IDENTIFICATION AND ANALYSIS OF ENTRY LEVEL CHARACTERISTICS THAT PREDICT SUCCESS ON NURSING BOARD LICENSURE: STUDY OF A SELECTED VOCATIONAL NURSING PROGRAM IN TEXAS

A Dissertation

by

SUANN LENTZ HEREFORD

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 2005

Major Subject: Educational Human Resource Development

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ABSTRACT

Identification and Analysis of Entry Level Characteristics That Predict Success on Nursing Board Licensure: Study of a Selected Vocational Nursing Program in Texas.

(December 2005)

Suann Lentz Hereford, B.S., Sam Houston State University; M.Ed., Texas A&M University; M.A., Sam Houston State University

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This study investigated 18 discrete demographic, academic, and experiential learner entry characteristics of graduates from a selected vocational nursing program to determine which characteristics were relevant in predicting success on the state licensure examination, NCLEX-PN. An analysis of these characteristics contributed to the development of a model designed to more effectively counsel and advise prospective vocational nursing students in community college settings.

The population for this study consisted of students who graduated from the licensed vocational nursing program at Kingwood College during a four-year period, from the nine classes beginning January 1997 through January 2001. During this time, there were 240 graduates but one file was eliminated because of incomplete information; thus the resulting study size was reduced to 239. This retrospective study utilized archival data collected from academic records.

Chi square analysis suggested statistical significance between six of the independent variables studied and the single dependent variable of successfully passing the NCLEX-PN on the first attempt. The six independent variables that demonstrated

statistical significance were ethnicity, method of high school completion, pre-nursing grade point average, reading assessment score on the TASP Test, developmental reading coursework, and developmental writing coursework.

Additional analysis through logistic regression suggested that the independent variables of ethnicity, method of high school completion, pre-nursing grade point average, and reading assessment score on the TASP Test were the best combination of predictive measures for passing the NCLEX-PN on the first attempt.

DEDICATION

I would like to dedicate this work to the memory of my grandfather, Dennis Curry Lentz, Class of 1930. I remember him telling me two things: I could do anything that I wanted to do and I should write a book some day. This has been a long journey for me, complete with a few detours and delays. I truly believe that since he could not be here himself to see me cross the finish line, he sent Kendra to see me through. Who would believe it – an Aggie and a Longhorn!

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CHAPTER I

INTRODUCTION

"The hard part is not in identifying winners: it is in making winners out of ordinary people. And that, after all, is the overriding purpose of education. Yet … in the past, education has reverted to selecting winners rather than creating them" (Cross, 1984, p. 170).

In the face of a global nursing shortage that is predicted to reach crisis proportions within the next ten years, nursing schools across the nation are feeling the pressure to produce more graduates who successfully obtain professional licensure ("Strategies to Reverse the 'New' Nursing Shortage", 2001). The causes of the current shortage are complex and contribute to the challenges faced by nursing schools in recruiting and retaining qualified students (Pedersen, 2001). The need to produce more graduates comes at a time when there is a decline in the number of enrolled students and graduates of vocational nursing programs as well as a decrease in the number of United States educated graduates taking the licensure examination (Seago, J.A., Spetz, J., and Chapman, S., Dyer, W., & Grumbach, K., 2004). Of course not all graduates are able to successfully pass the National Council Licensure Examination (NCLEX), which is necessary for them to enter the nursing profession (Nibert & Young, 2001). Jenks, Selekman, Bross and Paquet (1989) explain that a time of shortage "magnifies the need for decreasing attrition from the profession" as "a number of potential graduates are lost from the profession during their education, or their entry into practice is delayed because of NCLEX failure" (p.117).

In light of the current nursing shortage, effective academic counseling gains

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This dissertation follows the style of the *Journal of College Counseling*.

heightened importance as a means for recruiting students into pre-nursing classes, preparing them for the admissions process, and retaining them through their nursing preparing them for the admissions process, and retaining them through their nursing education programs. As part of the 2003 state legislation creating the Texas Success Initiative (TSI), public institutions of higher education are charged with developing a success plan for each college student, which includes assessment and appropriate academic advisement to ensure college readiness (Texas Education Code, Sec. 51.3062, 2003). The Texas Higher Education Coordinating Board (1996) reports that most academic advising, especially that conducted at four-year institutions, is still conducted in the traditional manner of assigning students to faculty members in their major departments. In contrast, some two-year institutions are utilizing centralized advising centers that are operated by professional counselors. Many students need more guidance than is typically provided through traditional academic advising, which often only includes course selection and scheduling.

Cohen and Brawer (1989) suggest that academic counseling include "goal setting, personal assessment, development of change strategies, strategy implementation, evaluation, and recycling of the whole process for each student" (p. 181). This developmental approach affords counselors the opportunity to address academic, career, and personal issues with their students. Academic counseling differs from traditional academic advising "in that counseling is regarded as a more comprehensive process that includes an assessment of psychological, interpersonal, and academic needs of students and recommendations related to course scheduling, academic development, and personal development" (Wlazelek & Coulter, 1999, p. 35).

Although counseling and guidance activities have long been central to student services departments in community colleges, a more contemporary approach to student advising is the counseling liaison model (Kadar, 2001).

In the traditional model of academic advising, faculty members are experts in their subject areas, degree requirements, and course offerings but are often unable to assist students with more complex issues. Professional counselors are trained in developmental theory and have expertise in providing assistance, intervention, and referrals to students. A centralized counseling and advising center may consolidate resources and may be more convenient for some students to access, but its very design necessitates a generalized approach to services. In the counseling liaison model, a professional counselor is assigned to work with a particular academic department or division. A counselor in this position is knowledgeable about the academic department that she or he represents as well as being skilled in strategies to facilitate student success. Kadar (2001) points out that the counseling liaison role requires the counselor to develop rapport with students and faculty within the academic department, thus building collaborative relationships that demonstrate an institutional commitment to student success at the departmental level.

The counseling liaison model is a system for providing support to students from their first contact with the department. The counselor assists students with academic, career, and personal issues that may impact their success in school, in addition to serving as a student advocate, a mediator, a mentor, and a guide to available resources.

Tinto (1993) stressed the importance of continuing, personal contact between faculty, staff, and other students on the long-term retention of students. Academic counseling and advising have also been shown to increase student retention rates (Boyd, V., Carstens, S., Hunt, P., Hunt, S., McLaren, B. & Magoon, T., 1987; Glennen, 1976; Metzner, 1989; Newton, 1990; Young, Backer, & Rogers, 1989). Kadar (2001) states, "Advisement offers multiple chances to develop a rapport with students and… to discuss prospects, goals, and personal issues that may be impeding their success" (p. 174). Effective academic counseling is critical for students as they consider the various levels of nursing programs available to them.

In Texas, there are two levels of nursing education: professional nursing, or registered nursing (RN), and licensed vocational nursing (LVN). Professional nursing and vocational nursing differ in three major areas: academic preparation, permissible practice on the job, and licensing examinations (National Council Licensure Examination for Registered Nurses or NCLEX-RN and National Council Licensure Examination for Practical Nurses or NCLEX-PN), which test different domains of nursing practice (Ostrye, 2000).

Registered nursing preparation is available most often through two-year (Associate Degree Nursing) or four-year (Bachelor of Science in Nursing) degree programs. After completion of either of these programs, students must pass the NCLEX-RN in order to obtain licensure. Vocational nursing programs are usually one-year certificate programs offered through community colleges or technical schools. Vocational nursing students must pass the NCLEX-PN in order to gain licensure.

Vocational, or practical, nursing has a long and distinguished history (Blair, 1998; White, 2001). Vocational nurses provide basic patient care to individuals who are ill, injured, convalescent, or disabled. They work under the direction of physicians and registered nurses (Bureau of Labor Statistics, 2000). Vocational nurses play a central role in our health care system and are critical in maintaining quality patient care. Licensed vocational nursing is among the 2004 targeted occupations identified by The Worksource (2004), meaning that it is a "high-skill high-growth" occupation in the Texas Gulf Coast region. Additionally, the Texas Workforce Commission (2004) estimates that 17.8% more licensed vocational nurses will be needed in Texas by 2010.

As of September 2004, Texas had 114 vocational nursing schools, and 90 of them were located in community colleges (Board of Nurse Examiners, 2004). Community colleges have a direct responsibility to their local taxpayers to provide an affordable education, allowing options for both university transfer and technical training for an immediate workforce. Consequently, due to their role in facilitating workforce, economic, and community development efforts in their immediate communities, community colleges may experience the greatest pressure to respond to the nursing shortage in hospitals, clinics, and extended care facilities located within their service areas.

Students who choose to enter community college vocational nursing programs are often fundamentally different from students who enroll in university nursing programs (Lamm & McDaniel, 2000), especially with regard to academic preparation, socioeconomic status, and other demographic characteristics, such as age, ethnicity, and family status. Many of them are also the first in their families to attend college or

"first generation" college students (Bissett, 1995). Since vocational nursing programs are usually one-year certificate programs that require few, if any, academic prerequisites for entry, these students tend to be less academically experienced than their counterparts in two or four year degree programs. Compared to traditional college students, they are also more likely to be older, to have families, and to maintain employment concurrently with their vocational nursing programs (Bundy, 2004; Cohen & Brawer, 1989). Investigating these distinguishing entry characteristics of vocational nursing students may elucidate differences in student characteristics that predict success on NCLEX-PN, thus having special implications for their counseling and advising needs. Why are some students able to complete their vocational nursing programs, yet are unable to pass their licensure examinations and enter their profession?

Research Focus

The North Harris Montgomery Community College District (NHMCCD), established in 1973, is the third largest community college district in Texas, enrollment-wise, serving an area of over 1,400 square miles. It includes eleven public school districts and surrounding communities. The college district consists of five colleges (North Harris College, Kingwood College, Tomball College, Montgomery College, and Cy-Fair College) and seven satellite centers. These colleges and centers serve over 41,000 students enrolling in credit courses, plus an additional 15,000 students pursuing workforce training or community education courses each semester. The NHMCCD also maintains a partnership with six Texas universities, offering undergraduate and graduate degrees in over 60 areas of study, including nursing, at The University Center (NHMCCD, 2005).

The mission and purpose statements of the NHMCCD confirm the commitment of the college district to the population that it serves:

> North Harris Montgomery Community College District as a publicly supported, two year, comprehensive community college system involves diverse individuals, businesses, and the community in quality education opportunities for the successful development of knowledge, skills and attitudes for a rapidly changing world.
>
> Through its colleges and centers, NMHCCD develops learning communities for:
> - Technical programs, leading to associate degrees or certificates, designed to develop marketable skills and support economic development
> - Academic courses in the arts and sciences to transfer to senior institutions
> - Continuing adult education programs for academic, professional, occupational, and cultural enhancement
> - Developmental education and literacy programs designed to improve the basic skills of students
> - A program of student support services, including counseling and learning resources, designed to assist individuals in achieving their educational and career goals
> - Workforce, economic, and community development initiatives designed to meet local and statewide needs (NHMCCD, 2005, p. 12).

Kingwood College opened as the NHMCCD's second college in the fall of 1984. It serves an economically and culturally diverse population of approximately 200,000 people, residing primarily in Montgomery, Liberty, and northeast Harris Counties (Kingwood College Fact Book, 2003-2004). Kingwood College offers a variety of career training options, especially in technology and healthcare. A new state of the art Health Science Building, which opened in 2004, will increase career opportunities through the addition and expansion of health care programs.

Vocational nursing began in the college district in 1974, with the program housed at Aldine High School, until North Harris College was completed in 1976. The program continued at North Harris College until 1984, when it moved to the newly

opened Kingwood College. It remained the only vocational nursing program in the college district until 1995, when an extension program was formed at Montgomery College (kcweb.nhmccd.edu, 2002). The two programs separated in 2002 and earned separate approval from the Texas Board of Nurse Examiners (BNE).

Due to the increased interest in nursing as a career, the demand for nurses in the college district service area, and state legislation providing funds for the expansion and addition of nursing programs, Kingwood College served as the model for establishing vocational nursing programs at each college across the district. Plans are also underway to add programs allowing vocational nursing graduates to transition into registered nursing associate degree programs at each college. These program options will offer students multiple entry and exit opportunities, beginning with certified nurse aid, vocational nursing, and associate degree registered nursing programs at all five colleges in addition to baccalaureate and post-baccalaureate nursing programs at The University Center. These program options mirror the "Nursing Career Lattice" program initiative designed by the Council for Adult and Experiential Learning (CAEL) in collaboration with the United States Department of Labor (CAEL, 2005). The concept of career lattice is designed to offer more flexible learning opportunities and improve workforce retention while recognizing that lateral career moves are also important in the workforce.

The student population within the vocational nursing program at Kingwood College is similar to that of many suburban community colleges. Cohen and Brawer (1989) describe the community college student body as including older students, students in search of nearby accessibility, students needing financial aid, as well as

women, minority students, and under-prepared students. Many of these students are also "first generation" college students (Bissett, 1995). Bundy (2004) explains that non-traditional students are usually defined as students older than 24 years of age, who may have families, may be financially independent, and attend college on a part-time basis but may also include "first generation" college students, students of color, students with disabilities, and students of disadvantaged socioeconomic backgrounds. The increasing number of nontraditional students seeking entrance into vocational nursing programs necessitates multiple avenues to achieve their career goals; therefore, effective academic counseling and advising becomes critical to student success. As Cross (1984) challenges in the opening quotation, how do these ordinary people become winners?

Statement of the Problem

Since educational resources are limited and every student in a nursing program is so potentially valuable to the community and because the community college mission is to fulfill the immediate need for nurses in the workforce, it is imperative that every prospective nursing student receives appropriate academic counseling and support to become a qualified candidate for these programs (Bissett, 1995; Briscoe & Anema, 1999). Without this support, potential nurses who could help alleviate the shortage may be delayed in entering the workforce or even lost from the profession (Wall, Miller & Widerquist, 1993). As a result, there is a profound need to identify student characteristics most likely to predict success on the state licensure examination in order to more effectively counsel and prepare those who wish to enter the field.

Purpose of the Study

The purpose of this study, therefore, was to identify which of 18 discrete learner entry characteristics are relevant in predicting student success on the state licensure examination, NCLEX-PN. Findings from an analysis of predictive characteristics should contribute to the development of a model to more effectively counsel and advise potential vocational nursing students in community college settings.

Significance of the Study

This study examined the importance of demographic, academic, and experiential learner entry characteristics on the effect of successfully passing the state licensure examination among graduates of a suburban community college vocational nursing program. The demographic learner entry characteristics considered included learner's age at program admission, gender, ethnicity, method of high school completion, and location of high school attended. The academic learner entry characteristics considered were pre-nursing college grade point average, reading assessment score, writing assessment score, mathematics assessment score, completion of one human anatomy and physiology course, completion of one freshman English course, completion of one non-college level course, and completion of developmental reading and writing coursework. The experiential learner entry characteristics examined were previous employment in the health care field, health care certifications obtained, and previous attempts in nursing programs. The results of the study will identify and analyze specific entry level characteristics of vocational nursing students that predict success on the state licensing examination, NCLEX-PN. Consequently, counseling and advising services

can be tailored to enhance individual student success on the state licensure examination.

The theoretical significance of this study contributes to the theory base of academic counseling and advising, academic preparation, and pedagogical theories as they apply to vocational education, specifically in a health care program of vocational nursing.

The practical significance and potential benefit of this study was the design of a predictive model of success based on discrete learner entry characteristics, which could be utilized to counsel students on the most effective academic and experiential pathways to successfully pass their licensing requirements. The model might also prove valuable in recruiting students most likely to succeed in these programs, thereby establishing a more rational approach to the process of student selection and admission into nursing programs. Finally, the application of this model contributes to the formulation of retention strategies for students already in vocational nursing programs.

Research Questions

This study was conducted to identify and analyze 18 specific entry level characteristics of vocational nursing graduates that predict success on the state licensing examination in order to more effectively counsel and advise prospective vocational nursing students in community college settings. The research questions framing this study were:

1) What are the learner entry demographic characteristics that contribute to passing the state licensure examination?

2) What are the learner entry academic characteristics that contribute to passing the state licensure examination?
3) What are the learner entry experiential characteristics that contribute to passing the state licensure examination?
4) Is there a subset of learner entry characteristics that correlate with successful passing of the state licensing examination?

Definition of Terms

Academic Learner Entry Characteristics – specific attributes of pre-nursing grade point average, reading assessment scores, writing assessment scores, mathematics assessment scores, completion of one human anatomy and physiology course, completion of one freshman English course, completion of one non-college level course, and completion of developmental reading and writing coursework

Assessment of Skills for Successful Entry and Transfer (ASSET Test) - an approved college entry assessment required by the State of Texas for all entering college students. This test covers reading, writing, and mathematics skills in a multiple choice, pencil and paper format. It is available through ACT, Inc. Passing scores in Texas include a score of 41 in reading, 40 in writing (40 is passing but Kingwood College required a score of 45), and 38 in elementary algebra (Texas Higher Education Coordinating Board, 1999, p. 8).

Computer Adaptive Placement Assessment and Support System (COMPASS Test) – an approved college entry assessment required by the State of Texas for all entering college students. This test covers reading, writing, and mathematics skills in a multiple choice, computer adaptive format. It is available through ACT, Inc. Passing scores in

Texas include a score of 81 in reading, 59 in writing (59 is passing but Kingwood College required a score of 85), and 39 in algebra (Texas Higher Education Coordinating Board, 1999, p. 8).

Demographic Learner Entry Characteristics – specific attributes of learner's age at program admission, gender, ethnicity, method of high school completion, and location of high school attended

Experiential Learner Entry Characteristics – specific attributes of employment in the health care field, health care certifications obtained, and previous attempts in nursing school programs

General Education Development (GED) Test – an accepted equivalent of high school completion that is achieved by passing a series of five tests in the areas of reading, writing, mathematics, science, and social studies developed by the American Council on Education (ACE, 2004).

Learner Entry Characteristics – demographic, academic, and experiential background traits present at the time of nursing program admission

License - a document issued evidencing the person has fulfilled requirements as stated in Chapter 302 of the Texas Occupational Code (BVNE, 2001, p.1)

Licensed Vocational Nurse - a person who is licensed under Chapter 302 of the Texas Occupational Code by the Board of Vocational Nurse Examiners (BVNE, 2001, p.2)

Mathematics Assessment - the college entry assessments (TASP, ASSET, and COMPASS) required by the State of Texas for all entering college students

National Council Licensure Examination for Practical Nurses (NCLEX - PN) - the practical/ vocational nurse licensure examination developed by the National Council of

State Boards of Nursing, Inc., and used for licensure by those jurisdictions whose boards of nursing are National Council members (BVNE, 2001, p.2)

Nursing or Nursing Services - attending or caring for a person's illness or health for compensation (BVNE, 2001, p.2)

Practical Nurse or Licensed Practical Nurse - the title used in some other states for nurses with licensure requirements similar to those for Licensed Vocational Nurses in this State (BVNE, 2001, p. 2)

Professional Nurse – registered nurse

Reading Assessment – the college entry assessments (TASP, ASSET, and COMPASS) required by the State of Texas for all entering college students

Selected Vocational Nursing Program – vocational nursing program offered at Kingwood College, a public suburban community college within the North Harris Montgomery Community College District, in Kingwood, Texas

State Licensing Examination – National Council Licensure Examination for Practical Nurses (NCLEX-PN)

Success on Licensure Examination – passing the NCLEX-PN on the first attempt

Texas Academic Skills Program (TASP Test) - an approved college entry assessment required by the State of Texas for all entering college students. This test covers reading, writing, and mathematics skills in a multiple choice, pencil and paper format. It also includes an essay section. It is available through National Evaluation Systems, Inc. Passing scores in Texas include a score of 230 in reading, 220 in writing, and 230 in mathematics (Texas Higher Education Coordinating Board, 1999, p. 8).

Writing Assessment – the college entry assessments (TASP, ASSET, and COMPASS) required by the State of Texas for all entering college students

Assumptions of the Study

The following assumptions were made for the purpose of this study:

1) Potential nursing students have a range of demographic, academic, and experiential learner entry characteristics.
2) Potential nursing students have completed all assessment tests in a serious manner and demonstrated their accurate skill level at that time.
3) Potential nursing students have completed all admissions and nursing program documents in a sincere manner, supplying truthful information.

Limitations of the Study

1) Operational definitions of terms were limited to those as explained in the "Definitions" section of this document.
2) Content knowledge obtained from the vocational nursing program itself was not evaluated in relation to successful passing of the state licensure examination since this study focuses only on demographic, academic, and experiential learner entry characteristics and their relationship to successfully passing the state licensure examination.
3) The population in this study (n=239) represented only a small percentage of students enrolled in vocational nursing programs in this state and country.
4) The sample studied was limited to a single community college-based vocational nursing program in a suburban area and may not be representative of all vocational nursing programs.

Organization of the Dissertation

This dissertation is organized into five chapters and presented as follows: Chapter I includes an introduction, research focus, statement of the problem, purpose of the study, significance of the study, research questions, definition of terms, assumptions of the study, and limitations of the study. Chapter II consists of a review of the literature as related to vocational nursing and includes the following sections: historical perspective of vocational nursing, the nursing shortage, the role of the community college in nursing education, predictors of success in registered nursing education, predictors of success in vocational nursing education, and a summary of the literature. Chapter III describes the methodology and contains the following parts: population description, design of the study, sources of data and collection methods, and analysis of data. Chapter IV describes the results of the study and includes an introduction, descriptive statistical analysis, inferential statistical analysis, and summary. Chapter V presents the summary, conclusions, recommendations based on the study, and recommendations for further study.

CHAPTER II

REVIEW OF THE LITERATURE

This literature review provides a brief historical perspective of vocational nursing and nursing education, followed by a discussion of current nursing education research in three interrelated areas. First, the impact of the current nursing shortage is explored. Second, the role of the community college in nursing education is considered. Finally, the available research on predicting student success in passing state licensure examinations is reviewed.

Historical Perspective of Vocational Nursing

Vocational nursing has a long and distinguished history. Since vocational nurses have provided care since the earliest of times, they actually existed long before the development of registered nurses (Blair, 1998). The era of modern nursing essentially began in the 1850's, with the efforts of Florence Nightingale during the Crimean War. Nightingale became known as the founder of trained nursing as a profession for women and was primarily responsible for eliminating the negative image of nursing (Blair, 1998).

Women who provided care for individuals without having any formal education were often called practical nurses (White, 2001). Formal educational programs for practical nursing were not available in the United States until The Ballard School opened in Brooklyn, New York, in 1893. It was a three-month training program that focused on providing simple nursing care for infants, children, the elderly, and the disabled, in their homes (White, 2001).

During World War I, there was a shortage of practical nurses because the supply was stretched to provide care for both soldiers on the battlefield and the civilian population at home. The Army School of Nursing was founded to help tackle the shortage of practical nurses in the military. Funds to expand practical nursing programs in vocational schools were endowed through the Smith-Hughes Act of 1917 (White, 2001).

There was, again, a great demand for nurses during World War II. Throughout the 1940's, more formal educational programs were established for practical nurses, and some states began requiring licensure for practical nurses (Blair, 1998). Because of the shortage of registered nurses during World War II, practical nurses were allowed positions of increased responsibility in hospital settings (White, 2001).

The National Association for Practical Nurse Education and Service, Inc. (NAPNES) was organized in 1941 for the purpose of improving educational opportunities for practical nurses as well as advocating for compulsory state licensing laws. In 1914, Mississippi became the first state to license practical nurses, and in 1938, New York became the first state to enact a nurse practice act that included two levels of nursing, both registered and practical. By 1960, licensure of practical nurses was required in all 50 states (Blair, 1998).

Before the development of structured and regulated nursing education programs, nurses received their training on the job. These first training programs were operated by hospitals and were known as hospital-based diploma programs. Prior to the 1960's, diploma programs were the most common source of training for nurses (Blair, 1998).

As early as 1919, there was national interest in the practice of nursing education. Several landmark reports were published in the first half of the twentieth century that shaped nursing education in the United States. In 1919, the Committee for the Study of Nursing Education was formed to examine the training of public health nurses. Their report, *Nursing and Nursing Education in the United States*, also known as the *Goldmark Report*, was published in 1923. Inadequacies such as limited resources, low admission standards, lack of supervision, poorly trained instructors, and failure to associate nursing theory with clinical practice were documented. Additionally, the report concluded that nursing education should be conducted in a university setting (Blair, 1998).

Nursing for the Future and Nursing Reconsidered: A Study for Change, also known as the *Brown Report*, was published by Esther Lucille Brown in 1948. Several recommendations for the improvement of nursing education were included in this report, most notably, the need to relocate the responsibility of nursing education programs from hospitals to universities in order to achieve increased professional competence (Blair, 1998).

In the early 1950's, fueled by the recent shortage of nurses during World War II, the *Institute of Research and Service in Nursing Education Report* resulted in the official creation of practical nurses as recognized health care providers under Title III of the Health Amendment Act of 1955. This legislation encouraged the growth of new practical nursing schools and obliged states to institute licensure for practical nurses (Blair, 1998).

The first college-based nursing education program was launched in 1900 when nursing students at Johns Hopkins University were required to complete a six-month program of science and nursing principles classes before they could move to the hospital wards (Schrefer, 2000). In 1909, the School of Nursing at the University of Minnesota was the first nursing school organized as a part of the university (Schrefer, 2000). In 1915, New York's Teachers College and the University of Cincinnati introduced the first five-year bachelor-degree programs in nursing, in an effort to elevate nursing to the level of other professions (Schrefer, 2000). This was the beginning of the movement to establish the baccalaureate degree as the basic preparation for professional nurses. An endorsement of this plan by the American Nurses Association in 1965 influenced the status and expansion of BSN programs (Blair, 1998).

Associate Degree Nursing (ADN) programs were introduced into community colleges to train "technical nurses" (Blair, 1998). Mildred Montag founded the first of these programs in 1952, intending to create a new level of nurse to bridge the gap between vocational nurses and professional nurses (Blair, 1998). Instead of evolving into a separate level of nurses, graduates of associate degree programs became eligible for licensure as registered nurses and joined graduates of baccalaureate programs in taking the NCLEX-RN (Blair, 1998). As a result, both baccalaureate and associate degree nurses fill the role of professional nurses, whereas vocational nurses retain the duties of bedside nurses (Blair, 1998).

In 1978, The National Council of State Boards of Nursing (NCSBN) was established "to provide an organization through which boards of nursing act and

counsel together on matters of common interest and concern affecting the public health, safety and welfare, including the development of licensing examinations in nursing" (NCSBN, 2004). The National Council Licensure Examinations for both registered nurses (NCLEX-RN) and vocational nurses (NCLEX-PN) were developed. These examinations are used to insure that graduates have the competencies to practice safe and effective nursing in an entry-level position (NCSBN, 2004). Timby and Scherer (1994) define an entry-level position for practical nurses as "comparable to that expected of a newly licensed practical nurse who has been employed for six months or less" (p. xvii).

Since the first NCLEX-PN test was introduced in 1982, some significant changes have occurred. The original test was based on the nursing process, systems of decision-making, and areas of human functioning. It was revised in 1987, maintaining an emphasis on nursing practice but introducing categories of client needs and eliminating the systems of decision-making and the areas of human functioning. In 1988, the report format for test results changed from a numerical score report to a pass/fail report and computerized adaptive testing was introduced in April 1994 (Ostrye, 2000).

In order to keep the test current and commensurate with entry-level practice, the National Council of State Boards of Nursing reviews the test plan content and the passing standards every three years (NCSBN, 1998). Changes in the test plan are based on job analysis studies of entry-level vocational nurses.

Each question on the examination comes from the test plan and includes the two major components of client needs and integrated nursing processes. Client needs

incorporates safe and effective care environment, health promotion and maintenance, psychosocial integrity, and physiological integrity. Integrated nursing processes include clinical problem-solving process, caring, communication and documentation, and teaching and learning (NCSBN, 2004).

An updated NCLEX-PN test plan was implemented in October 1996 and again in April 1999; however, the emphasis on nursing process and client needs were maintained in both versions (Ostrye, 2000). The NCLEX-PN is currently an adaptive computerized examination, which fields multiple-choice questions randomly for each candidate. Each candidate must answer a minimum of 85 questions from a maximum of 205 questions during a five-hour maximum test period (NCSBN, 2004). In Texas, graduates have four years to take the NCLEX-PN and pass before returning to school or attempting the examination in another state.

The Nursing Shortage

Although there have been several nursing shortages since World War II, the current shortage is unique in that it is both a supply and demand shortage. The causes of the current shortage are complex and include issues such as steep population growth in several states, declining enrollment in nursing programs, an aging workforce and larger population that will require health care services, and expanding job opportunities within the health care industry (Sigma Theta Tau, 2000; Kelsey, 1990; Strategies to reverse the "new" nursing shortage, 2001; Pedersen, 2001). The American Association of Colleges of Nurses (AACN,2005) reports that this situation is compounded by the struggle of nursing programs across the nation to expand their enrollment levels.

Hopkins (2001) reports, "The shortage is far from universal at this stage, however. It tends to be felt hardest in isolated rural areas, depressed urban environments and key specialty areas. The numbers indicate that the shortage also is more likely to be felt in Western and Southern states than it is in the East and Midwest." Hospitals located in states most impacted by the shortage of nurses are closing units, canceling non-urgent surgeries, and diverting emergency room patients.

Even though some hospitals have been forced to reduce patient services as a result of the nursing shortage, employment opportunities for nurses are decreasing in hospital settings. Policies in managed care programs have contributed to an environment of rising hospital acuity; consequently, "hospitals are increasingly becoming large intensive care units, with cardiac monitoring, respiratory assistance and intense treatment a growing part of the average patient's plan of care" (Sigma Theta Tau, 2000, p.1). Nurses with strong science backgrounds and technology-based training are required for the existing hospital employment opportunities, which are often found in high-skill areas such as critical care, emergency room, operating room, and pediatric intensive care areas (The U.S. Nursing Shortage: The New Realities in the Nurse Supply, 1997).

As the number of hospital nursing positions decrease, a major shift is occurring in employment opportunities for nurses. Opportunities are increasing in home health, nursing homes, ambulatory care facilities, physician offices, and other non-traditional healthcare settings (The U.S. Nursing Shortage: The New Realities in the Nurse Supply, 1997). Interestingly, the Department of Labor predicts that employment opportunities for licensed vocational nurses are expected to grow much faster than average in home

health care services, physicians' offices and clinics, ambulatory surgicenters, and emergency medical centers. A faster than average growth is expected for employment in nursing homes (Bureau of Labor Statistics, 2000). The Bureau of Health Professions (BHPr), within the United States Department of Health and Human Services, has developed a forecasting model called the Nursing Demand Model (NDM). The NDM suggests that there will be an increase in the demand for licensed vocational nurses from 618,000 in 2000 to 905,000 in 2020 - an increase of 46% (BHPr, accessed 2005). Although there may be a critical shortage of experienced nurses in some highly specialized areas, nurses are obviously needed in many different health care settings.

In order to help address the nursing shortage in Texas, State Senator Mike Moncrief sponsored Senate Bill 572, The Nurse Shortage Reduction Act of 2001. This legislation became effective September 1, 2001, with the intent of increasing nursing school capacity over the next several years. Senate Bill 572 establishes a program through which the Texas Higher Education Coordination Board (THECB) will provide funds to nursing programs in order to recruit and retain additional students, recruit and retain qualified faculty, amend the nursing financial aid program, and create a nursing workforce data center (Bill summary: 77th Texas legislative session, 2001). With increasing numbers of students seeking admission to nursing schools, effective academic counseling and advising will be essential for student success.

Similar legislation has been enacted at the federal level. The Nurse Reinvestment Act (P.L. 107-205), passed by the 107th Congress in 2002, was a bipartisan legislative effort designed to help recruit and train qualified nursing staff (Donley, R., Flaherty, M.J., Sarsfield, E., Taylor, L., Maloni, H., & Flanagan, E., 2002).

Key provisions of the Act include the support of remedial education for disadvantaged and older nursing students, increased federal funding for nurse training programs, grants to create career ladders and curriculum development, funding for a national public education campaign to advocate nursing as a career, and the establishment of a National Nurse Service Core.

The Act also emphasizes the study of gerontology in order to address the needs of an aging population. A recent study released by the National Commission on Nursing Workforce for Long-Term Care*, Act Now for Your Tomorrow* (2005), projects that long-term care facilities will require an estimated additional 83,000 vocational nurses by 2020. The need is also great for registered nurses and certified nursing aides.

In their recent report, *Supply, Demand, and Use of Licensed Practical Nurses*, the Health Resources and Services Administration notes that in times of shortage, there is renewed interest in licensed vocational nurses to augment the nurse workforce and enhance patient care (Seago, et al., 2004). Community colleges may provide the best avenue for educational mobility within the nursing profession.

The Role of the Community College in Nursing Education

It was in response to the nursing shortage surrounding World War II that associate degree nursing programs were first introduced in the early 1950s. As a result of the movement that began with the efforts of Dr. Mildred Montag, nursing education has changed from primarily hospital-based diploma programs to collegiate programs, which provide a background in science and liberal arts (Aronovitz, 2000). Community colleges have subsequently emerged as the primary source of nurses in this country (Pedersen, 2001). Higher education officials suggest that community colleges may

present the best solution to alleviate the currently projected nursing deficit by educating a new workforce of nurses. Although the nursing shortage is national in scope, the effects vary across regions, and that variability suggests that community colleges could play an important role in addressing nursing shortages in their respective regions (Lane, 2001). One important challenge will be attracting new students to community college nursing programs.

A possible solution to the challenge of recruiting prospective vocational nursing students may be an initiative introduced by The Texas Higher Education Coordinating Board (THECB) called "Closing the Gaps" (Dilling, 2002). In response to "a growing unskilled and under-educated population that cannot meet the demands of a technology-based workforce" (Dilling, 2002) and the decline of the average household income, the THECB has launched this project to increase college attendance by 500,000 more students and increase the number of degrees, certificates, and other identifiable program completions by 50%, by 2015.

In order to attract 500,000 new students to higher education over the next 10 years, it will be necessary to recruit students who might not typically consider college in their future plans, such as older students, students with financial needs, students with jobs and families, students with disabilities, minority students, and under-prepared students, many of whom will be the first in their family to attend college. Many of these nontraditional college students targeted in the "Closing the Gaps" project will choose to attend a community college close to their families and homes. Community colleges have long welcomed nontraditional students to their campuses.

Since community colleges are traditionally "open door" institutions, students are not subjected to the rigorous admission requirements of more selective institutions. Consequently, many nontraditional community college students are not as academically sophisticated as their university counterparts. This is observable among applicants to vocational nursing programs, which often need special guidance and counseling in addressing the additional academic requirements and the competitive selection process for admission. Jeffreys (1998) explains that nontraditional nursing students tend to underestimate their need for preparation and lack an understanding of the academic skills necessary to succeed in a nursing program. She considers students to be "nontraditional" if they meet at least one of the following criteria: age 25 or older, male, speak English as a second language, ethnic or racial minority, have dependent children, or received a GED.

Although community college nursing programs will be practical options for many students, there are a variety of pathways available to enter the nursing profession. Traditional avenues include colleges and universities, which offer baccalaureate (BSN) degrees, and community colleges, which offer associate (ADN) degrees; both providing registered nursing training programs. Additionally, community colleges and technical schools offer one-year vocational nursing certificates. Due to the growing demand for nurses, students will also find some innovative opportunities to increase their educational levels, such as transitional programs of study leading from a vocational nursing certificate to a registered nursing associate degree, an associate degree to baccalaureate degree transitional program, and a vocational nursing certificate to a baccalaureate degree transitional program. With all of these options accessible to

students, academic counseling and advising helps to set career goals, make sound scholastic decisions, and promote attainment of higher education.

Campbell and Dickson (1996, p. 48) advise, "If schools of nursing are to continue to respond to the challenge of producing highly qualified nurses, there is an ever-increasing need to understand the nature of diverse learners enrolled and to prevent high attrition. Identifying predictors of success… is one means whereby high attrition rates may be addressed." Identifying predictors of success can also be used as a means to prepare students to enter nursing programs. It is important to determine if learner entry characteristics predict success on the NCLEX-PN so that this information can be utilized in academic counseling strategies with incoming students.

Entry Level Characteristics Predicting Success in Registered Nursing Education

The research targeting predictors of success for students in baccalaureate and associate degree registered nursing programs is extensive. Numerous studies were published after the NCLEX-RN became the nationally approved licensure examination for registered nurses in 1982. Demographic characteristics, academic characteristics, and experiential characteristics are factors frequently considered in contemporary research for their relationship to successful NCLEX-RN performance.

Campbell and Dickson (1996) analyzed nursing education research, published between 1981 and 1990, on predictors of retention, graduation, and National Council Licensure Examination (NCLEX-RN) success of baccalaureate nursing students. Their integrative review of literature identified 47 related studies. Cognitive variables that revealed some significance in predicting retention, graduation, or NCLEX-RN success

were grade point averages, science grades, standardized test results, and nursing course grades. The authors concluded that grade point averages in science and nursing courses were the strongest academic predictors while student age and parental level of education were the strongest demographic predictors of student success.

Demographic characteristics such as age and ethnicity have yielded conflicting results in predicting student success. Safian-Rush and Belock (1988) and Aldag and Rose (1983) found age to be positively correlated to NCLEX-RN scores while several other studies reported contrary findings (McKinney, Small, O'Dell, & Coonrod, 1988; Lengacher & Keller, 1990, Dell & Valine, 1990; Felts, 1986; Woodham & Taube, 1986). Briscoe and Anema (1999) reported that older students were more likely to pass the NCLEX-RN. They also noted that race was significant in that students of African descent were more likely to be unsuccessful on the NCLEX-RN (Briscoe & Anema, 1999). This finding corresponds with previous studies indicating that ethnic minorities and foreign-born nursing students experience higher NCLEX-RN failure rates than do other students (Endres, 1997; Arathuzik & Abner, 1998; Frierson, Malone, & Shelton, 1993)

Academic characteristics, such as pre-nursing grade point average, standardized test scores, and grades in prerequisite science courses are often the focus of nursing studies investigating program success. Emphasis on pre-nursing college performance is apparent in several studies. The most consistent significant correlation to NCLEX-RN success for graduates of registered nursing programs appears to be pre-nursing grade point average (Allen, Higgs, & Holloway, 1985; Byrd, Garza, & Nieswiadomy, 1999; Glick, McClelland, & Yang, 1986; Heupel, 1994; McClelland, Yang, & Glick, 1992;

McKinney, et al., 1988; Payne & Duffey, 1986; Yang, Glick, & McClelland, 1987; Yocum & Scherubel, 1985).

Standardized test scores have also been examined regarding their relationship to NCLEX-RN success. Campbell & Dickson (1996) report that the SAT and ACT are among the tests most frequently cited in the literature. Several studies have noted that standardized test scores are significant predictors of NCLEX-RN success (Alexander & Brophy, 1997; Boyle, 1986; Dell & Valine, 1990; Felts, 1986; Foti & DeYoung, 1991; Fowles, 1992; Lengacher & Keller, 1990; Quick, Krupa, & Whitley, 1985; Sharp, 1984; Woodham & Taube, 1986; Yang, et al., 1987). This is not surprising since standardized assessments, such as the SAT, ACT, and NCLEX, all require similar skill sets of reading ability and comprehension; therefore, comparable outcomes would be expected.

A significant relationship has been found to exist between the completion of prerequisite science courses, such as chemistry, biology, anatomy, and physiology, and student success in nursing programs and/or on licensing examinations (Byrd, et al., 1999; Fowles, 1992; Glick, et al., 1986; Quick, et al.,, 1985; Sharp, 1984; Wall, et al., 1993; Whitley & Chadwick, 1986). These findings are predictable in that science courses provide knowledge about the structure and function of the human body, which then serves as the foundation for basic nursing theory and the understanding of health and illness. Accordingly, information obtained in prerequisite science courses becomes integrated within the knowledge base of nursing education.

Experiential characteristics, such as prior health care experience or training, have been studied in terms of their influence on the successful completion of a nursing program with conflicting results (Harner, 1993; Grzegorczyk, 1994; Oliver, 1985).

Harner (1993) and Oliver (1985) found no significant relationship between previous health care experience and completion of a registered nursing program; however, Grzegorczyk (1994) found that work experience was a factor in program completion for licensed practical nurses in an associate degree nursing program.

In summary, research conducted with registered nursing students suggests that the academic learner entry characteristics of pre-nursing grade point average, nursing grade point average, cumulative grade point average, standardized test scores, and the completion of prerequisite science courses seem to be most predictive of success on licensure examinations. Demographic learner entry characteristics, such as age and ethnicity, have been studied with conflicting results, as has the experiential learner entry characteristic of prior healthcare experience.

Entry Level Characteristics Predicting Success in Vocational Nursing Education

Even though there is an abundance of research involving predictors of success on NCLEX-RN, there is minimal research regarding predictors of success on NCLEX-PN. An extensive review of the literature revealed only one published study examining predictors of success on the state licensure examination by vocational nursing students in a statewide technical college system.

Lamm and McDaniel (2000) conducted a retrospective study of 667 practical nursing graduates at the Indianapolis campus of Ivy Tech State College between 1992 and 1996. They examined the variables of race, age, gender, socio-economic status, cumulative grade point average, anatomy and physiology course grades, high school graduation versus GED completion, and scores from each of the five PSB Aptitude Test

subscales in order to identify predictors of NCLEX-PN success. They found that the overall grade point average was significantly correlated with success on NCLEX–PN in their sample of students. Additionally, they determined that Caucasian students were more likely than black students to pass NCLEX-PN on the first attempt.

Additional research reports were located through a search of college dissertations. The success of low-income students in a practical nursing program was the subject of a study by Snook (1997). He studied eight classes over a six-year period in a Philadelphia practical nursing program, in order to identify predictors of program completion and cumulative grade point average among low-income students. The sample consisted of 391 students, 146 of whom were low-income. Low-income and non low-income students were studied separately. Program completion for low-income students was best associated with marital status. Grade point average for both groups was best predicted by full-time/part-time enrollment status, marital status, and PSB verbal score variables.

Hawsey (1997) conducted a study of 254 practical nursing students in five southern Alabama two-year colleges to determine the effects of remedial courses prior to nursing school admission. She considered age, gender, race, method of high school completion, receipt of need-based financial aid, participation in remedial coursework prior to program admission, cumulative nursing grade point average, number of nursing courses failed, and ACT-ASSET test scores in reading, language, and numerical skills. Hawsey found that there was no significant difference between program completion rates or NCLEX-PN success rates for students completing remediation before admission and those who had not. Successful program completion was influenced by age,

number of nursing courses failed, and the cumulative nursing grade point average. Reading ability as measured by the ACT-ASSET Test, race, and cumulative grade point average predicted for NCLEX-PN success.

Swift (1989) studied 1,254 practical nursing students who attended twelve different post-secondary schools in Georgia between 1983 and 1986 to compare the academic success of high school graduates to GED recipients. Independent variables in this study were completion of GED requirements, completion of high school graduation requirements, race, and age at the time of initial enrollment. Dependent variables were the graduation percentage, the graduation grade point average, and the first attempt pass percentage on the practical nursing licensure examination. Swift found that GED recipients generally performed as well as high school graduates in practical nursing programs. He also reported that black students tended not to perform as well as white students and that age did not significantly contribute to student performance.

In an effort to determine which of the screening tests used in Georgia was most reliable in predicting a passing score on the state licensure examination, Thompson (1989) studied the 398 candidates who completed the licensure examination in Georgia, in October of 1987. Candidates came from 35 of the 43 practical nursing programs in the state. She also compared licensure scores for high score graduates and GED recipients. Her findings suggested that Scholastic Aptitude Test verbal scores, Career Placement Program Reading Test scores, race, and age predicted licensure success. Thompson advised that a measure of reading ability be considered in admission decisions.

Dickey (1989) examined the records of 168 graduates of the Lamar University School of Vocational Nursing from 1984 to 1987 for whom NCLEX-PN scores were available. The SAT composite score and the Natural Science portion of the Psychological Services Bureau's (PSB) Aptitude for Practical Nurses Examination were highly predictive of NCLEX-PN scores. The variables of age, ethnicity, and marital status were significantly associated with NCLEX-PN performance.

The purpose of the study conducted by Parrish (1994) was to determine if a relationship existed between NCLEX-PN success and age, gender, race, and method of high school completion, and also to determine if a difference existed in the grade point averages of high school graduates and GED recipients. She examined a sample including all full-time students admitted during the Fall semesters of 1988 through 1990 into four practical nursing programs in Alabama. Parrish determined that age and race were the only variables to have a relationship with program outcome. The youngest age group (17 to 24 years old) and nonwhite students were found to have lower success rates in practical nursing programs.

Young-Richardson (1996) studied 261 graduates from an urban practical nursing program who completed the NCLEX-PN between 1982 and 1987. She studied seven demographic variables and five academic variables to determine their relationship with NCLEX-PN scores. Her findings concluded that demographic variables as a set were not predictive of NCLEX-PN success but that students having minor children, under 16 years of age, had higher NCLX-PN scores. Scores on the Practical Nursing Entrance Examination (PNEE) and National League of Nursing Achievement Test accounted for 69% of the variance in NCLEX-PN scores.

Ostrye (2000) studied 114 students who graduated from an Ivy Tech State College practical nursing program in December 1997, May 1998, and August 1998 and who completed the NCLEX-PN by December 1998. Fourteen predictor variables were explored: age, race, method of high school completion, needs-based financial aid recipient, five PSB (Aptitude for Practical Nursing Examination) sub-scale scores, type of remedial basic skill courses taken, repetition of remedial basic skill courses, course grade in PNU 127: Care of the Adult I, and cumulative grade point average at program completion. Ostrye (2000) found that cumulative nursing grade point average, PSB science score, and completion of a basic skill reading course were predictive of NCLEX-PN performance. Cumulative nursing grade point average and the PSB science score increased the probability of NCLEX-PN success but participation in a remedial reading program decreased chances of passing the examination. Additional analysis demonstrated a significant difference in NCLEX-PN pass rates among the sixteen practical nursing programs within the Ivy Tech State College system.

To summarize, the results of the literature studies for vocational nursing programs that investigated discrete learner characteristics with NCLEX-PN success suggests that overall grade point average, standardized test scores, and the completion of remedial courses seem to have predictive value on licensure examinations for vocational nursing students. Demographic learner entry characteristics, such as age and ethnicity, may have some predictive value as well.

Summary

This review of relevant literature reveals continuing interest in identifying predictors of student success, as measured by passing scores on the state licensure

examination, NCLEX-PN. Researchers have demonstrated that standardized test scores, pre-nursing and cumulative grade point average, completion of science courses, verbal ability, completion of remedial courses, and previous health care experience show some predictive value for success on the state licensure examination. Other factors, such as age and ethnicity, may have predictive value but continue to yield conflicting results.

Although a large body of research exists identifying predictors of student success among baccalaureate and associate degree nursing programs, few studies have been conducted following the change in score reporting, the adoption of a computerized adaptive testing format, and subsequent revisions of the NCLEX test plan. These changes may alter the predictor variables for student performance on the NCLEX-PN. More research is needed to examine the effect of current student characteristics given these modifications.

Predictors of success identified in previous studies of professional nursing students may not, however, be generalizable to vocational nursing students because of differences in academic preparation, permissible practice on the job, and separate licensing examinations that test different domains of nursing practice (Ostrye, 2000). Additionally, it appears that most of the studies examining predictors of success were conducted in order to establish guidelines for admissions or to determine optimum times for academic interventions rather than to construct a model to help prospective students prepare for vocational nursing programs and successfully pass the NCLEX-PN, thus making them the winners that Cross (1984) describes in the opening quotation.

Finally, several researchers have indicated that predictors for success seem to vary among institutions and urged individual nursing programs to identify their own

predictors for success, as well as to identify possible characteristics of students at risk for not succeeding (Alexander & Brophy, 1997; Foti & DeYoung, 1991; Fowles, 1992; Lewis & Lewis, 2000). These recommendations support the need for more contemporary research to determine academic, demographic, and experiential learner entry characteristics predictive of success on the NCLEX-PN for vocational nursing students in a community college setting.

CHAPTER III

METHODOLOGY

The purpose of this study was to examine 18 discrete learner entry characteristics that predict success on the state licensure examination, the NCLEX-PN, among the graduates of a selected vocational nursing program. An analysis of predictive characteristics will contribute to the development of a model that can be utilized to more effectively counsel and advise prospective vocational nursing students in community college settings to enhance licensure success. The research questions framing this study were:

1) What are the learner entry demographic characteristics that contribute to passing the state licensure examination?
2) What are the learner entry academic characteristics that contribute to passing the state licensure examination?
3) What are the learner entry experiential characteristics that contribute to passing the state licensure examination?
4) Is there a subset of learner entry characteristics that correlate with successful passing of the state licensing examination?

This chapter describes the study population and the process of data collection and analysis. It is organized as follows: population description, design of the study, sources of data and collection methods, and analysis of data.

Population Description

The population for this study consisted of students who graduated from the licensed vocational nursing program at Kingwood College during a four-year period,

from the classes beginning January 1997 through January 2001. Students were accepted in January and August so nine classes of new students were included in the time period of this study. There were 240 program graduates. One student record contained incomplete information and was therefore eliminated from the study; thus, the resulting study size was reduced to 239.

Design of the Study

The questions to be considered in this study were addressed using a quantitative research approach. This retrospective study utilized archival data collected from academic records. The 18 independent predictor variables investigated included demographic learner entry characteristics (age at program admission, gender, ethnicity, method of high school completion, and location of high school attended), academic learner entry characteristics (pre-nursing grade point average, reading assessment score, writing assessment score, mathematics assessment score, completion of one human anatomy and physiology course, completion of one freshman English course, completion of one non-college level mathematics course, and completion of coursework in developmental reading and writing), and experiential learner entry characteristics (previous employment in the health care field, health care certifications obtained, and previous attempts in nursing programs). The single dependent variable was successfully passing the state licensure examination, the NCLEX-PN, on the first attempt.

Each variable, with the exception of age, was recorded as nominal data with a binary outcome, meaning that the collected numbers were placed into one of two

categories. The variable of age, which is interval data, was divided into six ranges (17-20, 21-24, 25-29, 30-34, 35-39, and 40+) to more accurately report frequencies.

Operational Description of the Independent Predictor Variables Investigated

Table 1 displays the coding and level of data for the variables included as demographic learner entry characteristics.

Age - Age at program admission was calculated from the date of birth recorded in the college records and the year at the time of program admission. Since age is interval data, six ranges (17-20, 21-24, 25-29, 30-34, 35-39, and 40+) were established to more accurately report frequencies.

Gender - Gender was reported as male (coded as 0) or female (coded as 1) in the college records.

TABLE 1

Coding and Levels of Data for Demographic Learner Entry Characteristics.

Characteristic	Code	Data Level
Age at Admission	17 – 53	Interval
Gender	0 = Male	
	1 = Female	Nominal
Ethnicity	1 = White	
	2 = Non-White	Nominal
Method of HS Completion	0 = GED	
	1 = HS	Nominal
Location of HS Attended	0 = Foreign HS	
	1 = U.S. HS	Nominal

Ethnicity – Data on ethnicity were collected from information files maintained by the nursing department for statistical reporting purposes. Students selected one of the

following categories: White, Black, Hispanic, American Indian, Asian, or Other. Since the numbers were so small in some of the categories, data were grouped as either white (coded as 1) or non-white (coded as 2) for the purpose of this study.

Method of high school completion – This information was obtained from the licensed vocational nursing program application form and college admission records. Students who graduated from high school were coded 1 and students who earned a GED diploma were coded 0. Applicants were required to hold either high school or GED diplomas to enter the licensed vocational nursing program.

Location of high school attended – This information was obtained from the licensed vocational nursing program application form and college admission records. Students who attended a high school within the United States were coded 1 and students who attended high school in another country were coded 0.

Table 2 displays the coding and level of data for the variables pre-nursing grade point average and subject area assessment scores included as academic learner entry characteristics.

Pre-nursing grade point average – The pre-nursing grade point average was the cumulative grade point average obtained from the college information system, which included coursework taken at other institutions averaged with courses taken at NHMCCD, at the close of the final semester prior to entering the nursing program. Students with a grade point average higher than 3.0 were coded 1 and students with a grade point average of 3.0 or below were coded 2.

There were three possible tests that students could submit as part of their program application package: Texas Academic Skills Program (TASP Test administered

by National Evaluation Systems, Inc.), Assessment of Skills for Successful Entry and Transfer (ASSET Test administered by ACT, Inc.), and Computer Adaptive Placement Assessment and Support System (COMPASS Test administered by ACT, Inc.).

TABLE 2

Coding and Levels of Data for Academic Learner Entry Characteristics of Pre-Nursing GPA and Subject Area Assessment Scores.

Characteristic	Code	Data Level
Pre-Nursing GPA	1 = higher than 3.0	
	2 = 3.0 and below	Nominal
Reading Assessment Score		
TASP	1 = Pass	
	2 = Fail	
	3 = Not Taken	Nominal
ASSET	1 = Pass	
	2 = Fail	
	3 = Not Taken	Nominal
COMPASS	1 = Pass	
	2 = Fail	
	3 = Not Taken	Nominal
Writing Assessment Score		
TASP	1 = Pass	
	2 = Fail	
	3 = Not Taken	Nominal
ASSET	1 = Pass	
	2 = Fail	
	3 = Not Taken	Nominal
COMPASS	1 = Pass	
	2 = Fail	
	3 = Not Taken	Nominal
Math Assessment Score		
TASP	1 = Pass	
	2 = Fail	
	3 = Not Taken	Nominal
ASSET	1 = Pass	
	2 = Fail	
	3 = Not Taken	Nominal
COMPASS	1 = Pass	
	2 = Fail	
	3 = Not Taken	Nominal

Students could submit a variety of test scores in order to meet admission criteria; resultingly, each test must be considered separately. Scores were collected from college records.

Reading assessment score – For each test, TASP, ASSET, and COMPASS, scores were coded 1 for pass, 2 for fail, and 3 for not taken (See Definition Section in Chapter I for passing criteria).

Writing assessment score – For each test, TASP, ASSET, and COMPASS, scores were coded 1 for pass, 2 for fail, and 3 for not taken (See Definition Section in Chapter I for passing criteria).

Mathematics assessment score – Scores from TASP, ASSET, and COMPASS tests were coded 1 for pass, 2 for fail, and 3 for not taken (See Definition Section in Chapter I for passing criteria).

Table 3 displays the coding and level of data for the variables of academic and developmental course completion included as academic learner entry characteristics.

Completion of one human anatomy and physiology class – Transcript records were examined to determine if Biology 2401 – Human Anatomy and Physiology or an equivalent course as defined by the Texas Common Course Numbering System (TCCNS) was completed. If the course was present in college transcript records with a passing grade (D or higher), it was coded 1 for yes. If there was no record of the course in transcripts or if the course was taken but failed, it was coded 0 for no.

Completion of one freshman English class – Completion of English 1301 – Composition and Rhetoric I, or a similar course as defined by the TCCNS, was evaluated through college transcript records. If the course was listed with a passing grade (D or higher)

in college transcript files, it was coded 1 for yes. If it was not found or if the course was taken but failed, it was coded 0 for no.

Completion of one non-college level mathematics class - Since there was no college level math course required as part of the licensed vocational nursing program, students were not required to demonstrate a college level math competency; therefore, any non-college level mathematics course was included in this field. A variety of developmental, remedial, and basic mathematics classes were analyzed in this category. If there was a non-college level mathematics class present in the transcript files with a passing grade of C or higher, it was coded 1; if there was not a course present or if the course was taken but failed, it was coded 0.

TABLE 3

Coding and Levels of Data for Academic Learner Entry Characteristics of Academic and Developmental Course Completion.

Characteristic	Code	Data Level
Completion of Academic Classes		
Anatomy and Physiology	0 = No	
	1 = Yes	Nominal
Freshmen English	0 = No	
	1 = Yes	Nominal
Non-College Level Math	0 = No	
	1 = Yes	Nominal
Completion of Developmental Classes		
Reading	0 = No	
	1 = Yes	Nominal
Writing	0 = No	
	1 = Yes	Nominal

Developmental classes are designed to improve basic skills in reading, writing, and mathematics. They do not carry college credit and are usually mandated by assessment test scores that are not at college level. They may serve as prerequisites for college level courses.

Completion of developmental reading class – Transcript records were investigated to determine if students in the study completed a developmental reading class with a passing grade (C or higher). If a developmental reading class was present in the student transcript file, it was coded 1. If no course was found or if the course was taken but failed, it was coded 0.

Completion of developmental writing class – Transcript records were evaluated to determine if a developmental writing course was listed. If a developmental writing course was completed with a passing grade (C or higher), it was coded 1 and if no developmental writing course was located or if the course was taken but failed it was coded 0.

Table 4 displays the coding and level of data for the variables included as experiential characteristics.

Previous employment in the health care field – This information was collected from the licensed vocational nursing program applications that were completed by the students for admission consideration. If the student had any type of employment in the health care field, it was coded 1. If the student answered no, the code was 0.

Health care certifications obtained – This information was also acquired from the licensed vocational nursing program application. If the student listed a health care certification, it was coded 1. If they did not list a certification, it was coded 0.

Previous attempts in a nursing program – Students were asked on the licensed vocational nursing program application if they had attempted any previous nursing school, including registered nursing or licensed vocational nursing programs. If the response was yes, the data was coded 1. If this was the first attempt in a nursing program, it was coded 0.

TABLE 4

Coding and Levels of Data for Experiential Learner Entry Characteristics.

Characteristic	Code	Data Level
Previous Employment – Healthcare	0 = No	
	1 = Yes	Nominal
Healthcare Certifications Obtained –	0 = No	
	1 = Yes	Nominal
Previous Attempts in Nursing Program	0 = No	
	1 = Yes	Nominal

Operational Description of the Dependent Variable Investigated

The NCLEX-PN is a comprehensive national licensing examination for vocational nursing graduates. The test was developed by The National Council of State Boards of Nursing, Inc. (NCSBN), and is designed to measure the competencies required to practice effectively as an entry-level licensed vocational nurse. The NCLEX-PN is a computerized adaptive test in which question formats are primarily four-option and multiple choice. Each candidate must answer a minimum of 85 questions while the maximum number of questions is 205 during the five-hour testing period (NCSBN, 2004). Results of the NCLEX-PN are reported in a pass/fail format.

For the purpose of this study, student scores on the licensure examination were obtained from the director of nursing at Kingwood College. The result of the first NCLEX-PN attempt was documented. If the score was passing, it was coded 1. If it was not passing, it was coded 0. Table 5 illustrates the coding and level of data for the dependent variable examined in this study, passing the state licensure examination, NCLEX-PN, on the first attempt.

TABLE 5

Coding and Level of Data for the Dependent Variable Investigated.

Variable Name	Code	Data Level
NCLEX-PN	1 = Pass 2 = Fail	Nominal

Sources of Data and Collection Methods

The source of data for the independent predictor variables were academic records from the population of licensed vocational nursing program graduates at Kingwood College, from the nine classes beginning January 1997 through January 2001. The source of state board examination results, which was the dependent variable, was original reports issued by the Texas Board of Vocational Nursing and maintained by the director of the licensed vocational nursing program at Kingwood College. Data were obtained from the institutional student information database and from academic files maintained by the vocational nursing department at Kingwood College. Confidentiality was maintained by assigning each graduate an alpha-numeric code and by deleting the name and social security number from the data sets prior to

analysis. A form was developed to record information from the student files (Appendix A). Student records were matched with licensure examination results. Data were organized into a spreadsheet.

Permission to access student records was granted by the president of Kingwood College (Appendix B).

Analysis of Data

The purpose of this study was to examine 18 discrete learner entry characteristics among the graduates of a selected vocational nursing program that predict success on the state licensure examination, the NCLEX-PN. Descriptive statistics were used to analyze data for each of the variables considered in this study. In quantitative research, descriptive statistics are used to study one variable at a time and to summarize the information presented (Rasmussen, 1992). Information from the data collection forms was organized and recorded on spreadsheets. Each variable, with the exception of age, was recorded on a nominal scale with a binary outcome, meaning that the collected numbers were placed into one of two categories. The variable of age, which is interval data, was divided into six ranges (17-20, 21-24, 25-29, 30-34, 35-39, and 40+) to more accurately report frequencies. Frequency tables were prepared to illustrate the data.

In order to answer the first three research questions, a chi square analysis was conducted to determine the significance or the degree of association between each variable and success on the state licensure examination, the NCLEX-PN. Chi square analysis was chosen as the statistical technique because it is a "non-parametric test of statistical significance that is used when the research data are in the form of frequency

counts for two or more categories" (Rasmussen, 1992, p. 755). Non-parametric indicates that there is no assumption about the distribution and form of scores on the variable being investigated (Rasmussen, 1992). Significance was established at the 0.05 level of confidence. A significant chi square value would indicate that the null hypothesis could not be supported, meaning that a statistically significant relationship was found to exist between the independent variable being examined and the dependent variable. In contrast, a non-significant value would suggest that there was no more of a relationship between the variables than what would be expected to occur by chance.

Finally, logistic regression analysis was conducted with the independent predictor variables that demonstrated significance through chi square analysis to answer the fourth research question. Regression is a statistical technique used to determine the relationship between a single dependent variable and one or more independent variables (Gaugh, 2000). Since this study contained more than one significant independent variable, multiple regression analysis was selected as the appropriate statistical technique. Specifically, logistic regression was the test of choice because the variables studied are nominal in nature and the possible outcomes are binary, or limited to two categories. Logistic regression is also valuable because it has predictive ability. Furthermore, it provides information regarding the strength of the relationship between the independent variables examined and the dependent variable. Finally, a model for more effectively counseling and advising prospective vocational nursing students was developed based on the results of the logistic regression analysis.

The data in this study were analyzed using the *Student Edition of Minitab for Windows 95 and Windows NT Release 12* and *the Statistical Package for Social Sciences for Windows (SPSS) version 11.0.*

CHAPTER IV

ANALYSES AND RESULTS

Introduction

The purpose of this study was to examine 18 discrete learner entry characteristics that predict success on the state licensure examination, the NCLEX-PN, among the graduates of a selected vocational nursing program. An analysis of predictive characteristics contributed to the development of a model that could be utilized to more effectively counsel and advise prospective vocational nursing students in community college settings. The independent predictor variables investigated include demographic learner entry characteristics of age at program admission, gender, ethnicity, method of high school completion, and location of high school attended; academic learner characteristics of pre-nursing grade point average, reading assessment score, writing assessment score, mathematics assessment score, completion of one human anatomy and physiology course, completion of one freshman English course, completion of one non-college level mathematics course, and completion of classes in developmental reading and writing; and the experiential learner entry characteristics of previous employment in the health care field, current health care certifications, and previous attempts in nursing programs.

The study population of 240 students graduated from the licensed vocational nursing program at Kingwood College during a four-year period, beginning January 1997 through January 2001 (nine discrete classes). One student record contained incomplete information and was therefore eliminated from the study; the resulting sample size was reduced to 239.

Archival data were analyzed to determine which of the independent variables investigated predicted student success. Data were collected from the institutional student information database and from academic files maintained by the nursing department. A form was developed to record information from the student records (Appendix A). Information from the data collection forms was organized and recorded into Excel spreadsheets.

This chapter is divided into two sections. Results from the descriptive analysis of the independent predictor variables and the dependent variable are discussed in the first section. The second section presents the inferential analysis including the chi square analysis necessary to answer research questions one, two, and three, as well as the logistic regression analysis used to answer research question four.

Descriptive Analysis

Demographic Learner Entry Characteristics

The demographic learner entry characteristics are defined as the specific attributes of learner's age at the time of program admission, gender, ethnicity, method of high school completion, and location of high school attended. Table 6 presents the distribution of demographic learner entry characteristics for the population used in this study in frequencies and percentages.

The population (n=239) can be described as 95% (227) female and 5% (12) male. Ethnicity for the group was 60% (144) white and 40% (95) non-white. While 79% (188) held a high school diploma, 21% (51) had earned a GED diploma. The majority of the population, 89% (213), attended a high school in the United States while 11% (26) attended a foreign high school. It should be stated that attendance of

a high school in the United States or a foreign country does not imply actual graduation from that high school. Some students who attended a high school in the United States did not actually graduate from it, but received a GED diploma instead. Likewise, it was necessary for many international students who had attended schools in foreign countries to demonstrate their academic competence by earning their GED diplomas before they could attend college in the United States.

TABLE 6

Distribution of Total Sample by Demographic Learner Entry Characteristics (n=239).

Characteristic	Frequency	Percent
Gender		
Male	12	5
Female	227	95
Ethnicity		
White	144	60
Non-white	95	40
Diploma		
HS Completion	188	79
GED	51	21
HS Location		
United States	213	89
Foreign	26	11
Age at Admission		
17 – 20	12	5
21 – 24	62	26
25 – 29	69	29
30 – 34	43	18
35 – 39	29	12
40+	24	10

This information was all recorded as nominal data, meaning that it was placed into binary categories. The interval data of age at the time of program admission were

broken into six age ranges to more accurately describe the frequency: 5% (12) were 17-20 years; 26% (62) were 21-24 years; 29% (69) were 25-29 years; 18% (43) were 30-34 years; 12% (29) were 35-39 years; and 10% (24) were 40+ years. The actual age range of the study population was 17 to 53 years while the average age was 29 years.

Academic Learner Entry Characteristics

The academic learner entry characteristics were defined as the specific attributes of pre-nursing grade point average, reading assessment score, writing assessment score, math assessment score, completion of human anatomy and physiology class, completion of freshman English class, completion of a non-college level mathematics class, and completion of developmental reading and writing courses.

Of the study population, 28% (59) had a pre-nursing grade point average of above a 3.0 while 72% (150) had a pre-nursing grade point average that fell at 3.0 or below. It should be noted that 30 students did not have a pre-nursing grade point average to consider in this study because they were new college students with no completed college coursework prior to admission into the licensed vocational nursing program. These 30 students were not included in the logistic regression analysis as they had no pre-nursing grade point average to consider. Table 7 presents the distribution of pre-nursing grade point average for the population used in this study in frequencies and percentages.

The licensed vocational nursing department at Kingwood College had historically predicted likely success in a college level program based on demonstrating competency in reading, writing, and mathematics. Each competency could be met by any

combination of submission of passing scores on subject area assessment tests, completion of developmental coursework in reading, writing, and/or mathematics based on subject area assessment test scores, or the completion of selected college level courses. All of these diverse means of attaining the required competencies in reading, writing, and mathematics were analyzed in the section that follows.

TABLE 7

Distribution of Pre-Nursing Grade Point Average for the Study Population (n=209).

Characteristic	Frequency	Percent
Pre-Nursing GPA		
Above 3.0	59	28
3.0 or Below	150	72

Regarding the predictor variables of subject area assessment scores, there were three possible tests that students could submit for consideration: TASP, ASSET, and the COMPASS Test (See Definitions Section in Chapter I). Any combination of scores that demonstrated competency met the criteria for admission.

The results of the reading assessment scores are shown in Table 8. Of the 134 students that completed the TASP Test, 86% (115) passed the reading section of the test and 14% (19) did not. Additionally, 93 students completed the ASSET Test. Of that group, 73% (68) passed the reading section while 27% (25) did not. Finally, 23 students completed the COMPASS Test. Of those, 70% (16) passed the reading section and 30% (7) did not.

TABLE 8

Distribution of Reading Assessment Scores for the Study Population.

Characteristic	Frequency	Percent
Reading Assessment Score		
TASP (n=134)		
Passed	115	86
Failed	19	14
ASSET (n=93)		
Passed	68	73
Failed	25	27
COMPASS (n=23)		
Passed	16	70
Failed	7	30

Table 9 presents the distribution of writing assessment scores for the population used in this study in frequencies and percentages. In the area of writing assessment scores, 132 students completed the TASP Test. Of those students, 93% (123) passed the writing section of the test while 7% (9) did not. Moreover, 96 students completed the ASSET Test. Of that group, 43% (41) passed the writing section of the test and 57% (55) did not. Lastly, 24 students completed the COMPASS Test. Of those, 46% (11) passed the test and 54% (13) did not.

TABLE 9

Distribution of Writing Assessment Scores for the Study Population.

Characteristic	Frequency	Percent
Writing Assessment		
TASP (n=132)		
Passed	123	93
Failed	9	7

TABLE 9 (*Continued*)

Characteristic	Frequency	Percent
ASSET (n=96)		
Passed	41	43
Failed	55	57
COMPASS (n=24)		
Passed	11	46
Failed	13	54

The distribution of mathematics assessment scores for the population used in this study is displayed in Table 10. In the area of mathematics assessment scores, 138 students completed the TASP Test. Of the students in this group, 72% (100) passed the test and 28% (38) failed. A group of 31 students completed the ASSET Test and of that group, 35% (11) passed and 65% (20) failed the test. Finally, 31 students completed the COMPASS Test. Of those, 26% (8) passed the test and 74% (23) failed the test.

TABLE 10

Distribution of Mathematics Assessment Scores for the Study Population.

Characteristic	Frequency	Percent
Math Assessment Score		
TASP (n=138)		
Passed	100	72
Failed	38	28
ASSET (n=31)		
Passed	11	35
Failed	20	65
COMPASS (n=31)		
Passed	8	26
Failed	23	74

Given that students who failed a subject area assessment test could opt to complete developmental coursework in lieu of a passing test score, it was necessary to also consider the effect of completing developmental coursework in the areas of reading and writing on the dependent variable, passing NCLEX-PN. The results of this investigation are displayed in Table 11. Results indicate that 26% (63) of the students completed coursework in developmental reading while 74% (176) did not. In addition, 36% (86) of students completed coursework in developmental writing while 64% (153) did not. Since passing was defined as a C or higher, it should be noted that the category of "not taken" may also include students who took but did not pass the class.

TABLE 11

Distribution of Completed Developmental Coursework for the Study Population (n=239).

Characteristic	Frequency	Percent
Developmental Reading Class		
Completed Class	63	26
Not Taken	176	74
Developmental Writing Class		
Completed Class	86	36
Not Taken	153	64

Table 12 illustrates the distribution of completed academic classes within the population. In examining the predictor variable of the completion of a human anatomy and physiology class, it was found that 57% (136) of the population had completed a course with a grade of D or better and 43% (103) had not. In regard to the completion

of a freshman English class, 66% (158) of the group had completed a class with a grade of D or better while 34% (81) had not. Since passing was defined as a D or higher, it should be noted that the category of "not taken" may also include students who took but did not pass the class. Of the population, 74% (176) of the students completed a non-college level mathematics class with a grade of C or higher while 26% (63) of the group did not. Since passing was defined as a C or higher, it should be noted that the category of "not taken" may also include students who took but did not pass the class.

TABLE 12

Distribution of Completed Academic Coursework for the Study Population (n=239).

Characteristic	Frequency	Percent
Anatomy and Physiology Class		
Completed Class	136	57
Did Not Complete Class	103	43
Freshman English Class		
Completed Class	158	66
Did Not Complete Class	81	34
Non-college Level Mathematics Class		
Completed Class	176	74
Did Not Complete Class	63	26

Experiential Learner Entry Characteristics

The experiential learner entry characteristics are defined as the specific attributes of previous employment in a health care setting, maintaining current health care certifications, and previous attempt in a nursing program. Table 13 presents the

distribution of experiential learner entry characteristics for the population used in this study in frequencies and percentages.

Of the study population, 58% (139) were found to have been previously employed in a health care setting while 42% (100) had not. Results indicated that 49% (117) of the students did maintain a current health care certification of some nature whereas 51% (122) did not. Finally, it was noted that 17% (40) of the students had been enrolled in a nursing program prior to their enrollment in the program that led to their graduation while this was the only enrollment for 83% (199) of the population.

TABLE 13

Distribution of Total Sample by Experiential Learner Entry Characteristics (n=239).

Characteristic	Frequency	Percent
Previous Employment – Health Care		
Yes	139	58
No	100	42
Current Health Care Certifications		
Yes	117	49
No	122	51
Previous Attempts in Nursing Programs		
Yes	40	17
No	199	83

Dependent Variable

The dependent variable in this study was passing the state licensure examination or NCLEX-PN on the first attempt. Table 14 illustrates the distribution of the population. Of the 239 program graduates, 80% (191) successfully passed the

state licensure examination, NCLEX-PN, on the first attempt while 20% (48) did not pass the test on the first attempt.

TABLE 14

Distribution of Total Sample by State Licensure Examination (NCLEX-PN) Results (n=239).

NCLEX-PN Results	Frequency	Percent
Passed on First Attempt	191	80
Did Not Pass on First Attempt	48	20

Inferential Analysis

In order to answer the first three research questions, a chi square analysis was performed to determine the significance or the degree of association between each independent variable and the dependent variable of success on the state licensure examination, the NCLEX-PN. Chi square analysis was chosen as the statistical technique because there is no assumption about the distribution and form of scores on the variable being investigated and it can be used when the research data are in the form of frequency counts for two or more categories. Significance was established at the 0.05 level of confidence. A significant chi square value would indicate that the null hypothesis could not be supported, meaning that a statistically significant relationship was found to exist between the independent variable being examined and the dependent variable. In contrast, a non-significant value would suggest that there was no more of a relationship between the variables than what would be expected to occur by chance. Table 15 displays the distribution of demographic learner entry characteristics and NCLEX-PN results. Table 16 presents the distribution of academic

learner entry characteristics of pre-nursing grade point average and subject area assessments with NCLEX-PN results. Table 17 shows the distribution of academic learner entry characteristics of completed academic and developmental coursework with NCLEX-PN results. Table 18 presents the distribution of experiential learner entry characteristics and NCLEX-PN results. Table 19 displays the distribution of the single dependent variable, passing NCLEX-PN on the first attempt. Formatting of these data into Tables 15-19 was necessary in order to set up the chi square analyses.

Logistic regression analysis was conducted with the independent predictor variables that demonstrated significance through chi square analysis to answer the fourth research question. Logistic regression was selected for this study because the variables investigated were recorded on a nominal scale and the possible outcomes are binary. Logistic regression is also valuable in that is has predictive ability as well as provides information regarding the strength of the relationship between the independent variables examined and the dependent variable.

TABLE 15

Distribution of Demographic Learner Entry Characteristics and NCLEX-PN Results (n=239).

Characteristic	N	NCLEX-PN Pass Frequency / Percentage		NCLEX-PN Not Pass Frequency / Percentage	
Age Range					
17 – 20	12	11	92	1	8
21 – 24	62	51	82	11	18
25 – 29	69	48	70	21	30
30 – 34	43	36	84	7	16
35 – 39	29	27	93	2	17
40+	24	18	75	6	25

TABLE 15 *(Continued)*

Characteristic	N	NCLEX-PN Pass Frequency /	Percentage	NCLEX-PN Not Pass Frequency /	Percentage
Gender					
Male	12	9	75	3	25
Female	227	182	80	45	20
Ethnicity					
White	144	127	88	17	12
Non-white	95	64	67	31	33
Diploma					
HS	188	145	77	43	23
GED	51	46	90	5	10
High School Location					
US	213	173	81	40	19
Foreign	26	18	69	8	31

TABLE 16

Distribution of Academic Learner Entry Characteristics of Pre-Nursing Grade Point Average and Subject Area Assessments and NCLEX-PN Results (n=239).

Characteristic	N	NCLEX-PN Pass Frequency /	Percentage	NCLEX-PN Not Pass Frequency /	Percentage
Pre-Nursing GPA					
Above 3.0	59	54	92	5	9
3.0 and Below	150	113	75	37	25
No GPA	30	24	80	6	20
Reading Assessment Score					
TASP					
Passed	115	100	87	15	13
Failed	19	10	53	9	47
ASSET					
Passed	68	58	85	10	15
Failed	25	22	88	3	12
COMPASS					
Passed	16	13	81	3	19
Failed	7	3	43	4	57
Writing Assessment Score					
TASP					
Passed	123	104	85	19	15
Failed	9	4	44	5	57

TABLE 16 *(Continued)*

Characteristic	N	NCLEX-PN Pass Frequency / Percentage		NCLEX-PN Not Pass Frequency / Percentage	
ASSET					
Passed	41	37	90	4	10
Failed	55	45	82	10	18
COMPASS					
Passed	11	9	82	2	18
Failed	13	9	69	4	31
Math Assessment Score					
TASP					
Passed	100	87	87	13	14
Failed	38	28	74	10	26
ASSET					
Passed	11	10	91	1	9
Failed	20	19	95	1	5
COMPASS					
Passed	8	8	100	0	0
Failed	23	16	70	7	30

TABLE 17

Distribution of Academic Learner Entry Characteristics of Completed Academic and Developmental Coursework and NCLEX-PN Results (n=239).

Characteristic	N	NCLEX-PN Pass Frequency / Percentage		NCLEX-PN Not Pass Frequency / Percentage	
Completion of:					
Anatomy and Physiology					
Completed Class	136	110	81	26	19
Not Taken	103	81	79	22	21
Freshman English					
Completed Class	158	128	81	30	19
Not Taken	81	63	78	18	22
Non-College Level Math					
Completed Class	176	140	80	36	21
Not Taken	63	51	81	12	19
Developmental Reading					
Completed Class	63	45	71	18	29
Not Taken	176	146	83	30	17

TABLE 17 *(Continued)*

Characteristic	N	NCLEX-PN Pass Frequency	/ Percentage	NCLEX-PN Not Pass Frequency	/ Percentage
Developmental Writing					
Completed Class	86	60	70	26	30
Not Taken	153	131	86	22	14

TABLE 18

Distribution of Experiential Learner Entry Characteristics and NCLEX-PN Results (n=239).

Characteristic	N	NCLEX-PN Pass Frequency	/ Percentage	NCLEX-PN Not Pass Frequency	/ Percentage
Previous Employment in Health Care Setting					
Yes	139	112	81	27	19
No	100	79	79	21	21
Current Health Care Certifications					
Yes	117	93	80	24	21
No	122	98	80	24	20
Previous Attempts in Nursing Programs					
Yes	40	31	78	9	23
No	199	160	80	39	20

TABLE 19

Distribution of Total Sample by State Licensure Examination (NCLEX-PN) Results (n=239).

NCLEX-PN Results	N	NCLEX-PN Pass Frequency	/ Percentage	NCLEX-PN Not Pass Frequency	/ Percentage
First Attempt	239	191	80	48	20

Research Questions

Research Question 1: What are the learner entry demographic characteristics that contribute to passing the state licensure examination?

Individual chi square analyses were conducted to determine if there was an association between each of the independent predictor variables of age at program admission, gender, ethnicity, method of high school completion, and location of high school attended and the single dependent variable of successfully passing the state licensure examination, NCLEX-PN, on the first attempt. The chi square analysis did not show any statistical significance with the variables of age, gender, or location of high school attended. There was, however, a statistically significant association between the independent variables of ethnicity and method of high school completion and the dependent variable. Table 20 displays these findings.

The learner entry demographic characteristic of ethnicity yielded a chi square of 15.468 and a probability value of less than .01. Whites had a success rate of 88.19% while non-whites had a success rate of 67.37%. There is therefore a significant statistical association between the variable of white and successfully passing the state licensure examination, NCLEX-PN, on the first attempt.

TABLE 20

Summary of Statistically Significant Demographic Learner Entry Characteristics.

Characteristic	**χ^2 (degrees of freedom, n)**		**p value**
Ethnicity	χ^2 (1, n=239)	15.468	less than .01
Method of HS Completion	χ^2 (1, n=239)	4.269	0.039

The learner entry demographic characteristic of method of high school completion produced a chi square of 4.269 and a probability value of 0.039. Students who received a high school diploma had a success rate of 77.13% while students who earned their GED diplomas had a success rate of 90.20%. There is a significant statistical association between GED completion and successfully passing the state licensure examination, NCLEX-PN, on the first attempt. Analyzing whether this finding might actually be associated with age since many GED recipients earned their diplomas at an older age than traditional high school graduates, a separate chi square analysis was conducted using the variables of age and GED attainment. There was no statistical significance shown using the chi square analysis and these variables were determined to be independent of each other; therefore, the finding of statistical significance between GED completion and passing the state licensure examination, NCLEX-PN, on the first attempt is suggested.

Research Question 2: What are the learner entry academic characteristics that contribute to passing the state licensure examination?

A chi square analysis was conducted to determine if there was an association between the independent predictor variables of pre-nursing grade point average, reading assessment score, writing assessment score, mathematics assessment score, completion of one human anatomy and physiology class, completion of one freshman English class, completion of one non-college level mathematics class and the single dependent variable of successfully passing the state licensure examination, NCLEX-PN, on the first attempt. Chi square analysis was also conducted on the added independent predictor variables of completion of developmental reading coursework and completion

of developmental writing coursework and the single dependent variable of successfully passing the state licensure examination, NCLEX-PN, on the first attempt. Table 21 shows these results.

The chi square analysis did not reveal any statistical significance with the variables of writing assessment score, mathematics assessment score, completion of one human anatomy and physiology class, completion of one freshman English class, or completion of one non-college level mathematics class. There was, however, an association found to be statistically significant between the independent variables of pre-nursing grade point average, reading assessment score, completion of developmental reading coursework, completion of developmental writing coursework and the dependent variable. The learner entry academic characteristic of pre-nursing grade point average yielded a chi square of 6.914 and a probability value of 0.009. Students having a pre-nursing grade point average of 3.0 and higher had a success rate of 91.53% while students with a pre-nursing grade point average of less than 3.0 had a success rate of 75.33%.

TABLE 21

Summary of Statistically Significant Academic Learner Entry Characteristics.

Characteristic	**χ^2 (degrees of freedom, n)**		**p value**
Pre-Nursing GPA	χ^2 (1, n=209)	6.914	0.009
Reading Assessment Score – TASP Test	χ^2 (2, n=134)	13.067	less than .01
Not Taking Developmental Reading	χ^2 (1, n=239)	3.840	0.05
Not Taking Developmental Writing	χ^2 (1, n=239)	8.621	0.003

There is a significant statistical association between the variable of pre-nursing grade point average of higher than 3.0 and successfully passing the state licensure examination, NCLEX-PN, on the first attempt.

The learner entry academic characteristic of reading assessment score on the TASP Test produced a chi square of 13.067 and a probability value of less than .01. Students who passed the reading portion of the TASP Test had a success rate of 86.96% while students who did not pass the reading portion of the TASP Test had a success rate of 52.63%. There is a significant statistical association between the variable of reading assessment score on the TASP Test and successfully passing the state licensure examination, NCLEX-PN, on the first attempt.

The learner entry academic characteristic of completion of developmental reading coursework yielded a chi square of 3.840 and a probability value of 0.05. Students who did not take developmental reading coursework had a success rate of 83% while students who did take developmental reading coursework had a success rate of 71.4%. There is a significant statistical association between the variable of completion of developmental reading coursework and successfully passing the state licensure examination, NCLEX-PN, on the first attempt. This was also true for the completion of developmental writing coursework, which yielded a chi square of 8.621 and a probability value of 0.003. Students who did not take developmental writing coursework had a success rate of 85.6% while students who did take developmental writing coursework had a success rate of 69.8%. There is a significant statistical association between the variable of completion of developmental writing coursework

and successfully passing the state licensure examination, NCLEX-PN, on the first attempt.

Research Question 3: What are the learner entry experiential characteristics that contribute to passing the state licensure examination?

A chi square analysis was conducted to determine if there was an association between the independent predictor variables of previous employment in the health care field, maintaining current health care certifications, previous attempts in nursing programs and the single dependent variable of successfully passing the state licensure examination, NCLEX-PN, on the first attempt. The chi square analysis did not disclose any statistical significance with these variables.

Research Question 4: Is there a subset of learner entry characteristics that correlate with passing the state licensure examination?

Inferential statistical analysis suggested that yes, there is a subset of learner entry characteristics that correlate with passing the NCLEX-PN on the first attempt. The chi square analysis indicated that there were two demographic learner entry characteristics (ethnicity and method of high school completion) and four academic learner entry characteristics (pre-nursing grade point average, reading assessment scores on the TASP Test, completion of developmental reading coursework, and completion of developmental writing coursework) that were statistically significant with successfully passing the state licensure examination, NCLEX-PN, on the first attempt. Since these independent variables suggested significance in the chi square analysis, they were selected for inclusion in logistic regression. Table 22 illustrates the coding utilized in the logistic regression analysis.

TABLE 22

Coding Used in Logistic Regression Analysis (n=209).

Variables	Coding
Dependent Variables	
Ethnicity	1 = white 0 = other
HS Completion	1 = HS 0 = GED
Pre-Nursing	1 = 3 above 3.0 0 = 3.0 or below
Reading Assessment – TASP	1 = failed 2 = not taken 0 = pass
Completion of Developmental Reading	1 = yes 0 = no
Completion of Developmental Writing	1 = yes 0 = no
Independent Variable	
NCLEX-PN Results	1 = Passed on first attempt 0 = Did not pass on first attempt

Logistic regression analysis was conducted with the independent predictor variables that demonstrated significance through chi square analysis to answer the fourth research question. Regression is a statistical technique used to determine the relationship between a single dependent variable and one or more independent variables (Gaugh, 2000). Since this study contained more than one independent variable, multiple regression analysis was selected as the appropriate statistical technique. Logistic regression was chosen because the response variables studied are nominal in nature and the possible outcomes are binary. Binary logistic regression suggested that four of the original six independent variables were predictive of success

in passing the state licensure examination, NCLEX-PN. These findings are displayed in Table 23.

TABLE 23

Final Logistic Regression Model (n=209).

Characteristic	B	χ^2	Sig	Exp (B)
Ethnicity	1.139	8.397	.004	3.125
HS Completion	-1.300	4.638	.031	.272
Pre-Nursing GPA	1.093	4.141	.042	2.983
TASP – Reading – Fail	-1.755	8.599	.003	.173
TASP – Reading – NT	-.833	4.090	.043	.435
Constant	2.241	12.335	.000	9.402

Note:
Variable entered on Step 1: Ethnicity
Variable entered on Step 2: TASP – Reading – Failed
Variable entered on Step 3: Method of High School Completion
Variable entered on Step 4: Pre-Nursing GPA
Variable entered on Step 5: TASP – Reading – Not Taken

The logistic regression analysis did suggest a subset of discrete learner entry variables that associate with passing the NCLEX-PN on the first attempt. These characteristics included the demographic learner entry characteristics of ethnicity and method of high school completion and the academic learner entry variables of pre-nursing grade point average and reading assessment score on the TASP Test as displayed in Table 24.

Table 24 shows that the percentage of graduates passing the NCLEX-PN on the first attempt was 79.9% without considering any of the predictor variables. After the logistic regression analysis identified the least number of variables having the most predictive power, the percentage increased to 81.8%. This was a gain in predictability of about 2%.

TABLE 24

Logistic Regression Classification Table.

Observed	Predicted		Percentage Correct
	Fail	Pass	
Initial Model			
NCLEX			
0	0	42	.0
1	0	167	100.0
Overall Percentage			79.9
Final Model Including			
Ethnicity			
HS Completion			
Pre-Nursing GPA			
TASP – Reading – Fail			
TASP – Reading – Not Taken			
0	6	36	14.3
1	2	165	98.8
Overall Percentage			81.8

The final forward stepwise regression model is shown in Table 25. The forward stepwise procedure added a new variable into the analysis at each step. At the end of the fifth step, the measure of reliability of the model was 23.4%. This means that the model explains almost 25% of the variance, or what is happening within the study population.

TABLE 25

Forward Stepwise Regression Model.

Step	χ^2
1. Ethnicity	.098
2. +TASP – Reading – Fail	.141
3. +HS Completion	.179
4. +Pre-Nursing GPA	.207
5. +TASP – Reading – Not Taken	.234

Summary

Descriptive and inferential statistics were utilized to describe the study population and analyze the data. The population was 239 licensed vocational nursing graduates from nine classes beginning January 1997 through January 2001, at Kingwood College. Chi square analysis suggested that there was a statistically significant relationship between six of the independent variables (ethnicity, method of high school completion, pre-nursing grade point average, reading assessment score on the TASP Test, completion of developmental coursework in reading, and completion developmental coursework in writing) and the dependent variable of successfully passing the state licensure examination, NCLEX-PN, on the first attempt. Additional analysis through logistic regression suggested a subset of ethnicity, method of high school completion, pre-nursing grade point average, and reading assessment score on the TASP Test were the best predictive measures of passing the state licensure examination, NCLEX-PN, on the first attempt.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

In an effort to address a global nursing shortage that is predicted to reach crisis proportions within the next 10 years, nursing schools across the nation are feeling the pressure to produce more graduates who successfully obtain professional licensure ("Strategies to Reverse the 'New' Nursing Shortage", 2001). The need to produce more graduates comes at a time when there is a decline in the number of enrolled students and graduates of vocational nursing programs as well as a decrease in the number of United States educated graduates taking the licensure examination (Seago, et al., 2004). In light of the current nursing shortage, effective academic counseling is crucial as a means for recruiting students into pre-nursing classes, preparing them for the admissions process, and retaining them through their nursing education programs.

Vocational nursing programs are usually one-year certificate programs offered through community colleges or technical schools. As Lamm and McDaniel (2000) have noted, students entering community college vocational nursing programs are often fundamentally different from students enrolling in university programs, especially with regard to academic preparation, socioeconomic status, and other characteristics such as age, ethnicity and family status. Many of them are also "first generation" college students. Since vocational nursing programs require few, if any, academic prerequisites for entry, these students also tend to be less academically experienced than their counterparts in two or four year degree programs. Compared to traditional college students, they are more likely to be older, to have families, and to maintain

employment while attending school (Cohen & Brawer, 1989). These distinctive entry characteristics of vocational nursing students may reveal differences in student characteristics that predict success on the state licensure examination, NCLEX-PN, thus having special implications for their counseling and advising needs.

During the last 20 years, there has been great interest in researching the predictors of retention, graduation, and state board examination success within nursing programs but this research emphasizes baccalaureate and associate degree professional nursing programs. In comparison, there is very little research available regarding the success of students in vocational nursing programs. Although existing research based on professional nursing programs provides insight into the problem, the predictors of success identified in studies of professional nursing students may not be directly applicable to vocational nursing students. Several researchers (Alexander & Brophy, 1997; Foti & DeYoung, 1991; Fowles, 1992; Lewis & Lewis, 2000) have indicated that predictors for success seem to vary among institutions and urged individual nursing programs to identify their own predictors for success, as well as possible characteristics of students at risk for not succeeding. These recommendations support the need for more contemporary research in the area of demographic, academic, and experiential learner entry characteristic variables predictive of success on the NCLEX-PN for vocational nursing students in a community college setting. This information could then contribute to the development of a predictive model to be utilized for academic counseling with incoming students.

The purpose of this study was to examine 18 discrete learner entry characteristics among the graduates of a selected vocational nursing program that

predict success on the state licensure examination, the NCLEX-PN. The population for this study consisted of students who graduated from the licensed vocational nursing program at Kingwood College during a four-year period, from the nine classes beginning January 1997 through January 2001. There were 240 program graduates but one student record contained incomplete information and was therefore eliminated from the study; consequently, the study population was reduced to 239 graduates. This was a retrospective study that utilized archival data collected from academic records.

Conclusions

The following conclusions were reached within the limitations of this study:

Research Question 1

The first research question asks: What are the learner entry demographic characteristics that contribute to passing the state licensure examination? The independent variables of age at program admission, gender, ethnicity, method of high school completion, and location of high school attended were investigated to determine if there was a relationship between each of them and the single dependent variable of passing the state licensure examination, NCLX-PN, on the first attempt. A chi square analysis did not reveal any statistical significance with the variables of age, gender, or location of high school attended but there was found to be a statistically significant relationship between the independent variables of ethnicity and method of high school completion and the dependent variable of passing NCLEX-PN on the first attempt.

Conclusion 1

Based on the findings of this study, ethnicity does impact performance on the state licensure examination in that white students were more likely to pass NCLEX-PN on the first attempt than were non-white students. The learner entry demographic characteristic of ethnicity yielded a chi square of 15.468 and a probability value of less than .01. White students had a success rate of 88.19% on the NCLEX-PN while non-white students had a success rate of 67.37%. This finding supports previous research findings that Caucasian students were more likely to pass NCLEX-PN on the first attempt than were minority students (Lamm & McDaniel, 2000; Swift, 1989; Thompson, 1989; Dickey, 1989; Parrish, 1994; Hawsey, 1997).

Diversity among students is valued in a vocational nursing program as it is in a community health care setting where caregivers are sought to reflect the diversity of their patients. Academic counselors should continue to recruit students from a variety of ethnic backgrounds into their vocational nursing programs but should also understand that many of these students may have special needs and additional requirements for counseling. Briscoe and Anema (1999) noted that students of African descent were less likely to pass NCLEX-RN and indicated that international students may have problems with language, culture, and loss of social supports. Endres (1997) found that while ethnicity was unrelated to NCLEX-RN scores, African-American and foreign-born students often needed additional semesters to complete the nursing program. In a study of African-American nursing students at a historically black university, Frierson, Malone, and Shelton (1993) found that instruction in test-taking skills, participation in learning teams, and activities conducted by the faculty to

reinforce the first two strategies improved the NCLEX-RN pass rates. Oliver (1985) found that a disproportionate number of black students failed to complete their associate degree nursing program as compared to white students. While research may indicate that ethnicity is a predictor of NCLEX success, Boyle (1986) suggests that indicators of success may be different for minority students. More research is needed in this area to identify possible indicators and develop strategies for success for minority students.

The research literature indicates that efforts to improve NCLEX-PN success in vocational nursing programs may be more beneficial when directed at students already in the program rather than those in the pre-application process. An academic counselor working in the vocational nursing department, as described previously in the counseling liaison model advocated by Kadar (2001), could work with prospective students to strengthen their academic skills, thus improving their pre-nursing grade point average and increasing their standardized test scores as well students already in the program who may also need help with study skills, test-taking skills, and other academic issues.

Sherrod and Harrison (1994) implemented and evaluated a comprehensive advising system designed to recruit and retain disadvantaged students. Their findings suggest that a professional counselor should play a stronger role in college nursing departments. Jeffreys (1998) found that at-risk students were more likely to overestimate their academic support and underestimate their need for preparation. Smith (1990) suggests that a strong pre-nursing advisement program can aid in student retention as students are often not prepared for the demands of a nursing program. A counselor using the counselor liaison model to work closely with vocational nursing

faculty and students could help to address some of these issues. Kadar (2001) suggests that counselors working in academic divisions can be effective and proactive forces within their departments and program areas.

Conclusion 2

Based on the findings of this study, method of high school completion, specifically earning a GED diploma, does impact performance on the state licensure examination as GED recipients were more likely to pass NCLEX-PN on the first attempt than were high school graduates. The learner entry demographic characteristic of method of high school completion, high school diploma or GED diploma, produced a chi square of 4.269 and a probability value of 0.039. Students who received a high school diploma had a success rate of 77.13% while students who earned their GED diplomas had a success rate of 90.20%. There is a significant statistical association between GED completion and successfully passing the state licensure examination, NCLEX-PN, on the first attempt. This finding is in contrast to research conducted by Lamm and McDaniel (2000), Thompson (1989), Parrish (1994), and Ostrye (2000), who found no significant relationship between the method of high school completion and success on the NCLEX-PN. Swift (1989) studied 1,254 vocational nursing students in Georgia between 1983 and 1986 and found that GED recipients generally performed as well as high school graduates in practical nursing programs.

This was a surprising finding in light of the existing research regarding vocational nursing program graduates and GED completion. The GED Test series has a 60-year history and is in its fourth edition. It is a rigorous assessment that is developed to reflect standards developed at the national level in the subject areas of reading,

writing, mathematics, science, and social studies. It is estimated that 34 million adults have not completed high school or earned a GED diploma (American Council of Education, 2004). The most recent edition of the GED Test was introduced in January 2002. Data from this study were collected prior to the introduction of the latest version of the test.

Perhaps the findings of this study suggest that students completing their GED are more mature and have more responsibility, such as families and jobs, to consider. It is also possible that they may have developed clearer goals by the time they completed their GED as compared to high school graduates. Additionally, the process to prepare for the GED examination may be similar to that of a more traditional school setting so it is possible that students with a GED diploma had a more recent preparatory experience with study skills and test-taking skills than the students who completed high school. This study did not consider the date of GED or high school completion in relation to beginning the vocational nursing program. That may be a question for future research efforts. In any case, academic counselors should encourage qualified GED recipients to apply for the vocational nursing program and actively recruit promising students from GED preparation classes on campus and in the community. Furthermore, students should be encouraged by the past successes of previous GED recipients in the vocational nursing program.

Research Question 2

The second research question asks: What are the learner entry characteristics that contribute to passing the state licensure examination? The independent variables of pre-nursing grade point average, reading assessment score, writing assessment

score, mathematics assessment score, completion of one human anatomy and physiology class, completion of one freshman English class, completion of one non-college level mathematics class, and completion of developmental reading and writing coursework were examined to determine if there was a relationship between each of them and the single dependent variable of passing the state licensure examination, NCLX-PN, on the first attempt. A chi square analysis did not disclose any statistical significance with the variables of writing assessment score, mathematics assessment score, completion of one human anatomy and physiology class, completion of one freshman English class, or completion of one non-college level mathematics class. However, there was found to be a statistically significant relationship between the independent variables of pre-nursing grade point average, reading assessment score on the TASP Test, completion of developmental reading coursework, and completion of developmental writing coursework and the dependent variable of passing NCLEX-PN on the first attempt.

Conclusion 3

Based on the findings of this study, pre-nursing grade point average does impact performance on the state licensure examination as students with a grade point average of higher than 3.0 were more likely to pass NCLEX-PN on the first attempt than were students with a grade point average of 3.0 or less. The learner entry academic characteristic of pre-nursing grade point average yielded a chi square of 6.914 and a probability value of 0.009. Students having a pre-nursing grade point average of higher than 3.0 had a success rate of 91.53% while students with a pre-nursing grade point average of 3.0 or below had a success rate of 75.33%. There is a significant statistical

relationship between the variable of pre-nursing grade point average of higher than 3.0 and successfully passing the state licensure examination, NCLEX-PN, on the first attempt. This conclusion supports the significance of grade point average found by Lamm and McDaniel (2000), Hawsey (1997), and Ostrye (2000).

The most consistent significant correlation to NCLEX-RN success for graduates of registered nursing programs reported in the literature appears to be pre-nursing grade point average (Allen, et al., 1985; Byrd, et al., 1999; Glick, et al., 1986; Heupel, 1994; McClelland, et al., 1992; McKinney, et al., 1988; Payne & Duffey, 1986; Yang, et al., 1987; Yocum & Scherubel, 1985). It would seem that previous academic success continues to be the best indicator of future success.

In addition to the information obtained for the purpose of this study, nursing program grade point average and cumulative NHMCCD grade point averages were also collected. They were not included as variables in this study because the purpose of this study was to examine pre-admission variables. Not surprisingly, however, a chi square analysis revealed that both nursing program grade point average, which included only the courses required to earn the vocational nursing certificate, and cumulative NHMCCD grade point average at the conclusion of the vocational nursing program, which included all courses completed within the college district but not transfer grade point averages, displayed a statistically significant relationship with passing the state licensure examination, NCLEX-PN, on the first attempt. A vocational nursing program grade point average of higher than 3.0 yielded a chi square of 31.602 with a probability value of less than .01 when analyzed with NCLEX-PN first attempt pass rates. A cumulative NHMCCD grade point average at the end of the vocational nursing program

of higher than 3.0 produced a chi square of 19.227 and a probability value of less than .01. Review of grade point averages at three points in the academic career of this study population suggests that grade point average is a significant predictor of NCLEX-PN success. These data support previously published reports.

Clearly some students in a vocational nursing program struggle to maintain a passing grade point average and many who are not able to do so may leave the program and thus are not represented in the data. In a study of 1033 freshman students, Metzner (1989) found that the single best strategy for improving student retention was a comprehensive academic advising program. Wlazelek and Coulter (1999) explained that students who participated in one or more academic counseling sessions during a semester had a significant increase in grade point average. The Early Advising and Scheduling System (EASS) was evaluated by Young, Backer, and Rogers (1989) and they reported higher grade point averages and higher retention rates among the students who participated in the program. Professional counselors working in the nursing department could provide nursing specific academic counseling and advising to prospective as well as current vocational nursing students in order to help students improve their grade point averages, increase student retention, and prepare for the licensure examination.

Conclusion 4

Based on the findings of this study, the reading assessment score, specifically a passing score on the reading portion of the TASP Test, does impact performance on the state licensure examination as students who passed the reading portion of the TASP Test were more likely to pass NCLEX-PN on the first attempt than were students who

failed the test or did not take the test. The learner entry academic characteristic of reading assessment score on the TASP Test produced a chi square of 13.067 and a probability value of less than .01. Students who passed the reading portion of the TASP Test had a success rate of 86.96% while students who did not pass the reading portion of the TASP Test had a success rate of 52.63%. This indicated a statistically significant relationship between passing the reading portion of the TASP Test and successfully passing the state licensure examination, NCLEX-PN, on the first attempt. Interestingly, the reading assessment scores on the ASSET Test were not significant and the sample size for reading assessment scores on the COMPASS Test was too small to draw any meaningful conclusions or show significance.

The significance of a standardized reading test score was also found by Thompson (1989) with the Scholastic Aptitude Test verbal score and the Career Placement Reading Test score; Hawsey (1997) with reading scores on the ASSET Test; and Snook (1997) with the Psychological Services Bureau's Aptitude for Practical Nurses Examination verbal score.

Standardized test scores have also been examined regarding their relationship to NCLEX-RN success. Campbell & Dickson (1996) report that the SAT and ACT are among the tests most frequently cited in the literature. Several studies have noted that standardized test scores are significant predictors of NCLEX-RN success (Alexander & Brophy, 1997; Boyle, 1986; Dell & Valine, 1990; Felts, 1986; Foti & DeYoung, 1991; Fowles, 1992; Lengacher & Keller, 1990; Quick, et al., 1985; Sharp, 1984; Woodham & Taube, 1986; Yang, et al., 1987). This is not surprising since standardized

assessments, such as the SAT, ACT, and NCLEX, all require similar skill sets of reading ability and comprehension. Therefore, comparable outcomes would be expected.

Arathuzik and Abner (1998) noted a correlation between NCLEX-RN success and competency in taking tests that require critical thinking and evaluation skills. Ashley and O'Neil (1991) described the results of an intervention program that included test-taking skills. Students that participated in the intervention program had an NCLEX-RN success rate of 92.9% while those who did not participate had a success rate of 50%. Counselors working with vocational nursing students could conduct workshops in test-taking skills that could be helpful in standardized testing situations.

Conclusion 5

Based on the findings of this study, completion of developmental reading or writing coursework impacts performance on the state licensure examination in that students who did not take developmental reading or writing courses were more likely to pass NCLEX-PN on the first attempt than were students who did take those courses. The learner entry academic characteristic of completion of developmental reading coursework yielded a chi square of 4.596 and a probability value of 0.032. Students who did not take developmental reading coursework had a success rate of 83% while students who did take developmental reading coursework had a success rate of 71.4%. There was a significant statistical association between the variable of completion of developmental reading coursework and successfully passing the state licensure examination, NCLEX-PN, on the first attempt. Ostrye (2000) also found that participation in a remedial reading program decreased the chances of passing the examination; however, Hawsey (1997) reported that there was no significant difference

between program completion rates or licensure rates for students completing remediation before admission and those who had not.

This finding was also observed for the completion of developmental writing coursework, which produced a chi square of 7.562 and a probability value of 0.006. Students who did not take developmental writing coursework had a success rate of 85.6% while students who did take developmental writing coursework had a success rate of 69.8%. There is a significant statistical relationship between the variable of completion of developmental writing coursework and successfully passing the state licensure examination, NCLEX-PN, on the first attempt.

This study presents results concerning the relationship between completion of developmental reading and writing courses and passing the NCLEX-PN examination on the first attempt were also somewhat surprising. These findings may suggest that while the classes may be helpful for the general college population, the curriculum of developmental reading and writing classes may not meet the specialized needs of vocational nursing students required to pass the NCLEX-PN. Students whose test scores placed them into college level and did not require them to take developmental reading or writing classes had a higher initial success rate on their NCLEX-PN than students who were required to take developmental reading and/or writing classes.

Research Question 3

The third research question asks: What are the learner entry experiential characteristics that contribute to passing the state licensure examination? The independent variables of previous employment in the health care field, maintaining current health care certifications, and previous attempts in nursing programs were

considered to determine if there was a relationship with the dependent variable of successfully passing the state licensure examination, NCLEX-PN, on the first attempt. A chi square analysis did not suggest any statistically significant relationship between these independent variables and the dependent variable.

Conclusion 6

Based on the findings of this study, previous health care experience, maintaining current health care certifications, and previous attempts in a nursing program does not impact performance on the state licensure examination. Research findings in this area have been conflicting. Harner (1993) and Oliver (1985) found no significant relationship between previous health care experience and completion of a registered nursing program; however Grzegorczyk (1994) found that work experience was a factor in program completion for licensed practical nurses in an associate degree nursing program. It was thought that perhaps work experience and/or having other health care certifications such as nurse aide or emergency medical technician would be predictive in this study of vocational nursing graduates but that was not supported by this study.

Additionally, the vocational nursing department has traditionally believed that students that have not been successful in previous nursing programs, either vocational nursing or registered nursing, were less likely to be successful in this nursing program. Study of this population did not support this assertion. Students that have not been successful in previous nursing programs may have special needs that could be addressed by a professional counselor working with nursing faculty to be proactive and promote students success.

Research Question 4

The fourth research question asks: Is there a subset of learner entry characteristics that correlate with passing the state licensure examination?

Conclusion 7

Based on the findings of this study, a subset of predictive characteristics that correlated with passing the state licensure examination was identified and they were ethnicity, method of high school completion, pre-nursing grade point average, and reading assessment score on the TASP Test. The chi square analysis did establish that six of the independent variables (ethnicity, method of high school completion, pre-nursing grade point average, reading assessment score, completion of developmental reading coursework, and completion of developmental writing coursework) had a statistically significant association with the single dependent variable of successfully passing the state licensure examination, NCLEX-PN, on the first attempt. Additionally, logistic regression suggested that a combination of the demographic learner entry characteristic variables of ethnicity, method of high school completion and the academic learner entry variables of pre-nursing grade point average and reading assessment score on the TASP Test were found to be statistically significant in predicting success on the state licensure examination, NCLEX-PN, on the first attempt.

Results from the logistic regression analysis contributed to the design of a model based on discrete learner entry characteristics, which could be utilized to counsel students on the most effective academic and experiential pathways to successfully complete their educational and licensing requirements. The model might also prove

valuable in planning retention strategies for students already in vocational nursing programs.

Success Model For Vocational Nursing Students

The purpose of this study was to investigate 18 discrete learner entry characteristics that predict success on the state licensure examination, the NCLEX-PN, among the graduates of a selected vocational nursing program. Additionally, the analysis of predictive characteristics contributed to the development of a model that could be utilized to more effectively counsel and advise prospective vocational nursing students in community college settings to enhance licensure success.

Chi square and logic regression analysis suggested that two demographic learner entry characteristics (ethnicity and method of high school completion) and two academic learner entry characteristics (pre-nursing grade point average and reading assessment score on the TASP Test) have the most predictive value with passing the state licensure examination, NCLEX-PN, on the first attempt.

In considering activities and interventions targeted toward prospective and current vocational nursing students, it is helpful to realize that some students may have background traits that would indicate that they have special needs in order to be successful. These needs, once identified, can be addressed. The results of this study suggest that pre-nursing grade point average and a reading assessment score may be predictive academic indicators of licensure success. This information contributed toward the development of a model of success that could be utilized with prospective and current vocational nursing students (see Figure 1).

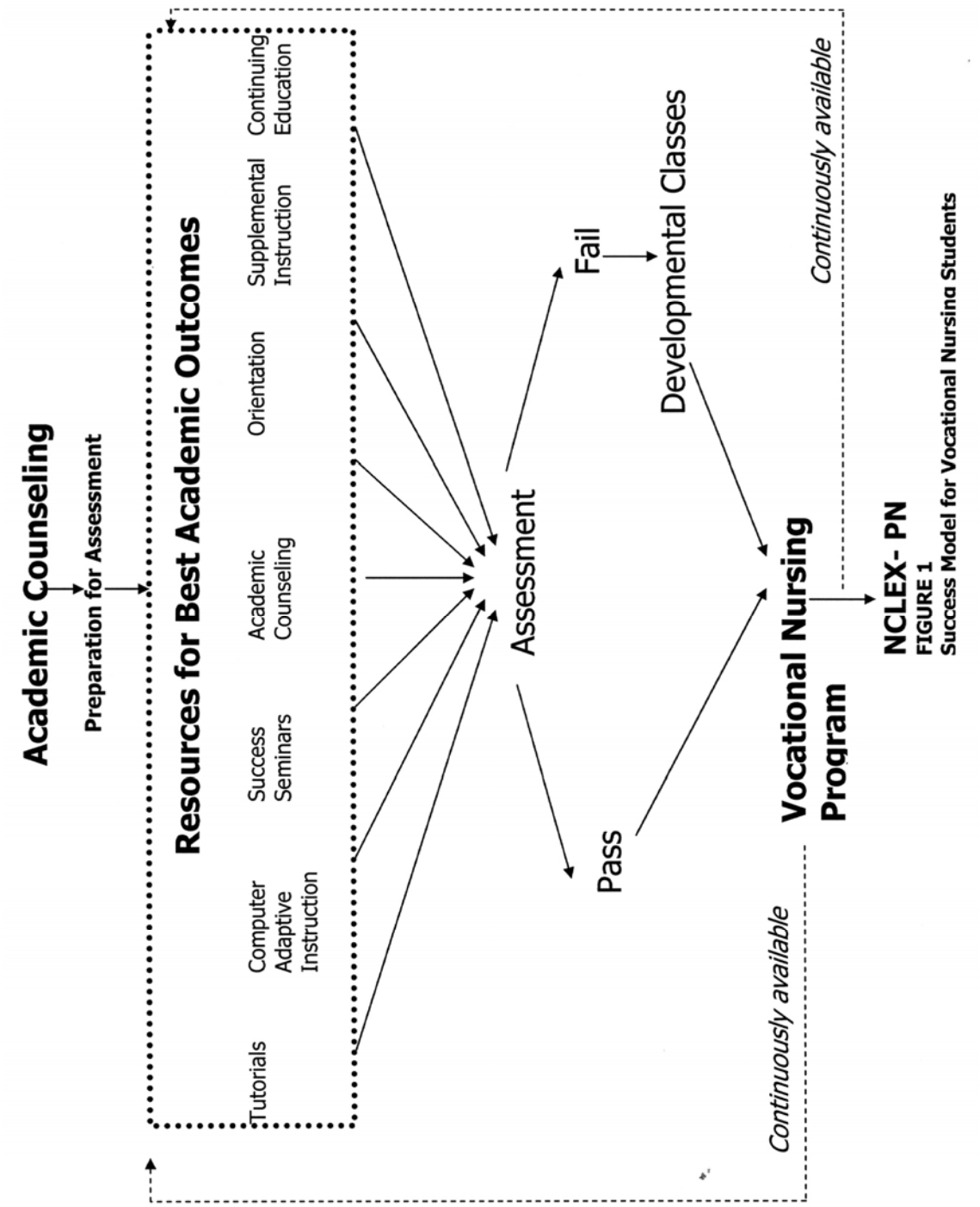

FIGURE 1
Success Model for Vocational Nursing Students

In Figure 1, a process of academic counseling is described from the first point of contact with a prospective student through the point of program graduation and passage of the NCLEX-PN. This process begins with an introduction to the many resources available on campus to prospective students to help them prepare for the initial assessment necessary to enter college and enroll in classes. These resources remain available to students through assessment, developmental classes that may be required, the vocational nursing program, and afterward as they prepare for the state licensure examination. Academic counseling plays a central role in these student support services.

This model focuses on the resources available to help students develop stronger academic skills and develop their reading ability as these are two academic characteristics that seem most predictive of licensure success. If prospective students realize the value of strong academic and reading skills early in their academic careers, they will be able to take advantage of these resources and better prepare to enter the vocational nursing program and ultimately achieve state licensure.

Recommendations

Recommendations Based on the Study

These findings have implications for academic counselors and other community college professionals who work with vocational nursing programs. The following recommendations are suggested:

1. This study found ethnicity to be a predictive variable for NCLEX-PN success on the first attempt. While vocational nursing programs should make every attempt to increase diversity among the student body and ultimately to the

professional body of licensed vocational nurses, minority students may have special needs that must first be idenitifed and then be addressed in order to improve student success. A review of the available literature may provide intervention strategies that could be immediately employed to help increase the NCLEX-PN pass rate on the first attempt.

2. Results from this study suggest that completion of the GED is predictive of NCLEX-PN success on the first attempt. While this is good news for students who have earned a GED diploma and all of the individuals who work to advance the GED program across this country, it would not be good practice to negate the value of earning a high school diploma. This study has provided valuable insight that students who have earned their GED diplomas should be recruited as competitive applicants for vocational nursing programs. Most community colleges and other community organizations offer GED preparation classes for people desiring to earn their GED diploma. Counselors should visit these classes and share information about the vocational nursing program and vocational nursing as a career with these prospective students.
3. Since pre-nursing grade point average was also found to be predictive, it is suggested that students interested in the vocational nursing program be targeted as early as possible and advised about the importance of grade point average and academic success. Students with lower grade point averages should be counseled about available tutoring, student success seminars on study skills, departmental workshops on success strategies, computer-based student success information, supplemental instruction opportunities, and other

methods of increasing academic success. Many students do not realize the value of strong study and test taking skills to their future success.

4. Since reading assessment scores, specifically from the TASP Test, were shown to be predictive of student success on the state licensure examination, it is recommended that students interested in the vocational nursing program be required to complete a standardized reading assessment in order to determine their current reading ability. The findings from this study suggest that the TASP Test (currently known as the Texas Higher Education Assessment or THEA Test) may be a better indicator of NCLEX-PN success than the ASSET Test and possibly the COMPASS Test. There are many standardized reading tests available for use, several designed specifically for health care students. The nursing department may wish to explore the use of one of these tests to gather more information about their students.
5. The use of a professional academic counselor, housed within the nursing department, should be considered to help provide a comprehensive counseling and advising program for prospective vocational nursing students as well as students already in the program. This counselor could also assist with retention efforts within the department.
6. The development and implementation of a departmental orientation for vocational nursing students might be beneficial. This orientation could include topics such as test-taking skills, study skill strategies, time management, stress management, computer adaptive testing strategies, and other topics identified by nursing faculty or students.

Recommendations for Future Study

1. Since these results are from a single population, the study should be repeated in other community college settings with greater diversity in ethnicity and gender among vocational nursing students to see if the results are similar.
2. Several researchers (Alexander & Brophy, 1997; Foti & DeYoung, 1991; Fowles, 1992; and Lewis & Lewis, 2000) suggest that each institution could benefit from in depth study of their unique students, program, and community atmosphere. Each institution should determine their individual predictors for student success. This research should be on-going.
3. Additional research is needed to determine what personal characteristics (such as study habits, working while attending school, and family support) and other special abilities (such as motivation, self-esteem, and test-taking skills) may predict success in vocational nursing programs. Identifying additional characteristics associated with success could help in preparing students for admission, increasing program retention, and achieving state licensure.
4. Since this study considered only the population of graduates of a selected vocational nursing program, it would be beneficial to study the students who did not complete the program as well, through an exit interview and a 90 day follow-up telephone interview. In helping to better prepare prospective students and planning interventions to successfully retain students already in the vocational nursing program, it would be beneficial to know why students do not complete the vocational nursing program. This information would help

counseling and nursing faculty to recognize students at-risk for failure and implement proactive strategies to improve their likelihood of success.

5. During the collection of data, it was observed that many students did not carry full college course loads (12 credit hours) prior to entering the vocational nursing program. The effects of transitioning from a course load of three to six hours into full-time enrollment may require future study.
6. In the data collection for this study, the length of time between high school graduation or GED completion and entrance into the vocational nursing program was not considered. Since the average age of students in this study was 29, this population was older than traditional college aged students. The length of time between high school graduation or GED completion and entrance into the vocational nursing program may suggest that future study is needed.
7. If it is determined that efforts should be focused more on retaining current vocational nursing students rather than preparing prospective vocational nursing students, it might be helpful to review student progress in the vocational nursing program several times. This analysis might help to identify points in the program where interventions would be most appropriate to improve student retention, promote program completion, and thereby increase the success rate on the state licensure examination, NCLEX-PN, on the first attempt.

These recommendations, taken together, may provide the data needed to develop strategies to more effectively prepare graduate vocational nurses to successfully pass the state licensure examination, NCLEX-PN, on the first attempt and enter the workforce as soon as possible. After all, this is as Cross (1984, p. 170)

declares, "the overriding purpose of education" and the way that we make winners out of ordinary people.

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APPENDIX A

DATA COLLECTION SHEET

Name: _____ Code: _____

.....

Code: _____

Demographics:

1) Age at program admission: _____

2) Gender: Male Female

3) Ethnicity: _____

4) High School Graduation OR GED Completion

5) US High School OR Foreign High School

Experiential:

6) Previous employment in health care field: Yes No

7) Current health care certification: Yes No

8) Previous attempts in any nursing program: Yes No

Academics:

9) GPA prior to LVN program: _____

10) Successful completion of one anatomy and physiology class: Yes No

11) Successful completion of one freshman English class: Yes No

12) Cumulative NHMCCD GPA at completion of LVN program: _____

13) LVN Program GPA: _____

14) TASP Test

Reading	Passed Failed	Writing	Passed Failed	Math	Passed Failed

15) ASSET Test

Reading	Passed Failed	Writing	Passed Failed	Math	Passed Failed

16) COMPASS Test

Reading	Passed Failed	Writing	Passed Failed	Math	Passed Failed

17) Completed developmental reading class: Yes No

18) Completed developmental writing class: Yes No

19) Completed developmental math class: Yes No

20) Passed NCLEX: 1 2 3 No

APPENDIX B

LETTER OF SUPPORT

KINGWOOD COLLEGE
A NORTH HARRIS MONTGOMERY COMMUNITY COLLEGE

20000 Kingwood Drive
Kingwood, Texas 77339-3801
281.312.1600

February 1, 2002

Suann Hereford
Division of Math, Science, and Health Science
Kingwood College
20,000 Kingwood Dr.
Kingwood, TX 77339

Dear Ms. Hereford:

Your request to collect data for your proposal titled, "Identification and Analysis of Entry Level Characteristics that Predict Success on Nursing Board Licensure: Study of a Selected Vocational Nursing Program" is approved. Thus, you are permitted access to student records, as they pertain to your study, from the institutional student information database as well as access to individual student records and NCLEX-PN scores maintained by the Vocational Nursing Department. It is understood that you will maintain confidentiality by coding the records after they are compiled.

If you have any questions, you may contact me.

Sincerely,

Linda Stegall

Linda Stegall, Ed.D.
President

Learning without boundary...

VITA

Suann Lentz Hereford

Address:
Kingwood College
Division of Math, Science, and Health Science
20,000 Kingwood Drive
Kingwood, TX 77339

Education:

Texas A&M University, College Station, Texas
Doctor of Philosophy, December 2005

Sam Houston State University, Huntsville, Texas
Master of Arts, August 1990

Texas A&M University, College Station, Texas
Master of Education, December 1983

Sam Houston State University, Huntsville, Texas
Bachelor of Science, August 1982

Professional Credentials:

Licensed Professional Counselor (LPC)
National Certified Counselor (NCC)
National Certified School Counselor (NCSC)
Distance Certified Counselor (DCC)
Texas Professional Counselor Certificate

Experience:

1999 – present	Kingwood College Academic Counselor (Professor) for the Division of Math, Science, and Health Science
1991 - 1999	Kingwood College Director of Counseling
1989 - 1991	South County Reassignment School Conroe ISD Counselor