Standardized Examinations as Predictors of NCLEX-PN® Success

A Dissertation

by

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We hereby certify that this Dissertation, submitted by Karen Whitham, conforms to acceptable standards and fully fulfills the Dissertation requirements for the degree of Doctor of Education from College of Saint Mary

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Dedication

This dissertation is dedicated in memory of Dr. Glenn Oren, without whose support, guidance, encouragement, and friendship, this would not have been possible.

"Have curiosity about everyone and everything around you. That is the secret of life"- Glenn Oren, PhD

Acknowledgement

My accomplishment of this degree was a result of the contributions of several people. First, I am indebted to my committee chair, Dr. Jennifer Rose-Woodward. Her guidance and support helped me successfully navigate the doctoral process. She was always supportive and encouraging throughout this process. I would also like to thank the members of my committee for their valuable assistance along the way, Dr. Kari Wade and Dr. Kathleen Zajic, and my advisor Dr. Lois Linden.

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My parents, Michael and Sandra McLaughlin, have been an inspiration for achieving this degree. The have instilled in me the desire to challenge myself and believe that I can accomplish any goal with hard work and perseverance.

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Abstract

Preparing practical nursing school graduates for success on the NCLEX-PN® examination has become a priority for schools of nursing to ensure a first-attempt pass rate that meets or exceeds the state mandated percentage. The purpose of this retrospective correlational study was to determine if the PN Comprehensive Predictor® Assessment Technologies Institute® (ATI®) examination correlates to first attempt National Council Licensure Examination- Practical Nurse® (NCLEX-PN®) success for practical nursing graduates of a large, proprietary, educational institution's 13 campuses. Logistic regression was completed using 1668 graduates who had complete data sets to determine if a correlation existed. The study determined that the variable, students' scores on the PN Comprehensive Predictor® examination, did not significantly increase the ability to predict the pass/fail results of the NCLEX-PN® examination. The results of this study identified that practical nursing education programs should not rely solely on the PN Comprehensive Predictor® examination to identify the graduate's ability to successfully pass or fail the NCLEX-PN® examination. Incorporating the findings of this study with those of previous research allows for the development of an effective plan of action for NCLEX-PN® examination success.

CHAPTER ONE- INTRODUCTION

The use of standardized testing has experienced a rebirth in the past several years (Fan, 1998). Several innovative companies have provided products in response to the changing landscape of education. Educational institutions have been given mandates by the government and they are being monitored for their ability to demonstrate that their learners are successful. This is different depending on the profession and is common in many areas of healthcare. In nursing education, success is readily measured by the attainment of the state licensure. Since 1994, graduates of nursing programs have been required to take the licensure examination using computerized adaptive testing (National Council State Boards of Nursing, 2012a). Several companies developed commercially available products in response to this changing landscape of nursing education. These products include the National League for Nursing (NLN) Achievement Tests®, Mosby AssessTest®, Assessment Technologies Institute® (ATI) specialty examinations and PN Comprehensive Predictor®, and the Health Education Systems, Incorporated® (HESI) specialty examinations and Exit Examination®. Several of these products are designed to predict success on the licensing examination (Mosser, Williams, & Wood, 2006). This use of standardized testing, now imbedded into the curriculum of many nursing education programs, is purported to increase the number of graduates who pass the National Council Licensure Examination- Practical Nursing (NCLEX-PN®) by identifying practical nursing student readiness to test or remediation needs. Mosser, Williams, and Wood (2006) and Adamson and Britt (2009) wrote about the practice of predicting student readiness and/or remediation needs. They found that the confidence in administrating standardized examinations at identified, specific points in the nursing education program was a practice that gained popularity, but was not as reliable as originally thought. Many schools of nursing, in response to these required and governmental

mandates for success on the licensure examinations, implemented commercial standardized

testing products and procedures which, selecting from various commercially available products,

are assumed to assist in preparing students for success on the NCLEX-PN® examination.

Several of these standardized testing products provide students with individual percentage scores

on comprehensive examinations that demonstrate level of knowledge. Thus, it is assumed that

the standardized examination result will predict success or failure on the licensing process. The

individual percentage scores are used to determine NCLEX-PN® examination readiness or

remediation needs before the formal licensing examination. The reliance on the standardized

testing to improve NCLEX-PN® examination results and meet the nursing program's mandated

pass rates is comprehensively based on this belief.

To understand the basis for this belief for this type of testing, a basic knowledge about

standardized testing is important. Standardized testing is used to compare individuals to the

same standard and create equality in the testing process (Garrison, 2009). The use of

examination results to determine the ability to perform to a specific standard began in 2200 B.C.

in ancient China, the parent country of standardized testing, and continued until 1905 A.D

(Wardrop, 1976). As stated by Wardrop (1976), the Emperor would administer an examination

to government officials every three years to determine fitness for office and retention of position.

Standardized testing became common place in the United States when soldiers, returning

from World War II, flooded academic campuses and were required to complete the college

entrance examinations for admission. The College Entrance Examination Board, founded in

1901, joined with the American Council on Education and the Carnegie Foundation for the

Advancement of Teaching to form Educational Testing Service to meet the increased demand for

college entrance examinations (Owen, 1985). Standardized testing continues to be used for

college admission and has become part of the workplace culture. By 1996, 43% of employers

used standardized examinations to test applicants to determine if they were awarded the position,

kept their position, or were promoted (Sacks, 1999). Standardized examinations are increasingly

being used as gatekeepers of professions that require a minimum score on examinations for

certification or licensure (Sacks, 1999). As we look back to nursing and how standardized

examinations have influenced this profession, it is found to be extremely influential especially in

the practical nursing arena. The National Council Licensure Examination for Practical Nursing

(NCLEX-PN®) is the examination that must be passed by graduates of practical nursing

programs to enter the profession of nursing. The NCLEX-PN® examination is developed and

maintained by the National Council of State Boards of Nursing (NCSBN®) and passing the

examination is required for state licensure and practice in the profession. Thus, this has

bolstered the state licensing board's decision to use standardized examinations to determine entry

into practice.

Preparing practical nursing school graduates for success on the NCLEX-PN®

examination has become a priority for schools of nursing. Educational institutions that offer

nursing education programs are mandated to maintain specific first-attempt pass rates determined

by the state board of nursing that provide accreditation for the program (National Council of

State Boards of Nursing, 2012a). Thus, many nursing education programs implemented various

strategies to ensure their pass rates meet the mandated requirements. The leadership of a large,

proprietary, educational institution initiated the use of Assessment Technologies Institute (ATI®)

standardized computerized testing program at their 13 campuses where practical nursing is

taught (Ascend Learning, 2013). Computer-based, standardized testing programs are used to

provide students experience taking standardized computerized tests, assess areas of risk, and

provide information about readiness prior to taking the NCLEX-PN® examination. The

NCLEX-PN® examination is designed to assess nursing knowledge, skills, and abilities at the

entry level (National Council of State Boards of Nursing, 2012a). The ATI® PN Comprehensive

Predictor® examination is designed to assess the abilities of the student practical nurse at the

same level as the NCLEX-PN® examination (Ascend Learning, 2011).   The ATI® product

purchased by this school of nursing is the PN Comprehensive Predictor® examination. This

standardized examination is considered a vital and critical predictor of success on the NCLEX-

PN® examination.

The PN Comprehensive Predictor® examination is given at or near the end of the

practical nursing education program to students who will be graduating and taking the NCLEX-

PN® examination (Assessment Technologies Institute, 2011). The purpose of this examination is

to provide a numeric score that will indicate the probability of passing the NCLEX-PN®

examination on their first-attempt. The examination is based on the NCLEX-PN® Detailed Test

Plan that aligns with the knowledge, skills, and abilities needed for entry-level practical nurses.

The percentage of questions students see on the PN Comprehensive Predictor® examination from

each NCLEX® Client Need Category is similar to the percentage of questions graduates see on

their NCLEX-PN® examination (Assessment Technologies Institute, 2011).

Problem Statement

Nursing education programs are required by their state's board of nursing and accrediting

bodies to maintain specified first-attempt NCLEX® pass rates that meet or exceed the national

average to remain approved and accredited (National Council of State Boards of Nursing,

2012c). There are many interventions that schools of nursing use to promote National Council

Licensure Examination-Registered Nurse (NCLEX-RN®) success (DiBartolo & Seldomridge,

2005, Morton, 2006, Davenport, 2007, Norton, et al, 2006). Most interventions are implemented

when the nursing program's first-attempt pass rates fall below the mandated state board of

nursing standard. The literature identifies various methods nursing programs use, but fails to

specify which specific interventions result in an increase in first-attempt pass rates (DiBartolo &

Seldomridge, 2005). The literature indicates that broad interventions, including predictor

examinations, were implemented in nursing programs that found their mandated pass rates had

fallen below the national standard and/or required state pass rates, however, the literature does

not provide clear evidence of which, if any, interventions or predictors of NCLEX-RN® success

actually had an impact. Thus, a gap in the literature has been identified due to the lack of studies

related to NCLEX-PN® predictor examinations. The review of the literature uncovers substantial

research studies related to registered nursing education programs and initiatives used to improve

NCLEX-RN® first-attempt pass rates, and there is a dearth of literature related to the results of

implementation of interventions by practical nursing education program to improve NCLEX-

PN® examination success rates, including use of predictor examinations.

Background and Rationale

The National Council Licensure Examination® (NCLEX®) is used to license both

practical/vocational and registered nurses in all 50 states, the District of Columbia, and eight

United States territories. NCLEX® examinations test applicants' knowledge, ability, and skills

with paramount focus on safe practice for entry-level practice in nursing. Graduates may not

enter into nursing practice until they successfully pass these licensure examinations. The

National Council of State Boards of Nursing (NCSBN®) and each state board of nursing measure

the success of nursing education programs by the first attempt NCLEX® pass rates of their

graduates (National Council of State Boards of Nursing, 2011). Forty-nine state boards of

nursing have regulatory authority over nursing education programs and provide a required criterion percentage pass rate for first time NCLEX® test takers Each state board of nursing determines the minimum criterion percentage pass rate for first time test takers that allows nursing schools to maintain unconditional good standing. The criterion percentage pass rate varies by jurisdiction from a low of 70% of program graduates passing the examination on their first attempt to a high of 85% of program graduates passing the examination on their first attempt. Many states mandate that nursing schools meet the national average of 84.83% or a percentage of that figure (National Council of State Boards of Nursing, 2011). Due to the importance of the NCLEX-PN® examination, it is crucial to determine the principle components that lead to student success on the examination and if what is currently being used to predict success is reliable and accurate.

The use of commercially available, computer-based, nursing examinations has been noted in the majority of the literature available. According to the literature, the most widely used products in nursing education programs are the National League for Nursing (NLN) Achievement Tests®, Mosby AssessTest®, Assessment Technologies Institute® (ATI) and Health Education Systems, Incorporated® (HESI) products (Mosser, Williams, & Wood, 2006). Each product line provides nursing schools with specialty nursing examinations that are administered throughout the education program along with exit examinations that are given at the end of the nursing programs. The specialty examinations are increasingly being used for program progression which assumes mastery of critical nursing content (Mosser, Williams, & Wood, 2006).

Standardized examinations have been developed by many companies to help nursing schools achieve the mandate for first-attempt pass rates. Comprehensive examinations,

including National League for Nursing (NLN) Achievement Tests®, the HESI Exit Exam®, and the Mosby AssessTest®, are used to assess preparedness. A correlation between standardized examinations and success on the National Council Licensure Examination- Registered Nurse (NCLEX-RN®) were noted in the literature, but the types of standardized examinations given throughout the program were not consistent (Bonis, Taft, & Wendler, 2007).

The belief of being able to predict, with some accuracy, the students who would benefit from additional preparation for NCLEX® examination success is a vital goal of many nursing education programs. The HESI Exit Exam® is marketed to nursing education programs as an accurate predictor of success for first-time test takers by establishing a benchmark score for which to compare student progress. Of the six annual research studies that have been completed by HESI®, it has been demonstrated that students in registered nursing programs who achieve a score of 850 or higher have more than a 95% probability of NCLEX-RN® success (Adamson & Britt, 2009). The HESI Exit Exam's® validity and reliability for registered nursing students have been determined in multiple studies; the examination biserial correlation coefficient is recalculated each time the examination is administered (Morrison, Adamson, Nibert, & Hsia, 2004). Thus, the HESI Exit Exam® appears to accurately predict success for the NCLEX-RN® examination. The HESI Exit Exam® is used by many nursing education programs and has many years of research studies but in not used by the nursing program in this study.

Purpose of the Study

The purpose of this retrospective correlational study was to determine if the PN Comprehensive Predictor® Assessment Technologies Institute® (ATI®) examination correlates to first attempt National Council Licensure Examination- Practical Nurse® (NCLEX-PN®) success for practical nursing graduates of a large, proprietary, educational institution's 13 campuses.

Research Question

Is there a relationship between results of the individual percentage score obtained from the PN Comprehensive Predictor® examination to first-attempt NCLEX-PN® examination results for graduates from January 2010 through December 2012 at 13 campuses of a large, proprietary, educational institution where practical nursing programs are located?

Conceptual Framework

The public has placed trust in the professionals that are licensed in their field, such as nurses. The same trust is placed by the examinees on the development of the examination. The high-stakes examination, NCLEX-PN®, determines who is and who is not qualified to receive licensure and practice nursing (ACT, 2010). In 1994, the NCLEX-PN® examination was converted from a 300-item paper and pencil examination to a variable length computer adaptive examination (Gorham & Reynolds, n.d.). The computer adaptive examination allows item difficulty to guide the progression of the questions. The computer re-estimates the test-takers ability after each question based on their previous answer and the difficulty of that item (National Council of State Boards of Nursing, 2014). Several theories and conceptual frameworks have influenced the development of the NCLEX-PN® examination and predictor examinations, including Classical Test Theory, Item Response Theory, and Bloom's Taxonomy for the cognitive domain.

The commercially available predictive examinations offered by ATI® have been developed using Classical Test Theory and, to a lesser extent, Item Response Theory in an attempt to determine content mastery and readiness to sit for the NCLEX-PN® examination (Assessment Technologies Institute, 2011). The NCLEX-PN® examination was developed using Item Response Theory, focusing on the level of difficulty of each question for licensure

decisions (National Council of State Boards of Nursing, 2012a). Both Classical Test Theory and

Item Response Theory allow for the selection of items based on the intended purpose of the

examination. With Classical Test Theory, the final selection of items is dependent upon how

each item contributes to the overall examination while Item Response Theory determines the

contribution of each specific item (Hambleton & Jones, 1993). Classical Test Theory and Item

Response Theory are appropriate to this research study as the ATI® examinations and the

NCLEX-PN® examination are constructed using both theories. Classical Test Theory is evident

in that students are given the same examination from the PN Content Mastery Series® and PN

Comprehensive Predictor® examination without regard to the item difficulty. The computer

adaptive format of the NCLEX-PN® examination is item dependent and addresses Item Response

Theory. ATI® examinations and the NCLEX-PN® examinations were written using Bloom's

Taxonomy for the cognitive domain.

Classical Test Theory

Classical Test Theory provides a theoretical framework to determine the ability of a

predictive examination to predict success or failure on examinations such as NCLEX-PN®

(Nibert, Adamson, Young, Lauchner, Britt, & Hinds, 2006). Classical Test Theory assumes that

each examination score will contain a true score and an observed score. The observed score may

contain errors due to the testing environment, candidate wellbeing, or any number of distractions.

The theory assumes that the errors are equally divided around the average and the true score is

the average score (Crocker & Algina, 1986). A limitation of Classical Test Theory is that the

scores of the examination are entirely test dependent (Hambleton, & Jones, 1993). This type of

examination does not allow for the response to a specific item or level of difficulty.

Item Response Theory

Item Response Theory has become the preferred method of standardized testing in computer-based applications (ACT, 2010). The use of Item Response Theory allows for test-takers to complete different versions of examinations based on item difficulty (Hambleton, Swaminathan, & Rogers, 1991). Item Response Theory focuses on the individual item to estimate the standard of errors for the ability estimate, rather than a single estimate of error for all test takers. The score is based on both the correctness of the response and the difficulty level of the question. A limitation of the Item Response Theory is the need for a large sample size (Hambleton & Jones, 1993).

Bloom's Taxonomy for the Cognitive Domain

Bloom, Englehart, Furst, Hill, and Krathwohl (1956) identified learning in three domains, cognitive, affective, and psychomotor. The cognitive domain, known as Bloom's Taxonomy of Learning, describes a hierarchy from simple to complex. The six levels of the cognitive domain from simplest to most complex are knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom, et al., 1956). At the simplest end of the taxonomy, test-takers are required to recall previously learned material (knowledge) or understand the meaning of the material (comprehension). The remaining four, higher levels require increasingly complex thought processes (Bloom, et al., 1956). The higher levels require skills such as application of principles (application), material broken down into component parts (analysis), combining elements into new concepts (synthesis), and judging the value of the material or information (evaluation) (Bloom, et al., 1956). The cognitive domain of Bloom's Taxonomy of Learning serves as a framework for the development of NCLEX-PN® examination and commercially available assessment examinations (Assessment Technologies Institute, 2012; National Council

of State Boards of Nursing, 2012a). The items on the NCLEX-PN® examination are written at

the application or higher level of cognitive ability since the practice of nursing requires the

application of knowledge, skills, and abilities (National Council of State Boards of Nursing,

2010).

Definition of Terms

The following definitions were used in this research study:

Ascend Learning®

Ascend Learning® provides technology-based educational and assessment solutions for

healthcare and other vocational industries. The company provides assessment and remediation

technology for secondary, post-secondary and professional education. Ascend Learning® is the

parent company of Assessment Technologies Institute® (Ascend Learning, 2013).

Assessment Technologies Institute®

Assessment Technologies Institute® Nursing Education products offer tools to improve faculty,

student and program outcomes (Ascend Learning, 2013). Assessment Technologies Institute®

(ATI®) products are designed to teach nursing students and graduates the way they learn best.

The tools provided prepare students and graduates to take the high-stakes National Council

Licensure Examination® (NCLEX®) (Assessment Technologies Institute, 2013).

Campuses

The large, proprietary, educational institution has residential campuses in various locations

across the United States where practical nursing programs are located. Campus-based programs

offer face-to-face classes and may or may not include one or more online courses.

Comprehensive Assessment and Review Program® (CARP®)

ATI's® Comprehensive Assessment and Review Program® (CARP®) is a focused remediation resource for students that is available to them throughout their nursing program. Testing is offered in practice and proctored environments and offers proprietary remediation that links directly to the NCLEX® examination test plan blueprint. The Comprehensive Assessment and Review Program identifies potential problems and allows faculty to intervene early to improve outcomes (Assessment Technologies Institute, 2013).

First-attempt NCLEX-PN® Examination Result

First-attempt NCLEX-PN® examination result is defined students as successfully passing or failing the NCLEX-PN® examination on their first-attempt within six-months of graduating from the practical nursing program (National Council of State Boards of Nursing, 2012a).

Licensed Practical/Vocational Nurse (LPN/VN)

A Licensed Practical/Vocational Nurse is an individual who has completed a state-approved practical/vocational nursing program, passed the NCLEX-PN® examination, and is licensed by a state board of nursing to provide patient care as an LPN/LVN.

National Council of State Boards of Nursing (NCSBN®)

"The National Council of State Boards of Nursing (NCSBN®) is a not-for-profit organization whose purpose is to provide an organization through which boards of nursing act and counsel together on matters of common interest and concern affecting the public health, safety and welfare, including the development of licensing examinations in nursing" (National Council of State Boards of Nursing, 2012b, p.1).

National Council Licensure Examinations (NCLEX®)

To ensure public protection, NCSBN® Member Board jurisdictions require candidates for

licensure to pass an examination that measures the competencies needed to perform safely and

effectively as a newly licensed, entry-level nurse. NCSBN® develops two licensure

examinations, the National Council Licensure Examination for Registered Nurses (NCLEX-

RN®) and National Council Licensure Examination for Practical Nurses (NCLEX-PN®). These

examinations are used by boards of nursing to assist in making licensure decisions (National

Council of State Boards of Nursing, 2012c).

PN Comprehensive Predictor®

The PN Comprehensive Predictor® examination is a proctored, multiple-choice examination to

help determine the student's preparedness to take the NCLEX-PN® examination (Assessment

Technologies Institute, 2013).

Practical Nursing Graduate

A practical nursing graduate is an individual who successfully completes the requirements of an

educational program that has been approved by the state board of nursing to provide initial

nursing education at the practical nurse level.

NCLEX-PN® Examination Result

NCLEX-PN® examination result is defined as successfully passing or failing the examination

using one of three stopping rules scenarios. With 95% Confidence Interval Rule, the computer

will stop when there is a 95% certainty that the candidate's ability is clearly above or below the

passing standard. The Maximum-Length Exam Rule scenario will estimate the candidate's

ability when the maximum number of questions, 205, has been reached for the NCLEX-PN®

examination. The Run-Out-of-Time Rule (R.O.O.T) occurs when the five-hour time limit has

been reached and the 95% Confidence Rule has not been met. When the candidate has not

answered the minimum 85 questions, and the five-hour testing time has expired, the candidate

will fail the examination. When the candidate has answered the minimum 85 questions or more,

the last 60 questions are analyzed. If the last 60 questions were at a difficulty level that is above

the passing standard, the candidate successfully passes the examination. If even one of the last

60 questions drops below the passing standard, once, the candidate fails the examination. The

95% Confidence Interval Rule is the most commonly used stopping rule scenario for candidates

taking the examination (National Council of State Boards of Nursing, 2012a).

Assumptions

For the results of this study to be valid, each practical nursing campus will have

provided the examinations to all students in the proper sequencing for the duration of the

program and will have keep accurate data regarding examination scores and NCLEX-PN®

examination outcomes. It is also assumed that all ATI® examinations are given in the proctored,

secured environment mandated by the creators of the product. It is unknown if graduates will

change behaviors related to study habits. While it is believed that no changes to the curriculum

occurred during this time, individual campuses may have enacted changes to the curriculum that

were not reposted to administration.

Delimitations

The ability to generalize the results of this study to all candidates that take the NCLEX-

PN® examination will be limited. Participants of this study were from one school of nursing

with 13 campuses that have practical nursing education programs. Though there was sufficient

data gathered based on the potential number of graduates during the selected time frame used,

the standardization of the curriculum may limit the generalizability of the study.

Limitations

      A possible limitation of the study is that the two-year time period when the data collected

does not address changes in the curriculum that may have occurred during or after the study was

completed. While it is believed that no changes to the curriculum occurred during this time,

individual campuses may have enacted changes to the curriculum that were not reposted to

administration.

CHAPTER II: LITERATURE REVIEW

Historical Context

The first president of the American Nursing Association (ANA), Isabel Hampton Robb, wrote in the late 19th century, "In the absence of educational and professional standards, I am sadly forced to admit that the term 'trained nurse' means anything, everything and next to nothing" (Adventure of the American Mind, 2007). Prior to the era of Florence Nightingale, there were no credentials available to nurses, the first credential was a certificate of completion issued by the nursing education program to graduates. In 1893, the group that would become known as the American Nurses Association (ANA) met to discuss permissive licensure laws to protect the general public (Adventures of the American Mind, 2007). Ten years later in 1903, North Carolina became the first state to pass legislation for permissive licensure and by 1923, all 48 states had permissive licensure legislation (Adventure of the American Mind, 2007). This licensure protected the title of registered or practical nurse, but not the term, "nurse." In 1947, New York became the first state to make mandatory nursing licensure law and today all 50 states and United States territories require mandatory licensure of nurses in the state of practice (Adventure of the American Mind, 2007).

Factors that Influence National Council Licensure Examination® Success

A full range of strategies have been implemented by nursing education programs to promote National Council Licensure Examination (NCLEX®) success for first time test takers. Remediation, tutoring, predication, and progression policies have been used, in various combinations, with success by multiple nursing education programs leading to increased first-attempt pass rates (Morton, 2006, Davenport, 2007, Norton, et al., 2006, Herrman & Johnson, 2009, Bonis, Taft, & Wendler, 2007, Lyons, 2008, & McDowell, 2008). Nursing education

programs have also identified pre-admission courses, within-program coursework, and final

grade point average (GPA) to identify those students deemed at risk for NCLEX® examination

failure (Haas, Nugent & Rule, 2004, Daley, Kirkpatrick, Frazier, Chung, Moser, 2003, Uyehara,

Magnussen, Itano, & Zhang, 2007) . The literature reveals a wealth of information related to

registered nursing education program strategies for NCLEX® examination success, however,

there was a gap in information related to practical nursing education program strategies for

NCLEX® examination success.

Multifaceted Strategies

      Several nursing programs offer students tutoring and as noted by Morton (2006), students

within the nursing education program that chose to use the structured learning assistance (SLA)

were those that were already doing well in their coursework. When the first time pass rates

within the program Morton (2006) identified in the study, fell to 65%, an NCLEX-RN®

Taskforce was initiated to determine the problem areas that contributed to the poor performance

on the examination. It was determined that students who had poor academic performance were

not identified early in the program as at-risk and no remediation plans were in place. The

university had SLA workshops in place, but they were not in the areas of nursing content or

NCLEX-RN® examination preparation. The NCLEX-RN® Taskforce put steps into place to

identify the students who were deemed at-risk and made it mandatory for those students to attend

workshops for two to four extra hours a week that were focused on nursing content and NCLEX-

RN® examination preparation. After implementing these changes, within two years the

university saw an increase in there NCLEX-RN® examination pass rates for first time test takers

from 65% to 92% (Morton, 2006). This study identifies one approach used to meet the mandated

first-time pass rates.

Many programs have implemented multifaceted strategies that include the use of

standardized examinations. A Midwestern Associate of Science in nursing education program

with approximately 300 students implemented a comprehensive plan to improve the success of

its students on the NCLEX-RN® examination (Davenport, 2007). Freshmen were introduced to

the plan early in the first semester of the nursing education program. The following strategies

were implemented:

- Provided content-specific computerized assessment examinations

- Offered test-taking strategies

- Used learning style inventory

- Analyzed test items for match with NCLEX-RN® format

- Required set number of practice NCELX-RN® test items

- Shared NCLEX-RN® preparation resources via online Blackboard® posting

- Used study guide questions for NCLEX-RN® practice

- Promoted use of study groups

- Hosted national review course

- Used NCLEX-RN® advising check-off form (Davenport, 2007, p. 32)

The students met with their faculty advisors in the final semester of the program to complete the

check-off form that identified the areas that needed further direction. The challenge for faculty

was that with approximately 300 students, it was difficult to provide individualized plans and

directions for students who did not meet the mandated benchmark scores (Davenport, 2007).

Georgetown University School of Nursing and Health Sciences implemented a successful

multifaceted program to increase NCLEX-RN® examination first-time pass rates (Norton, et al.,

2006). Initiatives included changes to academic policy, a newly designed remediation course,

curricular revisions, and competency testing. The competency testing included the ATI®

content-specific examinations and the RN Comprehensive Predictor® examinations. The results

of the content-specific examinations were used to determine students' potential risk status and

enrollment in the remediation program. Students were allowed to repeat the RN Comprehensive

Predictor® examination up to three times to achieve the minimum score of 64% to 65% score that

was required for graduation. Because multiple strategies were implemented by this school of

nursing it was impossible to determine which had the greatest contribution to NCLEX-RN®

examination success (Norton, et al., 2006).

Herrman and Johnson (2009) discussed the steps taken by the University of Delaware to

ensure that graduates had obtained the best preparation for NCLEX-RN® examination success.

One of the steps was a change to the curriculum that included a final year of clinical immersion

that included two seminars. The first semester seminar focused on the professional clinical

development necessary for success in nursing practice. The first seminar included information

about general test taking skills, decision-making and priority setting. Students were required to

complete more than 1500 NCLEX-RN® examination style questions in all content areas using

standardized computer examinations. Students received rationales for incorrect responses that

they were able to print to use to develop individual personal study plans. The second seminar

was given right before graduation and focused on study skills and NCLEX-RN® preparation

(Herrman & Johnson, 2009). The strategies outlined here led to an increase in the first-time pass

rate.

As evidenced by research conducted by McQueen, Shelton, and Zimmerman (2004),

faculty play a key role in preparing students academically and in building their confidence. In

this nursing education program, students were assigned to a faculty advisor that assisted in

identifying and assessing their assigned students' academic concerns and psychosocial needs.

The faculty advisors developed a portfolio that was a collection of tests, test results and study

plans. Each student was assigned to a "family" that consisted of a group of five to six students

and one faculty member that acted as the "other-mother." The family worked together taking

test questions, sharing ideas and test taking strategies, while supporting each other to build

confidence. The students adopted a 100% rule for attendance at meetings that occurred outside

of class time and each family celebrated or supported the other members when the need arose.

When faculty noticed that students were tired or stressed, they had "play" days where they

played music and completed arts and crafts projects to bring everyone back together and refocus

on the goal of NCLEX-RN® examination success (McQueen, Shelton, & Zimmerman, 2004).

This approach resulted in an increase in pass rates for graduates taking the examination for the

first time.

    The various strategies that are implemented in nursing education programs to promote

NCLEX-RN® examination success need to be evaluated for effectiveness to identify the methods

that lead to success. Bonis, Taft, and Wendler (2007) identified the ACE Star Model of

Knowledge Transformation to determine the success of the strategies implemented. This model

links research closely with educational practice that incorporates evidence-based practice to

evaluate effectiveness. The Knowledge Transformation Model moves through discovery,

summary, translation, integration, and evaluation (Bonis, Taft, & Wendler, 2007). The discovery

phase begins with gathering new knowledge to begin research to promote NCLEX-RN®

examination success. Strategies that have been implemented include test-taking strategies, study

groups, review courses, self-assessment and anxiety-reduction techniques. Comprehensive

examinations, including National League for Nursing (NLN) Achievement Tests®, the HESI Exit

Exam® and the Mosby AssessTest® were used to assess preparedness. Summary is the act of

evaluating the research studies that were located in the discovery phase. A correlation between

standardized examinations and success on the NCLEX-RN® examination were noted in the

research, but there was no consistency in the types of examinations administered. Of the

students who were unsuccessful on the examination, the self-identified factors that contributed to

failure were inadequate study habits, difficulty in setting priorities, poor test-taking skills, and

lack of knowledge in how to prepare (Bonis, Taft, & Wendler, 2007). Educational strategies

were identified during the translation phase and during integration, the appropriate changes were

incorporated into the program to facilitate success. These changes included an RN assessment

test that was required at the end of the first semester, during the last year of study and reading

assignments related to test-taking tips and simulated NCLEX-RN® examinations that were

administered within the last six weeks of the nursing program. Also, a faculty developed survey

was given by the nursing education program to 94 graduates over two semesters following the

NCLEX-RN® examination by the nursing education program. Of the 94 surveys sent out, 59

were returned and all, but one, passed the examination on their first attempt. During the

evaluation, the results of the new group were compared to the former group to determine if the

steps implemented were effective. Of the three cohorts that were researched immediately prior

to the strategies being implemented, they identified a first-time pass rate ranging from 83.87% to

87.76%. The second group of cohorts, after strategies were implemented, indicated a first-time

pass rate ranging from 89.74% to 94.81% (Bonis, Taft, & Wendler, 2007). This indicated that

the strategies implemented were successful in raising the NCLEX-RN® examination scores for

this program.

Many educational programs have implemented NCLEX-RN® review courses as part of their strategies to improve first-time pass rates. Lyons (2008) conducted a study with 54 students to determine the best method to deliver NCLEX-RN® review courses. Twenty-seven, fourth semester nursing students were enrolled in a traditional lecture style review course and 27 fourth semester nursing students were placed in a group that received 12 problem-based learning (PBL) case scenarios on topics that followed the NCLEX-RN® test blueprint. Those that participated in the PBL group completed the case study scenarios while working in a group setting, using textbooks and other resources to collaborate on the solutions. All participants were given pre-treatment and post-treatment tests on the Assessment Technologies Institute® (ATI®) Critical Thinking Test®. It was discovered that the students who participated in the PBL group scored higher on the ATI® Critical Thinking Test® and were more likely to pass the NCLEX-RN® examination on the first attempt (Lyons, 2008). This suggests that problem-based learning has a positive impact on critical thinking and passing the NCLEX-RN® examination on the first attempt.

Traditional review courses focus on the review of content instead of the process of effective test-taking skills (McDowell, 2008). McDowell (2008) lists the Knowledge base, Anxiety control, Test-Taking Skills (KATTS) framework as focusing on all three components to prepare students for success on the NCLEX-RN® examination. During the knowledge based section of the program, the focus is on completing an individual study plan and taking nursing content tests to identify areas of strengths and weaknesses. Anxiety can serve as a motivator but too much anxiety can cause students to question their knowledge and ability. Strategies taught during the KATTS programs include stress management and positive thought. Test-taking skills include completing 2,000 to 2,500 questions for all students and 3,000 to 4,000 questions for

those deemed at-risk. During the six years that were studied, the pass rates rose from 77% to

97% for first-time test takers (McDowell, 2008). It is believed that the strategies taught during

the KATTS program resulted in the increased first-time pass rate.

Predictors

Many areas have been identified in the research that indicates predictors for NCLEX-

RN® examination success. Frith, Sewekk, and Clark (2008) found that when a nursing program

experienced a significant reduction in first-attempt pass rates, the faculty typically analyzed the

student information to determine if correlations existed that were similar to those identified in the

literature. In the nursing education program that was studied by Frith, Sewekk, and Clark

(2008), of the 2001 graduating class of 67 students, 51 passed the NCLEX-RN® examination and

16 failed the NCLEX-RN® examination. When the various data from the student records were

researched, it was noted that the mean cumulative grade point average (GPA) for the graduates

that were successful on the NCLEX-RN® examination was 3.14 on a four-point scale and the

GPA for those that were unsuccessful was 3.07; although there was a difference, it was not

statistically significant (Frith, Sewekk, & Clark, 2008). The students were given the Mosby

AssessTest®, a paper and pencil exit examination and there was a weak correlation between that

examination and the students' SAT® scores. This nursing education program also administered

the NLN Achievement Tests® throughout the program and that had the highest correlation to the

Mosby AssessTest® and NCLEX-RN® success. The faculty believed that they would be able to

identify at-risk students by their performance on the NLN Achievement Tests®. It was also

determined that it would be beneficial to switch from the Mosby AssessTest® to a computer-

based examination that would provide rationale for correct and incorrect answers and gave

immediate feedback to the students. The HESI Exit Exam® was believed to meet those needs

and was selected by the faculty. A review course was included in the curriculum and was designed to support, motivate, and test students to prepare them for both the HESI Exit Exam[®] and NCLEX-RN[®] examination. After implementation of the above strategies, there was a marked increase in first-time pass rates.   Graduates from the spring 2002 cohort had an 83% pass rates. All other cohorts through 2005 had pass rates that exceeded 90% pass rate (Frith, Sewekk, & Clark, 2008). The study was unable to determine which intervention had the greatest impact on the pass rate results or if the increase was a result of both interventions.

Many studies have suggested strategies that impact the NCLEX-RN[®] examination pass rate, but few have identified statistical correlations related to implementation of those strategies. Haas, Nugent, and Rule (2004) found a statistical difference in the nursing cumulative grade point average (GPA) successful NCLEX-RN[®] test takers, they had a GPA approximately 0.3 point higher than those test takers that failed the examination. Daley, Kirkpatrick, Frazier, Chung, and Moser (2003) have identified two factors that were significantly correlated with success on the NCLEX-RN[®] examination as the final course grade in the senior-level medical-surgical nursing course and cumulative program grade point average. Significant correlations were identified by Uyehara, Magnussen, Itano, and Zhang (2007) between the nursing GPA and NCLEX-RN[®] along with the course grades in the Fundamentals course.

Of the identified predictive data for NCLEX-RN[®] examination success, critical thinking skills were not positively correlated with success. Giddens and Gloeckner (2005) completed a study where students were given the California Critical Thinking Skills Test[®] (CCTST) and the California Critical Thinking Disposition Inventory[®] (CCTDI) at entry into the program and again at exit from the program. No differences were seen in the scores between the two administrations of the examinations. The scores did not appear to have an impact on NCLEX-

RN® examination performance. Thus the critical thinking ability in the pre- and post-tests appeared to be unchanged.

It is believed, by many nursing education programs, that there is a relationship between specific courses and NCLEX-RN® examination success. According to Higgins (2005), a relationship was identified between grades in the prerequisite course in two biology courses, pre-admission test scores in science courses, and the nursing skills course. This suggests that identifying the at-risk students early in the program will allow for intervention and referral for study skills and remediation. The study also identified a relationship between the Health Education Systems, Incorporated® (HESI®) Exit Exam® score and successful performance on the NCLEX-RN® examination.   Upon completion of the HESI Exit Exam®, the areas of weakness were identified and faculty had the opportunity to work with students to develop a remediation plan before they took the NCELX-RN® examination.

One recurring theme found in the majority of the literature was that remediation programs are a standard component to preparing students for the NCLEX-RN® examination. One study, completed by Sifford & McDaniel in 2007, in a baccalaureate nursing education program, identified 47 students as at-risk for failure on the NCLEX-RN® examination based on the results of a commercial exit examination. The at-risk students were placed in a 15-week remediation course that included test-taking strategies and weekly exercises such as narrowing options and anxiety reducing activities. The students were, again, given the exit examination and a significant improvement was noted, including an increase of the NCLEX-RN® examination first-attempt pass rate (Sifford & McDaniel, 2007). A research study completed by Heroff (2009) targeting remediation also identified an increase in pass rates after students completed remediation coursework. According to the study completed by Morrison, Free, and Newman

(2002), five schools of nursing were evaluated based on the NCLEX-RN® examination pass rates

after implementing remediation policies. A nine to 41% increase in the NCLEX-RN® was found

within two years. It should be noted that the five schools also implemented progression policies

based on the HESI Exit Exam® scores. Students were not allowed to move through the course

until a mandated benchmark score was obtained on this examination (Morrison, Free, &

Newman, 2002). This leads to the assumption that the HESI Exit Exam® was an accurate

predictor of success on the NCLEX-RN® examination.

One commonality found in the literature was the use of commercially available computer

based examinations. The most widely used products in nursing programs are products developed

by Assessment Technologies Institute® (ATI®) and HESI®. Both companies provide specialty

tests that are administered throughout the educational program and exit examinations that are

given at the end of the program. Increasingly, these specialty examinations are being used to

determine progression in nursing programs in an attempt to ensure mastery of critical nursing

content (Mosser, Williams, & Wood, 2006). The HESI Exit Exam® is currently being used as a

predictor for NCLEX-RN® examination success by several nursing education programs,

however, other interventions are also used, and therefore it is unclear if the other strategies

implemented by the nursing education programs contributed to the predictability of the HESI

Exit Exam®.

The ability to predict with some accuracy which students would benefit from additional

preparation for the NCLEX-RN® examination is a goal of many nursing education programs.

The HESI Exit Exam® is used by many nursing education programs to predict success by setting

a benchmark score. Of the six serial and longitudinal studies that have been completed by

Adamson and Britt (2009), it has been shown that students who receive a score of 850 or higher

on the HESI Exit Exam® have a 95% probability of success on the NCLEX-RN® examination

(Nibert, Young, & Adamson, 2002). The HESI Exit Exam's® validity and reliability have been

determined in multiple studies completed by HESI® for registered nursing students; the

examination biserial correlation coefficient is recalculated each time the test is administered

(Newman, Britt, & Lauchner, 2000, Nibert & Young, 2001, Nibert, Young, & Britt, 2003,

Morrison, Adamson, Nibert, & Hsia, 2004). In a study by Spurlock and Hunt (2008), a nursing

program that used a benchmark score from the HESI Exit Exam® as a progression requirement

for graduation found that the scores did not match the NCLEX-RN® examination pass rates

expected. Students were allowed to repeat the HESI Exit Exam® until they received the

benchmark score of 900 set by the school. This study determined that the predictability of the

HESI Exit Exam® was valid and reliable only when the examination was administered once or

the first score was used to determine the first-time pass probability of the NCLEX-RN®

examination. Daley, Kirkpatrick, Frazier, Chung, and Moser (2003) identified remediation

focused on the areas of weakness as identified by the HESI Exit Exam® did have a positive

impact on the first-time pass rates for graduates. Studies have shown that the HESI Exit Exam®

added value and was useful to determine readiness for the NCLEX-RN® examination (Morris &

Hancock, 2008).

Lavandera et al., (2011) conducted a study to evaluate the variable of nursing grade point

average (GPA), graduates who received one or more D or F grades in a nursing, science, or math

course, and the score on the HESI Exit Exam® averaged over all attempts. Lavandera et al,

(2011) found that the HESI Exit Exam® was a statistically significant predictor for success on the

NCLEX-RN® examination and predicting failure was statistically insignificant. It was also noted

that earning one D or F in a nursing, science, or math course increased the probability of failure

from 6% to 25%. It was concluded that identifying "at-risk" students using academic

performance and the HESI Exit Exam® score was the most accurate (Lavandera et al, 2011).

Simon, McGinniss, and Krauss (2013) researched the variables that best predict success on the

NLN® readiness examination to determine those most likely to be successful on their first-

attempt NCLEX-RN® examination. The researchers found that the first nursing courses, Adult

Health Nursing and Maternal-Child Health Nursing were critical for NLN® readiness

examination (Simon, McGinniss, & Krauss, 2013).

Nursing education programs take many steps in an attempt to ensure that graduates are

prepared to sit for the NCLEX-RN® examination and be successful, but researchers have also

found that external factors also play a part in the success and/or failure on the examination. In

some nursing programs, students are encouraged to complete a self-assessment to identify the

areas of their life that may alter their focus and place them at risk for failure on the NCLEX-RN®

examination (Stark, Feikema, & Wyngarden, 2002). A factor that has been identified as placing

successful NCLEX-RN® examination results at risk is graduates who delay taking the

examination. The longer the wait or lag time is between graduation from nursing school and first

attempt on the NCLEX-RN® examination has shown to decrease the likelihood that the attempt

will be successful (Woo, Wendt, & Liu, 2009). Research shows that some graduates that are

expected to be successful fail the examination. A study by Rollant (2007) suggested that this

may be because some nursing programs believe that just knowing the content is enough to pass

the NCLEX-RN® examinations and students do not need critical thinking skills or the ability to

transfer learning.

Nursing schools take many steps in an attempt to ensure that they adequately prepare

their graduates for success on the NCLEX-RN® and NCLEX-PN® examinations. Schools often

use the National Council of State Boards of Nursing's (NCSBN®) detailed information from the practice analysis to prepare students (Aucoin & Treas, 2005). The practice analysis provides educators with information about the skills and knowledge base that graduates are expected to have when entering into practice. This information not only assists with the proper education for NCLEX-PN® examination success, but will possibly enhance the nurse's ability to practice in their first job. Candela and Bowles (2008), in a study done to determine the importance of this concept, found that the new nurses believed that there was more focus on preparing them for the NCLEX-RN® examination than there was to prepare them for practice. By identifying the NCLEX-PN® examination preparation that leads to success on the examination, additional focus can be placed on preparing graduates for practice.

ATI® Standardized Examination

The PN Comprehensive Predictor® examination provides a numeric value that indicates the likelihood of passing the NCLEX-PN® examination the first time and guides students' remediation based on the content of the items they missed. The examination is administered to students at or near the completion of the practical nursing program and are provided a list of topics related to missed items and a numeric indication of NCLEX-PN® examination readiness. Individual numeric scores and the predicted probability of passing the NCLEX-PN® examination are supplied in a table, by percentage, to guide the students and educators determine remediation and preparation activities. The probability of passing the NCLEX-PN® examination and the predictor score is related to the students' first-attempt of the examination (Assessment Technologies Institute, 2011).

The PN Comprehensive Predictor®, a 180-item examination that assesses the students' comprehension and mastery of the basic principles nursing, over a maximum of 180 minutes.

The examination includes the nursing principles of fundamentals, pharmacology, adult medical-surgical, maternal newborn care, mental health, care of children, nutrition, and management. The percentage of questions from each major category aligns with the NCLEX-PN® Client Need Categories blueprint identified by NCSBN®. The NCLEX-PN® Client Need Categories are coordinated care, safety and infection control, health promotion and maintenance, psychosocial integrity, basic care and comfort, pharmacological and parenteral therapies, reduction of risk potential, and physiological adaption (National Council of State Boards of Nursing, 2011). The test will generate an Individual Score, Predicted Probability to Pass NCLEX-PN®, and National and Program means (Assessment Technologies Institute, 2011).

Chapter Summary

There are many interventions that schools of nursing use to promote NCLEX-RN® examination success. The literature identifies the various methods used, but fails to specify which interventions result in an increase in the pass rates (DiBartolo & Seldomridge, 2005). The literature has been scrutinized to determine which interventions actually enhanced the pass rates and which had no impact. Missing in several of the studies were the data that indicated the sample size of the participants or the overall pass rate. Also, it is important to note that there is a dearth of research on interventions that promote NCLEX-PN® examination success.

CHAPTER III: METHODS AND PROCEDURES

This chapter presents the methods and procedures that were used in this study. In addition, the sample size and data collection procedures are discussed, as well as methods used to analyze the data.

Research Design

Quantitative research design began in the late 19th century, as a way to correlate and relate two or more ideas. Retrospective correlation quantitative design measures the degree of association between two or more variables using a statistical procedure (Creswell, 2008). Retrospective studies are conducted using data that has already been collected. Correlation analysis is used to determine if the results reveal a relationship between a two or more variables and an effect. The measurement provides the researcher with a level of certainty that a relationship is quantifiable (Houser, 2012). Houser (2012) states that an independent variable is an intervention that is introduced to determine its impact on a specific outcome.

The independent variable in this research study was the ATI® PN Comprehensive Predictor® standardized examination percentage score that was administered during the practical nursing education program. The dependent variable is the NCLEX-PN® examination result. The statistical procedure of logistic regression was used to analyze the data for this study. Logistic regression is a statistical method that identifies the best combination of independent variables that predicts the dependent variable (Mertler & Vannatta, 2010).

Logistic regression is used to classify individuals into groups. As an extension of multiple regression, logistic regression allows for a categorical dependent variable. Logistic regression is used as an alternative to discriminant analysis when the goal is to predict the value of a dependent variable that is categorical. The value that is predicted with logistic regression is

the probability of a particular outcome for each subject involved; that ranges from zero to one (Mertler & Vannatta, 2010). In logistic regression, all independent variables are entered into analysis independently to determine which specific, independent variable, makes a meaningful contribution to the overall prediction (Mertler & Vanatta, 2010). For this study, logistic regression was used to determine the smallest group of variables that account for the dependent variable (LoBiondo-Wood & Haber, 2002). This purpose of the research study was to determine if there was a the relationship between the independent variable, the PN Comprehensive Predictor® examination individual percentage score and the dependent variable, the first-attempt NCLEX-PN® examination result, pass or fail.

Identification of Sample

This study was comprised of student data collected from January 2010 through December 2012 from a large, proprietary school of nursing that has 13 practical nursing education programs in urban and rural areas. The possible study population was 1738 practical nursing education program graduates. Each campus-based program follows the same curriculum that includes standardized testing. Graduates who did not take the PN Comprehensive Predictor® examination and those who did not complete the examination in the pre-determined sequencing were excluded from the study. Only graduates with first attempt data were included in the study. The study participants were selected from a well-defined, intact group as recommended by Creswell (2008).

Logistic regression studies require a large number of observations to determine if there is a statistically significant relationship between the dependent and the independent variables. Sample size formulas are available to calculate the proper size of the sample, based upon the number of independent variables (Creswell, 2008). A sample size calculator was used to

determine the minimum number of observations needed to determine if a significant relationship

existed between the independent variables and the dependent variable. With one independent

variable, a minimum sample of 162 was needed for significance level of, alpha 0.01 (Creative

Research Systems, 2010). The significance level or level of significance is the probability of the

results of the study being accurate (Mertler & Vanatta, 2010).

Demographics

The 13 campus based practical nursing education programs are located in various cities

across the United States. The campus location was coded by a letter and was not disclosed to the

researcher. The only demographic variable included in the study was age. Age was represented

as a numeric value at the time of admission to the program. The collected demographic was not

used for the purpose of this study, but was collected for evaluation to determine if a trend was

noted that could be the subject for future research. The subject's gender, race/ethnicity, grade

point average (GPA), admission criteria, and prior academic experience were not gathered for

the purpose of this study.

Data Gathering Tools

Data was recorded using a prepared Excel® spreadsheet that contained sections for the

coded location letter for the nursing program, the student's age, PN Comprehensive Predictor®

examination score, and date the PN Comprehensive Predictor® examination was taken. The

National Director of Nursing of a large, proprietary, educational institution where practical

nursing programs are located gathered the data by campus location on the provided spreadsheet.

The Excel® spreadsheet included 13 pages that were titled Campus A to Campus M to

differentiate the various campus locations without disclosing identity of the locations.

Data Gathering Procedures

Data collection was limited to encrypted graduate data that contained the scores of

Assessment Technology Institutes® standardized examinations taken and the students' result on

the NCLEX-PN® examination. To obtain this information, a spreadsheet had been developed

that allows the National Director of Nursing to place the requested information. The National

Director of Nursing is the title used by this large, proprietary school of nursing for the person

that oversees all campuses where nursing education programs are held. The researcher provided

the training for the correct procedure for data collection. The National Director of Nursing was

compelled to assign a designee to gather the data and the researcher completed training with the

designee. The National Director of Nursing of the practical nursing programs was contacted, and

the spreadsheet requested with graduate names removed and a numerical value placed for

identification. A letter was assigned to identify the campus to separate the data and is not known

to the researcher. Incomplete data sets were verified by the National Director of Nursing before

exclusion decisions were made.

Data Analysis

The data management and analysis tool, Statistical Package for the Social Sciences,

produced by IBM® was utilized to perform the logistic regression to measure the relationship

between the independent variable and the dependent variables (IBM, n.d.). Data was checked for

outliers and missing data. Logistic regression was selected to determine the extent of

predictability of the independent variable, the PN Comprehensive Predictor® examination score,

on the dependent variable, the first-attempt NCLEX-PN® examination results. The independent

variable, the PN Comprehensive Predictor® examination score was entered as a percentage score.

The dependent variable, the first-attempt NCLEX-PN® examination results which is nominal

data, was entered as pass (1) or fail (0).

Data Quality Measures

   PN Comprehensive Predictor®. This 180-item examination assesses students' content

mastery of basic principles including fundamentals of nursing, pharmacology, adult medical-

surgical nursing, maternal newborn care, mental health nursing, nursing care of children,

nutrition, and management. The examination is based on the NCLEX-PN® Detailed Test Plan

that aligns with the knowledge, skills, and abilities needed for an entry-level practical nurses.

The percentage of questions from each NCLEX® Client Need Category is similar to the

percentage of questions on the NCLEX-PN® examination. The NCLEX® Client Need

Categories are coordinated care, safety and infection control, health promotion and maintenance,

psychosocial integrity, basic care and comfort, pharmacological and parenteral therapies,

reduction of risk potential, and physiological adaptation (Assessment Technologies Institute,

2011).

   The purpose of PN Comprehensive Predictor® examination is to provide a numeric

indication of the likelihood of students' passing the NCLEX-PN® examination given the

student's current level of readiness (Assessment Technologies Institute, 2011). The norming

phase of the PN Comprehensive Predictor® examination occurred in Spring 2011. Sixty-five

practical nursing programs, from across the country, volunteered to administer the examination

to their students who were approaching graduation as part of the norming phase. A total of 1680

students, took the examination and were asked if their first-attempt NCLEX-PN® examination

results could be shared with ATI®. Complete data was obtained for 898 students. Logistic

regression was completed on a representative sample of 804 students, resulting in statistical

significance that a relationship existed between the PN Comprehensive Predictor® and NCLEX-

PN® examination results. Each student's individual PN Comprehensive Predictor® examination

score was associated with the probability of passing the NCLEX-PN® examination (see table 1)

(Assessment Technologies Institute, 2011).

Table 1: Expectancy Table

PN Comprehensive Predictor® Individual Score	Predicted Probability of Passing the NCLEX-PN®
80.0%-100%	99%
77.3%-79.3%	98%
75.3%-76.7%	97%
73.3%-74.7%	96%
71.3%-72.7%	94%-95%
68.7%-70.7%	91%-93%
66.7%-68.0%	88%-90%
64.7%-66.0%	84%-86%
63.3%-64.0%	80%-82%
61.3%-62.7%	74%-78%
56.7%-60.7%	57%-72%
0.0%-56.0%	1%-54%

Ethical Considerations

Permission to use graduate data was granted by the National Director of Nursing of the

large, proprietary, educational institution where practical nursing programs are located

(Appendix A). To protect the student/graduate information, all names were removed from the

data and replaced with a number before they were recorded on the Excel® spreadsheet and given

to the researcher. Each campus was identified only by a letter and the letter from A to M on the

spreadsheet to maintain privacy of the campus location. The master spreadsheet containing the

data was maintained on a flash drive that was stored in a locked file cabinet that can be accessed

only the principle researcher. Data loaded on the password protected personal computer of the

researcher. Data will be maintained for seven years after the conclusion of the research study on

a flash drive that will stored in a locked file cabinet and then destroyed.

Institutional Review Board

An application was submitted to the College of Saint Mary's Institutional Review Board

(IRB) to request permission to complete the research study. An exempt review was requested as

the research planned to use encrypted retrospective data that did not contain campus or graduate

identifiers. Data was not gathered until Institutional Review Board approval was obtained from

College of Saint Mary and the institution from which the data was obtained.

Chapter Summary

Logistic regression was used to classify individual into groups when a dependent variable

is categorical. The purpose of this study was to predict membership in one of two groups,

NCLEX-PN® examination pass or fail results. The result of this study may have a positive

impact on practical nursing education programs and will provide information about preparation

of practical nursing program graduates for the NCLEX-PN® examination.

CHAPTER IV: RESULTS

This chapter discusses the methods used to analyze the data, data results for the research question, and a summary of significant findings.

Introduction

The purpose of this retrospective correlational study was to determine if there is a relationship between results of the individual percentage scores obtained from the PN Comprehensive Predictor® Assessment Technologies Institute® (ATI®) examination to first attempt National Council Licensure Examination- Practical Nurse® (NCLEX-PN®) for graduates from January 2010 through December 2012 at 13 campuses of a large, proprietary, educational institutions where practical nursing is taught. The study examined the correlation between students' individual percentage scores of the PN Comprehensive Predictor® examination and their first-attempt NCLEX-PN® examination results.

The National Council Licensure Examination® (NCLEX®) is used to license both practical/vocational and registered nurses in all 50 states, the District of Columbia, and eight United States territories. The PN Comprehensive Predictor® examination is given at or near the end of practical nursing education programs to students who will graduate and take the NCLEX-PN® examination (Assessment Technologies Institute, 2011). The purpose of this PN Comprehensive Predictor® examination is to provide a numeric score that indicates the probability of graduates passing the NCLEX-PN® examination on their first-attempt. The PN Comprehensive Predictor® examination is based on the NCLEX-PN® Detailed Test Plan that aligns with the knowledge, skills, and abilities needed for entry-level practical nurses. The percentage of questions students see on the PN Comprehensive Predictor® examination from

each NCLEX® Client Need Category is similar to the percentage of questions graduates see on their NCLEX-PN® examination (Assessment Technologies Institute, 2011).

Sample Details

This study was comprised of student data collected from January 2010 through December 2012 from a large, proprietary school of nursing that has 13 practical nursing education programs located in urban and rural areas. The potential study population was 1738 practical nursing education program graduates. Each campus-based program followed the same curriculum that includes standardized testing. Graduates that did not take the PN Comprehensive Predictor® examination and those that did not complete the examination in the pre-determined sequencing were excluded from the study. Only graduates with first attempt data were included in the study and 1668 graduates met the study criteria.

Data Gathered

Data was collected from 13 campuses of a large, proprietary, educational institution with practical nursing graduates. Complete data sets were collected from 1668 graduates, 1411 graduates successfully passed NCLEX-PN® examination on their first attempt and 257 failed the examination, (Table 15). Individual campuses are identified by Campus A through Campus M and specific details follow.

Campus A. Of the 142 graduates from Campus A who were included in the research study, 119 successfully passed the NCLEX-PN® examination on their first attempt and 23 failed the examination. The PN Comprehensive Predictor® examination scores for the graduates from Campus A who were successful on the examination ranged from 22.67% to 84.67%, with an average of 68.27%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 42% to 76%, with an average of 61.78% (Table 2).

Table 2: Campus A NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus A	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	119	22.67%-84.67%	68.27%
Fail	23	42%-76%	61.78%

Campus B: Of the 38 graduates from Campus B who were included in the study, 36 graduates successfully passed NCLEX-PN® examination on their first attempt and two failed the examination. The PN Comprehensive Predictor® examination scores for graduates who were successful on the examination ranged from 60% to 86% with an average of 72.89%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 58.67% to 68.67%, with an average of 63.66% (Table 3).

Table 3: Campus B NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus B	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	36	60%-86%	72.89%
Fail	2	58.67%-68.67%	63.66%

Campus C: Of the 118 graduates from Campus C who were included in the research study, 108 successfully passed the NCLEX-PN® examination on their first attempt and 10 failed the examination. The PN Comprehensive Predictor® examination scores for graduates who were successful on the examination ranged from 35.33% to 82% with an average of 69.68%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 52.67% to 74.67%, with an average of 65.27% (Table 4).

Table 4: Campus C NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus C	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	108	35.33%-82%	69.68%
Fail	10	52.67%-74.67%	65.27%

Campus D: Of the 99 graduates from Campus D who were included in the research study, 97 successfully passed the NCLEX-PN® examination on their first attempt and two failed the examination. The PN Comprehensive Predictor® examination scores for graduates who were successful on the examination ranged from 60% to 87.33% with an average of 71.96%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 62% to 67.33%, with an average of 64.67% (Table 5).

Table 5: Campus D NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus D	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	97	60%-87.33%	71.96%
Fail	2	62%-67.33%	64.67%

Campus E: Of the 98 graduates from Campus E who were included in the study, 93 successfully passed the NCLEX-PN® examination on their first attempt and five failed the examination. The PN Comprehensive Predictor® examination scores for graduates who were successful on the examination ranged from 58% to 82% with an average of 70.49%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 63.33% to 74%, with an average of 66.53% (Table 6).

Table 6: Campus E NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus E	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	98	58%-82%	70.49%
Fail	5	63.33%-74%	66.53%

Campus F: Of the 248 graduates from Campus F who were included in the study, 170 successfully passed the NCLEX-PN® examination on their first attempt and 78 failed the examination. The PN Comprehensive Predictor® examination scores for successful graduates ranged from 56% to 85.33% with an average of 69.01%. The PN Comprehensive Predictor® examination scores for unsuccessful graduates ranged from 40% to 80%, with an average of 62.83% (Table 7).

Table 7: Campus F NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus F	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	170	56%-85.33%	69.01%
Fail	78	40%-80%	62.83%

Campus G: Of the 128 graduates from Campus G who were included in the study, 117 successfully passed the NCLEX-PN® examination on the first attempt and 11 failed the examination. The PN Comprehensive Predictor® examination scores for graduates who passed the examination ranged from 56.67% to 86.67% with an average of 69.95%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 44.67% to 69.33%, with an average of 58.59% (Table 8).

Table 8: Campus G NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus G	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	117	56.67%-86.67%	69.95%
Fail	11	44.67%-69.33%	58.59%

Campus H: Of the four graduates from Campus H who were included in the study, all four successfully passed the NCLEX-PN® examination on their first attempt. The PN Comprehensive Predictor® examination scores for graduates who passed the examination ranged from 61.33% to 70% with an average of 66.67% (Table 9).

Table 9: Campus H NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus H	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	4	61.33%-70%	66.67%
Fail	0	NA	NA

Campus I: Of the100 graduates from Campus I who were included in the study, 87 successfully passed the NCLEX-PN® examination on their first attempt and 13 failed the examination. The PN Comprehensive Predictor® examination scores for graduates who passed the examination ranged from 59.33% to 82% with an average of 70%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 46.67% to 66.67%, with an average of 61.13% (Table 10).

Table 10: Campus I NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus I	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	87	59.33%-82%	70%
Fail	13	46.67%-66.67%	61.13%

Campus J: Of the143 graduates from Campus J who were included in the study, 106 successfully passed the NCLEX-PN® examination on their first attempt and 37 failed the examination. The PN Comprehensive Predictor® examination scores for graduates who passed the examination ranged from 60.67% to 89.33% with an average of 77.49%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 56% to 86%, with an average of 75.75% (Table 11).

Table 11: Campus J NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus J	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	106	60.67%-89.33%	77.49%
Fail	37	56%-86%	75.75%

Campus K: Of the 113 graduates from Campus K who were included in the study, 90 successfully passed the NCLEX-PN® examination on their first attempt and 23 failed the examination. The PN Comprehensive Predictor® examination scores for graduates who passed the examination ranged from 50.67% to 84% with an average of 70.4%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 55.33% to 74.67%, with an average of 64.69% (Table 12).

Table 12: Campus K NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus K	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	90	50.67%-84%	70.4%
Fail	23	55.33%-74.67%	64.69%

Campus L: Of the 223 graduates who were included in the study, 205 successfully passed the NCLEX-PN® examination on their first attempt and 18 failed the examination. The PN Comprehensive Predictor® examination scores for graduates who passed the examination ranged from 52% to 83.33% with an average of 68.54%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 53.33% to 74.67%, with an average of 64.33% (Table 13).

Table 13: Campus L NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus L	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	205	52%-83.33%	68.54%
Fail	18	53.33%-74.67%	64.33%

Campus M: Of the 214 graduates who were included in the study, 179 successfully passed the NCLEX-PN® examination on their first attempt and 35 failed the examination. The PN Comprehensive Predictor® examination scores for graduates who passed the examination ranged from 54% to 86.67% with an average of 70.38%. The PN Comprehensive Predictor® examination scores for graduates who failed the examination ranged from 48.67% to 69.33%, with an average of 59.83% (Table 14).

Table 14: Campus M NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

Campus M	NCLEX-PN® Result	Range of PN Comprehensive Predictor® Score	Average PN Comprehensive Predictor® Score
Pass	179	54%-86.67%	70.38%
Fail	35	48.67%-69.33%	59.83%

The PN Comprehensive Predictor® examination scores for graduates who passed the

NCLEX-PN® examination ranged from 22.67% to 89.33%. The PN Comprehensive Predictor®

examination scores for graduates who failed the examination ranged from 40% to 86%. The

average score on the PN Comprehensive Predictor® examination for graduates who were

successful on the examination was 70.44% and the average score was 64.08% for those who

were unsuccessful on the examination.

Table 15: Summary of NCLEX-PN® Pass/Fail Results and PN Comprehensive Predictor®

by Campus

Campus	NCLEX® Pass	Pass Average PN Comprehensive Predictor® Score	NCLEX® Fail	Fail Average PN Comprehensive Predictor® Score
Campus A	119	68.27%	23	61.78%
Campus B	36	72.89%	2	63.66%
Campus C	108	69.68%	10	65.27%
Campus D	97	71.96%	2	64.67%
Campus E	93	70.49%	5	66.53%
Campus F	170	69.01%	78	62.83%
Campus G	117	69.95%	11	58.59%
Campus H	4	66.67%	0	NA
Campus I	87	70%	13	61.13%
Campus J	106	77.49%	37	75.75%
Campus K	90	70.4%	23	64.69%
Campus L	205	68.54%	18	64.33%
Campus M	179	70.38%	35	59.83%

Statistical Analysis

The research question was: Is there a relationship between the results of the individual

percentage score obtained from the PN Comprehensive Predictor® examination to first-attempt

NCLEX-PN® examination results for graduates from January 2010 through December 2012 at 13

campuses of a large, proprietary, educational institution where practical nursing programs are located? To test the hypothesis and determine if there is a relationship between results on the PN Comprehensive Predictor® examination and success or failure on the NCLEX-PN® examination for graduates of practical nursing programs taking the examination for the first time, logistic regression was completed using SPSS. Logistic regression was selected as the method of analysis because the dependent variable, passing or failing the NCLEX-PN® examination is dichotomous and the independent variables, the results on the PN Comprehensive Predictor® examinations were continuous (Mertler & Vanatta, 2010). The NCLEX-PN® examination results were coded as "1"= pass and "0"= fail. Logistic regression determined that the variable, results of the PN Comprehensive Predictor® examination did not significantly increase the ability to predict the pass/fail results on the NCLEX-PN® examination.

The 1668 complete data sets revealed that 1411 graduates or 84.6% passed the NCLEX-PN® examination the first time and 257 graduates or 15.4% failed the examination the first time (Table 16).

Table 16: Observed NCLEX-PN® Results

Number of Graduates		
Passed	1411	84.6%
Failed	257	15.4%

Logistic Regression

The logistic regression analysis of the data predicted that a total of 24 graduates would fail the NCLEX-PN® examination based on their scores on the PN Comprehensive Predictor®

examination and a total of 1644 graduates would pass the NCLEX-PN® examination based on their scores on the PN Comprehensive Predictor® examination (Table 17). The PN Comprehensive Predictor® examination results were 99.5% accurate in predicting success on the NCLEX-PN® examination and only 6.6% accurate in predicting failure on the NCLEX-PN® examination. Thus, the overall accuracy of the PN Comprehensive Predictor® examination was 85.2%. This result was based on the observed scores of the PN Comprehensive Predictor® examination and the results of the NCLEX-PN® examination. The analysis was based on the lowest PN Comprehensive Predictor® examination percentage score observed and the likelihood of which graduates would pass or fail the NCLEX-PN® examination.

Table 17: Predicted Results on the NCLEX-PN® Examination

Number of Graduates		
Predicted Pass	1644	99.5%
Predicted Fail	24	6.6%
Overall Accuracy of PN Comprehensive Predictor® Examination		85.2%

The variable, PN Comprehensive Predictor® examination results were added in SPSS. The Omnibus Tests of Model Coefficients gives a Chi-Square of 140.293 on a 1 *df*, and was significant beyond the $p < 0.05$ (Table 18) to test the null hypotheses. The step, block, and model results were identical due to the single variable of the PN Comprehensive Predictor® examination results added to the logistic regression model. Table 18 shows the test of the null hypothesis and indicates that adding the variable of the PN Comprehensive Predictor®

examination results to the model did not significantly increase the ability to predict the NCLEX-PN® examination results.

Table 18: Omnibus Tests of Model Coefficients

	Chi-square	*df*	Significance
Step	140.293	1	.000
Block	140.293	1	.000
Model	140.293	1	.000

Discriminant Analysis

For further analysis, discriminant analysis was completed to determine the accuracy of the cut score of the PN Comprehensive Predictor® examination. ATI® identified a cut score on the PN Comprehensive Predictor® examination of 66.7%-68% for a predicted 88%-90% probability of passing the NCLEX-PN® examination on their first attempt. An analysis of the data, incorporating the PN Comprehensive Predictor® examination cut score, predicted that a total of 498 graduates would fail the NCLEX-PN® examination and 1170 graduates would pass the NCLEX-PN® examination (Table 19). The PN Comprehensive Predictor® examination results were 76.4% accurate in predicting success on the NCLEX-PN® examination and only 23.6% accurate in predicting failure on the examination when the cut score was applied.

The discriminant analysis tested the results of the NCLEX-PN® examination, PN Comprehensive Predictor® examination scores, and the PN Comprehensive Predictor® examination numeric indicator scores of 66.7%, the level identified by ATI® as the minimum cut score to predict success (Table 19). Of the 1411 graduates who successfully passed the NCLEX-

PN® examination on their first attempt with PN Comprehensive Predictor® examination scores at

or above the 66% cut score, 1078 were predicated to pass NCLEX-PN® examination and 333

were predicted to fail the examination.   Of the 257 graduates who failed the NCLEX-PN®

examination on their first attempt with scores below 66%, 92 were predicted to pass the NCLEX-

PN® examination and 165 were predicted to fail the examination.

Table 19: Predicted Pass/Fail Group Membership According to PN Comprehensive

Predictor® Scores

Observed NCLEX-PN® Examination Results	Number of Graduates Predicted to Pass	Number of Graduates Predicted to Fail	Percentage Correct
Pass- 1411	1078	333	76.4%
Fail- 257	92	165	23.6%

Table 20 illustrates the relationship between the ranges of the observed scores on the PN

Comprehensive Predictor® examination and the actual results on the NCLEX-PN® examination.

The total number of graduates who passed or failed the examination were grouped according to

their PN Comprehensive Predictor® examination percentage scores. A score of 66%, as

determined by ATI®, is the required score to have for an 88% probability of passing the NCLEX-

PN® examination on the first-attempt. This probability was observed as correct for all graduates

who had scores above 66% except the 80 to 86% level, which had an 85.6% passing rate. It is

noted that the five graduates with PN Comprehensive Predictor® examination scores in the range

of 22.67% to 35.33% passed the NCLEX-PN® examination on their first attempt. These outliers

cannot be explained by the collected data.

Table 20: PN Comprehensive Predictor® Pass/Fail Cross Tabulation

PN Comprehensive Predictor Scores	Pass	Fail
86.67% and above	12 (100%)	0 (0%)
80-86%	107 (85.6%)	18 (14.4%)
75.33-79.33%	215 (96%)	9 (4%)
70-74.67%	419 (93.5%)	29 (6.5%)
66-69.33%	325 (90%)	36 (9.9%)
60-65.33%	267 (73.8%)	95 (26.2%)
56-59.33%	53 (54.6%)	44 (45.4%)
50.67-55.33%	8 (33.33%)	16 (66.67%)
40-49.33%	0 (0%)	10 (100%)
22.67-35.33%	5 (100%)	0 (0%)
	N-1411	N-257

Chapter Summary

The results of the data analyses answer the research question: Is there a relationship between results of the individual percentage score obtained from the PN Comprehensive Predictor® examination to first-attempt NCLEX-PN® examination results for graduates from January 2010 through December 2012 at 13 campuses of a large, proprietary, educational institution where practical nursing programs are located?

Logistic regression determined that the variable, PN Comprehensive Predictor® examination results did not significantly increase the ability to accurately predict the result of graduates on their NCLEX-PN® examination. Discriminant analysis indicated a 76.4%

probability of accurately predicting success on the NCLEX-PN® examination and a 23.6%

probability of accurately predicting failure on the NCLEX-PN® examination. A summary of the

findings, conclusions, implications, and recommendations will be discussed in the following

chapter.

CHAPTER V: DISCUSSION AND SUMMARY

Purpose of the Study

The purpose of this study was to determine if a relationship exists between the results of

the individual percentage score obtained from the PN Comprehensive Predictor® examination to

first-attempt NCLEX-PN® examination results for graduates from January 2010 through

December 2012 at 13 campuses of a large, proprietary, educational institution where practical

nursing programs are located. The research design selected for this study was logistic regression.

The results of the study indicated that the variable, students' scores on the PN Comprehensive

Predictor® examination, did not significantly increase the ability to predict the pass/fail results of

the NCLEX-PN® examination. The findings have implications for education and future research.

The National Council Licensure Examination® (NCLEX®) is used to license both

practical/vocational and registered nurses in all 50 states, the District of Columbia, and eight

United States territories. NCLEX® examinations test applicants' knowledge, ability, and skills

with paramount focus on safe practice for entry-level practice in nursing. Graduates may not

enter into nursing practice until they successfully pass these licensure examinations. Several

companies developed commercially available products in response to this changing landscape of

nursing education. These products include the National League for Nursing (NLN) Achievement

Tests®, Mosby AssessTest®, Assessment Technologies Institute® (ATI) specialty examinations

and PN Comprehensive Predictor®, and the Health Education Systems, Incorporated® (HESI)

specialty examinations and Exit Examination®. Several of these products are designed to predict

success on their NCLEX-PN® examination (Mosser, Williams, & Wood, 2006).

The ATI® Comprehensive Predictor® examination was purchased by this school of

nursing to help prepare students for the NCLEX-PN® examination. This study examined the

relationship between the results of the individual percentage score of the PN Comprehensive Predictor® examination to the results of the first-attempt NCLEX-PN® examination.

Discussion of Findings

The research question was: Is there a relationship between the results of the individual percentage score obtained from the PN Comprehensive Predictor® examination to first-attempt NCLEX-PN® examination results for graduates from January 2010 through December 2012 at 13 campuses of a large, proprietary, educational institution where practical nursing programs are located? To test the hypothesis and determine if there is a relationship between students' results on the PN Comprehensive Predictor® examination and their success or failure on the NCLEX-PN® examination for graduates of practical nursing programs taking the examination for the first time, logistic regression was completed using SPSS. It was determined that the variable, students' scores on the PN Comprehensive Predictor® examination did not significantly increase the ability to predict the pass/fail results of the NCLEX-PN® examination. The research question may be answered as no, there is not a relationship between the results of the individual percentage score obtained from the PN Comprehensive Predictor® examination to first-attempt NCLEX-PN® examination results for graduates from January 2010 through December 2012 at 13 campuses of a large, proprietary, educational institution where practical nursing programs are located.

Data was collected from 13 campuses of a large, proprietary, educational institution with practical nursing graduates from January 2010 through December 2012. Complete data sets were collected from 1668 graduates, 1411 graduates successfully passed the NCLEX-PN® examination on their first attempt and 257 failed the examination, (Table 15). The PN Comprehensive Predictor® examination scores for successful graduates ranged from 22.67% to

89.33%. The PN Comprehensive Predictor® examination scores for graduates who failed the

examination ranged from 40% to 86%. The average score on the PN Comprehensive Predictor®

examination for students who were successful on the examination was 70.44% and the average

score was 64.08% for students who were unsuccessful on the examination.

Logistic regression analysis of the data based on scores on the PN Comprehensive

Predictor® examination predicted that a total of 24 graduates would fail the NCLEX-PN®

examination and a total of 1644 graduates would pass the NCLEX-PN® examination (Table 17).

The PN Comprehensive Predictor® examination results were 99.5% accurate in predicting

success on the examination and only 6.6% accurate in predicting failure on the examination.

Thus, the overall accuracy of the PN Comprehensive Predictor® examination was 85.2%.

Discriminant analysis was completed to determine the accuracy of the recommended cut

score of the PN Comprehensive Predictor® examination. An analysis of the data predicted, based

on the observed scores of the PN Comprehensive Predictor® examination that a total of 498

graduates would fail the NCLEX-PN® examination and 1170 graduates would pass the

examination (Table 19). The PN Comprehensive Predictor® examination results were 76.4%

accurate in predicting success on the examination and only 23.6% accurate in predicting failure

on the examination. The study findings demonstrate that using the recommended cut score of the

PN Comprehensive Predictor® examination results in limited ability to predict which students

will successfully pass the NCLEX-PN® examination, however, using the recommended cut score

of the PN Comprehensive Predictor® examination is not an accurate method to use to identify

students who are likely to fail the NCLEX-PN® examination.

The review of the literature identified that various methods have been used to promote

NCLEX-RN® examination success, but failed to specify which interventions resulted in an

increasing in first-attempt pass rates (DiBartolo & Seldomridge, 2005). Also, it is important to note that there is a dearth of research on interventions that promote NCLEX-PN® examination success. This research study was completed with the single variable, PN Comprehensive Predictor® examination. Various methods to promote success have been used in previous studies, but there has been an inability to determine which variable or variables had an impact on the increased pass rate. A review of the results of this study and how the findings relate to previous studies is detailed in the following section.

Many studies have suggested strategies that impact the NCLEX-RN® examination pass rate, but few have identified statistical correlations related to implementation of those strategies. Haas, Nugent and Rule (2004) found a statistical difference in the nursing cumulative grade point average (GPA) successful NCLEX-RN® test takers, they had a GPA approximately 0.3 point higher than those test takers who failed the examination. Daley, Kirkpatrick, Frazier, Chung, and Moser (2003) identified two factors that were significantly correlated with success on the NCLEX-RN® examination as the final course grade in the senior-level medical-surgical nursing course and cumulative program grade point average. Significant correlations were identified by Uyehara, Magnussen, Itano, and Zhang (2007) between the nursing GPA and NCLEX-RN® along with the course grades in the Fundamentals course. Though the studies completed by Haas, Nugent, and Rule (2004); Daley, Kirkpatrick, Frazier, Chung, and Moser (2003), and Uyehara, Magnussen, Itano, and Zang (2007) did not include standardized testing, the results of this study indicate that the inclusion of end of nursing education program comprehensive predicator examinations would provide additional information regarding the graduates ability to successfully pass the NCLEX-PN® examination on their first-attempt.

The use of standardized testing, now imbedded into the curriculum of many nursing education programs, is purported to increase the number of graduates who pass the NCLEX-PN® examination on their first attempt by determining practical nursing students' readiness to test or identifying their remediation needs. Frith, Sewekk, and Clark (2008) studied a nursing education program that experienced a significant reduction in first-attempt pass rates. Various data from the student records were researched and it was noted that the mean cumulative grade point average (GPA) for the graduates who were successful on their NCLEX-RN® examination was 3.14 on a four-point scale and the GPA for those that were unsuccessful was 3.07; although there was a difference, it was not statistically significant (Firth, Sewekk, & Clark, 2008). The students were given the Mosby AssessTest®, a paper and pencil exit examination, and there was a weak correlation between that examination and the students' SAT® scores. This nursing education program also administered the NLN Achievement Tests® throughout the program and that had the highest correlation to the Mosby AssessTest® and NCLEX-RN® success. The faculty believed that they would be able to identify at-risk students by their performance on the NLN Achievement Tests®. It was also determined that it would be beneficial to switch from the Mosby AssessTest® to a computer-based examination that would provide rationale for correct and incorrect answers and gave immediate feedback to the students. The HESI Exit Exam® was believed to meet those needs and was selected by the faculty. A review course was included in the curriculum and was designed to support, motivate, and test students to prepare them for both the HESI Exit Exam® and NCLEX-RN® examination. After implementation of the above strategies, there was a marked increase in first-time pass rates (Firth, Sewekk, & Clark, 2008). The study was unable to determine which intervention had the greatest impact on the pass rate results. The findings of this study imply that the use of a comprehensive predictor examination

at the end of the nursing education program will inform the graduate regarding a preparation plan

for NCLEX-PN® examination success.

According to Higgins (2005), a relationship was identified between grades in the

prerequisite course in two biology courses, preadmission test scores in science courses, and the

nursing skills course. This suggests that identifying the at-risk students early in the program will

allow for intervention and referral for study skills and remediation. The study also identified a

relationship between the Health Education Systems, Incorporated® (HESI®) Exit Examination®

score and successful performance on the NCLEX-RN® examination.   Upon completion of the

HESI Exit Examination®, the areas of weakness were identified and faculty had the opportunity

to work with students to develop a remediation plan before they took the NCELX-RN®

examination. The findings of this study were similar to the findings of Higgins (2005), the

identification of areas of weakness identified by end of course comprehensive predictor

examinations inform remediation planning prior to taking the NCLEX-PN® examination.

Mosser, Williams, and Wood (2006) and Adamson and Britt (2009) completed research

regarding the practice of predicting student readiness and/or remediation needs. The researchers

found that the confidence in administrating standardized examinations at identified, specific

points in the nursing education program was a practice that gained popularity, but was not as

reliable as originally thought. Though the studies completed by Mosser, Williams, and Wood

(2006) and Adamson and Britt (2009) included the use of content specific standardized

examinations used at identified points in the nursing education program and comprehensive

predictor examinations at the end of the education program the results of this study found similar

findings. While there was some success in predicting those graduates who were likely to pass

the NCLEX-PN® examination using a standardized predictor examination, it was difficult to predict those graduates who may fail.

One reason for the inability of the standardized examination to identify students who may fail the examination is the graduates that scored in the percentage range on the PN Comprehensive Predictor® examination that were predicted to fail the NCLEX-PN® examination may have changed their behaviors and implemented additional strategies to prepare for the examination. This may have changed their outcome and this resulted in their success on the examination. Each student was provided with their individual PN Comprehensive Predictor® examination score and the predicted probability of passing the NCLEX-PN® examination. A low percentage score may increase their motivation to prepare for the examination.

A full range of strategies have been implemented by nursing education programs to promote National Council Licensure Examination (NCLEX®) success for first time test takers. Remediation, tutoring, predication, and progression policies have been implemented, in various combinations, with success by multiple nursing education programs leading to increased first-time pass rates (Morton, 2006, Davenport, 2007, Norton, et al., 2006, Herrman & Johnson, 2009, Bonis, Taft, & Wendler, 2007 & Lyons, 2008). Nursing education programs have also identified preadmission courses, within-program coursework and final grade point average (GPA) to identify those students deemed at risk for NCLEX® examination failure (Haas, Nugent & Rule, 2004, Daley, Kirkpatrick, Frazier, Chung, Moser, 2003, Uyehara, Magnussen, Itano, Zhang, 2007) . Due to the multiple activities involved in these studies, it is not possible to determine which item had the greatest impact on the first-time pass rates. This study involved 13 campuses that implemented the same strategies to improve NCLEX-PN® examination pass rates during the two-year timeframe of the study. The consistent experience of students at these campuses

allowed this study to focus on the predictability of the PN Comprehensive Predictor®

examination and NCLEX-PN® examination success or failure, however, many nursing education

programs have experienced success using a combination of these strategies that have included

the use of standardized testing.

Lavandera et al., (2011) conducted a study to evaluate the variable of nursing grade point

average (GPA), graduates who received one or more D or F grades in a nursing, science, or math

course, and the score on the HESI Exit Exam® averaged over all attempts. Lavandera et al,

(2011) found that the HESI Exit Exam® was a statistically significant predictor for success on the

NCLEX-RN® examination and predicting failure was statistically insignificant. It was also noted

that earning one D or F in a nursing, science, or math course increased the probability of failure

from 6% to 25%. It was concluded that identifying "at-risk" students using academic

performance and the HESI Exit Exam® score was the most accurate (Lavandera et al, 2011).

Simon, McGinniss, and Krauss (2013) researched the variables that best predict success on the

NLN® readiness examination to determine those most likely to be successful on their first-

attempt NCLEX-RN® examination. The researchers found that the first nursing courses, Adult

Health Nursing and Maternal-Child Health Nursing were critical for NLN® readiness

examination (Simon, McGinniss, & Krauss, 2013). Lavandera et al (2011) and Simon,

McGinniss, and Krauss (2013) completed research to determine the variables that would lead to

success on the comprehensive predictor examinations. The belief that these commercially

available predictor examinations are accurate predictors of NCLEX-RN® success was identified

in multiple studies. Incorporating the results of this study with the findings of Lavandera et al

(2011) and Simon, McGinniss, and Krauss (2013) will lead to early identification of those

deemed at-risk.

Implications and Recommendations

The results of this study imply that the use of predicator examinations near the conclusion of the nursing education program should be included with the multifaceted approach. Additionally, identification of within program predictors of nursing program success and comprehensive predictor examination success should be incorporated with the multifaceted approach. Use of predictor examinations will identify those graduates likely to pass the NCLEX-PN® examination and validate the multifaceted approach to NCLEX-PN® examination preparation. The use of predictor examinations will also identify those who are likely to fail the NCLEX-PN® examination and allow the nursing education program to create remediation plans to enhance the graduates ability to be successful.

The results of this study have several implications for practical nursing education programs. Due to the immense scrutiny placed on first-attempt NCLEX-PN® examination pass rates of practical nursing graduates, the ability to predict success or failure is of paramount importance. This study identified there is a greater ability to accurately predict success using standardized testing, but a weak correlation in the ability to predict failure on the NCLEX-PN® examination.

The findings of this study identified that practical nursing education programs should not rely solely on the PN Comprehensive Predictor® examination to identify the graduate's ability to successfully pass or fail the NCLEX-PN® examination. Multifaceted strategies that included the use of standardized examinations were successfully implemented by many programs. Georgetown University School of Nursing and Health Sciences implemented a successful multifaceted program to increase NCLEX-RN® examination first-time pass rates (Norton, et al., 2006). Initiatives included changes to academic policy, a newly designed remediation course,

curricular revisions, and competency testing. The competency testing included the ATI®

content-specific examinations and the RN Comprehensive Predictor® examinations. The results

of the content-specific examinations were used to determine students' potential risk status and

enrollment in the remediation program. Students were allowed to repeat the RN Comprehensive

Predictor® examination up to three times to achieve the minimum score of 64% to 65% score that

was required for graduation. Because multiple strategies were implemented by this school of

nursing it was impossible to determine which had the greatest contribution to NCLEX-RN®

examination success (Norton, et al., 2006). Bonis, Taft, and Wendler (2007) identified the ACE

Star Model of Knowledge Transformation to determine the success of the strategies

implemented. This model links research closely with educational practice that incorporates

evidence-based practice to evaluate effectiveness. The Knowledge Transformation Model

moves through discovery, summary, translation, integration, and evaluation (Bonis, Taft, &

Wendler, 2007). The discovery phase begins with gathering new knowledge to begin research to

promote NCLEX-RN® examination success. Strategies that have been implemented include test-

taking strategies, study groups, review courses, self-assessment and anxiety-reduction

techniques. Comprehensive examinations, including National League for Nursing (NLN)

Achievement Tests®, the HESI Exit Exam® and the Mosby AssessTest® were used to assess

preparedness. Summary is the act of evaluating the research studies that were located in the

discovery phase. A correlation between standardized examinations and success on the NCLEX-

RN® examination were noted in the research, but there was no consistency in the types of

examinations administered. Educational strategies were identified during the translation phase

and during integration the appropriate changes were incorporated into the program to facilitate

success. These changes included an RN assessment test that was required at the end of the first

semester, during the last year of study, and reading assignments related to test-taking tips and simulated NCLEX-RN® examinations that were administered within the last six weeks of the nursing program. During the evaluation, the results of the new group were compared to the former group to determine if the steps implemented were effective. Of the three cohorts that were researched immediately prior to the strategies being implemented, an increase in first attempt NCLEX-RN® examination pass rates were noted in each group (Bonis, Taft, & Wendler, 2007). This indicated that the strategies implemented were successful in raising the NCLEX-RN® examination scores for this program. The use of multiple strategies resulted in an increase in first attempt pass rates.

The PN Comprehensive Predictor® examination percentage score provides information to practical nursing students and the practical nursing education program to guide students' remediation plans. The literature supports the use of the first percentage score to inform the student and program regarding the predictability of passing the NCLEX-PN® examination. In a study conducted by Spurlock and Hunt (2008), a program that was using the HESI Exit Exam® as a progression examination for graduation found that the scores did not match the NCLEX-RN® examination pass rates expected. Students were allowed to repeat the examination until they received the benchmark score of 900 set by the school. It was determined, by the researchers, that the predictability of the HESI Exit Exam® is only valid and reliable when given once and the first score is used to determine the first-time pass probability of the NCLEX-RN® examination. This finding implies that practical nursing programs should use the first attempt score of the PN Comprehensive Predictor® examination to determine the accuracy of the predictor examination to determine readiness to take the NCLEX-PN® examination.

The findings of this research study inform practical nursing education programs that the use of end of program predictor examinations, combined with various strategies will lead to increased first-attempt NCLEX-PN® examination results. Combining the results of this study with strategies found in the literature, such as content-specific examinations threaded throughout the curriculum, adhering to the first-attempt cut score, providing remediation when the observed score is below the recommended cut score and providing the support and resources prior to the first attempt NCLEX-PN® examination should result in higher first time pass rates for graduates of practical nursing programs. The results of this study brings together the existing research and allows for creating a plan using the previous findings.

Limitations of Study

Several limitations must be considered when interpreting findings from this study. Subjects were all graduates from one large, proprietary, educational institution where practical nursing education programs are located on 13 campuses across the United States of America, resulting in limited generalizability of the findings to other groups. Though the campuses were located in various geographical areas, the admission criteria and course sequencing were consistent limiting the ability to generalize the results to other practical nursing programs.

It is possible that one or more of the individual campuses implemented additional or different interventions to promote NCLEX-PN® examination success that were not sanctioned by the administration of the school of nursing in this study. Or, the success of the interventions mandated by the school of nursing administration may have varied between the campuses. These possibilities may have impacted the results of the study.

Based on their results on the PN Comprehensive Predictor® examination, graduates may have changed their behaviors and been motivated to engage in additional study before they

completed the licensure examination. When the results of the PN Comprehensive Predicator®

examination were identified in the percentage range that indicated a decreased likelihood of

success on the NCLEX-PN® examination graduates may have changed their study habits,

completed additional examination questions, or sought other methods of preparation.

The NCSBN® reviews and has an opportunity to change the NCLEX-PN® examination

passing standard every three years. The passing standard was not changed during the years of

the study, 2010-2012, but was increased for the 2010 testing season. This change may have

impacted the passing rates and altered the predictability of the PN Comprehensive Predictor®

examination (National Council of State Boards of Nursing, 2014). The possibility that the

change in 2010 impacted the pass rate was due to the increase in the passing standard for each

area of the blueprint that may not have been addressed in the PN Comprehensive Predictor®

examination. The passing standard was increased in 2013 and will be reviewed again in 2016,

possibly impacting the passing standard and the ability of predicting success or failure (National

Council of State Boards of Nursing, 2014).

Future Research

Results of the study have identified a need for additional research to determine the factors

that influence NCLEX-PN® examination success. Research should be completed at additional

educational institutions that prepare licensed practical nurses to determine the generalizability of

this study. Also, the study should be replicated for the years 2013 and 2014 to determine if the

change in the passing standard resulted in a change in the accuracy of using the PN

Comprehensive Predictor® examination. This study was conducted with graduate information

from 13 campuses of a large, proprietary, educational institution where practical nursing

education programs are located in rural and urban settings. Replicating the study at educational

institutions where practical nursing programs are located in various locations and having both

smaller and larger study participants will determine if the study is generalizable.

Future research should be conducted to determine the effectiveness of other standardized

examination products that are available to schools that teach practical nursing programs. Several

companies including, National League for Nursing (NLN) Achievement Tests®, Mosby

AssessTest®, Assessment Technologies Institute® (ATI), Kaplan Test Prep®, and Health

Education Systems, Incorporated® (HESI) have developed software that is expected to predict

success in the student's licensing endeavor (Mosser, Williams, & Wood, 2006). Individual

companies have conducted research regarding their products and a comparison study would

determine if one product has superior results if the groups were similar in location and

participant size.

Many companies that provide predictor examinations to determine the readiness of

graduates to attempt the NCLEX-PN® examination also provide examinations designed to be

given throughout the education program. These proctored examinations are given to students at

specific points in the program, as identified by faculty, to determine mastery of the content.

Future research should be performed to determine if standardized examinations that occur

throughout the licensed practical nursing program of study help identify students who are at risk

for failure on the NCLEX-PN® examination. If these tests are accurate predictors, it would

provide an opportunity to intervene with the student prior to their completion of the program.

Additional research could be conducted to determine other factors that may relate to the

predictability of the PN Comprehensive Predictor® examination. Factors for additional study

could be demographics, admission variables, cumulative grade point average (GPA), and nursing

course GPA. Demographics could include gender, age, and ethnicity. Admission variables

include high school GPA, previous college GPA, and entrance examination scores. Nursing

course GPA could be analyzed by specific courses and include faculty rating of clinical

performance. These factors could be analyzed individually and in various combinations to

determine the factors that would lead to predictability of NCLEX-PN® examination success.

It is noted that the five graduates with PN Comprehensive Predictor® examination scores

in the range 22.67% to 35.33% passed the NCLEX-PN® examination on their first attempt. The

intent of this study was not able to determine the reason for the extremely low PN

Comprehensive Predictor® examination and the success on their NCLEX-PN® examination.

Future research could be completed to include interviews of the participants to determine if the

predictor scores were due to computer error, apathy, illness, or other factors.

Summary

Ensuring an acceptable NCLEX-PN® examination first-attempt pass rate is imperative for

all practical nursing education programs to meet the mandates set forth by the state boards of

nursing. Results from this study identified that the use of a comprehensive standardized

predictor examination did not significantly increase the ability to predict success or failure on the

examination. The results of this study identified that practical nursing education programs

should not rely solely on the PN Comprehensive Predictor® examination to identify the

graduate's ability to successfully pass or fail the NCLEX-PN® examination. Multifaceted

strategies that included the use of standardized examinations were successfully implemented by

many programs. Although several studies have been completed in this area, further research is

needed to determine definitive predictors for NCLEX-PN® examination success or failure.

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Appendix A

Dear Ms. Whitham:

Thank you for forwarding the materials in support of your request for permission to conduct research using campus data at Brown Mackie Colleges.

Having reviewed these and verifying that you have provided us with the required information and discussion that your proposal is to conduct a retrospective regression study to determine if any of the seven proctored standardized and one Comprehensive Predictor, Assessment Technologies Institute(r) (ATI) examinations contribute to first attempt NCLEX-PN(r) success for practical nursing graduates as the basis for your dissertation, I am pleased to provide you with this letter of approval.

We look forward to reading the results of this important research.

If you have any questions, please just let me know.

Regards,

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