied health students, specifically; PTA students enrolled at TBR community colleges in Tennessee by evaluating the correlation of these factors with this cohort's retention rates and first-time pass rates on the NPTE. This study fulfilled its purpose by providing PTA program and other allied health program directors with the data necessary to choose the best predictor variable of retention and success. Outcomes-based funding has placed unprecedented pressure on allied health programs to improve both retention and first-time pass success on state licensing exams. In response to this pressure allied health program directors and faculty have seen the need to develop policies that improve the selection of qualified applicants. This study provides allied health program directors and faculty with the statistical analysis of four standardized tests that can be implemented along with the student's GPA that have proved to correlate with program success.

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## Appendix A

**From:** Christopher Wayne Whitehead (cwhitehd) on behalf of Institutional Review Board  
**Sent:** Wednesday, July 29, 2015 3:56 PM  
**To:** Jeff Wilson (jwlson4); Patricia Jane Easley (peasley)  
**Subject:** Determination #3809

Dr. Wilson and Ms. Easley,

From the information provided on your Initial Review Request form for the study, "ACADEMIC AND NON-ACADEMIC FACTORS AS PREDICTORS OF ACADEMIC SUCCESS OF PHYSICAL THERAPIST ASSISTANT STUDENTS ENROLLED IN PROGRAMS AT TENNESSEE BOARD OF REGENT'S COMMUNITY COLLEGES" the IRB Administrator has determined that your research uses 1) only coded private information, 2) that this data was not collected for your specific research project, and 3) that the investigators cannot readily ascertain the identity of individuals about whom the private information pertains. Therefore, you are not conducting human subjects research and 45 CFR 46 does not apply.

This research does not require IRB approval nor review

Best regards,

**Chris Whitehead**

IRB Administrator  
Research Support Services  
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