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The utilization and effectiveness of the HESI E(square) exit exam as a graduation requirement toward increasing NCLEX-RNRTM pass rates in baccalaureate nursing programs

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THE UTILIZATION AND EFFECTIVENESS OF THE HESI E^2 EXIT EXAM AS A GRADUATION REQUIREMENT TOWARD INCREASING NCLEX-RN® PASS RATES IN BACCALAUREATE NURSING PROGRAMS

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ABSTRACT

The Utilization and Effectiveness of the HESI E^2 Exit Exam as a Graduation Requirement toward Increasing NCLEX-RN® Pass Rates in Baccalaureate Nursing Programs

by

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Due to a desire to better prepare BSN students for the Nurse Council Licensure Examination for Registered Nurses (NCLEX-RN®) and to increase first-time pass rates, nursing programs across the US are using predictive testing to implement policies that require students to pass a standardized exit exam to graduate (National League for Nursing, 2010). Evolve Learning Systems owned by Elsevier, Inc. offers such an exit exam named the HESI E^2, which recommends a benchmark score to predict success on the NCLEX-RN®. To offset an expected decrease in NCLEX-RN® pass rates due to recent changes in the passing standard, BSN program faculty may consider implementing a graduation requirement using predictive exams such as the HESI E^2, to motivate students to better prepare for NCLEX-RN®. From a student's perspective, a requirement to pass a single exam to graduate may seem unfair, after spending time and money for an education. A single high stakes exam can cause pronounced individual student personal and social stress (Spurlock & Hunt, 2008).

Adult Education Theory and Classical Test Theory were used as a conceptual framework to design this quasi-experimental retrospective study. A large sample of BSN student graduates and potential graduates from nursing programs across the US that may or may not incorporate the HESI E^2 exit exam as part of their curriculum were examined.

The sampling of this study is hierarchical in that graduate BSN students were sampled within graduation periods of BSN programs and BSN programs were sampled within the population of BSN programs in the United States.

The purpose of the study was threefold. The first purpose compared the NCLEX-RN® first-time pass rates of BSN students in nursing programs that use the HESI E^2 exit exam with other computerized exit exams, and those using no exit exam. NCLEX-RN® first-time pass rates for students taking HESI E^2 did not show a statistically significant increase compared to students that took no exit exam. The results would suggest that the education acquired in nursing school prepares students adequately for the NCLEX-RN® without the use of a standardized exit exam. It may also be that the assessment results provided by the HESI E^2 are not being utilized by the BSN students to better prepare for NCLEX-RN®.

A second purpose, compared NCLEX-RN® first-time pass rates of BSN students in nursing programs utilizing the E^2 that require a minimum benchmark score as a graduation requirement with those BSN students that use HESI E^2 but are not subjected to this requirement. The results from this study did show a statistically significant increase in NCLEX-RN® first-time pass rates for students in BSN programs in the South and West, regions of the US that used the E^2 minimum benchmark score as a graduation requirement. The third purpose was to determine an estimated percentage of BSN students that would have actually failed NCLEX-RN® among students that failed to graduate because of a failure to meet an E^2 minimum benchmark score. Application of an algorithm, designed by the author, revealed that E^2 predicted failure on NCLEX-RN® 73% of the time. This finding did not agree with a previous study by Spurlock and Hanks

(2004), which stated that E^2 was good at predicting success on NCLEX-RN® but was not able to predict failure 81% of the time. In other words, 81% students that failed to pass E^2 went on to pass NCLEX-RN®. Their study did not consider the motivator of a graduation requirement, and when this was included in this study, the result was very different: only 27% of the students that failed E^2 would have passed NCLEX-RN® and 73% would have failed NCLEX-RN®.

Lauchner et al.(2006), Morrison et al. (2002), Newman et al.(2000) Nibert & Young (2001), and Nibert et al. (2002) offer evidence that HESI E^2 exit exam has predictive value in predicting success on NCLEX-RN®. The results of this study agree with their assertion and offers new information in that the HESI E^2 exit exam has value in predicting failure on NCLEX-RN® when a motivator such as a graduation requirement is in place. Although this study did reveal that HESI E^2 exit exam was accurate at predicting failure, nursing faculty are advised to consider the profound impact of a "high stakes" exam on a student's livelihood. Recommendations from this study suggest that the use of the predictive value of HESI E^2 exit exam in nursing programs be only part of a constellation of evaluation criteria to assist BSN students to prepare to pass NCLEX-RN®.

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CHAPTER 1

INTRODUCTION

Computerized standardized exit exams are being used in nursing programs in the United States to better prepare BSN students to take the Nurse Council Licensure Examination for Registered Nurses (NCLEX-RN®) (Spurlock & Hunt, 2008). One such computerized standardized exit exam used by many nursing programs is the Health Education Systems, Inc. (HESI) exit exam (referred to as E^2). The providers of this exam, Elsevier, Inc. recommend a minimum benchmark score to predict a student's success on NCLEX-RN® (Nibert, Young & Britt, 2003). They offer high levels of evidence that support the reliability and predictability of their exams (Adamson & Britt, 2009; Lauchner, Newman, & Britt, 2006; Lewis, 2005; Newman, Britt, & Lauchner, 2000; Nibert & Young, 2001; Nibert, Young, &Adamson, 2002). Based on this evidence and desire for student success, some nursing programs require every BSN student to achieve a minimum benchmark score as a condition of graduation from a nursing program (Nibert et al., 2003). The National League of Nursing (National League of Nursing [NLN], 2010) recently addressed the practice of using NCLEX-RN® predictive testing as a "growing and intensifying trend" (para.1) that can have serious consequences such as blocking graduation (NLN, 2010). Although these exams can predict that a student, that achieves a high score on their exam, will be successful on NCLEX-RN®, a high percentage of the time, they do not predict which students are likely to fail NCLEX-RN® (Spurlock, 2006; Spurlock & Hanks, 2004). When a nursing program does not allow students to graduate, they are in actuality failing students based on a minimum benchmark score on an exam that predicts success, not failure (Spurlock & Hunt, 2008).

Although, the providers of these exams can provide evidence of the predictability and reliability of their exams, there remains minimal evidence to support the use these types of exams as a condition for graduation.

Background of the Study

Historically, a primary objective for nursing programs has been to supply competent professional nurses to provide care for the public (Davenport, 2007; DiBartolo & Seldomridge, 2005). One way nursing programs measure their achievement toward this objective is by observing first-time pass rates of their graduating BSN students on the NCLEX-RN® (Davenport, 2007; McDowell, 2008; Norton et. al., 2005). Currently, a national nursing shortage has pressured nursing programs to supply increased numbers of qualified nurses to care for an increasing population of acute patients (Abbott, Schwartz, Hercinger, Miller, & Foyt, 2008). As a result, "the stakes are high in nursing education; nursing programs are under pressure to produce more graduates, more quickly, with fewer faculty and less financial and clinical resources" (Spurlock, 2006, p. 301). The reality is that the first-time pass rate in 2010 for United States educated baccalaureate degree test takers was 88.69% (National Council of State Boards of Nursing, [NCSBN], 2010b). With approximately one out of every ten baccalaureate graduates not passing the NCLEX-RN® on their first attempt, nursing programs are challenged with the task of more efficiently and effectively imparting knowledge toward raising these rates (Norton et al., 2006).

Problems that nursing programs may face with substandard pass rates for first-time NCLEX-RN® test takers are six fold: (1) Recruitment efforts are influenced if prospective students use nursing pass rates as a criteria for a nursing program selection;

(2) Application rates are affected if the brightest high school students decline to apply; (3) Loss of operating revenue when at-risk students are unsuccessful, resulting in decreased attrition; (4) Program scrutiny by local boards of nursing, Commission of Collegiate Nurse Educators, National League of Nursing, etcetera; (5) Decreased customer satisfaction by graduates, parents, and community, and (6) Risk of regulatory intervention for program approval and accreditation (Norton et al, 2006).

In the interest of public safety, the National Council of the State Boards of Nursing (NCSBN) writes NCLEX-RN® exams to measure nursing competency (NLN, 2010). These tests are written to test entry-level competence for registered nurse licensure candidates (NCSBN, 2010a). Every three years, the NCSBN board of directors re-evaluates the passing standard and reviews the test plan (NCSBN, 2010a). Increases in the passing standard for the NCLEX-RN® exam occurred in 1998, 2004, 2007, and again April 2010 (Kenward, Woo, Gross, & Liu, 2010; NCSBN, 2010a). Statistics on national pass rates from 1995 through 2008 show that decreased pass rates correlate with increased passing standards (Kenward et al., 2010). Another challenge is that the test format has changed from strictly multiple choice type questions to include other formats such as multiple answers, fill-in the blank, drag and drop, and analysis of picture items (Norton et al., 2006) and more recently multi-media alternative items (NCSBN, n.d.). Since the practice of nursing requires the application of knowledge, the 2010 NCLEX-RN® items are written at the application or higher levels according to Bloom's taxonomy of cognitive ability (Anderson & Krathwohl, 2001; Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956; NCSBN, 2010a). These higher-level test items require more critical

thinking skills which include complex thought processes and problem solving (NCSBN, 2010a).

In response to the increases in NCLEX-RN® passing standards and fluctuating pass rates, nurse educators across the nation have tried to develop mechanisms for accurately identifying factors that would predict student success on the NCLEX-RN® (Ukpabi, 2008). Throughout the years, nurse educators have continuously published various methods to predict success on NCLEX-RN® (Waterhouse & Beeman, 2003). A few examples of some of the approaches developed spanning the years include: Giddens and Gloeckner (2005) found a correlation between pass rates and high critical thinking scores but did not find any significance in failure rates and low critical thinking scores; Barkley, Rhodes and Dufour (1998) developed a predictive instrument; Beeman and Waterhouse (1991) used a 21 factor predictive tool; and Krupa, Quick, and Whitley (1988) found that high introductory and medical-surgical course grades correlated with initial passing of NCLEX-RN. Unfortunately, there still has not been a method or tool published that is accurately predicts NCLEX-RN® success without using complex statistical approaches (Waterhouse & Beeman, 2003). Computerized comprehensive standardized exit exams offer a somewhat simple solution to predicting NCLEX-RN® success, compared to some of the other methods that include multiple variables to calculate. They claim to be able to predict student success on NCLEX-RN® based on a minimum benchmark score on an exit exam. These exams also provide a means to evaluate nursing program goals and outcomes (Davenport, 2007; Noel, 2009). Allowing the BSN student practice in completing a computerized test and answering the types of

questions that comprise the NCLEX-RN® in a similar environment, are other notable benefits to these exams (Lowenstein & Bradshaw, 2001).

Evolve Learning System owned by Elsevier, Inc. and located in Houston, Texas (formerly Health Education Systems, Inc., [HESI]) offers an exam named the E^2 (also referred to as the HESI exit exam by many in nursing education). The E^2 exam items are written using Bloom's taxonomy (Bloom et al., 1956) and parallel the methodology used for NCLEX-RN® exam items. This E^2 exam measures cognitive ability at the application level and above while maintaining the most current NCLEX-RN® test plan. The E^2 is a 160 item comprehensive exam designed to be administered toward the end of a BSN program curriculum (Morrison, Adamson, Nibert, & Hsia, 2004).

Evolve Learning System, through the use of an E^2 minimum benchmark score, offers a means of predicting student success on the NCLEX-RN®; using proprietary HESI Predictability Model, which is claimed to be highly accurate (Adamson & Britt, 2009; Davenport, 2007; Lauchner, et al., 2006; Lewis, 2005; Nibert & Young, 2001; Nibert et al., 2002). In addition to establishing predictability, Evolve Learning System has established the reliability and validity of the E^2 (Morrison, Free & Newman, 2002). Because of this evidence, a new trend has emerged in nursing education that uses the recommended minimum benchmark score on the E^2 as a means of identifying nursing students at risk for NCLEX-RN® failure (Davenport, 2007; Nibert, et al., 2003).

Fletcher (2007) suggests that a graduation policy using an E^2 benchmark score in nursing programs is likely to give students incentive to prepare for the NCLEX-RN®, and to develop the skills needed for examination success. Due to a desire to prepare BSN students for the NCLEX-RN®, graduation policies requiring a minimum benchmark score

to graduate from nursing school, have been implemented at many BSN programs (Davenport, 2007; Spurlock & Hunt, 2008). In these cases, it is crucial for nursing students to pass the E^2 in order to proceed to the next phase of their career (Spurlock, 2006). Without a nursing degree, an individual cannot take the NCLEX-RN® and proceed into nursing practice. Failure to pass the E^2 could be devastating to an individual who devoted years of their life, invested personal and/or family money for tuition, and incurred possible emotional distress (Spurlock, 2006) toward obtaining a degree in nursing. With so much at stake for students, nurse educators must be able to make informed decisions regarding the use of the E^2 as a graduation policy (Spurlock & Hanks, 2004).

In a study of 182 nursing programs, Lewis and Young (2004, July) found that almost half of those nursing programs used the E^2 as a benchmark for progression. More recently, Davenport (2007) found that out of nine nursing programs surveyed in Indiana, two used exit exams as a graduation requirement and three used a minimum benchmark score. Nibert et al. (2003) found that 30.2% of the nursing programs (45 out of 149) reported use of complete or partial progression policies utilizing the E^2. Many nursing faculty are apparently concluding that a student that does not meet a minimum benchmark score on the E^2 exam will not pass the NCLEX-RN®.

Spurlock and Hanks (2004) assert that, for the E^2 to be useful, it needs to predict failure as well as success because the NCLEX-RN® is a pass/fail exam. They also suggest that the use of the E^2 as a progression policy may indeed increase NCLEX-RN® pass rates because you have eliminated the poorer performing students (Spurlock & Hanks, 2004). A troubling statistic cited in their work is that 81% of the students that did

not achieve a benchmark score of 900 actually went on to pass the NCLEX-RN® at first sitting (Spurlock & Hanks, 2004). Another problem with not graduating students that do not achieve a minimum E^2 benchmark score is that you have possibly delayed a large number of students that may have entered the workforce.

The E^2 results can be used in many useful ways to benefit student learning, such as comparing their knowledge to national norms and helping faculty identify curricula weakness and strengths (NLN, 2010). Lauchner et al. (2006) point out that the E^2 can be used as a learning tool to help students identify weak areas in their nursing knowledge because of the immediate feedback of the exam. Nibert et al. (2006) state that E^2 scores are meant to assess a student's risk so that remediation efforts can be made by faculty to enhance the student's likelihood of passing the NCLEX-RN®. Furthermore, Nibert et al.(2006), agree with Spurlock and Hanks (2004) that the E^2 should only be part of a variety of performance evaluation tools and not used as a single reason to deny graduation (Nibert et al., 2006).

There are no universally accepted standards or policies on how to implement predictive standardized testing such as the E^2 (NLN, 2010). With so much contradictory information in how to best utilize E^2, it is clear that BSN programs would benefit from having more evidence to support decision making in the use of E^2 toward increasing NCLEX-RN® pass rates.

Statement of the Problem

The problem exists in that Evolve Learning System's HESI E^2 exam is effective at predicting success on NCLEX-RN® based on a minimum benchmark score; however evidence is lacking in the ability of this exam to predict NCLEX-RN® failure. BSN

programs using a minimum benchmark score on the E^2 as a requirement for graduation may be holding back large number of students that would have passed; when only a low number of those students would have actually failed the NCLEX-RN® if allowed to graduate and sit for the exam.

Evolve Learning Systems uses an inaccessible proprietary HESI Predictability Model which is a statistical model used to make these predictions. Spurlock and Hanks (2004) and Spurlock and Hunt (2008) applied a clinical statistical sensitivity/specificity model to HESI E^2 exit exam predictions, but did not account for motivation that the graduation requirement would obviously pose. On the other hand BSN programs that do not have this graduation requirement may better use the E^2 as a learning tool to help prepare students to take the NCLEX-RN®. There is not enough literature to support a qualified decision by faculty on the most effective use of the E^2 as a learning tool or how best to use a minimum benchmark score as a graduation requirement.

Study Purposes, Research Questions, and Hypotheses

The purposes of this study are threefold:

1. To compare first-time NCLEX-RN® pass rates of BSN students from nursing programs that use the E^2 with programs using other standardized exit exams, and those using no exit exam.
2. To compare first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing the E^2, that require the E^2 minimum benchmark score as a graduation requirement with those that do not.

3. To determine an estimate of how many BSN students would have actually failed the NCLEX-RN® among students that failed to graduate because of failure to meet an E^2 minimum benchmark score.

The following research questions are asked in this study:

1. Are there differences in first-time NCLEX-RN® pass rates for BSN students from nursing programs utilizing the E^2 and those using other standardized exit exams, or no exit exam?
2. For programs utilizing the E^2, are there differences in first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing the E^2 exam's minimum benchmark scores as a graduation requirement and those that do not?
3. What percentage of BSN students that failed to graduate due failing to meet a minimum benchmark score, would have actually failed NCLEX-RN®?

The research hypotheses and null hypotheses for this study are:

1. BSN students from nursing programs utilizing the E^2 will have different first-time NCLEX-RN® pass rates than BSN students from nursing programs that use other standardized exit exams, and those using no exit exam.

   H_o: BSN students from nursing programs utilizing the E^2 will have no difference in first-time NCLEX-RN® pass rates than BSN students from nursing programs utilizing other standardized exit exams, and those using no exit exam.

2. There will be a difference in first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing E^2 exam's minimum benchmark scores as a graduation requirement, and those that do not.

   H_o: There will be no difference in first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing E^2 exam's minimum benchmark scores as a graduation requirement, and those that do not.

3. It is estimated that less than 100% of BSN students that did not graduate due to not meeting a minimum benchmark score, would have failed NCLEX-RN®.

   H_o: It is estimated that a 100% of BSN students that did not graduate due to not meeting a minimum benchmark score, would have failed NCLEX-RN®.

Rationale for Research Questions and Hypotheses

Nursing programs ideally prepare students to pass the NCLEX-RN® on their first attempt; having an assistive tool, such as the E^2, to determine if they are able to accomplish this is desirable. If E^2 is a tool that assists faculty in increasing the nursing knowledge needed to pass the NCLEX-RN®, then schools utilization of E^2 (question and hypothesis one), will increase first-time NCLEX-RN® pass rates in schools utilizing the E^2.

It seems logical that NCLEX-RN® pass rates would increase if a nursing program did not graduate BSN students that did not meet a minimum benchmark score on the E^2 because the lower performing students would be eliminated from taking the NCLEX-RN®. If the filtering out of lower performing students is all to be considered, one might simply raise the grade point average that is required to graduate (Spurlock & Hank, 2004). The benchmark score may also be an incentive to better perform on the E^2 as

Fletcher (2007) discusses or a motivator for the adult student to solve timely problems as Knowles (1980, 1984) describes. The recommended minimum benchmark scores set by Evolve Learning Systems for the E^2 is 900 which is predicted to have a high probability of passing NCLEX-RN® and 850 which has a moderate possibility of passing NCLEX-RN®. With their recommendations students scoring lower that 850 would not be allowed to take the NCLEX-RN®; perhaps there is a different benchmark score that is a better incentive or motivator to perform well on the E^2 (question and hypothesis two) and ultimately do well on NCLEX-RN®.

Nursing programs that do not permit a BSN student to graduate when they fail to meet a minimum benchmark score, have created dichotomous categories of students. As stated by Spurlock (2005), "students not predicted to pass are, therefore, predicted to fail [when they fail to meet a minimum E^2 benchmark]." In essence either a BSN student passes or fails the graduation requirement creating two categories of students. Question and hypothesis three is concerned with those BSN students that failed to meet the graduation requirement of failing to meet a minimum benchmark score. In essence, how many of those students would have actually failed NCLEX-RN if they had been allowed to take it. By comparing a large number of BSN students in nursing programs that do not have this requirement one can derive an algorithm to apply to this group of students to determine an estimated percentage of those students that would have failed the NCLEX-RN. This would give us a failure rate for the various minimum benchmark requirements

Definition of Terms

BSN programs. BSN programs or the term nursing programs is defined as those that offer a baccalaureate in the science of nursing degrees and the curriculum prepares students "to practice within complex healthcare systems and assume the following roles: provider of care; designer/manager/coordinator of care; and member of a profession" (American Association of Colleges of Nursing [AACN], 2008, p.2). The Commission on Collegiate Nursing Education (CCNE) which ensures the quality and integrity of baccalaureate programs (AACN, 2009) will accredit BSN programs in this study.

NCLEX-RN®. NCLEX-RN® is an exam administered by each state as a requirement for licensure as a registered nurse (NCSBN, 2008). The NCLEX-RN® exam "measures the competencies needed to perform safely and effectively as a newly licensed, entry-level registered nurse" (NCSBN, 2008). Exam items are written using Bloom's taxonomy for the cognitive domain, using application or higher levels of cognitive ability (Anderson & Krathwohl, 2001; Bloom, et al., 1956). The NCLEX-RN® currently uses 6 types of questions: multiple choice-multiple answer; fill-in-the-blank test items; hot-spots-identify an area on a picture or graphic; drag and drop (ranking); chart exhibit; and innovative item format such as video, audio, animation, identification on a picture, graph or chart, graphics interaction, or decision task item sets (Wendt & Harmes, 2009) and more recently multi-media alternative items (NCSBN, n.d.). The 2008 RN practice analysis surveyed 12,000 entry-level nurses between January 1 through April 13, 2008 to determine the importance and frequency of a nursing activity (Wendt, Kenny, & Brown, 2010). This information is used to write the 2010 test plan (NCSBN, 2010a).

Following is a table representing the distribution of content for the NCLEX-RN® exam 2010 test plan.

Table 1
Distribution of Content for the NCLEX-RN® Test Plan

Category/Subcategory	Percentage of Items from Each Client Needs
Safe and Effective Care Environment	
Management of Care	16-22%
Safety and Infection Control	8-14%
Health Promotion and Maintenance	6-12%
Psychosocial Integrity	6-12%
Physiological Integrity	
Basic Care and Comfort	6-12%
Pharmacological and Parenteral Therapies	13-19%
Reduction of Risk Potential	10-19%
Physiological Adaptation	11-17%

Note. This information for this table was taken from NCSBN (2010a).

E^2. The E^2 is a computerized standardized exit exam known by most in nursing education as the HESI Exit Exam. The E^2 was originally developed by HESI and is currently distributed by Evolve Learning Systems, which is owned by Elsevier, Inc. and located in Houston, Texas. The E^2 exam items are written by nursing experts using Bloom's taxonomy (Bloom et al., 1956) and parallel the methodology used to write NCLEX-RN® exam items. This E^2 measures cognitive ability at the application level and above while maintaining the most current NCLEX-RN® test plan. All exam items are evaluated for reliability and validity to ensure accurate measurement of test scores (Morrison et al., 2004). Lauchner, Newman, and Britt (2006) summarize the instruments

development as being an ongoing process that uses ParSYSTEM, distributed by Scantron Corporation, to manage the test item bank and to perform item analysis. Below is an in-depth description by Lauchner et al. (2006) of the E^2 development:

> Each school group that administered an E^2 was analyzed using ParSYSTEM's test analysis program. The reliability coefficient, the Kuder-Richardson Formula 20 (KR20), for each group was calculated within ParSYSTEM and described in the test analysis report. These reports were reviewed and data were tabulated for all administrations of the E^2 during the academic year studied, 1996–1997. Fourteen different E^2s were administered to 80 groups at 62 schools. The KR20 for these administrations ranged from 0.34 to 0.91, and the average KR20 for the 80 administrations was 0.85. Overall item analysis data, including item difficulty level (*P* value) and discrimination data (point biserial correlation coefficient), were calculated for each administration of the E^2. These data were accumulated and stored within the item banking program of ParSYSTEM for 7 years, from 1990 to 1997. Additional items were developed throughout this 7-year period, and new test items were piloted with the administration of each E^2. Students' were unaware of which items were pilot items, and the piloted items did not count toward the students' score. Data from all uses of all items provided the normative data for the E2. A mathematical formula for predictability was developed by HESI, and is considered by the company to be proprietary. This predictability model was applied to each test as a whole, as well as within each subject area tested. The application of this model was implemented by HESI's testing program, SIMCAT. This program permitted comparison of the student taking the

test with all students that had previously answered the same test items. Additionally, the SIMCAT program performed certain correlations, which were components of the predictability model and were used to ensure accuracy of predictions made by the E^2. (pp. 5S-6S)

The E^2 is a 160 item comprehensive exam which is designed to be administered toward the end of a BSN curriculum (Morrison et al., 2004). Scores range from 0 to over 1,000, and can be as high as 1,500 (depending on the difficulty level of the exam). HESI recommends 900 as predictive of student success on NCLEX-RN® and 850 as an acceptable level of performance. All test items are weighted according to their difficulty level; for example, if a student answers more difficult items correctly, then more credit will be given and conversely a student will get less credit for answers that are less difficult. Due to this scoring method, it is highly probable that two students answering the same number of test items correctly will receive different scores because these scores depend not only on the number of test items the student answered correctly, but also on how many difficult and less difficult test items the student answered correctly. The score reflects application of the proprietary HESI Predictability Model (HPM) to the student overall score and each subject area score (Lauchner, et al., 2006). Evolve claims that research studies have found the HPM to be highly accurate in predicting NCLEX-RN® success (Adamson & Britt, 2009; Lauchner et al., 2006; Lewis, 2005; Nibert & Young, 2001; Nibert et al., 2002).

Graduation requirements. Graduation requirements are defined as meeting at least one of three criteria: (1) a nursing program policy that requires a successful E^2 benchmark score to be eligible for graduation; (2) including a successful E^2 benchmark

score as part of a course; or (3) withholding permission to take the licensing exam until the student achieves a minimum score designated by the nursing program on the E^2 (Morrison et al, 2004). Nursing programs may use different procedures to implement this policy and this will be explored in the data collection instrument.

NCLEX-RN® first-time pass rates. NCLEX-RN® first-time pass rates are a statistic that represents the number of students that passed the NCLEX-RN® board exam on the first attempt out of the total number of students that took the exam. For example, a BSN program had 100 nursing graduates that took the NCLEX-RN® board exam for the first time and out of those students 98 passed, therefore the nursing program would have a 98% first time pass rate. This pass rate is looked at from various perspectives such as the national pass rate for 2010 was 89.4% (NCSBN, 2010a).

Assumptions

For the purposes of this research the assumption is made that all BSN programs and their faculty that respond to the data collection instrument are comparable in their ability to teach nursing and prepare nursing graduates to take the NCLEX-RN® exam, as evidenced by their CCNE accreditation. It is also assumed that a school's first time NCLEX-RN® pass rate will represent a percentage of BSN students from the program. Conversely, the percentage of students that passed will be deducted from 100% to represent the percentage of BSN students that failed the NCLEX-RN® on their first attempt. To illustrate this assumption, a BSN program that has 50 students taking the NCLEX-RN®, and has an 85% first time pass rate. Then one can assume that 43 students passed the exam and seven failed to pass.

Summary

BSN programs across the United States are using the Evolve Learning System's HESI exit exam, known as the E^2, as a means to evaluate a student's ability to pass NCLEX-RN® (Spurlock & Hunt, 2008). In many cases, BSN programs have implemented graduation requirements based on a student's ability to meet a minimum benchmark score recommended by the provider of the exams (Nibert, et al., 2003). BSN programs hope to better prepare students for NCLEX-RN® while simultaneously ensuring acceptable first-time NCLEX-RN® pass rates for the nursing program (Nibert et. al., 2003). A problem exits that BSN programs using a minimum benchmark score on the E^2 as a requirement for graduation may be holding back large numbers of students that may have actually gone on to pass the NCLEX-RN®. The purposes of this study are three fold: to compare first-time NCLEX-RN® pass rates of BSN students that use the E^2 to other exit exams, or no exit exam; to compare first-time NCLEX-RN® pass rates among BSN students utilizing the E^2 as a graduate requirement to BSN students from programs that do not; and to determine an estimated percentage of BSN students, that did not graduate due to not meeting a benchmark score, and would have actually failed NCLEX-RN®. Presently, there is not enough evidence to support a qualified decision by faculty on the utilization and effectiveness of the E^2 as a learning tool or as a graduate requirement toward increasing first-time NCLEX-RN® pass rates in BSN programs.

CHAPTER 2

CONCEPTUAL THEORY/FRAMEWORK

This chapter will discuss the conceptual theories used to develop this research. Adult Education Theory as described by Knowles (1980, 1984) and Critical Test Theory as defined by Crocker and Algina (1986) are investigated and applied to the research questions and hypotheses.

Adult Education Theory

Adult Education Theory is an educational framework that guided the development of this research. Although there is no single theory to describe adult learning, there have been a number of frameworks, or models, that contribute to an understanding of adult learning (Merriam, Caffarella, & Baumgartner, 2007). This approach to adult learning offers a system of ideas and concepts used by many in adult education to facilitate the teaching-learning process (Knowles, 1980). These frameworks offered guidance toward evaluation of the use of a standardized exit exam as an effective adult education strategy to prepare BSN students to pass the NCLEX-RN®.

As early as 1926 the American Association for Adult Education was founded as a result of noted differences in the way children and adults learn (Knowles, Holton, & Swanson, 1998). Until the 1970's, learning was based in psychology which defined learning as a change in behavior to benefit their practice (Merriam et al., 2007). Attention turned to research and theory building in adult education 1970's with the publication of, Houle's *The Design of Education* (1972), Kidd's *How Adults Learn* (1973) and Knowle's *The Adult Learner: A Neglected Species* (1973). Attempts to classify distinctions between adults and children as a theory, model, framework, or set of

principles continues to be pursued by adult educators. The best known of these efforts is Malcolm Knowles that developed a distinctive conceptual basis for adult education and introduced the term andragogy to describe the education of adults; in contrast to pedagogy which is used to describe the education of children (Knowles, 1975, 1980, 1984). Two other prominent approaches to adult learning would be Tough's work on self-directed Learning (1967, 1971, 1978, 1979) and Mezirow's transformation learning (1978, 1981, 1991, 1995, 1996, 1997). Although elements from many of these frameworks will be considered, Knowles approach to adult education theory is the primary focus used in this research.

Knowles defined andragogy as "the art and science of helping adults learn" (Knowles, 1980, p. 43). Andragogy is based on assumptions about the characteristics of adult learners that are different from the assumptions about child learners on which traditional pedagogy is premised (Knowles, 1980, 1984). Considering pedagogy, learning is dependent on and determined by society; the learner plays a minimal role in determining their readiness to learn; what they learn tends to be subject-centered; and any motivation to learn is usually extrinsic in nature. Conversely, andragogy is concerned with adults who, as they mature tend to move toward being self-directed and independent; ready to learn tasks important to personal social roles; able to apply their reservoir of life experience; and becoming more pragmatic and problem-centered. Adults like to determine their own readiness to learn; their motivation is more intrinsic in nature (Merriam et al., 2007). Jackson and Caffarella (1994) describe five additional characteristics to the adult learner: adults have more and different life experiences organized differently than children; adults have personal differences in learning styles;

adults prefer to be actively involved in the learning process; adults prefer to be associated with and supported by each other in the learning process; and adults have personal responsibilities and life situations that allow a social context that affects their learning.

Knowles theory has been criticized as to whether andragogy is a learning theory or a theory of teaching (Brookfield, 1986; Hartree, 1984). Others argue that andragogy does not reflect the full range of adult learning, especially in vocational and occupational contexts where learning may not be voluntary (Merriam et al., 2007). A major assumption, that life experiences supports learning, is questioned as to whether it is the quality or quantity of experience that affects adult learning (Laureate Education, 2008; Merriam et al., 2007). Hartree (1984) asserts that the theory is weak and fails to encompass an underlying epistemological base. Other claims are that it is poorly researched, lacks specific outcomes, and is prescriptive in nature (Hartree, 1984). However, Knowles, himself, preferred to think of andragogy, not as a theory, but as a "system of concepts and assumptions" (Knowles, 1984, p. 8).

Brookfield (2003) expressed concerns from many researchers who suggest that andragogy does not consider culture or race. The individualistic, learner directed, focus of andragogy is criticized for ignoring cultural and social interactions and the context in which learning takes place (Grace, 1996; Jarvis, 1987). From the perspective of critical theory, andragogy lacks identifying political influences, and fails to consider race, ethnicity, socioeconomic situation, and other forms of privilege or oppression (Sandlin, 2005).

Assessing the validity of andragogy is difficult as Merriam, Caffarella, & Baumgartner (2007) state. Some points, such as the assumptions that adults are engaged

in self-directed learning are well supported by other research. The plethora of research continuing in recent years seems to be prima fascia evidence that andragogy, in whatever form chosen, is still a valid framework to utilize in research. Application of basic assumptions according to Knowles (Knowles, 1975, 1980, 1984) of adult learning is applied to this research.

To apply andragogy concepts to this study, the first consideration in the adult learner as being self-directed (Knowles, 1980, 1984; Tough, 1971). The BSN student as the adult learner is self-directed and expected to prepare for the E^2 and NCLEX-RN® without direction from faculty (Mullen, 2006). Faculty would be likely to assist the student as needed with no structured learning directives toward how to prepare for the E^2 or NCLEX-RN®. An advantage to self-directed adult learning is that adult students are able to determine their own learning needs and pace personal learning goals toward preparing for both E^2 and NCLEX-RN® exams (Billings & Halstead, 2009). A disadvantage of self-directed adult learning is that when learning directives are unstructured, it may be discerning and stressful to some students (Billings & Halstead, 2009). Without structured faculty guidance for preparing for E^2 or NCLEX-RN®, some students may also find added stress when E^2 is used as a graduation requirement (Spurlock & Hunt, 2008). Data collected from research question and hypothesis onecompared NCLEX-RN® first-time pass rates from BSN students that sat for the E^2 as well as other computerized standardized exit exams and to those who did not take any computerized standardized exit exams. Taking computerized standardized exit exams could help identify students that are not self-directed and allow faculty to offer assistant to these students before taking the NCLEX-RN®. A comparison is also made of E^2 to

other exams to determine if there is a difference in first-time NCLEX-RN® pass rates between the exams. If the pass rates for all groups of BSN students were close in range, then one could surmise that the computerized standardized exit exams do not help identify BSN students who are not self-directed.

Research question and hypothesis two compares first-time NCLEX-RN® pass rates from BSN students that attend nursing programs that utilize the E^2 with a minimum benchmark score as a graduation requirement, to those that do not. This minimum benchmark score requirement for graduation could be conceived as taking away self-direction and motivating the BSN student by demanding that they pace personal learning toward preparing for the E^2 exam in order to graduate on time. When all the categories of nursing programs have the same level of first-time NCLEX-RN® pass rates then it would stand to reason that the graduation requirement had no effect on the first-time NCLEX-RN® pass rates. Therefore the graduation requirement is simply an impotent added stressor to the self-directed adult student. When pass rates are significantly higher for nursing programs that have a graduation requirement it could suggest that poor performing students are identified before they graduate that may struggle with self-direction before sitting for their first NCLEX-RN® exam.

A second assumption of adult education theory is that as a person matures he accumulates experiences that become an increasing resource for learning (Knowles, 1980). Learning principles for adult education are actually based in a cognitive constructivist learning theory of Piaget (1970a, 1970b, 1973) which states that new learning is built on previously learned knowledge and experience. The E^2 and NCLEX-RN® exam questions are based on testing knowledge accumulated and assimilated

through experience learned in a BSN nursing program. Each student's life experiences and personal motivation will guide the student's preparation for these exams (Duncan & McKeachie, 2005). The experience alone gained from taking the E^2 should provide knowledge to build on in preparation to take the NCLEX-RN®. This principle relates to research question and hypothesis one which looks at the possibility that just the experience of taking a computerized standardized exit exam or more specifically the E^2 would help prepare BSN students for NCLEX-RN® by increasing knowledge and acclimating students to experiencing an NCLEX-RN® type exam.

A third assumption of adult education theory is based on the adult student's readiness to learn. The developmental tasks and social roles of the adult student have a direct influence on the readiness to learn (Knowles, 1980). Adults have personal responsibilities and life situations that affect their learning ability (Jackson & Caffarella, 1994). Life situations and responsibilities could have a direct influence on a student's ability to study or sit for E^2 and NCLEX-RN® exams. All the HESI exams were developed using the Classical Test Theory which accounts for extraneous variables the student may experience the day of the exam (i.e., headache) which may not have existed on a different exam day (Nibert et. al, 2006). Research question and hypothesis one compares BSN students that take the E^2 to other exit exams, or no exam. When E^2 is correlated with higher first-time NCLEX-RN® pass rates than other exit exams or no exam, it could imply that the E^2 actually does account for a student's readiness to learn and provides a true score that could also be attained on NCLEX-RN® (Nibert et. al, 2006).

A fourth assumption of adult education is that adult learners are motivated to learn by a desire to solve timely problems in their lives (Knowles, 1984). Adults commit to learning goals that are perceived to be immediately useful and realistic to the student's personal, professional, and career needs (Billings & Halstead, 2009). A graduation requirement that requires a BSN student to be successful on the E^2 could motivate the adult student to study for the E^2 because it would be immediately useful toward graduating nursing school. In contrast, if a there was no immediate advantage to studying for the E^2 (no graduation requirement) then an adult student would prioritize other problems or responsibilities. Does forcing the student to pass the E^2 to graduate actually increase the nursing program's first-time NCLEX-RN® pass rates? This principle is considered in research question and hypothesis two, that compares BSN students' first-time NCLEX-RN® pass rates from nursing programs using E^2 as a graduation requirement to BSN students from nursing programs that do not have the requirement. Question two gathers data to compare the various benchmark scores that may utilized on the E^2. There may a more realistic and meaningful minimal benchmark score that is effective as motivator to prepare for E^2 and ultimately prepare the BSN student to sit for the NCLEX-RN®.

Research question and hypothesis three further examines the Knowles fourth assumption that adult learners are motivated to learn by a desire to solve timely problems that are meaningful and useful in their lives (Knowles, 1984, Billing & Halstead, 2009). Since it is questionable as to whether the E^2 benchmark scores are precise in predicting failure on NCLEX-RN® (NLN, 2010), research question three attempts to estimate if students that were not permitted to graduate would have actually failed NCLEX-RN®. If

the exam is accurate at predicting failure on NCLEX-RN®, then BSN students may be more motivated to prepare for E^2.

Classical Test Theory

Classical Test Theory is another theoretical framework (conceptual framework) that will be considered in evaluating the effect E^2 has on predicting first-time NCLEX-RN® pass rates in this study (Crocker & Algina, 1986). Nibert et al. (2006) stated that this theory provides a sound framework for assessing the value of E^2 in predicting NCLEX-RN® outcomes. Crocker and Algina (1986) state that there is always an element of error in how a student's performance today (predictor variable) can predict how a student will perform at a later date (Nibert et. al, 2006). Classical Test Theory puts forth that the observed score is equal to the true score plus some degree of error. The true score is a score that would be the same every time the student takes the exam (which for humans is impossible). The error accounts for extraneous variables the student may experience the day of the exam (i.e., headache) which may not have existed on a different exam day. The observed score can predict a student's performance on an exam in the future (Nibert et al., 2006). Classical Test Theory has been found in multiple studies to be highly predictive of success on the NCLEX-RN® as well as student learning outcomes (Noel, 2009). This theory was judiciously chosen to be used in the development of the E^2 because when dealing with human being there is always an element of error (Nibert, et al., 2006). If E^2 correctly accounts for human error then it could predict that the BSN student would score in a similar manner on a parallel exam such as NCLEX-RN®.

Both research questions and hypotheses two and three examine the predictive value of E^2. Question and hypothesis two compares first-time NCLEX-RN® pass rates

from nursing programs that use the E^2 recommended benchmark score as a graduation requirement to those that don't. The students that graduated from these programs would have met the E^2 recommended benchmark score which predicts that the BSN student will be successful on the NCLEX-RN®. If the E^2 is predictive, as claimed by Evolve Learning Systems, then most of BSN students should be successful and the nursing program would have high first-time NCLEX-RN® pass rates. Question and hypothesis three determines if students, that were not allowed to graduate due to not meeting a minimum benchmark score, would have actually failed NCLEX-RN®. If the failure rate is high then the predictive value of E^2 is supported.

Conclusion

In conclusion, Adult Education Theory as described primarily by Knowles (1980, 1984) is used as a theoretical basis to guide the research for this study. The four basic assumptions of the theory is tested by the research questions: adults are self-directed; adults build knowledge on previously accumulated knowledge; adults' readiness to learn affects the exam performance; and adults are motivated to learn by a desire to solve timely problems that are meaningful and useful in their lives (Billing & Halstead, 2009; Knowles, 1980, 1984; Tough, 1971). Classical Test Theory was also presented in this chapter as it is used by Evolve Learning System's HESI exams to conceptually determine the predictability of E^2 on NCLEX-RN® success (Nibert et. al, 2006).

CHAPTER 3

LITERATURE REVIEW

The literature review chapter will present three major areas of research. The first section will present evidence that supports the E^2 exam itself as being thoroughly examined by various authors to present finding of validity and reliability. The second section will comprehensively review literature that discusses the utilization and effectiveness of the E^2 in in BSN programs. The third section examines evidence that evaluates the use of E^2 as a benchmark for graduation.

Searches were performed toward finding evidence related to the use the E^2 as a graduation requirement using the key words "HESI," "Evolve Learning System," "NCLEX-RN® pass rates," "graduation requirements," "graduation policies," "nursing shortage," "high-stakes tests", and "standardized exams" in various combinations. Allowing any research from the years 1956 to 2011, these searches were performed in the Academic Search Premier, ERIC, CINAHL, Pubmed/Medline, ProQuest Dissertations & Theses, and Google Scholar databases.

Evidence Supporting Validity, Reliability and Predictability of the E^2

Morrison et al. (2004) provided an in depth discussion of the development of E^2 test items with an overview of the methods used to measure reliability and validity, the current reliability findings, and the current validity data. Classical Test Theory as defined by Crock and Algina (1986) and Critical Thinking Theory as discussed by Paul (1990) are used as conceptual frameworks to develop HESI exam items. The HESI Predictability Model is a proprietary mathematical model used to calculate scores on the E^2 and is applied to raw data. Test items are individually weighted based on their

difficulty level: which is determined by how many students answered the item correctly divided by the total number of students that answered the test item to provide a percentage of correct responses to that item. The parameters used to qualify each test item for the E^2, is that no item can be less than 40% cumulative difficulty level and a point biserial correlation co-efficient of 0.15 or above. Each E^2 provides a conversion score which represents a weighted percentage score. On each exam that is administered, reliability is determined by conducting an item analysis and overall reliability is calculated using a KR20. Validity is determined by assessment of content validity, construct validity, and criterion-related validity. Content for the test items are developed from the NCLEX-RN® blueprint and syllabi from nursing programs and are used to quantify behaviors that represent psychological attributes of the test taker. Test items are reviewed by nurse educators and modified as needed. In summary, their article states that nurse educators can be assured that there is sufficient scientific data to confidently use the E^2 to assess student progress. The evidence provided by this study suggests that the items of the E^2 are reliable and valid.

In four separate studies (Lauchner et al., 2006; Newman et al., 2000; Nibert & Young, 2001; Nibert et al., 2002), data were collected on 17,342 registered nursing students over four consecutive years (1996 to 2000). In summarizing these studies, Nibert et al. (2006) reported that the E^2 was shown to be between 96.4% and 98.3% accurate in predicting NCLEX-RN® success. These predictions were made with the HESI predictability model (Nibert et al., 2002) which is proprietary to Evolve Learning System and unpublished. In the last of these four studies (Nibert et al., 2002); an E^2

benchmark score of 900 was recommended to predict success on the NCLEX-RN® at the 98.3% level.

In the above validity study by Nibert et al. (2002), the researchers not only looked at outcomes of students scoring high and low on the E^2, but also compared NCLEX-RN® outcomes for five E^2 scoring benchmark intervals. They found that, when the E^2 scores decreased by interval, the percentage of NCLEX-RN® failures significantly increased. Nibert et al. looked at these rates of success and failure in 6,800 nursing students. If a student scored 900 or better on the E^2 then that student was successful on the NCLEX-RN® 98.3% of the time and had a 1.7% rate of failure; students that scored between 850 and 899 were successful 94.1% of the time and had 5.9% rate of failure; students that scored between 800 and 849 were successful 89.2% of the time and had a 10.8% rate of failure; students that scored between 700 and 799 were successful 76.3% of the time and had a 23.7% rate of failure; and students that scored less that 699 were successful 49.8% of the time and had a 50.2% rate of failure. It is interesting to note that students that scored below 699 on the E^2 still maintained a near 50% pass rate on the NCLEX-RN®.

Evidence Pertaining to the use of E^2 in a Nursing Curriculums

Spurlock and Hanks (2004) discussed the possibility of using an E^2 benchmark score as a graduation policy in nursing programs. A graduation policy using 900 as a minimum benchmark on the E^2 would mean that all students that scored 899 or less would not graduate. The issue of concern for Spurlock and Hanks was that the E^2 does not predict which students are likely to *fail* the NCLEX-RN®. In other words, how many students that scored less than 900 might have actually passed the NCLEX-RN®? Since Evolve Learning System does not publish their HESI predictability model, there is no

way to examine how well their model might actually predict failure. In the study conducted by Spurlock and Hanks, using a clinical statistical sensitivity/specificity model, they looked at HESI exit exam predictions reported by Nibert, et al. (2002). The score used as an E^2 benchmark used was 900; they found that 81% of students, that were predicted to fail, actually passed the NCLEX-RN®. It is important to note that no consideration was mentioned that would account for the motivation that a minimum benchmark score graduation requirement would instill in a student. In response to their article, Nibert, Young, and Adamson (2005) objected to the Spurlock and Hanks perspective which, they claim ignores the "concept of risk reduction" (p. 307) and is a "promotion of philosophical bias against progression policies based on a view as being inherently punitive to students" (p. 303).

Another point made by Spurlock and Hanks (2004) is that nurse educators should consider other predictors of NCLEX-RN® success and not write a graduation policy based solely on a passing E^2 score. Other variables they cite as being predictive are course grades, Mosby Assess Test scores, grade point averages, and science course grades (Saxton, Pelikan, & Green, 1999; Waterhouse & Beeman, 2003). Nibert et al. (2006) agree that nursing faculty should carefully consider all the facts and not base a graduation policy on one single outcome measure. Spurlock and Hanks state that there is only one study by Newman, Britt, and Lauchner (2000) that shows that remediation is effective in increasing NCLEX-RN® scores. A final point by Spurlock and Hanks is that the NCSBN (2002) found that the longer a student waits to take the NCLEX-RN®, the more his or her chances of passing may decrease.

Nancy Spector, Director of Education and Maryann Alexander, Associate Executive Director, Regulatory Programs from the NCSBN wrote an editorial regarding the use of exit exams from a regulatory perspective (Spector & Alexander, 2004). When exit exams are administered at the end of a nursing program, with little or no remediation, this could create financial problems for students by delaying them seeking employment. An informal survey was conducted of 60 state boards of nursing about their experiences with exit examinations, 42 boards responded. Most boards did not report any problems; however fifteen did report problems with exams given at the end of the nursing program. One state board of nursing policy includes a statement that an exit exam cannot be used as a bar to graduation when all other program requirements have been met (Spector & Alexander).

Recommendations made by Spector and Alexander (2004) are to include a comprehensive assessment program with remediation throughout the curriculum. If a nursing program consistently has high grade point average students that fail the exit exam, then the expectations of students, the curriculum, teaching methods, and the grading system should be evaluated. Written policies for graduation requirements are required in many states and an exit exam requirement must be included in those states. In the NCLEX-RN® Delay Pass Rate Study (2002), the NCSBN found that students (RN population from 1998-2000) that took the exam 0-26 days after graduation had a first-time pass rate of 89.2%; 27-39 days after graduation, the first-time pass rate was 86.1%; 40-62 days after graduation, the first-time pass rate was 81.1%; and 61-1568 days after graduation, the first-time pass rate was 51%. Exit exams that hold students back from

taking the NCLEX-RN® exam may compound student problems by preventing them from taking the exam when their chances to pass are the highest (Spector & Alexander).

Karen Morin, an expert in academic policy (Morin, 2006) wrote a commentary regarding the issues raised by Spurlock and Hanks (2004) and Nibert et al. (2005). One issue raised is the use of a single assessment tool such as the E^2 when data indicate that student success on NCLEX-RN® is multifactorial (Spurlock & Hanks, 2004). Nibert et al. (2003) effectively interpreted that progression policies do correlate with increase pass rates. The recommendation is that graduation policies should be comprehensive using a variety of evaluation methods. In regard to the differing theoretical perspectives used to analyze data, Morin suggests that perhaps there is a way to predict an odds ratio rather than a pass or fail. The use of a comprehensive graduation policy would also decrease the confusion about the issue of whether faculty should use the E^2 to predict failure or success on NCLEX-RN®. Regarding, the influence of remediation on student success on the E^2 or NCLEX-RN®, she agrees with DiBartolo & Seldomridge (2005) that all students should be treated as "at-risk" students because non-academic factors could jeopardize, even the most academically gifted students, first-time NCLEX-RN® test-takers.

Yvonne Michel (2006) an expert in psychometrics, evaluated Spurlock and Hanks (2004) and Nibert et al. (2006) arguments and found both sides presented good arguments. She found the critical point of the students that score from 700 – 890 on the E^2 are the most difficult to predict. Even though Nibert et al (2002) state that greater than or equal to 900 will be successful on NCLEX-RN®, Spurlock and Hanks (2004) rightly point out that a progression policy that uses these scores is still a pass/fail or dichotomous

measure. A way to resolve the issue is to look at outcomes which show that nursing programs with low NCLEX-RN® first-time pass rates show an increase in NCLEX-RN® first-time pass rates after implementation of graduation policies. Therefore, nursing programs that experience low NCLEX-RN® first-time pass rates should use graduation policies. In conclusion, she states that no one test can resolve the issue of low NCLEX-RN® first-time pass rates, because there are factors other than content on the E^2 that are related to NCLEX-RN® failure.

Evidence Evaluating the use of E2 with a Benchmark for Graduation

In a study of 182 nursing programs, Lewis and Young (2004, July) found that almost half of those nursing programs used the E^2 as a benchmark for progression. Davenport (2007) surveyed nine nursing programs and found two programs required passing an exit exam and three required the student to meet a minimum benchmark score to graduate. Nibert et al. (2003) examined the use of the E^2 as a benchmark of progression and its use as a remediation guide in nursing programs. They surveyed 92 associate degree, 63 BSN, 3 diploma, and 36 practical nursing programs. The data they actually analyzed was focused only on the registered nurse programs, which resulted in data from 149 of their sampled programs. They found that 30.2% of the nursing programs (45) reported use of complete or partial progression policies utilizing the E^2. There were three consequences for failure to meet the progression policy (Nibert et al., 2003): denial of eligibility to graduate, an incomplete or failing grade in a capstone course, or withholding approval for NCLEX-RN® candidacy. Of those nursing programs that used an E^2 benchmark as a graduation requirement, 88.9% used mandatory re-testing for the E^2. When asked if remediation was required as part of the school's progression policy,

71.8% stated that remediation was not required (Nibert et al., 2003). There was no report of how the progression requirement affected first-time NCLEX-RN® pass rates, only that progression (graduation) requirement were being utilized by nursing programs.

Davenport (2007), Nibert et al. (2003), and Lewis and Young (2004, July) reported that nursing programs are using the E^2 as a graduation requirement, a literature search found only three studies that specifically examined the effectiveness of this practice (Morrison et al., 2002; Spurlock and Hunt, 2008; Noel, 2009).

Morrison et al. (2002) queried information from five nursing programs that used the E^2 as a progression (graduation) requirement. For these five nursing programs, they found that, after two years of using the policy, the NCLEX-RN® pass rates increased anywhere from 9% to 41%. Spurlock & Hunt (2008) argue that five nursing programs is a minimal sample size and found multiple methodological issues in the results of Morrison et al. The Morrison et al. study did not examine results from individual students.

In a Spurlock and Hunt (2008) study, the population was a homogenous group of 179 nursing students at one school. Using logistic regression, they found a statistically significant relationship between first attempt scores on the E^2 and NCLEX-RN® pass rates, $p < 0.005$. At their school, if a student did not pass the E^2 on their first attempt, they were allowed to retake it until they passed. When correlating the final E^2 scores to NCLEX-RN® pass rates, no statistically significant relationship was found via logistic regression, $p = 0.733$. In other words, the first attempt E^2 score was a better predictor of NCLEX-RN® success than the final E^2 score after being allowed to re-test several times. They also determined that the best cut-off score for first-time test takers to predict NCLEX-RN® failure was 650. Even though they found a statistically significant

relationship for first-time test takers, they suggest that placing a graduation standard using the E^2 devalues the rest of the nursing program. Also, a statistically significant relationship does not suggest a strong relationship. It simply illustrates a non-zero relationship. In fact their point-biserial correlation between first-time E^2 scores and first-time NCLEX-RN® pass/fail was only $r = 0.275$. Spurlock and Hunt concluded that the E^2 should not be used as a sole predictor of NCLEX-RN® success.

Noel (2009) also examined the effectiveness an E^2 graduation requirement as a predictor of success on the NCLEX-RN®. A descriptive correlational design was used to study a sample of 94 nursing students in a licensed vocational nurse to registered nurse program at a community college. These students were required to pass the E^2 with a minimum benchmark score of 850. The time period of data collection was four academic years from 2004 through 2007, with the E^2 graduation policy in place during latter two years. A positive relationship was found between the graduation policy and increased first-time pass rates on the NCLEX-RN®, chi-square $p < 0.01$. This study did not evaluate the E^2 as an accurate predictor of NCLEX-RN® first-time pass rates, or whether or not the graduation policy fostered higher E^2 scores among students. In addition, Noel's study was not clear on what happened to students that failed to achieve the required E^2 benchmark.

The requirement to pass a standardized exit exam to graduate from a nursing program has caught recent attention from NLN, that considers this practice as "high-stakes" testing and a "growing and intensifying trend" (NLN, 2010, p.1). An NLN Presidential Task Force was organized to address concerns about this practice and to develop policy guidelines for the use of high-stakes testing (NLN, 2010). Five major

areas of considerations were presented in the article. First was that although comprehensive exams can be useful in providing students with information on how their knowledge compares with students across the nation and helping faculty identify curricular weaknesses and strengths, these exams should not be used to predict NCLEX-RN® performance. Secondly, while these exams work well in predicting student success in passing NCLEX-RN®, they are much less precise in identifying students that will fail NCLEX-RN®. Thirdly, the use of a single exam to determine a student's graduation at the expense of the student's ability to thrive can have a profound damaging effect on the student. Fourthly, these exams should not be used for hiring decisions for graduate nurses prior to taking the NCLEX-RN®. And lastly, students that have had negative consequences from poor performance on standardized exams have filed law suits against nursing programs citing education malpractice. Recommendations made by the task force to nursing programs is a commitment to fair testing practices to ensure that decisions and testing practices are supported by solid evidence (NLN, 2010).

Summary

In summary, there is strong evidence that the HESI E^2 has been in the past and continues to be duly evaluated for validity and reliability (Lauchner et al., 2006; Morrison et al., 2004; Newman et al.,2000; Nibert & Young, 2001; Nibert et al., 2002). Morrison et al. (2002) and Noel (2009) suggest that the use of a minimum benchmark score on the E^2 as a graduation requirement will increase BSN program NCLEX-RN® first-time pass rates. Many nursing programs have adopted these recommended benchmark scores on the E^2 as a graduation requirement (Davenport, 2007; Lewis & Young, 2004, July; Niebert et al., 2003; Spurlock, 2006; Spurlock & Hanks, 2004;

Spurlock & Hunt, 2008). A problem exists in that there may be a high percentage of students that do not meet the minimum benchmark score on the E^2 and would have actually gone on to pass the NCLEX-RN® (Spurlock, 2006; Spurlock & Hanks, 2004; Spurlock & Hunt, 2008). Although the NLN Presidential Task Force and others make qualified recommendations, nurse educators need evidence to support decisions on using the E^2 as a graduation policy. In light of the minimal evidence that supports the use of the E^2 as a graduation requirement (Morrison et al., 2002; Noel, 2009) and opposing evidence (Michel, 2006; Morin, 2006; NLN, 2010; Spurlock & Hanks, 2004; Spurlock and Hunt, 2008) that argues against the practice, it is apparent that more research is needed to guide faculty in making informed decisions.

Several studies looked at the predictive value of the E^2 using the HESI Predictive Model (Nibert et al., 2000; Nibert & Young, 2001; Nibert et al., 2002), however Spurlock and Hunt, 2008 used a clinical statistical model and found a different recommended benchmark score (650) to predict that would fail the NCLEX-RN®. This proposed research study will use a different statistical methodology (an algorithm) to estimate the percentage of BSN students that would have actually failed NCLEX-RN® if they had been allowed to take it. Since the HESI predictive model is propriety it is impossible to test the predictability in the same way. For this reason, there is minimal literature that examines the predictive value of the E^2.

There were no studies in the literature that used large samples of BSN students to examine the utilization and effectiveness of the E^2 toward increasing first-time NCLEX-RN® pass rates and using the E^2 recommended minimal benchmark score as a graduation

requirement. This study is intended to provide new knowledge addressing the above mentioned gap in the nursing education literature.

CHAPTER 4

METHODS

In addition to ethical considerations, this chapter presents the methodology adopted in the present study. Study setting, design, sample, study variables, operational definitions, and the data collection instrument are discussed. Power analysis, data collection, statistical analyses, and study limitations are also presented.

Ethical Considerations

Upon reviewing the present study, the Institutional Review Board (IRB) of the University of Nevada, Las Vegas (UNLV) deemed it excluded from IRB review (see Appendix 6), as minimal risks to human subjects was perceived and all human rights were maintained. Appropriate confidentiality procedures were implemented and a pledge was made to all nursing program administrators that any identifying information regarding nursing programs or students would not be publicly reported.

Setting

Online data collection began on July 25, 2011, upon official exclusion by the UNLV IRB. It was initiated by sending email requests to deans, directors, or chairs of CCNE accredited BSN schools inviting them to participate in the study. The potential study participants were asked to complete the data collection instrument by hyperlinking to an address provided by SurveyMonkey®.

Design

Given that there are three overarching research questions and hypotheses in this study, several study designs—all of which were retrospective—were explored. BSN program deans, directors or chairs, based on existing data, completed data collection

instruments. Thus, the data collection instrument served to gather this information from the program deans, directors, or chairs for analysis, who acted as study informants.

Regarding the first two research questions and hypotheses, the design can be conceptualized as quasi-experimental (Campbell & Stanley, 1966; Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002). Regarding the first research question and hypothesis, random assignment was deemed inappropriate for identifying BSN students that attended programs using the E^2, as well as those enrolled in other programs. Thus, as there are clearly two independent groups of BSN students being compared to one another, the BSN students in programs not using the E^2 could be conceptualized as the control group.

The second research question and hypothesis focuses only on those BSN programs that utilized the E^2. Consequently, this sub-group of BSN programs is further divided into those using a benchmark on the E^2 as a graduation requirement and those that do not. Once again, these were developed into independent groups of students, with the non-benchmark group serving as a control group. With respect to both research questions, several potential confounding variables were measured and included in the analysis for statistical control purposes.

Regarding the third research question (an estimation of the failure rate of students that were not allowed to graduate because of failure to meet the E^2 benchmark), a cross-sectional methodology was deemed the most appropriate, although data from all sampled semesters, quarters, and years were used in this analysis. However, although the BSN programs that use an E^2 benchmark and those that do not were utilized in the analysis, the focus will specifically be on the first group. This is essentially an analysis of a single

group conducted with the aim to estimate the percentages of students who were not allowed to graduate their BSN programs, but may have actually failed the NCLEX-RN® had they been permitted to sit for the exam.

Sample

Data was collected from US BSN programs accredited by the CCNE, of which—according to the AACN (2011)—there are currently 548. Moreover, personal communications with an Elsevier representative revealed that approximately over 200 BSN programs are currently using the E^2 (P. Wilson, personal communication, April 8, 2009). Thus, contact with all 548 programs was attempted via email and participation in this study requested. Even though the focus of this study are nursing student graduates in these BSN programs (and, in some cases, nursing students that failed to graduate because of failure to pass the E^2), no information on specific nursing students was collected. Instead, various percentages of BSN students graduating from these nursing programs and passing the NCLEX-RN® (at first attempt) were gathered via a data collection instrument distributed to BSN program deans, directors, or chairs. Using these percentages, a proxy dataset was derived, representing the individual nursing students. Deans, directors, and chairs were asked to provide statistics that dated back approximately one and a half years and thus included the nurses in the most recent graduating period that had time to sit for the NCLEX-RN® and have their results reported to the program.

Data that were collected met the minimum requirement of 1000 BSN students, which was the number needed to obtain 80% statistical power using Statical Package for

the Social Sciences (SPSS) SamplePower 2.0 software . Further explanation related to the power analysis conducted in this study is presented later in this chapter.

Study Variables

The dependent variable of this study is whether or not a particular BSN graduate passes the NCLEX-RN®. This is a dichotomous measure recorded in the proxy dataset and derived from the percentage of BSN students that passed the NCLEX-RN® as a part of the BSN program from which they graduated. The primary independent variables include:

- whether or not the E^2 is being used in the program;
- whether or not some other exit examination instrument is being used in the program;
- if the E^2 is being used, whether or not an E^2 benchmark score is required for graduation;
- if an E^2 benchmark is being used, the specific value of the benchmark; and
- if an E^2 benchmark is being used, whether or not each particular BSN student met the benchmark, thereby being allowed or not allowed to graduate and sit for the NCLEX-RN®.

Other variables measured, which will be considered as potential confounds, will include:

- the particular semester/quarter/year;
- whether BSN program is state or privately funded;
- physical location of the program in terms of United States regions, as defined by the US Census Bureau (Census Regions and Divisions of the United States, n.d.);

- financial cost per credit hour (excluding fees);
- if the E^2 was used, how many BSN students failed to graduate due to the failure to meet the E^2 benchmark;
- whether or not there was a minimum GPA admissions requirement;
- if there was a GPA requirement, its value; and
- the number of students graduating in each period queried.

Operational Definitions

NCLEX-RN®. The NCLEX-RN® has been previously described in Chapter 1 under Definition of Terms. In this context, it is defined as the actual first-time NCLEX-RN® pass rates recorded in the data collection instrument sent to BSN programs and is related to whether or not a particular student passed the NCLEX-RN® at first attempt. These data were formulated into a proxy dataset, as discussed under the data analysis section of this chapter. To verify the first-time NCLEX-RN® pass rates, as stated in the data collection instrument responses, twenty-five percent of the reported pass rates were audited to match with the actual pass rates as reported by the state boards of nursing public records in the state where the program was located. These first-time NCLEX-RN® pass rates were matched with responses from the corresponding nursing program.

BSN programs. BSN programs were previously described in Chapter 1 under Definition of Terms. However, BSN program deans, directors, or chairs that used the E^2 were further asked if their programs had a benchmark E^2 score required for graduation (which would allow the students to sit for the NCLEX-RN®). Rather than noting whether a student graduated, whether or not they were allowed to sit for the NCLEX-RN® was of interest for the present study. In this document, and in the data collection instrument, this

variable is referred to as a 'graduation requirement', as this is equivalent to being allowed to sit for the NCLEX-RN® in most BSN programs. However, these two concepts may not have the same meaning in all cases, as it is possible for a BSN program to allow a student to graduate and still deny their right to sit for the NCLEX-RN®. In an attempt to clarify this issue for respondents, a note was included with the data collection instrument explaining the operational definition of a graduation requirement as defined in the following paragraph.

Graduation requirement. A graduation requirement in the context of this study indicates a condition that prohibits a student from sitting for the NCLEX-RN® exam: specifically, referring to a minimum E^2 (HESI exit exam) benchmark score. In practice, students may be taking the E^2 (HESI exit exam) in a computer lab or as part of a course. Moreover, some nursing programs may allow students to graduate with their BSN but still deny their right to sit for the NCLEX-RN® exam. This was considered a graduation requirement for purposes of this study, as the right to sit for the NCLEX-RN®, rather than actual graduation, was of interest here, which was explained to BSN program deans, directors and chairs

Reporting periods. BSN program deans, directors, or chairs were asked to provide NCLEX-RN® first-time pass rates for the most recent 18 months. BSN Programs vary in the periods of time that classes are offered, ranging from a semester, quarter, or six-week long courses. Thus, a BSN program that offered classes on a semester basis would have three reporting periods in the 18-month time frame.

The operationalization of all other measures, including the other independent variables and possible confounding variables, is based solely on their responses to the

data collection instrument that was distributed to BSN program deans, directors, and chairs. However, it is implicitly assumed that the actual concepts being measured should be well understood by the respondents. This would include the concepts of a physical location, GPA, graduation exit exam, numbers of students, percentage pass rate, and credit hour.

Data Collection Instrument Development

The data collection instrument is a self-response instrument designed by the principal investigator for the purpose of the present study. The questions included on the data collection instrument are provided in Appendix 1. As explained previously, UNLV IRB granted exclusion from review for the present study in terms of need to prove minimal risks to participants and preservation of their human rights. Thus, an invitation to participate in the study as well as a request for data was emailed to the deans, directors, and chairs of BSN programs accredited by CCNE (Appendix 2).

Data Collection

All CCNE accredited BSN programs in United States were identified through the AACN resources (2011). The complete list of accredited BSN programs is included as Appendix 2. An email was sent to each of the deans, directors, and chairs of these programs inviting them to participate in this study. A copy of the email that was sent is presented in Appendix 3. The email requested nursing programs to participate in the study and included a link to a data collection instrument, which was located on a secure encryption based website. Two forms designed to assist with gathering the information required of the data collection instrument were attached to the email—one for BSN

programs on the semester system, and the other for programs on the quarter system. These forms can be seen in Appendices 4 and 5 respectively.

For all emails returned as undelivered, the address was corrected or verified through the BSN program's website. If a BSN program representative responded to the survey, their name was removed from the electronic contact list. Representatives of all BSN programs that still remained on the revised contacts were emailed again on August 2, 2011 and then again on August 9, 2011, if they failed to respond on the previous e-mail. As many messages stating that the recipient was out of the office for summer break were received, those individuals were contacted again during the week following the indicated return date. Thus, based on the above procedure, the entire data collection process lasted for seven weeks and four days and ended on September 9, 2011, when an adequate sample size was attained.

Data Analysis

Once the full data set was acquired, all the data collected were imported to a Microsoft Excel 2010 spreadsheet. Formatting corrections were made and words were standardized (e.g., changing the word 'one' to the number 1). Twenty-five percent of the pass rates reported by the schools were audited with state board of nursing public reports on the state's website. Discrepancies were found in all BSN programs from which students graduated more than once a year. During the data validation process, two problems were discovered. Firstly, the 2011 pass rates had not been reported yet on the state board of nursing website, even though the BSN programs had received their results. Secondly, in most cases, the number of students that graduated did not match the state board of nursing reported student numbers. When students graduate at the end of a year,

they usually take their NCLEX-RN® in the following year, which presents a problem for schools that allow the students to graduate more than once a year. Consequently, several schools, as was explained by the respondents, resorted to checking each student individually to arrive at their graduating class first-time pass rate. For this reason, the pass rates, as reported by the BSN program, were included in the data set.

There were 116 BSN programs the representatives of which responded to the request to complete the data collection instrument on SurveyMonkey®. Of those, 22 had to be eliminated due to incomplete or conflicting data. This resulted in data collected and analyzed from 94 BSN programs with 11,254 students represented.

Creation of a proxy dataset. After all the data was collected and evaluated, it was determined that desired statistical power was attained and the responses formulated into a dataset (SPSS SamplePower 2.0). Initially, Microsoft Excel 2010 was used to develop the dataset. Since data from individual students were not obtained, the responses provided on the data collection instrument formed a proxy for the actual BSN student data. Table 2 illustrates an example dataset of two quite small BSN programs. Seven students were from one university (Uno Univ.) that had an E^2 benchmark requirement for graduation. Consequently, only six met the benchmark with 83% pass rate. Four students graduated from another university (Dos Univ.) that did not use the E^2 in their BSN program, and they had a 75% pass rate.

Table 2
An Example of a Proxy Dataset

Student Number	University	E^2 Used	E^2 Benchmark Used	Student Met E^2 Benchmark and Took NCLEX-RN®	Student Passed NCLEX-RN®
1	Uno Univ.	Y	Y	Y	Y
2	Uno Univ.	Y	Y	Y	Y
3	Uno Univ.	Y	Y	Y	Y
4	Uno Univ.	Y	Y	Y	Y
5	Uno Univ.	Y	Y	Y	Y
6	Uno Univ.	Y	Y	Y	N
7	Uno Univ.	Y	Y	N	
8	Dos Univ.	N			Y
9	Dos Univ.	N			Y
10	Dos Univ.	N			Y
11	Dos Univ.	N			N

Thus, in order to create the proxy dataset, in the case of the first university, the 83% pass rate is multiplied by the six students who sat for the NCLEX-RN® to determine that five passed and one failed. The same approach was taken for the second university. However, in Table 1, it can be seen that several fields are often left blank. For instance, if a BSN program does not use the E^2, data indicating whether or not an E^2 benchmark was used.

This example dataset only serves as an indication of the subjects (students) and the variables (represented by columns) included in the final proxy dataset. Columns for each of the variables measured, including all potential confounding variables were included in the final dataset.

Division into groups. In order to answer the research questions, as well as test Hypothesis 1 and Hypothesis 2, the dataset was divided into groups. The research question number one (whether or not there is a difference in first-time NCLEX-RN® pass

rates amongst BSN program that use the E^2, use other exit exams, and those programs that do not use an exit exam) relates directly to a column in the dataset, which allows easy division. Thus, students that attended a program that used E^2, had a benchmark requirement, and failed to achieve the benchmark (and were thereby not allowed to sit for the NCLEX-RN® with their respective cohort) were not included in this analysis. As noted earlier, this analysis focuses solely on a comparison of first-time NCLEX-RN® pass rates between BSN programs using the E^2, programs using other exit exams, and those not using an exit exam. However, as it was noted that programs using other exit exams might not have benchmark requirements, or allow students to sit NCLEX-RN® exam, all students that attended them were excluded from the proxy dataset.

Regarding the second research question and hypothesis (differences in NCLEX-RN® pass rates based on whether or not an E^2 minimum benchmark is required to graduate), students attending BSN programs not using the E^2 were excluded from this analysis, as only BSN programs utilizing the E^2 in some capacity were included. The divisions into groups were thus based on whether or not a benchmark score on the E^2 was required for graduation, which was clearly marked in a designated column in the proxy dataset. As with the first research question and hypothesis, those students who were in a BSN program that required an E^2 benchmark and failed to achieve the benchmark were not included in the analysis.

Answering the third research question and testing Hypothesis 3 does not involve a direct statistical comparison of two groups used to answer second research question and test the corresponding hypothesis. Rather, the data are used to estimate the percentage of students that failed to meet a required E^2 benchmark and may have actually failed

NCLEX-RN®. This is the only analysis that will include the group of students who did not actually sit for the NCLEX-RN® with their cohort.

Data analyses for group comparisons. The statistical approach to data analyses for the first two research questions and corresponding hypotheses shall be the same. Thus, the dependent variable is a dichotomous measure indicating whether or not the specific subjects passed the NCLEX-RN® on their first attempt. This is a straightforward dichotomous measure and is analyzed by applying the logit function, as is done in logistic regression (Polit & Beck, 2008).

However, this dataset presents other analysis problems. One of the fundamental assumptions of a statistical group comparison is that the participants within each of the groups be independently sampled and measured. Stated differently, within any group, no characteristic should systematically cluster sub-groups of participants within the group. However, there may be random factors that cluster, such as gender, ethnicity, religion, etc., which will not affect the outcome of the analysis. However, there should not be anything that systematically imposes. Thus, the fact that the students are systematically grouped into BSN programs violates this assumption. Consequently, traditional parametric statistical approaches utilizing ordinary least squares (OLS) derivation of error terms cannot be used for this analysis (Snijders & Rosker, 2002).

The sampling of this study is hierarchical in that graduate nursing students are sampled within graduation periods of BSN programs, and BSN programs are sampled within the population of BSN programs in the United States (defined by the programs the representatives of which responded to the data collection instrument). Thus, the statistical analysis approach that is most appropriate for such a design is the hierarchical

linear model (HLM) (Tabachnick & Fidell, 2007). According to Hanks (2005) and other researchers, this model is appropriate for studying situations in which the E^2 is being examined. Through use of the restricted maximum likelihood (REML) approach to calculating error terms, HLM correctly calculates *p* values used in hypothesis testing (Tabachnick & Fidell, 2007). In the present study, Hierarchical Linear and Nonlinear Modeling version 7 are used to derive these HLM *p* values. This program adequately handles dichotomous data via the logit function and appropriately utilizes the mathematics of REML.

There are three levels of hierarchy considered in the development of HLM. The first level was *Student* which only concerned the dependent variable. The second level was *Reporting Periods* which included the primary independent variables. The third level was *BSN Programs* which consisted of the potential confounds.

To examine the influence of other possible confounding variables, additional HLM analyses were conducted, whereby the dependent, independent, and hierarchical variables remained the same. However, other potential confounding variables were input in the HLM analysis model to assess their effects on the output *p* values.

To derive other descriptive statistics, a combination of Microsoft Excel 2010 and SPSS for Windows version 15 was used. Statistical significance (the Alpha level) for each tested hypothesis was set at $p < .05$, and Hypothesis 1 and Hypothesis 2 were tested as two-tailed, whereas Hypothesis 3 was one-tailed.

Calculation of students who would have failed NCLEX-RN®. Two groups of students in BSN programs using the E^2 were formed for the purpose of analysis—with and without benchmark requirement. When a benchmark is used, there are three ways

that its utility could be conceptualized: as a teaching aid, as a motivator, and as a filter (Fletcher, 2007; Spurlock & Hanks, 2004). Benchmark used as a teaching aid provides students the opportunity to experience the high-stakes situation imposed by the NCLEX-RN®, which may give them a level of comfort when they actually do take the NCLEX-RN® and improve their chance of passing (relates to Adult Education Theory Assumption 2, as described by Knowles, 1980, 1984). As a motivator, an E^2 benchmark would encourage students to study before taking the E^2, therefore better acquiring nursing knowledge and skills, and improve their chances of achieving the benchmark and then going on to pass the NCLEX-RN® (relates to Adult Education Theory Assumption 4, as described by Knowles, 1980, 1984). As a filter (relates to Adult Learning Theory Assumption 1, as described by Knowles, 1980, 1984), the E^2 benchmark would hold back students not yet prepared to sit for the NCLEX-RN® and not allow them to progress and take it (Spurlock & Hanks, 2004; Spurlock & Hunt, 2008).

The objective of research question three and the corresponding hypothesis is to estimate the percentage of students that were not allowed to graduate because of failure to meet an E^2 benchmark, under the assumption that they would have also failed the NCLEX-RN® had they been allowed to take it. From a certain perspective, failure to meet an E^2 benchmark is a prediction of failure on the NCLEX-RN® (Spurlock & Hanks, 2004; Spurlock & Hunt, 2008). However, another important question arises—what other sound justification do these BSN programs have for holding back these students? Research question three and Hypothesis 3 attempt to assess the accuracy of this prediction.

Based on the data derived from the data collection instrument utilized in this study, several approaches to making this estimate were identified. In the first approach, it is assumed that an E^2 benchmark serves exclusively as a filter, without a teaching aid or motivator component. Under this assumption, it is implied that BSN programs using an E^2 benchmark would have had the same NCLEX-RN® pass/fail rates as BSN programs using the E^2 but without any benchmark requirement. From here, an algorithm can be derived, allowing estimation of the number and percentage of students that were not allowed to graduate because of failure to meet an E^2 benchmark (in benchmark utilizing programs) and would have failed the NCLEX-RN® had they been allowed to take it. The following steps, as well as Figure 1 through 3, outline this algorithm:

Programs utilizing E^2 benchmark:

[N of students passing E^2 benchmark (overall)]
(a known value)

[N of students passing E^2 benchmark but failing NCLEX-RN®]
(a known value)

[N of students failing E^2 benchmark (overall)]
(a known value)

[N of students failing E^2 benchmark who would have failed NCLEX-RN®]
(to be estimated)

Programs utilizing E^2 but with no benchmark requirement:

[NCLEX-RN® failure rate in programs without benchmark]
(a known value)

Furthermore, it can be derived:

[Total N of students in E^2 benchmark programs] =

[N of students passing E^2 benchmark (overall)] +

[N of students failing E^2 benchmark (overall)]

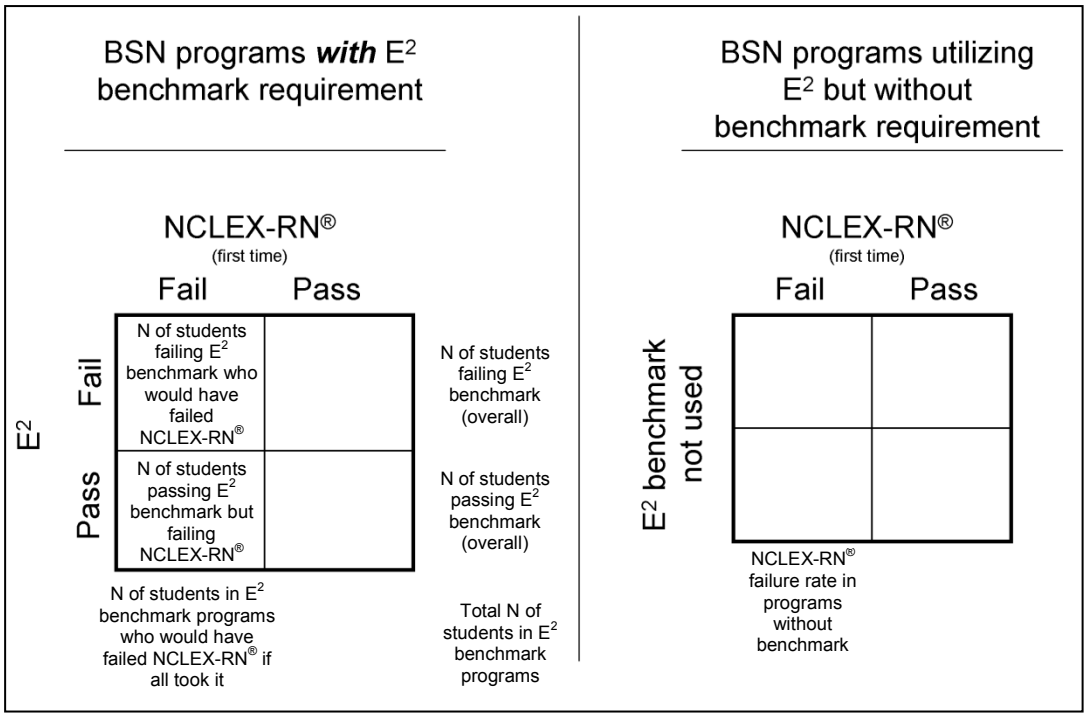

Figure 1. Conceptual representation of initial numbers.

Under the above assumption that an E^2 benchmark serves exclusively as a filter, it follows that:

[N of students in E^2 benchmark programs who would have failed NCLEX-RN® if all took it] =

[Total N of students in E^2 benchmark programs] ×

[NCLEX-RN® failure rate in programs without benchmark]

Having the N of students passing E^2 benchmark but failing NCLEX-RN®, the value can be subtracted to derive N of students failing E^2 benchmark who would have failed NCLEX-RN® using the expression below:

[N of students failing E^2 benchmark who would have failed NCLEX-RN®] =

[N of students in E^2 benchmark programs who would have failed NCLEX-RN® if all took it] –

[N of students passing E^2 benchmark but failing NCLEX-RN®]

The above can be converted to a rate via:

[Rate of students failing E^2 benchmark who would have failed NCLEX-RN®] =

[N of students failing E^2 benchmark who would have failed NCLEX-RN®]
[N of students failing E^2 benchmark (overall)]

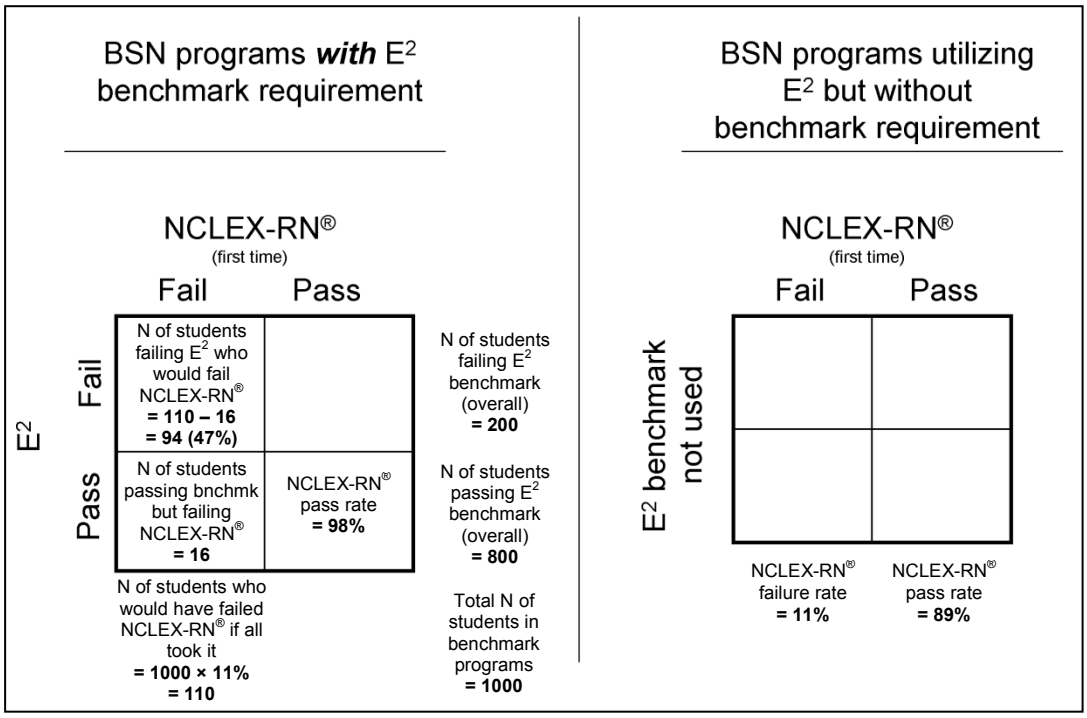

Figure 2. Example of algorithm with filter assumption with theoretical figures.

It is interesting that, in Figure 2, even though the benchmark BSN programs have a 98% NCLEX-RN® pass rate, they still have under a 50% success (47%) in correctly predicting NCLEX-RN® failure through the use of an E^2 benchmark.

Thus, it is likely that the use of an E^2 benchmark has more than just a filter effect for students unprepared to sit for the NCLEX-RN®. As suggested above, it could be argued that a benchmark has both motivational and teaching tool components to it (Fletcher, 2007). The example figures in Figure 2 indicate rather small difference yielded by the use of benchmark—98% and 89% pass rate for BSN programs using and not using a benchmark respectively. However, it is likely that, without the benchmark, students may not study at all for the E^2, and they may not take the E^2 testing environment

seriously. Moreover, some students may choose not to take it, since there is no minimum score that would prohibit them from graduating.

When considering the difference between the 89% and 98% pass rates (9%), one may argue that at least part of this increase is due to more than just the filtering ability of an E^2 benchmark. Just as a further example, it can be assumed that 5% of the difference is due to filtering unprepared students and that 4% is due to the motivational and teaching tool benefits of an E^2 benchmark. Therefore, in line with the above algorithm (E^2 benchmark is used exclusively as a filter), the 4% motivational and teaching tool component should be subtracted from the original 98% pass rate, adjusting it downward to 94% (Figure 3). Similarly, after this adjustment, the correct rate of the E^2 benchmark as a predictor of NCLEX-RN® failure reduces from 47% to 31%. Therefore, the assumption that an E^2 benchmark is exclusively a filter is the most *forgiving* way to assess the accuracy of an E^2 benchmark as a predictor of failure on the NCLEX-RN®.

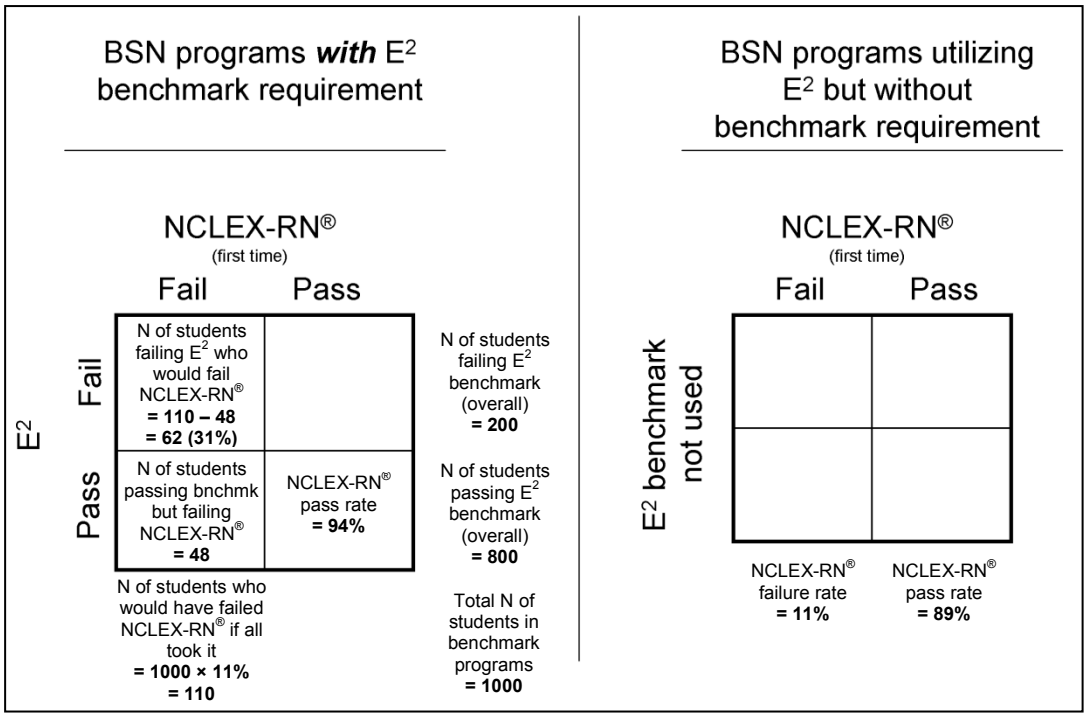

Figure 3. Example of algorithm with adjusted filter assumption.

When data were collected, the possibility that the actual NCLEX-RN® failure rate for BSN programs not using a benchmark could be lower was considered. It was also deemed possible that very few students failed to meet the E^2 benchmark in programs utilizing it. Both of these scenarios would tend to increase the accuracy of predicting NCLEX-RN® failure with an E^2 benchmark, which further illustrates the importance of the present study. Furthermore, the above algorithmic approach was used to examine various E^2 benchmark levels, in addition to a direct comparison of all BSN programs using a benchmark and all BSN programs using E^2 without a benchmark. Stratifying the analysis of the actual benchmark values allowed an examination of how the accuracy of predicting failure changes in response to different benchmark values.

Odds ratios. When a dependent variable is dichotomous and analyzed with the logit function (as done as a part of logistic regression analysis), even in the context of an

HLM analysis, odds ratios are often used as descriptive statistics. As the name suggests, odds ratios are a ratio of odds, with odds being defined as successes divided by failures. In the context of the present study, the *odds* refer to ratio of students that passed and failed the NCLEX-RN® in reference to a particular group. For example, if there were 1,000 students in this group, and 900 passed (90% pass rate), the odds of passing would be 900/100, or nine to one. Similarly, if in a group of 1,000 students, a pass rate was 92% (i.e. 920 passing NCLEX-RN® and 80 not passing), their *odds* of passing would be 920/80, or 11.5 to 1.

An odds ratio is a ratio of odds that have been derived from two different groups. For instance, in the above example, the odds ratio (*OR*) would be stated as:

$$OR = \frac{\frac{\quad}{\quad}}{\frac{\quad}{\quad}} = \frac{\frac{\quad}{\quad}}{\frac{\quad}{\quad}} = 1.28$$

This concept can be interpreted as a factor by which the odds change when moving from one group to the other. For instance, in the above example, when moving from the first group (with 9:1 odds of passing) to the second group (with 11.5:1 odds of passing), the likelihood of success increased by a factor of 1.28.

Rather than speaking in terms of numbers of students, odds and the *OR* can be stated directly in terms of overall percentages (NCLEX-RN® pass rates). In this case, the odds would be defined as pass rate / (1 – pass rate), where pass rate is a proportion rather than a percentage. In these terms, the *OR* would be stated as:

$$OR = \frac{\frac{\quad}{\quad}}{\frac{\quad}{\quad}}$$

In terms of a hypothesis test (or a *p* value), it could be said that the test is performed to establish whether or not the *OR* is significantly different than one, with an *OR* of one suggesting that there is no significant difference in pass rates between the two groups. Similarly, an *OR* significantly less than one indicates a marked difference between two groups. Thus, care must be taken which group is used in the denominator, as by reversing the group labels, an *OR* greater than one (i.e. reciprocal of the original) would be obtained. Nonetheless, in order to avoid confusion, whenever an *OR* is statistically significant, it is always advisable to return to the pass rates of the two groups to appreciate which group performed better.

If the *OR* between two groups is known, and the pass rate for one of the two groups is known, the pass rate of the other group can be solved:

$$PassRate_{gp1} = \frac{\qquad\qquad\qquad\qquad\qquad\qquad}{\qquad\qquad\qquad\qquad\qquad\qquad}$$

Thus, using the above example, we can derive pass rate of group two by performing the following calculation:

$$PassRate_{gp2} = \frac{\qquad\qquad\qquad\qquad}{\qquad\qquad\qquad\qquad} = \frac{\qquad}{\qquad} = .90 \text{ (or 90\% pass rate)}$$

Clearly, if the pass rate of group one is known and the pass rate of group two is desired, the reciprocal of the *OR* is used in the above formula.

Statistical Power Analysis

As stated previously, the sampling in this study is hierarchical, and HLM was the statistical model used for hypothesis testing (Tabachnick & Fidell, 2007). However, the principal investigator is not aware of any software program that performs power analyses for HLM models. Since power analysis is typically thought of as an approximation, for

power analysis purposes, this study's statistical model was viewed as multiple logistic regression. To perform a power analysis for a logistic regression model, several factors must be specified: the alpha value, the number of tails used, the level of power desired, and the hypothesized population proportions of the dichotomous variable for each of the two groups. The alpha value and number of tails were previously specified. The level of power desired was set at 80%, which is the level recommended by many statisticians (Polit & Beck, 2008), whereby SPSS SamplePower 2.0 was used to perform all calculations of power.

In order to derive the hypothesized proportions of the two groups, a minimum theoretical effect size was established. For this study's model, this would be a minimum difference in the first-time NCLEX-RN® pass rates between the nursing programs that have an E^2 graduation requirement and those that do not. For the purpose of power analysis, this requirement was set at 4%. In other words, if an E^2 graduation requirement does not raise the first-time NCLEX-RN® pass rates by at least 4%, it is deemed not warranted. In 2010, the national NCLEX-RN® first-time pass rate was 89% (or 0.89 when stated as a proportion) (NCSBN, 2010b). Since it was not known how many of these nursing graduates would come from programs that had an E^2 graduation requirement, this 0.89 was bracketed with the 4% minimum effect size, yielding a proportion of 0.87 for one group and 0.91 for the other.

At the time of the proposal, the size of the two groups of BSN students was also unknown. However, the vast majority of statistical power is derived from the size of the smaller of two groups being analyzed (Tabachnick & Fidell, 2007). Therefore, even if the two groups differed vastly, statistical power could be stated in terms of the number of

subjects needed in the smaller of the groups. Under these conditions, in the present study, a multiple logistic regression analysis would require 980 subjects in the smaller of the two groups to achieve 80% statistical power.

However, this was not a true logistic regression study, as its adopted sampling methods were hierarchical. Thus, to correctly calculate a REML error term toward derivation of a *p* value, the hierarchical variable (nursing programs) must be included in the analysis model. As such, one degree of freedom is lost for each nursing program in the analysis. Consequently, as an approximate adjustment, the number of nursing programs per group must be added to the number subjects required to maintain at least 80% power.

At present, there are 548 accredited BSN programs in the United States (AACN, 2011). In 2010, approximately 62,000 BSN graduates sat for the NCLEX-RN® and approximately 54,000 passed (NCSBN, 2010b). This equates to an approximate average of 113 BSN graduates per program. Therefore, roughly one degree of freedom will be lost for each 100 study participants from the hierarchical nature of the data. Consequently, for 80% power, about 9.8 (or 10) participants should be added to the original estimate of 980. As a precaution, this number was rounded up to 1,000, as the minimum acceptable value for the number of participants in the smaller of the groups being analyzed.

At the time of proposal, it was not known how many of the BSN nursing programs used an E^2 benchmark score as a graduation requirement. However, even if this number was relatively low, and the response rate was at least 50%, it was anticipated that there should be more than adequate responses to achieve 1,000 BSN student

graduates in the smaller of any of the groups being analyzed. Given that data were requested for approximately one and a half years of graduates and an estimated 62,000 graduates per year for the BSN programs, there were 93,000 potential study participants. At a 50% response rate, a dataset of 46,500 participants would be obtained. At this response rate, only 2.1% of the BSN programs would need to be using the E^2 as a graduation requirement to obtain 1,000 subjects in this graduation requirement group and maintain 80% power. Therefore, it was deemed that at least 80% power would be easily achieved in this study.

Limitations

This study was limited to US BSN programs accredited by CCNE. The nursing program chairs, deans, and directors were asked to respond to an electronic online survey, which could limit responses to respondents with computer access. Moreover, only students whose nursing program chairs, deans, and directors decided to respond to the survey would be considered in the study. Nonetheless, a considerable effort was made (as described in the data collection section) to collect as many data collection instruments as possible.

As with any study design, there are some limitations. The primary limitation of retrospective quasi-experimental designs is that they are not prospective (Polit & Beck, 2008). The BSN programs were not randomly assigned to the E^2 benchmark and E^2 non-benchmark groups. In addition, there was no random assignment amongst programs using the E^2 and those using other criteria or none at all. This allows for the possibility of other unexamined extraneous variables that influence the results (Polit & Beck, 2008). In other words, other unexamined factors could potentially influence the first-time

NCLEX-RN® pass rates in BSN programs. These include, but are not limited to, admission criteria, curriculum design, faculty support, student grade point averages, personal life events of the students, and diverse populations (DiBartolo & Seldomridge, 2008). Although such information would be difficult to collect and analyze, the study data collection instrument specifically requested information regarding each school's demographics, credit hour cost, admission requirement of a minimum GPA, graduation cycles or periods, number of BSN student graduates, NCLEX-RN® first time rates, and whether a commercial computerized exit exam is used towards the end of the program. It was hoped that an examination of the potential confounding variables that were collected and the potentially large sample size would diminish the effects of this possible threat to internal validity.

A threat to selection bias was not a concern because response rates were high (Polit & Beck, 2008). Data analyzed only pertained to students from BSN programs the representatives of which responded to the data collection instrument. Moreover, the data collection instrument was emailed several times to a large number of BSN programs, with follow up corrections to email addresses. This process helped to address the problem of pre-existing differences in groups, such as the size of the school, workload of staff, timing of email, or interest in the area of study.

Generalizability of the study is limited due to exclusion of BSN nursing programs with administrators that did not respond to the data collection instrument, did not have access to email or the internet, and BSN nursing programs that were not CCNE accredited.

CHAPTER 5

RESULTS

This chapter presents the sample descriptives and potential confounding variables, followed by the results related to each research question and hypothesis.

Descriptives and Potential Confounds

Complete data are available from 94 BSN programs, which this corresponded to data (responses on questionnaire) on 212 reporting periods. Regarding the first two research questions and hypotheses, the design can be conceptualized as quasi-experimental (Campbell & Stanley, 1966; Cook & Campbell, 1979; Shadish et al., 2002). Moreover, for answering the first research question and testing Hypothesis 1, random assignment was deemed inappropriate for identifying BSN students that either attended programs using the E^2 or were enrolled in other programs. Thus, as there are clearly two independent groups of BSN students being compared to one another, the BSN students in programs not using the E^2 could be conceptualized as the control group. The frequency of the reporting of periods of graduation per BSN program can be seen in Table 3. Because the E^2 and other requirements changed from one reporting period to the next, even in the same BSN program, other descriptive statistics are reported in terms of these reporting periods.

Table 3
Frequency of the reporting of periods of graduation per BSN program

Periods of Graduation Reported	BSN Programs Reporting	Percent
1	23	24.5%
2	32	34.0%
3	31	33.0%
4	8	8.5%

Across all reporting periods, there were 11,254 BSN students that reportedly graduated, indicating a mean of 53.1 students per period with the range from one to 200 students. Thus, the standard deviation was 35.9 students. The mean NCLEX-RN® pass rate for the reporting periods was 90.2%, with the range 43% − 100% and corresponding standard deviation of 8.7%. It is worth noting that, in 201 of the 212 reporting periods, some type of commercially available exit exam was used. The frequency of the various exit exams used for reporting periods and graduating students can be seen in Table 4. According to Table 4, there were 91 reporting periods in which the E^2 was used, representing 4,514 student graduates. However, four BSN programs changed their chosen exit exam between the reporting periods for which they provided data. One School switched from using no exam to the Kaplan, another switched from the E^2 to the Kaplan, one switched from ATI to Kaplan, and one switched from Kaplan to ATI.

Table 4
Reporting periods and students for each type of exit exam used

Length of BSN Program	Reporting Periods		Student Graduates	
	Number	Percent	Number	Percent
None	11	5.2%	702	6.2%
E^2	91	42.9%	4,514	40.1%
Kaplan	15	7.1%	794	7.1%
ATI	93	43.9%	5,074	45.1%
NLN	2	0.9%	170	1.5%

For the 91 reporting periods in which the E^2 was used, only 29 used a benchmark required for graduation, corresponding to 12 BSN programs and 1,162 student graduates. Similarly, the remaining 62 reporting periods using the E^2 without a benchmark represented 28 BSN programs and 3,352 student graduates.

For two of the 29 reporting periods using the E^2 with a benchmark, the benchmark was set at 900. However, one of these was for a BSN program that reported only one reporting period. The other was from a BSN program that had two reporting periods in the study context, but used the 900 benchmark in only one, for which there were 28 graduating students and one student held back because of failure to meet the benchmark. In this reporting period, the BSN program allowed students three attempts to pass the E^2 with the required benchmark. For the other reporting period (different BSN program) with the 900 benchmark, there was only one graduating student, and 28 students were held back for failure to meet the benchmark. In this reporting period, the BSN program actually allowed the students six attempts to attempt to pass the E^2 with the required benchmark score.

The remaining 27 reporting periods using the E^2 with a benchmark used a benchmark score of 850. This represented 1,133 graduating students and 55 students held back for failure to meet the benchmark. These 27 reporting periods using an E^2 benchmark of 850 represented 11 BSN programs. The number of reporting periods allowing various numbers of attempts to take the E^2 to meet the 850 benchmark can be seen in Table 5.

Table 5
Number of times allowed to take E^2 for reporting periods using 850 as benchmark

Times Allowed To Take E^2 to Meet Benchmark	Reporting Periods	Percent
2	2	7.4%
3	7	25.9%
4	6	22.2%
6	12	44.4%

The potential confounding variables that were measured included geographic region, public or private institution, cost per credit hour (exclusive of fees), minimum GPA requirement for acceptance into the BSN program, length of the program in either semesters or quarters, and a number of times per year that graduation from the BSN program takes place. All BSN programs reported the state they were in, and these were grouped into regions, as shown in Table 6. The number of BSN programs, reporting periods, and students in each of these regions is shown in Table 7. With exception of for region (or state), and whether or not they were a public or private institution, all other potential confounding variables suffered from incomplete data. However, only complete data were included in the subsequent analysis. Moreover, for programs that did not have a minimum GPA requirement for admission, a zero was entered, whereby all GPA requirements were scaled on a 4.0 system.

Table 6
Grouping of states into regions

Region	States
Northeast	ME, NH, VT, MA, RI, CT, NY, PA, NJ
Midwest	WI, MI, IL, IN, OH, MO, ND, SD, NE, KS, MN, IO
South	DE, MD, DC, VA, WV, NC, SC, GA, FL, KY, TN, MS, AL, OK, TX, AR, LA
West	ID, MT, WY, NV, UT, CO, AZ, NM, AK, WA, OR, CA, HI

Table 7
BSN programs, reporting periods, and students per region

Region	BSN Programs		Reporting Periods		Student Graduates	
	Number	Percent	Number	Percent	Number	Percent
Northeast	14	14.0%	24	24.0%	1128	10.0%
Midwest	34	34.0%	72	72.0%	3565	31.7%
South	37	37.0%	89	89.0%	4745	42.2%
West	9	9.0%	27	27.0%	1816	16.1%

Across all the students, the cost per educational credit hour ranged from $0 to $1728, with the mean of $530, and a standard deviation of $373. The single school with $0 indicated that all expenses were met through scholarships. There were 11 BSN programs that did not provide financial information, which was treated as missing data. These 11 programs represented 20 reporting periods and related to 1,159 students. Regarding the length of the BSN program, the options that were available were ‘from 4 to 6 semesters’ or ‘from 4 to 8 quarters’. However, the representative of one program refused to answer this question and data related to 15 other programs indicated ‘other’. The latter were also analyzed as missing data. The breakdown of this program length variable and the other remaining potential confounds are shown in Table 8 −11.

Table 8

BSN programs, reporting periods, and students, per public or private institution

Public or Private	BSN Programs		Reporting Periods		Student Graduates	
	Number	Percent	Number	Percent	Number	Percent
Public	40	42.6%	105	49.5%	6292	55.9%
Private	54	57.4%	107	50.5%	4962	44.1%

Table 9

BSN programs, reporting periods, and students, per minimum GPA requirement

GPA Requirement	BSN Programs		Reporting Periods		Student Graduates†	
	Number	Percent	Number	Percent	Number	Percent
0.00	10	11.0%	25	12.1%	1505	13.9%
2.25	1	1.1%	1	0.5%	47	0.4%
2.50	18	19.8%	38	18.4%	1765	16.3%
2.60	2	2.2%	4	1.9%	127	1.2%
2.70	11	12.1%	28	13.5%	1481	13.6%
2.75	22	24.2%	46	22.2%	2960	27.3%
2.80	4	4.4%	10	4.8%	387	3.6%
2.85	1	1.1%	1	0.5%	48	0.4%
3.00	18	19.8%	44	21.3%	2050	18.9%
3.20	3	3.3%	7	3.4%	357	3.3%
3.60	1	1.1%	3	1.4%	123	1.1%
Missing	3		5		404	

†Mean GPA across students was 2.4 with a standard deviation of 1.0.

Table 10

BSN programs, reporting periods, and students, per length of BSN program

Length of BSN Program	BSN Programs		Reporting Periods		Student Graduates	
	Number	Percent	Number	Percent	Number	Percent
4 Semesters	32	41.0%	76	42.9%	3596	38.1%
5 Semesters	23	29.5%	56	31.6%	3430	36.4%
6 Semesters	22	28.2%	44	24.9%	2343	24.8%
8 Quarters	1	1.3%	1	0.6%	64	0.7%
Missing	16		35		1821	

Table 11
BSN programs, reporting periods, and students, per graduation times per year

Graduation Times per Year	BSN Programs		Reporting Periods		Student Graduates	
	Number	Percent	Number	Percent	Number	Percent
1	36	38.3%	94	44.3%	4954	44.0%
2	16	17.0%	52	24.5%	3074	27.3%
3	41	43.6%	63	29.7%	3098	27.5%
5	1	1.1%	3	1.4%	128	1.1%

Cost per credit hour and minimum GPA for admission were analyzed as continuous (interval) variables. Geographic region, public or private, length of program, and graduation times per year were all analyzed as grouping (nominal) variables. In addition, the 8-semester group (length of program) was coded as missing when included in the analysis. Even though this represented only one school, one reporting period, and included 64 students, there was a concern over the undue influence such a small group would have on statistical power. The student count with complete data on all potential confounds (including the exclusion of the 8 semester group) was 8,469, representing 161 reporting periods and 70 BSN programs. Moreover, the data corresponding to reporting period from one program with five reporting periods was marked as missing. However, this did not affect the frequency of the complete data on these confounds because this single program had other missing data that already excluded it form the analysis.

To better appreciate NCLEX-RN® pass rates, under certain circumstances, it is advantageous to group the minimum GPA for admission into suitable groups. Thus, for the purpose of this study, the GPA measure was subdivided into groups of 0.00 (indicating no requirement), 2.25 to 2.70, 2.75 (as a single value), and 2.80 to 3.60. The frequencies for this breakdown are provided in Table 12.

Table 12
BSN programs, reporting periods, and students, per grouped GPA requirement

GPA Requirement Groups	BSN Programs		Reporting Periods		Student Graduates	
	Number	Percent	Number	Percent	Number	Percent
0.00	10	11.0%	25	12.1%	1505	13.9%
2.25 to 2.70	32	35.2%	71	34.3%	3420	31.5%
2.75	22	24.2%	46	22.2%	2960	27.3%
2.80 to 3.60	27	29.7%	65	31.4%	2965	27.3%

Research questions and hypotheses, and the HLM analysis approach

HLM analysis approach. In all cases where the research question involved using the measure of whether or not a student passed the NCLEX-RN® on their first attempt, a hierarchical linear model approach was used to analyze the data (Raudenbush, Bryk, Cheong, Congdon, & Toit, 2011). Consequently, this dichotomous outcome variable of whether or not a student passed the NCLEX-RN® was analyzed with the logit function applying a two-level hierarchical linear model. Passing (or failing) the NCLEX-RN® per student was the outcome measure of the first level, and the beta value(s) of the prediction equation in the first level were the outcome measures of the second level, with reporting period being the link between the levels. In cases were predictor variables at the first level of the model were present, group centering at the second level was always used, as is recommended except in unusual circumstances (Raudenbush & Bryk, 2002).

HLM analysis was utilized for research questions 1 and 2 applying the following levels of hierarchy.

Table 13
HLM development of levels of hierarchy

Measure	Predictor or Criterion	Level Analyzed
NCLEX-RN® passing	Criterion	Student
E^2 used	Predictor	Reporting Period
Other exit exam used	Predictor	Reporting Period
E^2 benchmark used	Predictor	Reporting Period
Region	Predictor	BSN Program
Public or Private	Predictor	BSN Program
Cost per Credit Hour	Predictor	BSN Program
Minimum GPA	Predictor	BSN Program
Length of Program	Predictor	BSN Program
Graduation Times per Year	Predictor	BSN Program

Research Question 1. Are there differences in first-time NCLEX-RN® pass rates for BSN students from nursing programs utilizing the E^2 and those using other standardized exit exams, or no exit exam? This question was examined through evaluation of the results of the study, as applied toward Hypothesis 1 and Null Hypothesis 1

Hypothesis 1**:** BSN students from nursing programs utilizing the E^2 will have different first-time NCLEX-RN® pass rates than BSN students from nursing programs that use other standardized exit exams, and those using no exit exam.

Null Hypothesis 1: BSN students from nursing programs utilizing the E^2 will have no difference in first-time NCLEX-RN® pass rates than BSN students from nursing programs utilizing other standardized exit exams, and those using no exit exam.

Results. The pass rate among students subjected to the various exit exams are shown in Table 14. When comparing the pass rates of all students in programs using the E^2 to all other students, there was no statistically significant difference, $p = .795$. As per

Table 14, the pass rates for students subjected to the E^2 were 90.5%, whereas it was 90.3% for all other students, indicating the odds ratio of 1.02 between these two rates. When comparing the students in programs using the E^2 to only students in programs using no exit exam, there was no statistical significance either, $p = .731$. The odds ratio was 0.95 between the two pass rates, corresponding to 90.9% pass rate for students in programs with no exit exam. Even though the difference was not statistically significant, higher pass rate among the students in sampled programs not using E^2 was rather unexpected and required further investigation. Considering these results, the null hypothesis is accepted, however further examination of the potential confounds is warranted.

Table 14
Pass rates for various exit exams used

Exit Exam Used	Students	NCLEX-RN Pass Rate
None	702	90.9%
E^2	4514	90.5%
Kaplan	794	87.4%
ATI	5074	90.6%
NLN	170	92.9%

Confounding variables considered. Given the above results, the potential confounds that were measured must be viewed as potential suppressor effects, dampening possible differences that would otherwise exist when their influence is removed. With all potential confounds included in the analysis, the results become statistically significant for whether or not the students were in programs using the E^2, $p = .010$. The statistical significance of all the potential confounds can be seen in Table 15. With confounds included in the analysis, the null hypothesis can be rejected, implying that there are

differences in first-time NCLEX-RN® pass rates in programs utilizing the E^2 compared to BSN students from nursing programs that use other standardized exit exams, and those using no exit exam.

The fact that the results are not statistically significant without the confounds included in the analysis suggests a complex picture. In order to attempt to gain a better understanding of this phenomenon, the NCLEX-RN® pass rates for each of the statistically significant confounds were further examined. Since the variables related to cost per credit hour and graduate times per year were not statistically significant, they were not further examined.

Table 15
Statistical significance of possible predictors of whether or not a student passes NCLEX-RN®

Predictor	p value	Adjusted Odds Ratio†
E^2 Used (Yes or No)‡	.010	1.26
Region	.000	
Public or Private	.000	1.55
Cost per Credit Hour	.189	1.00
Minimum GPA	.006	1.15
Length of Program	.005	
Graduation Times per Year	.281	

†Region, program length, and graduation times did not have odds ratio because they were neither continuous nor dichotomous.
‡A "no" response includes programs using other exit exams.

Region was examined first by performing the analysis stratified by region, which is summarized in Table 16. Whether or not the E^2 was used had a statistically significant effect in two of the regions, the Northeast and the Midwest. However, these results were somewhat contradictory, in that the Northeast showed an overall decrease in the pass rates of 3.6% when the E^2 was used, whereas the Midwest showed an increase of 3.4%.

Table 16
NCLEX-RN® pass rates per whether or not E^2 is used, stratified by region

Region	E^2 Used		E^2 Not Used		*p* Value for Difference in Pass Rates
	NCLEX-RN® Pass Rate	Student Graduates	NCLEX-RN® Pass Rate	Student Graduates	
Northeast	90.5%	706	94.1%	422	.036
Midwest	91.2%	1038	87.8%	2527	.003
South	90.2%	2477	91.0%	2268	.334
West	89.8%	293	92.4%	1523	.132

Whether the BSN program from which the students graduated was a public institution or a private institution was examined next, and these results are shown in Table 17. Previously, Table 17 indicated that public versus private was a significant predictor of NCLEX-RN® pass rates. Moreover, Table 17 shows that the public schools have a slightly higher pass rate, regardless of whether E^2 is used or not. However, Table 17 also illustrates that whether or not a school is public has little to do with the efficacy of using the E^2 to improve NCLEX-RN® pass rates.

Table 17
NCLEX-RN® pass rates per whether or not E^2 is used, stratified by public or private institution

Public or Private	E^2 Used		E^2 Not Used		*p* Value for Difference in Pass Rates
	NCLEX-RN® Pass Rate	Student Graduates	NCLEX-RN® Pass Rate	Student Graduates	
Public	91.6%	2358	91.6%	3934	.991
Private	89.2%	2156	88.5%	2806	.436

The program admissions GPA requirement was examined next, using the GPA grouping measure outlined above for minimum GPA, as shown in Table 18. The only statistically significant finding with respect to the influence of using the E^2 was among students in programs which did not require a minimum GPA admission, and the NCLEX-RN® pass rate was actually higher in programs that did not use the E^2.

Table 18
NCLEX-RN® pass rates per whether or not E^2 is used, stratified by GPA requirement group

GPA Requirement Group	E^2 Used		E^2 Not Used		*p* Value for Difference in Pass Rates
	NCLEX-RN® Pass Rate	Student Graduates	NCLEX-RN® Pass Rate	Student Graduates	
0	88.3%	956	93.4%	549	.001
2.25 to 2.70	91.6%	1352	89.7%	2068	.053
2.75	90.8%	786	89.5%	2174	.291
2.80 to 3.60	90.6%	1420	92.0%	1545	.195

When examining the length of the BSN program, the E^2 appeared to be of benefit in boosting NCLEX-RN® pass rates for programs using a four-semester system, as shown in Table 19. However, the effect of using the E^2 was not statistically significant for programs on either a five semester or six semester system.

Table 19
NCLEX-RN® pass rates per whether or not E^2 is used, stratified by length of BSN program

Length of BSN Program	E^2 Used		E^2 Not Used		p Value for Difference in Pass Rates
	NCLEX-RN® Pass Rate	Student Graduates	NCLEX-RN® Pass Rate	Student Graduates	
4 Semesters	92.1%	1578	90.5%	2018	.000
5 Semesters	89.5%	1511	91.0%	1919	.091
6 Semesters	93.0%	559	87.2%	1784	.156

Given the above results, it is evident that, even after stratifying by all the possible confounds, a clear picture of the effect of using the E^2 does not emerge. For example, the fact that the adjusted odds ratio in Table 15 for use of the E^2 with all other confounds controlled for was 0.97 suggests that other programs fared slightly better in passing the NCLEX-RN® than the programs using the E^2. Thus, in order to explore this issue further, the programs using the E^2 with only those programs not using any exit exam at all will be contrasted next.

A comparison of BSN programs using the E^2 with other BSN programs not using any other exit exam. As shown in Table 15 and stated above, overall, there was no statistically significant difference in NCLEX-RN® pass rates between these two groups. However, this finding was not examined with the potential confounding variables considered. Table 20 shows this result with the possible confounds included in the analysis. However, even with the possible confounds in the analysis, use of the E^2 did not reveal statistical significance in increasing NCLEX-RN® pass rates when compared to students in programs not using an exit exam, $p = .864$. The adjusted odds ratio was 0.97 and, as reported above, the unadjusted odds ratio (without considering the possible confounds) was 0.95. In this case, the possible confounds were not further examined because the use of the E^2 was not statistically significant, even with these confounds controlled for. When comparing BSN students in programs utilizing E^2 to BSN students in programs that used no exit exam, the findings support acceptance of the null hypothesis because there was no statistically significant difference in first-time NCLEX-RN® pass rates.

Table 20
Statistical significance of possible predictors of whether or not a student passes NCLEX-RN®, examining only BSN programs either using E^2 or not using any exit exam

Predictor	p value	Adjusted Odds Ratio†
E^2 Used (Yes or No)‡	.864	0.97
Region	.000	
Public or Private	.000	2.99
Cost per Credit Hour	.455	1.00
Minimum GPA	.000	1.28
Length of Program	.242	
Graduation Times per Year	.000	

†Region, program length, and graduation times did not have odds ratio because they were neither continuous nor dichotomous.
‡A "no" response includes only programs not using an exit exam.

Research Question 2. For programs utilizing the E^2, are there differences in first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing the E^2 exam's minimum benchmark scores as a graduation requirement and those that do not? This question will be examined through evaluation of the results of the study, as applied toward Hypothesis 2 and Null Hypothesis 2.

Hypothesis 2**:** There will be a difference in first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing E^2 exam's minimum benchmark scores as a graduation requirement and those that do not.

Null Hypothesis 2: There will be no difference in first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing E^2 exam's minimum benchmark scores as a graduation requirement and those that do not.

Results. Table 4 illustrates that there were 91 reporting periods in which the E^2 was used, accounting for 4,514 students. Within these 91 reporting periods, there were 29 in which an E^2 graduation benchmark was used. In addition, within these 29, an E^2

benchmark of 850 was used in 27. For the remaining two reporting periods, an E^2 benchmark of 900 was used, whereby one represented a BSN program that provided data on this single reporting period. In addition, the other represented a BSN program that provided data on two reporting periods, one using a benchmark of 850 and the other using a benchmark of 900. The frequencies of these E^2 graduation benchmark is provided in Table 21.

Table 21
BSN programs, reporting periods, and students, per length of BSN program

Value of E^2 Graduation Benchmark Used	BSN Programs†		Reporting Periods		Student Graduates	
	Number	Percent	Number	Percent	Number	Percent
No E^2 Benchmark	28	68.3%	62	68.1%	3352	74.3%
E^2 Benchmark of 850	11	26.8%	27	29.7%	1133	25.1%
E^2 Benchmark of 900	2	4.9%	2	2.2%	29	0.6%

†One BSN program is counted twice because they used a benchmark of 850 in one reporting period and 900 in another.

The first analysis combined the two groups using either an 850 benchmark or a 900 benchmark and then compared them to the group using no benchmark. The NCLEX-RN® pass rate for graduating BSN students from programs using a benchmark score as a graduation requirement was 88.9%, and the pass rate for those BSN students from programs using E^2 without a benchmark was 91.0%. This difference was statistically significant, $p = .034$, with an odds ratio of 0.79, indicating that the use of the E^2 benchmark score has a negative effect on first-time NCLEX-RN® pass rates. Thus, Null Hypothesis 2 can be rejected and Hypothesis 2 accepted. In other words, there was a difference in first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing E^2 exam's minimum benchmark scores as a graduation requirement, and those that do not.

Confounding variables considered. The next analysis examined the potential confounds in order to establish if they have any influence on these results, as shown in Table 22. Table 22 reveals statistical significance in the use of the E^2 benchmark score as a graduation requirement when compared to not using an E^2 benchmark score, when all confounds are controlled for. Furthermore, the adjusted odds ratio for use of the E^2 benchmark score was greater than one, suggesting that use of the benchmark actually does have a positive influence when the confounds are controlled for. Thus, with all the confounding variables controlled for, Null Hypothesis 2 can be rejected again.

Table 22
Statistical significance of possible predictors of whether or not a student passes NCLEX-RN®, examining only BSN programs using E^2 either with or without a benchmark

Predictor	p value	Adjusted Odds Ratio†
E^2 Benchmark Used (Yes or No)	.035	1.59
Region	.000	
Public or Private	.000	0.34
Cost per Credit Hour	.283	1.00
Minimum GPA	.001	1.48
Length of Program	.593	
Graduation Times per Year	.003	

†Region, program length, and graduation times did not have odds ratio because they were neither continuous nor dichotomous.

Further examination of Table 22 indicates that region, public or private, minimum GPA, and graduation times per year were significantly related to NCLEX-RN® pass rate. Thus, these potential confounds will be more fully examined to determine their exact effect.

The analysis stratified by region (Table 23) indicates that the largest region is the South, where the pass rate was significantly higher for those students subjected to an E^2 benchmark, compared to the pass rate for those students not required to pass E^2 with a

benchmark. Although the numbers were much smaller (especially for the students required to pass a benchmark), the Northeast had somewhat opposite results. The West showed a statistically significant trend favoring the use of E^2 benchmarks.

Table 23
NCLEX-RN® pass rates among students required to take E^2, per whether or not an E^2 benchmark is used, stratified by region

Region	E^2 Benchmark Used		E^2 Benchmark Not Used		*p* Value for Difference in Pass Rates
	NCLEX-RN® Pass Rate	Student Graduates	NCLEX-RN® Pass Rate	Student Graduates	
Northeast	73.3%	60	92.1%	646	.000
Midwest	95.2%	82	90.9%	956	.202
South	99.0%	921	91.4%	1556	.012
West	88.9%	99	85.1%	194	.005

When examining stratifications by public versus private educational institution (Table 24), an interaction effect was not observed, which would explain the change in the odds ratio and the adjusted odds ratio. Pass rates were somewhat higher for both public and private sector when an E^2 benchmark was not used, although the difference was not statistically significant for private institutions.

Table 24
NCLEX-RN® pass rates among students required to take E^2 per whether or not an E^2 benchmark is used, stratified by public or private institution

Public or Private	E^2 Benchmark Used		E^2 Benchmark Not Used		*p* Value for Difference in Pass Rates
	NCLEX-RN® Pass Rate	Student Graduates	NCLEX-RN® Pass Rate	Student Graduates	
Public	89.4%	814	92.8%	1544	.005
Private	87.6%	348	89.5%	1808	.310

The analysis that stratified GPA entrance requirement into appropriate groups (Table 25) showed statistical significance for the group with no GPA requirement.

However, this analysis showed a significant drop in NCLEX-RN® pass rates for the group using a benchmark when compared to the group using E^2 without a benchmark.

Table 25
NCLEX-RN® pass rates among students required to take E^2, per whether or not an E^2 benchmark is used, stratified by GPA requirement group

GPA Requirement Group	E^2 Benchmark Used		E^2 Benchmark Not Used		*p* Value for Difference in Pass Rates
	NCLEX-RN® Pass Rate	Student Graduates	NCLEX-RN® Pass Rate	Student Graduates	
0	84.3%	230	89.5%	726	.034
2.25 to 2.70	91.3%	461	91.8%	891	.761
2.75	84.4%	32	91.1%	754	.203
2.80 to 3.60	89.1%	439	91.3%	981	.176

The last potential confound that was examined was the length of the BSN program the student graduates attended (Table 26), where a benefit of using an E^2 benchmark in four semester programs was indicated, albeit not statistically significant, $p = .168$. The only statistically significant finding related to five semester programs, where a decrease in pass rates for programs using an E^2 benchmark was noted.

Table 26
NCLEX-RN® pass rates among students required to take E^2, per whether or not an E^2 benchmark is used, stratified by length of BSN program

Length of BSN Program	E^2 Benchmark Used		E^2 Benchmark Not Used		p Value for Difference in Pass Rates
	NCLEX-RN® Pass Rate	Student Graduates	NCLEX-RN® Pass Rate	Student Graduates	
4 Semesters	93.9%	345	91.6%	1233	.168
5 Semesters	86.8%	570	91.2%	941	.008
6 Semesters	91.7%	48	93.2%	511	.700

Again, a clear picture of the effect of the potential confounds does not emerge from their examination. It is somewhat puzzling that the odds ratio adjusted for these confounds between using a benchmark or not and the NCLEX-RN® pass rates is 1.59, which suggests that a benchmark is beneficial.

Within BSN programs using the E^2, a comparison of those programs using an 850 benchmark with those programs not using a benchmark. In the collected data, only 29 corresponded to students that were subjected to an E^2 benchmark that was not 850 (Table 21). However, for completeness, the 1,133 students subjected to an 850 benchmark will be compared to those 3,352 students in BSN programs using the E^2 but with no benchmark requirement. BSN student graduates subjected to the 850 benchmark had an 88.9% pass rate, whereas students in BSN programs using the E^2 without a benchmark had a 91.0% pass rate. Again, these results are rather unexpected and counterintuitive. Moreover, this difference in pass rates was statistically significant, $p = .034$, with an odds ratio of 0.79. Thus, Null Hypothesis 2 is rejected in this scenario of using 850 as a benchmark score because there was a difference in NCLEX-RN® first-time pass rates among BSN students from nursing programs utilizing E^2 exam's minimum benchmark scores of 850 as a graduation requirement, and those that do not.

As with the above analysis, making a distinction between the 850 and 900 benchmark, an analysis was performed with the potential confounding variables included, as shown in Table 27. All the numbers are exactly the same as in Table 22 due to the small effect of removing the 29 students that were subjected to a 900 benchmark. Actually, the unadjusted odds ratio of 0.79 did not change either. Because of the virtually identical results in these two scenarios, a breakdown of the potential confounds was not repeated here.

Table 27
Statistical significance of possible predictors of whether or not a student passes NCLEX-RN®, examining only BSN programs using E^2 either with an 850 benchmark or without a benchmark

Predictor	p value	Adjusted Odds Ratio†
E^2 850 Benchmark Used (Yes or No)	.035	1.59
Region	.000	
Public or Private	.000	0.34
Cost per Credit Hour	.283	1.00
Minimum GPA	.001	1.48
Length of Program	.593	
Graduation Times per Year	.003	

†Region, program length, and graduation times did not have odds ratio because they were neither continuous nor dichotomous.

Research Question 3. What percentage of BSN students that failed to graduate due failing to meet a minimum benchmark score would have actually failed NCLEX-RN®?

Hypothesis 3: It is estimated that less than 100% of BSN students that did not graduate due to not meeting a minimum benchmark score would have failed NCLEX-RN®.

Null Hypothesis 3: It is estimated that 100% of BSN students that did not graduate due to not meeting a minimum benchmark score would have failed NCLEX-RN®.

Results. The algorithm designed to calculate how many BSN students that failed to graduate due failing to meet a minimum benchmark score would have actually failed NCLEX-RN® was based on the assumption that use of the E^2 benchmark would increase NCLEX-RN® pass rates. The first analysis for Hypothesis 2 showed that use of an E^2

benchmark actually decreased NCLEX-RN® pass rates, at least before any adjustments were made for potential confounds. With an odds ratio of 0.79, it could thus be assumed that *all* of the held back students would have passed NCLEX-RN®, and the pass rates between the benchmark and non-benchmark groups would still not be equal. Thus, based on this reasoning, without considering adjustments for confounding variables, Null Hypothesis 3 is accepted.

Moreover, the number of students actually held back because of failure to meet an E^2 benchmark was small and rather poorly distributed. In total, there were 84 students held back for failure to be an E^2 benchmark. However, 28 of these came from one reporting period in which the BSN program used a 900 benchmark. In total, there were 29 students held back because of a 900 benchmark (representing two reporting periods of two different BSN programs), and 55 held back because of an 850 benchmark (representing 27 reporting periods of 11 BSN programs).

In an attempt to try to interpret these results, the focus was restricted to only the 55 students held back for failing to meet the 850 E^2 benchmark. However, there is still the problem of students in BSN programs using an 850 benchmark having a lower NCLEX-RN® pass rate than students in BSN program using E^2 without a benchmark. Given that this was the case only when the potential confounds were not controlled for, the potential confounds were subsequently controlled for, and the adjusted odds ratio of 1.59 (p = .035) obtained, suggesting that students in programs with a benchmark would have better pass rates. When data are weighted such that confounds are controlled for, a precise NCLEX-RN® pass rate is not reported in the analysis. However, starting with the assumption that the NCLEX-RN® pass rate for students in BSN programs using E^2

without a benchmark was 91.0%, which was reported above, the approximated NCLEX-RN® pass rate for statistically matched BSN programs using the E^2 with an 850 benchmark (statistically matched on the measured confounds) can be derived. This is accomplished by using the adjusted odds ratio of 1.59 and solving the equation for the pass rate of the programs using E^2 with an 850 benchmark:

$$PassRate_{WithBenchmark} = \frac{\quad}{\quad}$$

$$= \frac{\quad}{\quad} = .941 \text{ (or } 94.1\%)$$

When adjusted for the potential confounds, the use of an 850 benchmark appears to increase the pass rate by approximately 3.1%, and that was done at a cost of holding back 55 students. Under these conditions, application of the algorithm developed in the Methods section enabled an estimation of how many of these 55 students might have actually failed the NCLEX-RN®, had they been given a chance to take it. Below, all known information is noted first, before proceeding with the calculations.

N of students passing E^2 benchmark (overall, 850 benchmark only)	=	1,133
N of students passing E^2 benchmark but failing NCLEX-RN® (This was calculated using the confound-controlled for pass rate of 94.1%. Since a *failure* rate is requested, this is derived by 1,133 × (1 - .941))	=	67
N of students failing E^2 benchmark (850 benchmark only)	=	55
NCLEX-RN® failure rate in programs using E^2 without a benchmark (This is simply the 91% pass rate subtracted from 100%)	=	9%
Total N of students in E^2 benchmark programs (1,133 + 55)	=	1,188
N of students in E^2 benchmark programs that would have failed NCLEX-RN® if all took it (as per algorithm, this is 1,188 × .09 or (9%))	=	107
N of students failing E^2 benchmark that would have failed NCLEX-RN® (as per algorithm, this is 107 – 67)	=	40
Rate of students failing E^2 benchmark that would have failed NCLEX-RN® (as per algorithm, this is 50 / 55)	=	73%

Another factor that should be considered when contemplating the use of a graduation benchmark in conjunction with the E^2 is how many times students are permitted to take the E^2 toward meeting the benchmark. Table 28 shows the frequency distributions of how many times the E^2 was allowed toward meeting the 850 benchmark, broken down for BSN programs, reporting periods, and student graduates.

Table 28
Number of times students could sit for the E^2 toward meeting 850 benchmark for the 1,188 students in BSN programs using the 850 benchmark

Times Allowed to Sit for E^2	BSN Programs		Reporting Periods		Students	
	Number	Percent	Number	Percent	Number	Percent
Two	1	8.3%	2	7.4%	76	6.4%
Three	3	25.0%	7	25.9%	177	14.9%
Four	3	25.0%	6	22.2%	348	29.3%
Six	5	41.7%	12	44.4%	587	49.4%

Thus, Null Hypothesis 3 is rejected when 850 is used as a benchmark score and the potential confounding variables are considered, as fewer than 100% of BSN students (73%) that did not graduate due to not meeting a minimum benchmark score would have failed NCLEX-RN®.

CHAPTER 6

DISCUSSION

The purpose of the present study is threefold, and each aim will be delineated and examined individually. In addition, the conceptual frameworks appraised in relation to the results from the study are Adult Education Theory and Classical Test Theory. Finally, current literature that established validity, reliability, and predictability of E^2, use of E^2 in nursing curriculums, and use of E^2 as a graduation requirement will be evaluated in reference to the study results.

Purpose of the Study

Purpose 1. First-time NLCEX-RN® pass rates of BSN students from nursing programs that use the E^2 were compared to those of BSN students that attended programs that use other standardized exit exams, or have no exit exam. Interestingly, there was no statistically significant difference in pass rates between the students in programs that used the E^2 and those students that used other exit exams, or no exit exam. In other words, the findings of the first analysis indicate that the E^2 did not prepare students to take NCLEX-RN® any better than other exit exams or no exams did. When all the potential confounds were included in the second analysis, and their influence was thus removed, the results did become statistically significant ($p = .010$). In this scenario, E^2 demonstrated increased NCLEX-RN® first time pass rates when compared to the group of BSN students that took other exit exams or had no exams. However, even when these potential confounds were stratified, still no clear reason for this difference emerged. This problem suggests a complex interaction between the variables that would require further investigation beyond the scope of this study.

It was particularly interesting to note that the pass rates among the students from schools that had no exit exam were actually slightly higher (90.9% compared to 90.5%) than for students subjected to the E^2 tests. For this reason, a third analysis was conducted with all the potential confounds removed between students in BSN programs that used E^2 and those students in BSN programs that used no exit exam. However, the results indicated that the use of the E^2 still did not reveal statistical significance in increasing NCLEX-RN® first-time pass rates. Surprisingly, BSN students that took E^2 did no better on NCLEX-RN® than students that did not take an exit exam did.

Purpose 2. The second purpose of the study was to compare first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing the E^2 that require E^2 minimum benchmark score as a graduation requirement with those that attended E^2 programs that do not. The first analysis on this data revealed statistical significance in pass rates between the two groups of students. Moreover, rather counter-intuitively, the results revealed that the NCLEX-RN® first-time pass rates were higher for students that did not have a benchmark requirement for graduation (91.0%) compared to students that were in programs that had a minimum benchmark score requirement (88.9%). However, when the influence of potential confounds was removed, there was a statistically significant difference in pass rates in the opposite direction; whereby students from programs with a benchmark requirement had higher pass rates than students from schools that did not have this requirement.

Further investigation through stratification of the potential confounding variables, found variables representing regions, public or private school, minimum GPA, and graduation times per year statistically significant. However, data related to region were

hard to interpret, as the Northeast region had 73.3% and 92.1% pass rate with and without the benchmark score respectively, whereas all other regions showed the opposite effect of the benchmark requirement. Although it is not clear why this phenomenon occurred, it may be that the Northeast region skewed the results of the first analysis. This assumption is further supported by the fact that there is statistical significance in NCLEX-RN® first-time pass rates in the south and the west regions of the country. These regions show increased NCLEX-RN® first-time pass rates for BSN students that had an E^2 benchmark score requirement to graduate.

Purpose 3. The third purpose of the study was to determine an estimate of how many BSN students would have actually failed the NCLEX-RN® among students that failed to graduate because of failure to meet an E^2 minimum benchmark score. Since the first analysis related to Research Question 2 resulted in data that revealed that students from BSN programs that did not use a benchmark (91.0%) actually had a higher pass rate that BSN programs with a benchmark (88.9%), this issue was difficult to approach. Based on these statistics, the only logical assumption is that all of the students held back would have actually passed NCLEX-RN®. When the potential confounding variables were controlled for and only the schools that used a benchmark score of 850 (as 900 benchmark score only included 29 students) were considered, a statistically significant increase in pass rates of 3.1% (94.2%)—compared to BSN student pass rates from schools that did not use a benchmark score as a graduation requirement (91%)—was shown.

The data revealed that, over the examined period, there were 55 out of a total of 1133 students that failed to meet the 850 benchmark score and were not allowed to

graduate. Thus, the algorithm described in the analysis section and further detailed in the results section was applied to calculate how many of these 55 students that were held back would have actually failed the NCLEX-RN®. The findings indicated that 50 would have failed NCLEX-RN® and only five would have passed NCLEX-RN® if they had been allowed to take it. In other words, according to the model developed as a part of this study, the E^2 predicted failure 73% of the time.

Conceptual Framework

Adult Education Theory. Adult Education Theory, as defined by Knowles (1975, 1980, 1984), was the educational framework that guided this research. The first concept of the theory asserts that adult learners are self-directed (Knowles, 1980, 1984; Tough, 1971). The collected data from Research Question 1 indicated that NLCEX-RN® first-time pass rates from students in BSN programs that used E^2 had pass rates that were close in range (not statistically significant) to those of students in BSN programs that used other exams, as well as those who used no exit exam. This could suggest that BSN students are self-directed and the E^2 does not identify students that need help with self-direction more successfully than other exit exams. It also raises the question of whether there is a need for using exit exam in such programs.

In answering Research Question 2, NCLEX-RN® first-time pass rates of students in BSN programs using the E^2 with a minimum benchmark score as a graduation requirement were compared to students in BSN programs that do not have this requirement. The findings suggest that in the South and West regions of the country, this requirement had a statistically significant positive effect on NCLEX-RN® first-time pass rates. This could suggest that when a graduation requirement is in place, poor performing

students, who may struggle with self-direction, are identified prior to graduation and held back before being allowed to sit for their NCLEX-RN® exam.

The second assumption of Adult Education Theory is that, as an adult matures, knowledge accumulates from experiences that become an increasing resource for learning (Knowles, 1980). Thus, based on this assumption, in the context of the present study, the experience of taking the E^2 or any other type of exit exam should help the student perform better on the NCLEX-RN®, since the experience of taking a similar type of exam would increase their knowledge. However, the data collected for study question one did not support this concept. It seems that the knowledge accumulated from the courses in nursing school prepared the students for NCLEX-RN® and the subsequent experience of taking the exit exams did not really increase their knowledge or prepare them for boards. In fact, students in BSN programs that had no exit exam had slightly higher NCLEX-RN® first-time pass rates than did students who had taken the E^2. Thus, the experience of taking the E^2 did not increase NCLEX-RN® first-time pass rates.

A third assumption of Adult Education Theory is based on a student's readiness to learn. The E^2 was developed using classical test theory that calculates an observed score, which accounts for extraneous variables that may influence a student's readiness to learn. Logically, the E^2 would give the student insight into how they would perform on NCLEX-RN®. However, based on the findings of this study, E^2 did not show a statistical significance in increasing NCLEX-RN® first-time pass rates over no exit exam. In fact, students that never took an exit exam performed slightly better that those that took E2. Thus, the insight gained from taking the E^2 is questionable since it did not help raise NCLEX-RN® first-time pass rates. Interestingly, this changes when there is a graduation

requirement in place, as the analysis conducted to answer Research Question 3 indicated that E^2 was 73% accurate in predicting failure on the NCLEX-RN®. Apparently, the ability of E^2 to predict student exam performance is more reliable when a graduation requirement is in place. Thus, the data from Research Question 1 does not support the concept that the E^2 accounts for the adult student being ready to learn any better than not taking any exit exam, unless there is a graduation requirement in place.

The fourth Adult Education Theory concept is that the adult learner is motivated by a desire to solve timely problems. Research Question 2 examines this concept of motivation. The findings of the analysis performed to answer this question reveal that use of a minimum benchmark score on E^2 as a graduation requirement did motivate students to pass the E^2 to graduate and did increase NCLEX-RN® first-time pass rates for those students, in every region except the Northeast. The timely requirement of achieving a benchmark score on E^2 appears to have motivated students to pass; thus, they were ultimately better prepared for NCLEX-RN®. When the present study was conceptualized, it was hoped that, perhaps, a benchmark score different to the HESI recommended benchmark scores would emerge that motivated students to pass E^2 and also increased NCLEX-RN® first-time pass rates. Unfortunately, the schools the representatives of which agreed to participate in the study and provide the required data only used the HESI recommended benchmark scores of 850 and 900; thus, no other benchmark scores were used.

Classical Test Theory. Classical Test Theory puts forth that the observed score on an exam is equal to the true score with some degree of error. This theory was used to develop the E^2 and HESI states that their exams will correctly account for human error

(Nibert et al., 2006). Human error is described as the variance of performance in taking an exam on one day compared to taking it on a different day, due to external factors that influence a student's performance, such as a headache or a stressful event prior to the exam. In the context of the present study, this concept correlates with the third concept of Knowles' (1975, 1980, 1984) Adult Education Theory that relates to the adult's readiness to learn. As such, this concept was examined to indicate that the predictive value of E^2 was more accurate when a minimum benchmark score of 850 was used as a graduation requirement.

Literature Review

Evidence supporting validity, reliability, and predictability of the E^2.

Lauchner et al. (2006), as well as Morrison, et al. (2002) and Morrison, et al. (2004) have published impressive data supporting the reliability of validity, as well as the predictability of the E^2. However, the purpose of this study was not to test reliability or validity of the questions used in the E^2, but rather to examine the performance and predictability of E^2 results. Research Question 1 thus compared BSN students that took the E^2 to BSN students that took other exit exams or no exit exam. The findings suggest that the use of E^2 did not prepare students for NCLEX-RN® any better than using no exit exam. Even though psychometrics of validity and reliability of the questions contained in the E^2 have been thoroughly examined, it is important to note, "the E^2 was developed to assess students' preparedness for the licensing exam." (Morrison et al., 2004, p.221). It seems that use of the exam itself does not prepare students but rather it offers an assessment of the student's preparedness that is intended to be used to identify a students strengths and weaknesses. Students and faculty may not be using the E^2 assessment

findings to better prepare for NCLEX-RN®. The evidence from Question 1, suggests that by just taking the E^2 does not offer any advantage toward increasing NCLEX-RN® pass rates.

In four separate studies (Lauchner et al., 2006; Newman et al., 2000; Nibert & Young, 2001; Nibert et al., 2002); data were collected on 17,342 registered nursing students over four consecutive years (1996 to 2000). In summarizing these studies, Nibert et al. (2006) reported that the E^2 was shown to be between 96.4% and 98.3% accurate in predicting NCLEX-RN® success. These predictions were made with the HESI predictability model (Nibert et al., 2002), which is proprietary to Evolve Learning System and unpublished. Since the HESI predictability model (Nibert et al., 2002) was not available for review as a part of the present study, an algorithm was developed to predict failure rates as opposed to pass rates. The model was based on the assumption that a graduation requirement requiring a minimum benchmark score would be in place in some schools and not in others. The results of this study suggest that E^2 predicts failure 73% of the time and supports the assertion from the above studies that E^2 does have predictive value when a graduation requirement is in place (Lauchner et al., 2006; Morrison et al., 2002; Newman et al., 2000; Nibert & Young, 2001; Nibert et al., 2002).

Evidence pertaining to the use of E^2 in a Nursing Curriculum. Spurlock and Hanks (2004) looked at a history of E^2 scores reported by Nibert et al. (2002). They found that 81% of students that failed HESI (<900) actually went on to pass NCLEX-RN®. They concluded that, while the E^2 does a good job at predicting success on NCLEX-RN®, it does not predict which students are likely to fail NCLEX-RN®. At first glance, this seems intolerable, as the above assertions imply that some students are

currently held back from graduating, when 81% of those students would have actually passed NCLEX-RN®. However, their study did not account for potential motivators, such as a graduation requirement, which could increase their ability to pass NCLEX-RN®. This study found only 29 BSN students from two programs that failed E^2 and were not permitted to graduate because they did not meet a minimum benchmark score of 900. There were also 55 out of a total of 1133 BSN students that were required to meet a minimum benchmark score of 850 as a graduation requirement. For this reason, the minimum benchmark score of 850 was examined, as opposed to 900 used in Spurlock and Hanks (2004). Moreover, even though Spurlock and Hanks (2004) posited that E^2 did not predict failure, the current study findings indicate otherwise, as E^2 was found capable of predicting failure 73% of the time.

Other experts (Michel, 2006; Morin, 2006; Nibert et al., 2006; Spector & Alexander, 2004), commented on the Spurlock and Hanks' (2004) article and all agreed that nurse educators should consider other predictors of NCLEX-RN® success and not write a graduation policy based solely on a passing E^2 score. Other variables they cite as being predictive are course grades, science grades, and GPA. Although this study does not examine other factors, this author agrees with their argument that undue stress placed on a student for a high stakes exam, such as the E^2, could cause personal and social problems, which should be considered when writing a graduation policy. This research did yield results that were difficult to interpret, especially in the Northeast region of the country where the pass rates for BSN students who had graduation requirement was only 73.3%, compared to 92.1% for those student that were not subjected to the requirement. Clearly, the E^2 is not a perfect predictor of success or failure and using it as the sole

reason to not allow a BSN student to graduate could cause not only student stress, but also result in student filed lawsuits.

Evidence evaluating the use of E2 with a benchmark for graduation. In a study of 182 nursing programs, Lewis and Young (2004, July) found that almost 50% of those nursing programs used the E^2 as a benchmark for graduation. Davenport (2007) surveyed nine nursing programs and found two programs required passing an exit exam and three (33%) required the student to meet a minimum benchmark score to graduate. Nibert et al. (2003) found that 45 out of 149 (30%) registered nurse programs surveyed used complete or partial graduation policies using E^2. Davenport (2007), Nibert et al. (2003), and Lewis and Young (2004, July) established that nursing programs were using the E^2 as a graduation requirement. This study was based on data similar to that used in the Nibert et al. (2003) study, whereby out of 40 BSN program (4,514 students) that used the E^2, in 30% BSN programs a minimum benchmark score achievement on E^2 was a graduation requirement. However, these studies only examined BSN programs and did not evaluate BSN students, thus the number of students affected was not considered, as was the case in the present study. Moreover, none of the comparable studies evaluated the effect of the graduation requirement on the NCLEX-RN® first-time pass rates.

Nibert et al. (2003) found three consequences for failure to meet the graduation (progression) policy: denial of eligibility to graduate, an incomplete or failing grade in a capstone course, or withholding approval for NCLEX-RN® candidacy. These same criteria were used to operationalize the term 'graduation requirement' in this study.

Only three studies were found that specifically examined the effectiveness of using a minimum benchmark score achievement as a graduation requirement (Morrison

et al., 2002; Spurlock & Hunt, 2008; Noel, 2009). Morrison et al. (2002) only looked at five nursing programs, and found that NCLEX-RN® pass rates increased anywhere from 9% to 41%. In a Spurlock and Hunt (2008) study, 179 nursing students at one school were subjected to a similar graduation requirement. However, they were allowed unlimited re-tests until they achieved the benchmark score. Using logistic regression, the authors found a statistically significant relationship between first attempt scores on the E^2 and NCLEX-RN® pass rates, $p < 0.005$. however, when correlating the final E^2 scores to NCLEX-RN® pass rates, no statistically significant relationship was found via logistic regression, $p = 0.733$. In other words, the first attempt E^2 score was a better predictor of NCLEX-RN® success than the final E^2 score after being allowed to re-test several times. Noel (2009) also examined the effectiveness an E^2 graduation requirement as a predictor of success on the NCLEX-RN® for a sample of 94 nursing students in a licensed vocational nurse to registered nurse program at a community college. These students were required to pass the E^2 with a minimum benchmark score of 850. A positive relationship was found between the graduation policy and increased first-time pass rates on the NCLEX-RN®, chi-square $p < 0.01$.

Morrison et al. (2002), Noel (2009), and Spurlock and Hunt (2008) all agree with this study in that NCLEX-RN® first-time pass rates increase when an E^2 graduation requirement is in place. However, the first two studies did not evaluate the E^2 as an accurate predictor of NCLEX-RN® first-time pass rates, or whether or not the graduation policy fostered higher E^2 scores among students as this study does. In contrast, Spurlock and Hunt (2008) found that a benchmark score of 650 was a better predictor of success than the recommended 850 or 900 recommended by HESI. Thus, given these findings, it

was hoped that different benchmark scores could be evaluated in this study. However, the schools in the sample only used a benchmark score of 850 or 900.

The requirement to pass a standardized exit exam to graduate from a nursing program has caught recent attention from NLN that considers this practice as "high-stakes" testing and a "growing and intensifying trend" (NLN, 2010, p. 1). An NLN Presidential Task Force was organized to address concerns about this practice and to develop policy guidelines for the use of high-stakes testing (NLN, 2010). Five major areas of considerations were presented in the article and these will be evaluated with the results of this study. The first was that, although comprehensive exams can be useful in providing students with information on how their knowledge compares to that of other students across the nation and help faculty identify curricular weaknesses and strengths, these exams should not be used to predict NCLEX-RN® performance (NLN, 2010). This study found that the assessment of student knowledge provided by E^2 might not be well utilized by faculty or students. However, the E^2 does provide predictive value of how a student will perform on NCLEX-RN® when a graduation requirement is used. Secondly, while these exams work well in predicting student success in passing NCLEX-RN®, they are much less precise in identifying students who are likely to fail. In opposition, the present study findings indicate that E^2 actually can predict failure when a graduation requirement is in place. Thirdly, the use of a single exam to determine a student's graduation at the expense of the student's ability to thrive can have a profound damaging effect on the student. Although these assertions were not examined in this study, the fact that the E^2 is not a perfect predictor of success or failure would warrant agreement with this statement. Fourthly, these exams should not be used for hiring decisions for graduate

nurses prior to taking the NCLEX-RN®. This concept was not examined by this research. Lastly, students that have had negative consequences from poor performance on standardized exams have in past filed law suits against nursing programs citing education malpractice. This concept was not examined in this study. Recommendations made by the task force to nursing programs is a commitment to fair testing practices to ensure that decisions and testing practices are supported by solid evidence (NLN, 2010). It is hoped that data from this study will provide evidence towards this end.

Summary

In summary, there is strong evidence that the HESI E^2 has been in the past, and continues to be, duly evaluated for validity, reliability, and predictability (Lauchner et al., 2006; Morrison et al., 2004; Newman et al., 2000; Nibert & Young, 2001; Nibert et al., 2002). However, this study suggests that since BSN students who did not even take an exit exam outperformed those that took the E^2, perhaps assessment of student knowledge information provided the E^2 is not utilized by students or faculty.

Many nursing programs that presently use E^2 (22% − 50%) have adopted recommended benchmark scores on the E^2 as a graduation requirement (Davenport, 2007; Lewis & Young, 2004, July; Nibert et al., 2003; Spurlock, 2006; Spurlock & Hanks, 2004; Spurlock & Hunt, 2008). This study found that 30% of the BSN programs and 27% of the BSN students that used E^2 and their representatives responded to the data collection instrument used a minimum benchmark score on E^2 as a graduation requirement.

However, as there is a likelihood that there may be a high percentage of students that do not meet the minimum benchmark score on the E^2 and would have actually gone

on to pass the NCLEX-RN®, the validity of E^2 was questioned by many authors (Spurlock, 2006; Spurlock & Hanks, 2004; Spurlock & Hunt, 2008). However, these assertions were not supported by the findings of the present study. Through the use of an algorithm developed for the purpose of this study, E^2 was able to predict failure 73% of the time, indicating that only 9% of students held back based on their E^2 score would have actually passed NCLEX-RN®.

NLN (2010) formed a Presidential Task Force to make qualified recommendations regarding five areas of consideration in relation to the use of exit exams as a graduation requirement. The first two recommendations are directly related to this study. The first recommends BSN programs to not using exit exams as a predictor of performance on NCLEX-RN®, whereas the second postulates that, while exit exams work well at predicting success, they are not precise in predicting failure. This study found the E^2 was actually good at predicting both success and failure on NCLEX-RN® when a graduation requirement was in place.

There is minimal evidence available on the predictability of the E^2 when a graduation requirement is in place, as only two studies were found during the literature review where the use of the E^2 as a graduation requirement was supported (Morrison et al., 2002; Noel, 2009). Even though Spurlock and Hunt (2008) found a positive relationship between first-time E^2 and NCLEX-RN® first-time pass rates, the recommendation was to not use E^2 as a graduation requirement. There were no studies reported in the literature that used large samples of BSN students to examine the utilization and effectiveness of the E^2 toward increasing first-time NCLEX-RN® pass rates and using the E^2 recommended minimal benchmark score as a graduation

requirement. Thus, this study will offer new knowledge to help guide faculty in making informed decisions about the use of E^2 as a graduation requirement.

CHAPTER 7

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The present study determined the utilization and effectiveness of the E^2 as a graduation requirement toward increasing NCLEX-RN® pass rates in BSN programs. Thus, in this chapter, a summary of the key findings, conclusions, recommendations for further research and implications of the study will be presented.

Summary of Findings

The research was conducted on a large sample of 11,254 graduated BSN students, representing data from 94 BSN nursing programs in 44 states, and 212 reporting periods. The Midwest (31.7%) and South (42.2%) regions of the U.S. were best represented. About 40% of these BSN students sat for E^2 before graduation, of whom 26% were required to meet a benchmark score to graduate.

Three research questions determined the utilization and effectiveness of the E^2 as a graduation requirement toward increasing NCLEX-RN® pass rates in BSN programs. For answering Question 1 and 3, HLM approach was used to analyze the data (Raudenbush et al., 2011), and this dichotomous outcome variable of whether or not a student passed the NCLEX-RN® was analyzed with the logit function. However, in order to answer Research Question 3, the results obtained in the process of addressing Question 2 to calculate failure rate using an algorithm designed specifically for this study. Moreover, given that the outcomes of tests performed in reference to Question 1 and 2 were inconclusive, a second analysis was performed to control for potential confounding variables, followed by analyses stratified by each of the potential confounding variables. It was disappointing that the confounding variables had such a significant effect on the

results for all three of the questions in this study. The following paragraphs will succinctly summarize findings related to each Research Question in turn.

Research Question 1 asked if there were differences in first-time NCLEX-RN® pass rates for BSN students from nursing programs utilizing the E^2 and those using other standardized exit exams, or no exit exam. The first analysis revealed that use of the E^2 did not increase student's NCLEX-RN® first-time pass rates more than any other exit exam, or if no exit exam was used. When the confounding variables were controlled for, BSN students who used the E^2 did show a statistically significant increase in pass rates over the other groups of BSN students. However, the stratification analysis of the potential confounding variables offered no clear explanation for this problem. In fact using no exit exam resulted in comparable NCLEX-RN® first-time pass rates for students that took the E^2 even when the confounding variables were controlled for. This finding was unexpected, as, according to Knowles' Adult Education Theory (1973, 1975, 1980, 1984), the experience gained by taking a comparable exam, such as the E^2, would logically build knowledge and skills needed to increase NCLEX-RN® first-time pass rates. This concept was not supported by the data gathered to answer Research Question 1, as findings suggested that using no exit exam prepared students to pass NCLEX-RN® at a comparable level as using E^2.

Research Question 2 asks whether, for programs utilizing the E^2, there are differences in first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing the E^2 exam's minimum benchmark scores as a graduation requirement and those that do not. The first data analysis for the two groups showed no statistically significant differences between students' scores. However, as BSN students

in nursing programs that had no graduation requirement had actually slightly higher scores, secondary analysis was required. As above, when the confounding variables were controlled for, the results changed. In this case, a clear reason for this discrepancy emerged when the results were stratified by region; the Northeast region had a wide difference in pass rates between the two groups and this could have affected the results. In contrast, the Midwest, South, and West regions of the country had increased NCLEX-RN® first time pass rates when the minimal benchmark score on the E^2 was used as a graduation requirement.

Knowles' first assumption held true for this question. The use of a minimum benchmark score on E^2 as a graduation requirement was expected to increase NCLEX-RN® first-time pass rates, as the poor performing students who needed self-direction were be held back and not considered in NCLEX-RN® first time pass rates. Knowles' Assumption 4 also held true for this question, as using a benchmark score for graduation is a motivator to increase NCLEX-RN® first-time pass rates.

Research Question 3 asked what percentage of BSN students who failed to graduate due failing to meet a minimum benchmark score would have actually failed NCLEX-RN®. An algorithm was developed and applied to the findings related to Question 2. However, as the confounding variables had an effect on Question 2, this made the calculation somewhat difficult. Thus, in order to answer Question 3, the algorithm used data related to BSN students that were not subjected to a graduation requirement to calculate the failure rate of students that had not met the required 850 minimum benchmark score to graduate. The results indicated the E^2 was accurate in predicting failure 73% of the time. These results also supported Knowles' Assumption 1

and 4. According to Assumption 1, poor performing students that would have failed NCLEX-RN®, are filtered out by the E^2 73% of the time. Similarly, Assumption 4 is true in that the graduation requirement is a motivator to pass E^2 in a timely manner and go on to pass NCLEX-RN®.

Conclusions

When comparing BSN student NCLEX-RN® first time pass rates of students that sat for E^2 to those that sat for other exit exams and those that took no exit exam, the findings of this study suggest a complex picture. Thus, the data from this study would not provide enough evidence to promote using the E^2 over any other exit exam, or using no exit exam. Probably the most surprising result was when a comparison is made between the pass rates for BSN students that took E^2 to those students that took no exit exam, as there was no statistically significant difference in their pass rates, even when the confounding variables are controlled for. It would seem that the knowledge gained in nursing school adequately prepares students for taking NCLEX-RN® implying that they do not require additional preparation in a form of exit exam. The findings of the present study confirm that taking the E^2 did not provide any advantage toward raising NCLEX-RN® first time pass rates. However, these results should be interpreted with caution, as, although use of exit exams did not increase pass rates significantly over using no exit exam, there are benefits to using exit exams beyond the scope of this research. Exit exams can provide important assessment of student knowledge, comparing students' performance to national norms, objective data for BSN programs that can be used for measures of program student learning outcomes, and curricula strengths and weaknesses. (NLN, 2010).

Use of a benchmark score on E^2 as a graduation requirement resulted in an increase in first-time NCLEX-RN® pass rates in schools in the South, Midwest, and West regions of the country. It is not clear why the Northeast region of the country had such drastically contrasting results. Since the South, Midwest, and West regions of the country provided the largest groups of BSN students, this data will support the statement that use of E^2 minimum benchmark score as a graduation requirement does result in increased NCLEX-RN® first time pass rates. This conclusion is in line with the Morrison et al. (2002) assertion that a graduation policy alone is enough to motivate students to study so that they would meet designated E^2 benchmarks and be prepared to pass the NCLEX-RN®. It is interesting that, in July 2010, in Texas—the state where HESI originated—the Texas Board of Nursing published an education guideline on the use of standardized exams that states "Standardized examinations are not recommended as 'high stakes testing' where the passing score is the sole determinant of progression or graduation" (para. 5).

When using the findings in support of Research Question 2, and applying the algorithm developed specifically for this study, the E^2 failure prediction was correct 73% of the time. This result would support the statement that the E^2 does have a predictive value when combined with a motivator, such as graduation requirement. Spurlock (2006) and Spurlock and Hanks (2004), stated that, while E^2 does predict success, it does not predict failure on NCLEX-RN®. The authors' assumptions were made based on E^2 scores; however, their studies did not examine E^2 scores when a graduation requirement was in place. Thus, the results of the present study will contribute new information to

this research field, as there was no evidence found in the literature that this phenomenon was previously explored.

The findings of this study suggests that there is a possibility of an increase in NCLEX-RN® first time pass rates when an E^2 benchmark score is used as graduation requirement. The ability of E^2 to serve as a prediction of failure measure was found adequate, as the results indicated that it was 73% accurate. However, this must be weighed against the risks of damaging a student's ability to thrive and of potential lawsuits from students that were held back from graduation due to their exam scores (NLN, 2010). Spurlock and Hanks (2004), Spector and Alexander (2004), Nibert et al. (2006), Morin (2006), NLN (2010) and the Texas Board of Nursing (2010, July) suggest the use of "high stakes" exams, such as the E^2, be only part of a nursing program's student evaluation criteria.

Recommendations

Recommendations for future research. Several recommendations for additional research emerged from the present study, as indicated below.

1. Graduation requirement as operationalized in this study provided a motivator for BSN students to study for E^2 and ultimately perform better on NCLEX-RN®. The motivator of a "high-stakes" exam seems extreme and more information is needed to determine if a less extreme motivator or combination of motivators would result in increasing NCLEX-RN® first time pass rates at a similar level.

2. Since the use of the E^2 did not increase pass rates for BSN students, more research in the area of how faculty and students use the data provided by exit exams to improve student learning would be appropriate.
3. An exploratory study should be conducted to determine various methods of exit exam integration into the BSN curriculum.
4. A study to determine what remediation strategies are provided to BSN students would yield valuable information.
5. Confounding variables made interpreting the results of this study difficult. Thus, by limiting the study to BSN students that shared similar physical characteristics to better match BSN students, such as size of graduating class or region of the country, could decrease their influence.
6. The inclusion of different potential confounding variable could add depth to a similar study.
7. A longer data collection period would result in a larger sample, which would also influence the results and provide richer data.
8. It should be noted that sixty-six percent of the BSN students took the E^2 four times or more in order to be successful on E^2 and be allowed graduate. Although Spurlock and Hunt (2008) did not support unlimited test and re-test to be able to meet a minimum benchmark score on the E2, this practice warrants further investigation.

Implications of the Study

The nursing education provided by BSN programs adequately prepares students to sit for the NCLEX-RN® exam without the use of E^2. The E^2, as well as other exit exams,

provide valuable objective data to students and faculty that should be considered by faculty making decisions regarding whether or not to use exit exams. However, when more accurate prediction of whether a BSN student would pass NCLEX-RN® is required, a motivator must be associated with the exit exam.

The requirement of a minimum benchmark score on the E^2 to graduate was found to be a motivator to increase in NCLEX-RN® first-time pass rates in this study. The E^2 also provided predictive value on failure to pass the NCLEX-RN®. However, more research is needed on ways to include the E^2 in the curriculum with other appropriate motivators in place.

For example, one school offers a licensure preparation course that includes a pre-test E^2 Version 1, a review course, practice questions, remediation, and a post-test E^2 Version 2 exam. An exploratory study could reveal other interesting methods to prepare students to pass NCLEX-RN® and to identify BSN students that may need remediation.

However, in light of the arguments presented by Spurlock and Hanks (2004), Spector and Alexander (2004), Nibert et al. (2006), Morin (2006), NLN (2010) and the Texas Board of Nursing (2010, July), stating that undue stress placed on a student for a high stakes exam such as the E^2 could cause personal and social problems and should be considered when writing a graduation policy, it is evident that further study regarding the validity of exit exams is needed. The results of the present study support the above claims and indicate that this complex scenario needs further research. The E^2 is not a magic bullet and the predictive value should only be part of a constellation of evaluation criteria used by nursing programs to prepare BSN students to pass NCLEX-RN®.

APPENDIX 1

DATA COLLECTION INSTRUMENT

Notes in Times Roman font are not included on the data collection instrument.

NCLEX-RN® Pass Rates Data Collection Instrument
NOTE: Using the "back" button of your browser disrupts this questionnaire.
Be sure to use the "Next" and "Prev" buttons at the bottom of the pages.

My name is Debra Sullivan. I am a doctoral candidate at the University of Nevada, Las Vegas, and I would like to invite your participation in my dissertation research. If you agree, I will be asking questions regarding the use (or non-use) of computerized exit exams in your Baccalaureate nursing program.

TITLE OF STUDY: The Utilization and Effectiveness of the HESI E^2 Exit Exam as a Graduation Requirement toward Increasing NCLEX-RN® Pass Rates in Baccalaureate Nursing Programs

INVESTIGATOR(S): Debra Sullivan and Mary Bondmass

CONTACT PHONE NUMBER: 702-895-3418

PURPOSE: The purpose of this study is threefold:

1. To compare first-time NCLEX-RN® pass rates of BSN students from nursing programs who use the E^2 with programs using other standardized exit exams, and those using no exit exam.

2. To compare first-time NCLEX-RN® pass rates among BSN students from nursing programs utilizing the E^2, that require the E^2 minimum benchmark score as a graduation requirement with those that do not.

3. To determine an estimate of how many BSN students would have actually failed the NCLEX-RN® among students who failed to graduate because of failure to meet an E^2 minimum benchmark score.

PARTICIPANTS: To be included in the sample for the research study, the nursing program you represent must be a Baccalaureate nursing program.

PROCEDURES: If you volunteer to participate in this study, you will be asked to complete a data collection instrument that includes your program's use of computerized exit exams and a few demographic questions.

BENEFITS OF PARTICIPATION: There may be no direct benefits to you as a participant in this study. However, we hope to determine the utilization and effectiveness of the HESI E^2 exit exam and its use as a graduation requirement. It is hoped that enough data will be collected to submit an article for publication and therefore dissemination of the results for use by other nursing educators.

RISKS OF PARTICIPATION: There are risks involved in all research studies, but this study may include only minimal risks in that you may feel uncomfortable or stressed in answering some of the questions.

COST/COMPENSATION: The study will take approximately 20 minutes of data collection and about 10 minutes of your time to complete the data collection instrument. There is no financial cost to you to participate in this study. You will not be compensated for your time.

CONTACT INFORMATION: If you have any questions or concerns about the study, you may contact Mary Bondmass (PI and Faculty Dissertation Chair) at mary.bondmass@unlv.edu or 702-895-3418. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact the UNLV Office of Research Integrity – Human Subjects at 702-895-2794 or toll free at 877-895-2794 or via email at IRB@unlv.edu.

VOLUNTARY PARTICIPATION: Your participation in this study is voluntary. You may refuse to participate in this study at all or you have the ability to skip answers on the survey and/or submit the survey without requiring an answer on each item. You are encouraged to ask questions about this study while gathering your program information, at the beginning of the data collection, or any time during the research study.

CONFIDENTIALITY: All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. The Internet Protocol address used to contact you will not be collected. All records will be stored in a locked facility at UNLV for 3 years after completion of the study. After the storage time the information gathered will be destroyed.

IRB APPROVAL: This study has been approved by the UNLV Institutional Review Board.

PARTICIPANT CONSENT: If you have read the above information, you meet the inclusion criteria and you wish to participate in this study, please proceed by clicking the Next icon at the bottom center of the screen.

The name of your nursing program:
(kept completely confidential)

_____

The state in which your BSN program is located:
(kept completely confidential)

_____

Is your nursing program primarily publicly or privately funded?

- ❍ Publicly funded.
- ❍ Privately funded.

What is the estimated cost per one credit hour (excluding fees) at your school?

Does your BSN program require some minimum GPA for admission into your program?

- ❍ Yes.
- ❍ No.

If the above question is "Yes," please specify the minimum GPA requirement (based on a 4.0 system):

How long is your BSN program (after admission to program)?

- ❍ 4 semesters.
- ❍ 5 semesters.
- ❍ 6 semesters.
- ❍ 4 quarters.
- ❍ 5 quarters.
- ❍ 6 quarters.
- ❍ 7 quarters.
- ❍ 8 quarters.
- ❍ Other.

Please specify the typical graduation times for your BSN program. If none exactly fit your program, please select the one that most closely fits:

- ❍ Fall and Spring semesters.
- ❍ Fall, Spring, and Summer semesters.
- ❍ Spring semester only (or annually).
- ❍ Three quarters (excluding summer).
- ❍ Four quarters (including summer).

Next

Depending on how the above question is answered, the headings on the following questions will change. Approximately one and a half years of data will be surveyed. The following are possibilities for headings on the battery of questions to follow:

Spring 2011 Semester Graduates
Fall 2010 Semester Graduates
Summer 2010 Semester Graduates
Spring 2010 Semester Graduates

Spring 2011 Quarter Graduates
Winter 2011 Quarter Graduates
Fall 2010 Quarter Graduates
Summer 2010 Quarter Graduates
Spring 2010 Quarter Graduates
Winter 2010 Quarter Graduates

After a response is made to the question regarding the graduating times, the following note will appear:

Now, we would like to go back through the graduation periods for about 18 months, in reverse chronological order. You will be asked the same questions for each period. These are the questions that were mentioned in the email you received.

Next

The following battery of questions will appear repeatedly for each of the school's appropriate graduation periods:

How many BSN students graduated in this period?

What was your NCLEX-RN® pass rate percentage for this graduation period?
(Just report the percent as a number. For instance, 92 would mean that 92% passed.)

In your BSN program leading up to the above graduation period, did your program administer a commercially available computerized standardized exit exam? If so, please specify the exam used:

- ❍ NOT USED (commercially available computerized standardized exit exam not used).
- ❍ E^2 (HESI).
- ❍ Kaplan.
- ❍ ATI.
- ❍ NLN.
- ❍ Mosby.
- ❍ OTHER commercially available computerized standardized exit exam not listed.

Next

If they answered "E^2 (HESI)" to the above question, the following questions will be asked. Otherwise, they proceed to the next graduation period.

For this study, a graduation requirement indicates something that prohibits a student from sitting for the NCLEX-RN® exam. Specifically, we will be referring to a minimum E^2 (HESI exit exam) benchmark score as a requirement. Students may be taking the E^2 (HESI exit exam) in a computer lab or as part of a course. Also, some nursing programs may allow students to graduate with their BSN but still deny their ability to sit for the NCLEX-RN® exam. This would still be considered a graduation requirement for purposes of this study. The interest is in being able to sit for the NCLEX-RN® and not actual graduation.

For this graduation period, was a minimum E^2 (HESI exit exam) benchmark scores used as a graduation requirement (allowed to sit for NCLEX-RN®)?

- ❍ Yes.
- ❍ No.

If "Yes" for the above, what was the minimum benchmark E^2 (HESI exit exam) score needed?

If "Yes" for the above (benchmark required), how many times were students allowed to take the E^2 (HESI) in their attempts to reach the benchmark score?

- ❍ Benchmark not required (as indicated above).
- ❍ Only one attempt allowed.
- ❍ Twice.
- ❍ Three times.
- ❍ Four times.
- ❍ More than four times, if needed.

If "Yes" for the above (benchmark required), how many students in this graduation period FAILED to achieve the benchmark, thereby failing to graduate and sit for the NCLEX-RN® with their cohort?
(as with everything, kept completely confidential)

Next

This is the end of the graduation period questions. The following questions are asked at the conclusion of the data collection instrument.

You are now done with the questions regarding each of your graduation periods.

If it would be okay to contact you with any follow-up or clarifying questions, please provide the best contact name and phone number in the space below:

Comments. This space is for any comments to the principal investigator you may have about this data collection instrument or the study in general.

Your participation is GREATLY appreciated. Thank you. Debra Sullivan and Mary Bondmass, principal investigator.

Done

APPENDIX 2

COMMISION ON COLLEGIATE NURSING EDUCATION ACCREDITIED UNITED STATES BACHELOR OF SCIENCE IN NURSING PROGRAMS PER AMERICAN ASSOCIATION OF COLLEGES OF NURSING, 2011

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APPENDIX 3

EMAIL FOR DIRECTOR, CHAIR, OR DEAN OF BACHELOR OF SCIENCE IN NURSING PROGRAMS

Dear Director, Chair, or Dean,

My name is Debra Sullivan, and I am a doctoral candidate at the University of Nevada, Las Vegas. I need your assistance as a participant in my dissertation research, that is, I need your assistance to collect data regarding your use of computerized exit exams used or not used in your Baccalaureate nursing program.

You were selected to participate because your nursing program was listed as accredited by the Commission on Collegiate Nursing Education. In general, the questions will be about your school's demographics, BSN program curriculum, NCLEX-RN® pass rates, and use of the computerized standardized exit exams. Although I will include the information you provide in the study about how or if you use computerized standardized exit exams, the study will ultimately focus on the E^2 (HESI) exit exam and the use of a minimal benchmark as a graduation requirement.

If you are willing to participate, you will be asked to complete a short electronic data collection instrument that will take about 10 minutes. The anonymity of all information you provide will be maintained. Any information provided that can identify your nursing program will not be publicly reported in any manner.

There are two attachments to this email that will assist in completing the data collection instrument, one for programs on the semester system and another for programs on the quarter system. You are advised to print the appropriate form and gather the required data before starting the actual data collection instrument. It is estimated that it will take 20 minutes to gather this information.

Please click on the link below to complete the data collection instrument

http://www.surveymonkey.com/s/PassRates

or, cut and paste this URL into your browser window.

TITLE OF STUDY: The Utilization and Effectiveness of the HESI E^2 Exit Exam as a Graduation Requirement toward Increasing NCLEX-RN® Pass Rates in Baccalaureate Nursing Programs

INVESTIGATOR(S): Debra Sullivan and Mary Bondmass

CONTACT PHONE NUMBER: 702-895-3418

If there are any questions, please feel free to reply to this email or call the above telephone number.

Thank you for your support.
Sincerely,
Debra Sullivan, PhD(c), MSN, RN, CNE

APPENDIX 4

FORM ATTACHED TO EMAIL FOR SEMESTER BASED BSN PROGRAMS

Information Needed to Answer the Questionnaire for Programs on Semester System

Name of nursing program: _____

Location of nursing program (state): _____ Public or privately funded school: _____

Estimated cost per credit hour (excluding fees) at your school: _____ Minimum GPA required for admission: _____

How long is your program after admission into program (eg., five semesters): _____

Graduation time	Number of students graduated at this time	NCLEX-RN® pass rate percentage for period	Commercially available computerized standardized exit exam used (or none)	Was minimum E^2 (HESI) benchmark score used as graduation requirement (***see note***)?	If "Yes," what was minimum E^2 (HESI) score needed?	If "Yes," how many times were students allowed to take E^2 (HESI)?	If "Yes," how many students in this period FAILED to achieve benchmark (and were not allowed to sit for NCLEX-RN with their cohort?
Spring 2011				YES or NO			
Fall 2010				YES or NO			
Summer 2010				YES or NO			
Spring 2010				YES or NO			

If you do not have graduation for a listed graduation time, do not fill in that information.

Note: For this study, a graduation requirement indicates something that prohibits a student from sitting for the NCLEX-RN® exam. Specifically, we will be referring to a minimum E^2 (HESI exit exam) benchmark score as a requirement. Students may be taking the E^2 (HESI exit exam) in a computer lab or as part of a course. Also, some schools may allow students to graduate with their BSN but still deny their ability to sit for the NCLEX-RN® exam. This would still be considered a graduation requirement for purposes of this study. The interest is in being able to sit for the NCLEX-RN® and not actual graduation.

APPENDIX 5

FORM ATTACHED TO EMAIL FOR QUARTER BASED BSN PROGRAMS

Information Needed to Answer the Questionnaire for Programs on Quarter System

Name of nursing program: _____

Location of nursing program (state): _____ Public or privately funded school: _____

Estimated cost per credit hour (excluding fees) at your school: _____ Minimum GPA required for admission: _____

How long is your program after admission into program (eg., six quarters): _____

Graduation time	Number of students graduated at this time	NCLEX-RN® pass rate percentage for period	Commercially available computerized standardized exit exam used (or none)	Was minimum E^2 (HESI) benchmark score used as graduation requirement (***see note***)?	If "Yes," what was minimum E^2 (HESI) score needed?	If "Yes," how many times were students allowed to take E^2 (HESI)?	If "Yes," how many students in this period FAILED to achieve benchmark (and were not allowed to sit for NCLEX-RN with their cohort?
Spring 2011				YES or NO			
Winter 2011				YES or NO			
Fall 2010				YES or NO			
Summer 2010				YES or NO			
Spring 2010				YES or NO			
Winter 2010				YES or NO			

If you do not have graduation for a listed graduation time, do not fill in that information.

Note: For this study, a graduation requirement indicates something that prohibits a student from sitting for the NCLEX-RN® exam. Specifically, we will be referring to a minimum E^2 (HESI exit exam) benchmark score as a requirement. Students may be taking the E^2 (HESI exit exam) in a computer lab or as part of a course. Also, some schools may allow students to graduate with their BSN but still deny their ability to sit for the NCLEX-RN® exam. This would still be considered a graduation requirement for purposes of this study. The interest is in being able to sit for the NCLEX-RN® and not actual graduation.

APPENDIX 6

IRB Approval

Biomedical IRB
Notice of Excluded Activity

DATE: July 22, 2011

TO: **Dr. Mary Bondmass,** Physiological Nursing

FROM: Office of Research Integrity – Human Subjects

RE: Notification of review by /Cindy Lee-Tataseo/
Cindy Lee-Tataseo, BS, CIP, CIM
Protocol Title: **The Utilization and Effectiveness of the HESI E2 Exit Exam as a Graduation Requirement Toward Increasing NCLEX-NR Pass Rates in Baccalaureate Nursing Programs.**
Protocol# 1106-3863M

This memorandum is notification that the project referenced above has been reviewed as indicated in Federal regulatory statutes 45CFR46.

The protocol has been reviewed and deemed excluded from IRB review. It is not in need of further review or approval by the IRB.

Any changes to the excluded activity may cause this project to require a different level of IRB review. Should any changes need to be made, please submit a Modification Form.

If you have questions or require any assistance, please contact the Office of Research Integrity – Human Subjects at IRB@unlv.edu or call 895-2794.

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REFERENCES

Abbott, A., Schwartz, M., Hercinger, M., Miller, C., & Foyt, M. (2008). Predictors of success on national council licensure examination for registered nurses for accelerated baccalaureate nursing graduate. *Nurse Educator, 33*(1), 5-6.

Adamson, C., & Britt, R. (2009). Repeat testing with the HESI exit exam–sixth validity study, Health Education Systems, Inc. *CIN: Computers, Informatics, Nursing, 27*, 393-397.

Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of education objectives*. New York, NY: Addison Wesley Longman, Inc.

American Association of Colleges of Nursing. (2008). *The essentials of baccalaureate education for professional nursing practice.* Retrieved from http://www.aacn.nche.edu/Education/pdf/BacEssToolkit.pdf

American Association of Colleges of Nursing. (2009). *Standards for accreditation of baccalaureate and graduate degree nursing programs*. Retrieved from http://www.aacn.nche.edu/Accreditation/pdf/standards09.pdf

American Association of Colleges of Nursing. (2011). *Accredited Baccalaureate & Graduate Nursing Programs*. Retrieved from http://www.aacn.nche.edu/Accreditation/accprogs.htm

Barkley, T. W., Rhodes, R. S., & Dufour, C. A. (1998). Predictors of success on the NCLEX-RN among baccalaureate nursing students. *Nursing and Health Care Perspeaives, 9*, 132-137.

Beeman, P. B., & Waterhouse, J. K. (2001). NCLEX-RN performance: Predicting success on the computerized exam. Journal *of Professional Nursing, 17,* 158-165.

Billings, D., & Halstead, J. (2009). *Teaching in nursing: A guide for faculty* (3rd ed.). St. Louis, MO: Saunders Elsevier.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook I. Cognitive Domain.* New York, NY: Longmans, Green.

Brookfield, S. D. (1986).*Understanding and facilitating adult learning: A comprehensive analysis of principles and effective practices.* San Francisco, CA: Jossey-Bass.

Brookfield, S. D. (2003). Pedagogy/Andragogy. In A. Stefano, K. Rudestam, & R. Silverman (Eds.), *Encyclopedia of Distributed Learning* (pp. 365-369). Thousand Oaks, CA: Sage. Retrieved from http://www.sage-ereference.com/distributedlearning/Article_n125.htm

Campbell, D.T., & Stanley, J.C. (1966). *Experimental and Quasi-Experimental Designs for Research*. Chicago, IL: Rand McNally.

Census Regions and Divisions of the United States. (n.d.). Retrieved from http://www.census.gov/geo/www/us_regdiv.pdf

Cook, T. D., & Campbell, D. T. (1979). *Quasi-Experimentation: Design and Analysis for Field Settings*. Chicago, IL: Rand McNally.

Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory.* New York, NY: Holt, Rinehart and Winston, Inc.

Daley, L. K., Kirkpatrick, B. L., Frazier, S. K., Chung, M. L., & Moser, D. K. (2003). Predictors of NCLEX-RN success in a baccalaureate nursing program as a foundation for remediation. *Journal of Nursing Education, 42*, 390-398.

Davenport, N. C. (2007). A Comprehensive Approach to NCLEX-RN Success. *Nursing Education Perspectives*, *28*(1), 30-33.

Duncan, T. G., & McKeachie, W. J. (2005). The making of the motivated strategies for learning questionnaire. *Educational Psychologist*, *40*(2), 117-128.

DiBartolo, M., & Seldomridge, L. (2005). A review of intervention studies to promote NCLEX-RN® success of baccalaureate students. *Nurse Educator, 30*(4), 166-171.

Fletcher, G. H. (2007). An eye on the future. *T H E Journal*, *34*(7), 26–27.

Giddens, J. & Gloeckner, G. W. (2005). The relationship of critical thinking to performance on the NCLEX-RN. *Journal of Nursing Education 44*, 85-89.

Grace, A. P. (1996). Taking a critical pose: Andragogy-missing links, missing values. *International Journal of Lifelong Education*, *15*, 382-392.

Hanks, C. (2005). Debate regarding interpretation of HESI exit examination scores. *Journal of Nursing Education, 44*, 101-106.

Hartree, A. (1984). Malcolm Knowles' theory of andragogy: A critique. *International Journal of Lifelong Education*, *3*(3), 203-210.

HLM 7 for Windows [Computer software]. (n.d.). Lincolnwood, IL: Scientific Software International.

Houle, C. O. (1972). *The design of education*. San Francisco, CA: Jossey-Bass.

Jackson, L., & Caffarella, R. S. (1994). *Experiential learning: A new approach.* San Francisco, CA: Jossey-Bass.

Jarvis, P. (1987). *Adult learning in the social context*. London, UK: Croom Helm.

Kenward, K., Woo, A., Gross, L., & Liu, W. (2010). *2008 Nurse Licensee volume and NCLEX examination statistics.* Retrieved from https://www.ncsbn.org/10_2008NCLEXExamStats_Vol42_web_links.pdf

Kidd, J. R. (1973). *How adults learn* (rev. ed.). New York, NY: Associated Press.

Kirkwood, B. R., & Sterne, J. A. (2003). *Essential medical statistics* (2nd ed.). Malden, MA: Blackwell.

Knowles, M. S. (1973). *The adult learner: A neglected species* (1st ed.). Houston, TX:

Gulf

Knowles, M. (1975). *Self-directed learning*. Chicago, CA: Follet.

Knowles, M. S. (1980). *The modern practice of adult education*. Chicago, CA: Follett.

Knowles, M. S. (1984). *The adult learner: A neglected species* (3rd ed.). Houston, TX:

Gulf.

Knowles, M. S., Holton, E. G., & Swanson, R. A. (1998). *The adult learner: The definitive classic in adult education and human resources development*. Houston, TX: Gulf.

Krupa, K. C. Quick, M. M., & Whitley, T. W. (1988).The effectiveness of nursing grades in predicting performance on the NCLEX-RN. Journal *of Professional Nursing, 4*(4), 294-298.

Laureate Education, Inc. (2008). *How adults learn: Theory and research*. Baltimore, MD: Author.

Lauchner, K. A., Newman, M., & Britt, R. B. (2006). Predicting licensure success with a computerized comprehensive nursing exam: The HESI exit exam. *Nurse Educator, 31*(3), 4S-9S.

Lewis, C. (2005). *Predictive accuracy of the HESI Exit Exam on NCLEX-RN® pass rate and effects of progression policies on nursing student exit exam scores*. Unpublished doctoral dissertation, Texas Women's University, Denton, TX.

Lewis, C., & Young, A. (2004, July). *Trends in benchmarking with HESI Exams.* Paper presented at the 15th International Nursing Research Congress of Sigma Theta Tau, Dublin, Ireland.

Lowenstein, A., & Bradshaw, M. (2001). *Fuszard's innovative teaching strategies in nursing* (3rd ed.). Sudbury, MA: Jones and Bartlett.

McDowell, B. M. (2008). KATTS: A framework for maximizing NCLEX-RN performance. *Journal of Nursing Education, 47*(4), 183-186.

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.). San Francisco, CA: Jossey-Bass.

Mezirow, J. (1978). Perspective transformation. *Adult Education*, *23,* 100-110.

Mezirow, J. (1981). A critical theory of adult learning and education. *Adult Education, 31*(1), 3-27.

Mezirow, J. (1991). *Transformative Dimensions of Adult Learning*. San Francisco, CA: Jossey-Bass.

Mezirow, J. (1995). Transformation theory of adult learning. In M. R. Welton (Ed.)*, In Defense of the Lifeworld*. Albany, NY: SUNY Press.

Mezirow, J. (1996). Contemporary paradigms of learning. *Adult Education Quarterly, 46,* 158-172.

Mezirow, J. (1997). Transformative learning: Theory to practice. In P. Cranton (Ed.), *Transformative Learning in Action: Insights from Practice.* New Directions for Adult and Continuing Education, no. 74, San Francisco, CA: Jossey-Bass.

Microsoft Excel 2010 [Computer software]. (n.d.). Redmond, WA: Microsoft Corporation.

Michel, Y. (2006). Commentary: use of the HESI Exit Examination in schools of nursing. Commentary from the perspective of an expert in psychometrics. *Journal of Nursing Education*, *45*(8), 309-310.

Morin, K. (2006). Commentary: use of the HESI Exit Examination in schools of nursing. Commentary from the perspective of an expert in academic policy. *Journal of Nursing Education*, *45*(8), 308-309.

Morrison, S., Adamson, C., Nibert, A., & Hsia, S. (2004). HESI exams: An overview of reliability and validity. *CIN: Computers, Informatics, Nursing, 22*, 220-226.

Morrison, S., Free, K. W., & Newman, M. (2002). Do progression and remediation policies improve NCLEX-RN pass rates? *Nurse Educator*, *27*(2)*,* 94–106.

Mullen, P. A. (2006). Use of Self-Regulating Learning Strategies by Students in the Second and Third Trimester of an Accelerated Second-Degree Baccalaureate Nursing Program. *Journal of Nursing Education*, *46*(9), 406-412.

National Council of State Boards of Nursing. (n.d.). Alternative item formats: Frequently asked questions. Retrieved from /www.ncsbn.org/2334.htm#When_did_NCSBN_first_introduce_alternate_item_formats

National Council of State Boards of Nursing. (2002, March). *NCLEX research report.* Retrieved from http://www.ncsbn.org/pdfs/Research_Web_Testing.pdf

National Council of State Boards of Nursing. (2009a). *2009 Number of candidates taking NCLEX examination and percent passing, by type of candidate*. Retrieved from https://www.ncsbn.org/Table_of_Pass_Rates_2009.pdf

National Council of State Boards of Nursing. (2009b). *Setting the passing standard for the NCLEX examination.* Retrieved from https://www.ncsbn.org/12_17_09_RN_Passing_Standard.pdf

National Council of State Boards of Nursing. (2010a). 2*010 NCLEX-RN ® test plan*. Retrieved from https://www.ncsbn.org/2010_NCLEX_RN_TestPlan.pdf

National Council of State Boards of Nursing. (2010b). *2010 Number of candidates taking NCLEX examination and percent passing, by type of candidate*. Retrieved from https://www.ncsbn.org/Table_of_Pass_Rates_2010.pdf

National League of Nursing Accreditation Commission. (2008). *NLNAC Standards and Criteria Baccalaureate.* Retrieved from http://nlnac.org/manuals/SC2008_BACCALAUREATE.pdf

National League of Nursing News. (2010). *High stakes testing addressed by national league for nursing*. Retrieved from http://www.nln.org/newsreleases/hst_121510.htm

Newman, M., Britt, R. B., & Lauchner, K. A. (2000). Predictive accuracy of the HESI exit exam: A follow-up study. *Computers in Nursing, 18*, 132-136.

Nibert, A. T., & Young A. (2001). A third study on predicting NCLEX success with the HESI exit exam. *Computers in Nursing, 13*, 172-178.

Nibert, A. T., Young, A., & Adamson, C. (2002). Predicting NCLEX success with the HESI Exit Exam: Fourth annual validity survey. *Computers, Informatics, Nursing, 20,* 261-267.

Nibert, A., Young, A., & Britt, R. (2003). The HESI E^2 exit exam: Progression benchmark and remediation guide. *Nurse Educator, 28*(3), 141-145.

Nibert, A., Young, A., & Adamson, C. (2005). Debate regarding interpretation of HESI exit examination scores. *Journal of Nursing Education, 44*, 101-106.

Nibert, A. T., Adamson, C., Young, A., Lauchner, K. A., Britt, R. B., & Hinds, M. N. (2006). Choosing a theoretical framework to guide HESI exit examination research. *Journal of Nursing Education 45*, 303-307.

Noel, V. (2009). *Efficacy of a progression policy: Implementing an exit exam benchmark score as a predictor for success on NCLEX-RNRTM.* Doctoral dissertation. Available from ProQuest Dissertations and Theses Database. (UMI No. 3354654).

Norton, C. K., Relf, M. V., Cox, C. W., Farley, J., Lachat, M., Tucker, M., & Murray, J.(2005). Ensuring NCLEX-RN success for first-time test takers. *Journal of Professional Nursing 22*(5), 322-326.

Paul, R. (1990). *Critical thinking: What every person needs to survive in a rapidly changing world*. Rohnert Park, CA: Center for Critical Thinking and Moral Critique.

Piaget, J. (1970a). Piaget's theory. In P. H. Musen (Ed.), *Carmichael's manual of psychology* (pp. 703-752). New York, NY: Wile.

Piaget, J. (1970b). *Structuralism*. New York, NY: Basic Books.

Piaget, J. (1973). *To understand is to invent: The future of education*. New York, NY: Grossman.

Polit, D. F., & Beck, C. T. (2008). *Nursing Research: Generating and Assessing Evidence for nursing practice* (8th ed.). Philadelphia, PA: Wolters Kluwer/Lippincott Williams & Wilkins.

Raudenbush, S. W. & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Raudenbush, S. W., Bryk, A. S., Cheong, Y. F., Congdon, R., & Tolt, M. (2011). *HLM7: Hierarchical linear and nonliner modeling.* Lincolnwood, IL: Scientific Software International, Inc.

SamplePower 2.0 [Computer software]. (n.d.). Somers, NY: IBM Corporation.

Sandlin, J. (2005). Andragogy and its discontents: An analysis of andragogy from three critical perspectives. *PAACE Journal of Lifelong learning*, *14*, 25-42.

Saxton, D. F., Pelikan, P. K., & Green, J.S. (Eds.) (1999). *Mosby's assess test: A practice exam for RN licensure*. St. Louis, MO: Mosby, Inc.

Shadish, W. R., Cook, T. D., & Campbell, D.T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. New York, NY: Houghton Mifflin

Snijders, T., & Rosker, R. (2002). *Multilevel Analysis: an introduction to basic and advanced multilevel modeling*. London, UK: Sage Publications.

Spector, N., & Alexander, M. (2006). Exit Exams from a regulatory perspective. *Journal of Nursing Education, 45*(8), 291-292.

Spurlock, D. (2005). Debate regarding interpretation of HESI exit examination scores. *Journal of Nursing Education, 44*, 101-106.

Spurlock, D. (2006). Do no harm: Progression policies and high-stakes testing in nursing education. *Journal of Nursing Education, 45,* 297-302.

Spurlock, D. R., & Hanks, C. (2004). Establishing progression policies with HESI exit examination: A review of the evidence, *Journal of Nursing Education, 43*, 539-545.

Spurlock, D., & Hunt, L. (2008). A study of the usefulness of the HESI Exit Exam in predicting NCLEX-RN failure. *Journal of Nursing Education, 47,* 157-166.

SPSS 15.0 for Windows [Computer software]. (n.d.) Somers, NY: IBM Corporation.

SPSS SamplePower 2.0 for Windows [Computer software]. (n.d.) Somers, NY: IBM Corporation.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (5th ed.). Boston, MA: Allyn and Bacon.

Texas Board of Nursing. (2010, July). Education Guideline Using Standardized Exams. Retrieved from http://www.bon.state.tx.us/nursingeducation/edudocs/3-7-4-a.pdf

Tough, A. (1967). *Learning without a teacher*. Educational Research Series, No. 3. Toronto, Canada: Ontario Institute for Studies in Education.

Tough, A. (1971). *The adult's learning projects: A fresh approach to theory and practice in adult learning*. Toronto, Canada: Ontario Institute for Studies in Education.

Tough, A. (1978). Major learning efforts: Recent research and future directions. *Adult Education, 28*(4), 250-263.

Tough, A. (1979). *The adult's learning projects: A fresh approach to theory and practice in adult learning* (2nd ed.). Toronto, Canada: Ontario Institute for Studies in Education.

The Hierarchical Linear and Nonlinear Modeling. (Version 6.06) (2008) [Computer software]. Lincolnwood, IL: Scientific Software International.

Ukpabi, C. (2008). Predictors of successful nursing education outcomes: A study of the North Carolina Central University's nursing program. *Educational Research Quarterly*, *32*, 30-40.

Waterhouse, J. K., & Beeman, P. B. (2003). Predicting NCLEX-RN success: Can It Be Simplified? *Nursing Education Perspectives, 24*(1), 35-39.

Waterhouse, J. K., Bucher, L., & Beeman, P. B. (1994). Predicting NCLEX-RN performance: Cross-validating an identified classification procedure. *Journal of Professional Nursing, 10*(4), 255-260.

Waterhouse, J. K., Carroll, M. C., & Beeman, P. B. (1993). National Council Licensure Examination (NCLEX) success: Accurate prediction of student performance on the post-1988 exam. *Journal of Professional Nursing, 9*(5), 278-283.

Wendt, A., & Harmes, J. C. (2009). Evaluating innovative items for the NCLEX, part I: Usability and pilot testing. *Nurse Educator, 34*(2), 56-59.

Wendt, A., Kenny, L., & Brown, K. (2010). Keeping the NCLEX-RN current. *Nurse Educator 35*(1), 1-3

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