PREDICTORS OF STUDENT SUCCESS IN THE ARMY MEDICAL DEPARTMENT (AMEDD) LICENSED PRACTICAL NURSE TRAINING PROGRAM (91WM6) AS IDENTIFIED BY EXPERT NURSE EDUCATORS, INSTRUCTORS, AND ADMINISTRATORS

A Dissertation

by

ANTONIA SCIALDO

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 2004

Major Subject: Educational Administration

PREDICTORS OF STUDENT SUCCESS IN THE ARMY MEDICAL DEPARTMENT (AMEDD) LICENSED PRACTICAL NURSE TRAINING PROGRAM (91WM6) AS IDENTIFIED BY EXPERT NURSE EDUCATORS, INSTRUCTORS, AND ADMINISTRATORS

A Dissertation

by

ANTONIA SCIALDO

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

DOCTOR OF PHILOSOPHY

Approved as to style and content by:

Stephen L. Stark (Chair of Committee)	Walter F. Stenning (Member)
Clifford L. Whetten (Member)	G. Patrick Slattery, Jr. (Member)
Jim Scheurich (Head of Department)	

December 2004

Major Subject: Educational Administration

ABSTRACT

Predictors of Student Success in the Army Medical Department (AMEDD) Licensed Practical Nurse Training Program (91WM6) as Identified by Expert Nurse Educators, Instructors, and Administrators. (December 2004)

Antonia Scialdo, B.S.N., Barry University;

M.S. Ed., Florida Atlanta University;

M.S.N., The University of the Incarnate Word

Chair of Advisory Committee: Dr. Stephen L. Stark

The U.S. Army Licensed Practical Nurse (LPN) dates back to the fall of 1947 and evolved from severe professional nursing shortages of World War II. Today, as in the past, to sustain U.S. Army readiness the highly medically trained combat soldier must possess skills and competency of an LPN, which is a result of successful completion of a 52-week 91WM6 training program.

The purpose of this two-part descriptive study includes evaluation of quantitative and qualitative data. The Delphi technique and a retrospective student record review were utilized to gather data. Dependent variables included student demographics such as age, rank, gender, years of military experience, marital status, prior education and medical related experience, Armed Services Vocational Aptitude Battery (ASVAB) scores, specifically Skilled Technical (ST) and General Technical (GT), students' interpretation of stressors of military life, occupational goals, number of college units attained, number of examinations failed and physical fitness tests

failed, Article 15's administered, and counseling. The independent variable was successful completion of the National Council Licensure Examination for Practical Nursing (NCLEX) examination on the first attempt.

Major research findings of this study included:

1. The research revealed higher pass rates for a private first class and specialist, as compared to lower pass rates of corporals and sergeants. Additionally, soldier students in the study who had completed at least one college unit (had attended college), had a 92% pass rate as compared to those who had not completed any additional education or college after high school (75.0%). It is suggested that prior experience may improve entry cognitive skills that enhance academic performance along with the student's achievement.
2. The research revealed that those soldier students who tended to have higher GT and ST scores failed program tests significantly fewer times.
3. Based on the results of the expert opinions of the panelists (Delphi) who participated in the study, the highest-rated predictors in completing the course were positive study habits, demonstrating diligence, and motivation. For predictors related to passing the NCLEX-PN, the highest rate was the ability to think critically and specifically preparing for the NCLEX examination.

DEDICATION

This dissertation is dedicated to all Americans who served our great nation and especially to those soldiers now serving.

I see soldiers every day who display courage, selflessness, honor, and the willingness to put themselves in harms way so that people can enjoy freedom. They are the pulse that makes the heart of this great nation beat so well.

I am humbled by their dedication and grateful to have the honor of working with such brave men and women.

ACKNOWLEDGEMENTS

Appreciation is extended to Dr. Kathleen Dunemn, Colonel, AN, CNMW, Ph.D., whose unflagging support and mentorship have enabled me to continue my pursuit of higher education. Dr. Dunemn has brought style, energy, and support to my emerging role as a scholar, for which I will be forever grateful. Her brilliance is reflected in her many selfless years of patriotic service as an Army nurse, nurse midwife, researcher, statistician, scholar, and mentor. Dr. Dunemn is a shining star, and I thank her for all that she has taught me. Kudos to Mr. Dunemn, USAF, Retired, who kept my frozen computer thawed.

One of the brightest shining stars in my life is my sister, Dr. Penee Scialdo. Dolly, you helped me to gain a pulse and rhythm with your constant "Get that dissertation done so we can celebrate." You and I will be connected forever. You are my hero. Thanks for the BOB, who sat up so many late nights with me.

And to my eldest sister, Dr. Rosina Scialdo, what do you say, fellow Aggie?

To my two beloved children, Kevin Eugene and Melody Maria Nehring, you both are the loves of my life. Kevin, I am so proud of your accomplishments at the University of Nebraska – know that you can do anything in life you want. (It's never too late to transfer to A&M in College Station…more days to play your golf game). You are the best son any family could have. Maria, I am so proud of your musical prowess in high school. You play many musical instruments and make such heavenly breathtaking sounds. Life to you is playing your solo – before the rest of the band does.

You are the best daughter any family could have. You too, can do anything…even Math. Both of you have been the wind beneath my wings.

Thank you Julie Anne Martinez from the bottom of my heart. Your precious gift to us has changed so many lives.

And lastly, I will be forever grateful to my late mother, O'Mama, who instilled in me a love of education and learning. Mom, sorry about all the times you were called to Mother Superior's office, who would report me for reading such books as *Gone With the Wind* in second grade. I miss you very, very much and know that you are watching over us.

Thanks to Marilyn Oliva at Action Ink in San Antonio, Texas. *She is the best of the best at formatting and editing dissertations*.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Licensed Practical Nurses (LPNs) provide nursing care for clients in a myriad of settings. LPNs, as a specialty group of health care providers, originated due to the increased need for "hands-on" direct care in health care settings along with their knowledge and focused training of basic nursing care skills (Sarnecky, 1999).

There is a tremendous demand in today's United States Army for soldiers who possess excellent nursing skills. Past and future warfare have and continue to be very violent and deadly, resulting in mass casualties. It is predicted that soldiers will experience severe wounds and require top-notch nursing skills for rapid treatment and evacuation from battlefields to combat hospitals (Wynd & Gotschall, 2000). The improved and redefined combat medic embodies all the spirit and tradition of the combat medic combined with new and improved technical and medical competency (DeLorenzo, 2000).

The United States Military Armed Forces continually train to ensure battlefield superiority into the next millennium. The current plan in the U.S. Army is known as Force XXI, which is an envisioned, dispersed, highly fluid battlefield. Service members will possess increased firepower and maneuverability, and improved situational awareness. The Army Medical Department (AMEDD) is responding to this

---

The style and format of this dissertation follow that of *The Journal of Educational Research*.

goal by adapting to the new concept by deploying a lighter and more mobile, yet highly capable medical force. Over the past decade, combat operations and military operations, other than war, have increased the challenges in providing quality health care to all of the United States Army soldiers. The Army is now preparing for a Future Force. The program calls for operational characteristics such as increased battle tempo, lengthy evacuation distances, and greater unit dispersion along with a redesign of the medical infrastructure to bolster first responder capabilities. Due to the evolving changes in military health care, a soldier known as a 91WM6 has emerged and possesses the essential skill mix to support the Army on the future battlefield (AMEDD, 2000). The improved and refined combat medic embodies all the spirit and tradition of the combat medic combined with new and improved technical and medical competencies (DeLorenzo, 2000).

The U.S. Army Licensed Practical Nurse (LPN) dates back to the fall of 1947. The modern licensed practical nurse role evolved from the severe professional nursing shortages of World War II. Shortages continued to be felt in the postwar years; therefore, the number of practical nurses grew even more. In 1947, Colonel Mary G. Phillips served as Chief of the U.S. Army Nurse Corps. She was instrumental in increasing all educational opportunities for U.S. Army nurses. Further, she spearheaded the first 48-week practical nurse program for the Woman's Army Corps (WAC) personnel. Obtaining the credential of "LPN" rapidly became the crown jewel of the U.S. Army enlisted medical education. The role of the U.S. Army Licensed Practical

Nurse (LPN) will continue in the future as the backbone of the field hospital (Sarnecky, 1999).

To sustain U.S. Army readiness goals, the highly medically trained combat soldier must possess the skills and competency of a Licensed Practical Nurse (LPN), which is a result of successful completion of a 52-week 91WM6 training program. The program includes Phase I and Phase II, along with successful completion/scoring on the National State Licensure Test. The goal for the U.S. Army is to reach the aggregate strength of 100% by fiscal year 2002. Currently, the fill rate for the LPN entry program is 73% with the goal of 100% (AMEDD, 2001).

A major objective of the Army Medical Department (AMEDD) School Division strategy (Balanced Score Card) for medical readiness is to "train the medical force." One of the longest standing and highly prized AMEDD training programs is the 91WM6 program. This program provides AMEDD soldier medics with practical nursing knowledge and skills. Faculty and administrators of the AMEDD 91WM6 program are continually challenged to provide the numbers of high-quality 91WM6 personnel needed to fill the ongoing vacancies this military operational specialty (MOS) experiences (AMEDD, 2001).

Records maintained at the AMEDD School Division reveal that the attrition rate among the 91WM6 students has been reported as high as 30-50%. Interviews with four key U.S. Army nurse education experts affirm this (K. Dunemn & J. Harris, personal communication, February 22, 2002). Several national studies report attrition rates of 15-45% among Registered Nursing students. Of the 70% who graduate, only

85% will pass the National Nursing Licensing Examination (Ehrenfeld, Rotenberg, Sharon, & Bergman, 1997).

The major reasons that students are dropped from the 91WM6 program are deficiencies or failures in the following areas: (a) academic abilities, clinical skills, drug tests, i.e., testing positive for an illegal substance and (b) military physical fitness and bearing, i.e., overweight or unable to pass the physical fitness test. Each student who is dropped from this program represents a vacancy that will not be filled in a timely manner, thereby, causing an under lap in nursing personnel and a significant monitory loss of hundreds of thousands of dollars to the AMEDD (J. Harris & K. Dunemn, personal communication, March 26, 2002). To overcome this high rate of attrition and failure of the National Licensing Examination, the faculty and administrators of this program need to be able to identify student characteristics that would most likely predict success in the program.

In health-related professions, success of an academic program is defined by students successfully passing the credentialing examination upon program completion (Edenfield & Hansen, 2000). No recent literature could be located that specifically addresses the predictors of student success in a unique program such as the U.S. AMEDD 91WM6 program.

Throughout the 1990s and early 21st century, many major changes have occurred in the AMEDD 91WM6 curriculum. Identification of the predictors of success will assist the program faculty administrators (a) in review and update of program admission requirements (b) in changes to the curriculum that more closely

resemble the needs of the students and (c) in the identification of students who will need extra or preliminary course work to be successful. The purpose of this study was to identify the predictors of success for students in the AMEDD 91WM6 Licensed Practical Nurse Training Program, therefore, determining if a specific set of factors can be used to predict whether a student will successfully complete the program.

Lowry (1992) reports that the issue of attrition and repeat rates among nursing students has long been the subject of concern and debate. Among the reasons for heightened interest in this topic is the rapidly increasing high cost to health care organizations in terms of time and resources

Stephen (1999) reiterates findings from the Heathrow debate of 1994, which determined a prediction for the future of nursing. The issue of the attractiveness of nursing as a profession is one for serious consideration. The lack of interest in a career as a LPN has threatened and decreased the number in the pool of those who apply to nursing programs, therefore, decreasing the number available.

Byrd, Garza, and Nieswiadomy (1999) assert that nursing programs must establish the most reliable admission and progression criteria due to a serious shortage of qualified faculty, financial resources, and the logistical frustrations of student re-entry among students who are progressing.

A search of the literature drives the inquiry as to just what the predictors of success are in the U.S. Army 91WM6 Licensed Practical Nurse Training Program. Research confirms that identifying valid variables to predict success of nursing students has captivated the interest of nurse educators. If such variables were

determined, nursing programs would utilize them for admission criteria and intervene early in the program when students are not succeeding. “Studying factors that contribute to success in nursing school and successful performance on the State Board of Nursing Examination is vital for society, colleges, and nursing programs” (Briscoe & Anemma, 1999, p. 82).

Combining the performance of the rigorous 52-week LPN training course with the challenge of becoming a soldier and adapting to military life may indeed contribute to the current high attrition rate. Research confirms that military recruits face physical and psychological pressures in basic training. There are numerous reasons why a recruit can fail to complete training. They include a lack of medical fitness, self-requested discharge, and poor psychological or physical suitability. The financial cost to military establishments can be well over several thousand dollars for each recruit who does not successfully complete his or her intended training. The costs are enormous and are attributed to initial recruitment, transportation to training, equipment, uniforms and study materials, lodging, rations, wages, instruction, and supervision along with medical, psychological, and dental care. The estimated cost of the loss of each student ranges from $20,999 to $50,000 (Pope, Herbert, Kirwan, & Graham, 1999).

According to Kruegar (1998), there are many psychological stresses of military life that contribute to the whole picture of the emotional makeup of those who wear the military uniform. Among them include being away from family and friends for extended periods, feeling command and peer pressures to perform, experiencing fear of

being injured or killed by an enemy, each of which can constitute adverse conditions of sort.

Alexander (2000) reports that soldiers experience unfamiliar and often hostile environments. U.S. military forces are deploying to harsh and threatening areas of the world to serve in such missions as potential war, low-intensity conflict such as peacekeeping, disaster relief, and humanitarian assistance. Soldiers are never sure what or where their future will be.

The entire nation as well as the military society is affected by failure of soldiers to pass the National Licensed Practical Nurse licensure examination. Such failure not only translates into a delay in the return on the financial investment made by taxpayers, but also affects the supply of competent soldiers needed to render peacetime care and forward battlefield care in such times as war. This is the first time in this nation's history that battlefield casualties have experienced such high survival rates (P. Rodriquez, personal communication, May 28, 2004).

The success of the soldier in the 91WM6 Licensed Practical Nurse (Advanced Medic) is vital not only to this nation, but also to the soldiers who are serving and wounded. The wounded deserve a supply of competent soldier Licensed Practical Nurses providers of health care.

Statement of the Problem

The Bureau of Health Professions (1994) Division of Nursing predicts critical shortages of all nurses through the year 2005 and beyond. There is an urgent need to

fill the soldier requirements in the critically undermanned health care area such as 91WM6 positions, Licensed Practical Nurses in the U.S. Army (AMEDD, 2001). The U.S. Army Practical Nurse Program prepares selected and qualified Army Medical Department enlisted personnel to provide entry-level practical nursing support during the delivery of medical and nursing care to patients during peacetime and mobilization and to function as first-level medical professionals in a variety of military settings (Devlin, 2001). In both the civilian and Army sector, the Licensed Practical Nurse serves as a skilled extension of Registered Nurses (Reeves, 1997).

Additionally, serving in the U.S. Army proves to have many other stressors and requirements as well. As part of the requirement for a career soldier in the Army medic category, he/she must successfully complete the 52-week Licensed Practical Nurse Program along with certification by state examination and licensure. Among the 150 enrolled in both Phase I and II, there exists an annual "wash back" or failure rate of 30-45%. To support the U.S. Army mission, readiness, and health care, along with the goal of saving resource and education dollars, determination of predictors of success for the soldier students in the U.S. Army 91WM6 program is vital (K. Dunemn, personal communication, February 26, 2001).

Accurately predicting student soldier success and subsequent passage of the state licensure examination is a critical issue for nursing schools (Bonte-Eley, 2002). The use of predictors should result in increased success rates of LPN students (Treich & Boss, 1997)

Purpose of the Study

The primary purpose of this study was to determine predictors of student soldier success in the Army Medical Department (AMEDD) Licensed Practical Nurse Training Program (91WM6) as identified by expert nurse educators, instructors, and administrators.

Research Questions

The following research questions were addressed:

1. To what extent do selected student demographics impact the successful completion of the U.S. Army Medical Department (AMEDD) 91WM6 Licensed Practical Nurse Training Program?
2. To what extent do selected stressors of military life and serving on active duty in the U.S. Army impact the successful completion of the Army Medical Department (AMEDD) 91WM6 Licensed Practical Nurse Training Program?
3. What is the relationship of student training success with expert panel predictors of success?

Operational Definitions

The following definitions were pertinent to this study:

Academic Success: Completion of the student's program of study along with successfully passing the National State Licensed Practical Nurse Examination.

Academic success is the level of achievement students attain in didactic and clinical courses with a minimum level of defined percentage or satisfactory (Moore, 1996).

Administrator: An individual who is assigned a position of authority to ensure the correct flow of process (K. Dunemn, personal communication, May 2, 2001).

Army Medical Education Department Division Center and School (AMEDD Center and School): The hub of the Army Medical Training Center located on Fort Sam Houston Army Post Installation in San Antonio, Texas. The mission is to (a) provide command and control of subordinate units, (b) provide administration and log support to train all assigned soldiers, and (c) provide field medical support and maintain training and readiness to sustain the soldier and family (Devlin, 2001).

Armed Services Vocational Aptitude Battery (ASVAB): An aptitude test used for military selection since the mid-1970s. The battery subtests include paragraph comprehension, numerical operations, coding speed, word knowledge, arithmetic reasoning, mathematical knowledge, electronics information, mechanical comprehension, general science, and automotive/shop information (Wigdor & Garner, 1982).

Attrition: The loss of a student from the practical nursing program due to voluntary withdrawal, transfer, recycle, or dismissal (Moore, 1996).

Brooke Army Medical Center (BAMC): A modern state-of-the-art, 450-bed health care facility that provides level-one trauma and graduate medical education. The physical appearance along with the efficiency of space throughout the hospital creates a user-friendly, high-quality health care environment for patients, their families, and

health care providers. The Medical Center accommodates programs supporting its pursuit of treatment and health care excellence (Brooke Army Medical Center [BAMC], 2002).

Clinical Setting: "The clinical setting is a valuable teaching environment for students in the health fields, offering learning opportunities not always feasible in the classrooms, including development of psychomotor and socialization skills and experience in advanced problem solving. The practicum serves as a bridge between classroom theory and professional practice" (Hill, Wolf, Bossetti, & Saddam, 1999, p. 86).

Delphi Technique: A data collection technique developed by the Rand Corporation for obtaining judgments from a panel of experts. The experts are questioned individually, a summary of the judgments is circulated to the entire panel, and the experts are questioned again, with further iterations until consensus is reached (BAMC, 1998).

Demographic Characteristics: Information that describes the personal characteristics of the subjects in a study. For purposes of this research study, gender, age, military rank, component of service, method of high school completion, months of military service and medical related experience, General Technical score (GT), Skilled Technical score (ST), marital status, number of dependents, times counseled, accrued college credits, career goals, instructor evaluation of clinical performance, first time NCLEX-PN results, and times physical fitness and weigh ins were not satisfactory (K. Dunemn, personal communication, May 12, 2003).

Expert: An individual who possesses a high degree of skill in and knowledge of the art and science of nursing. The individual has achieved "expert" as having displayed great skill and knowledge and is rewarded through promotion and job assignments (K. Dunemn & J. Harris, personal communication, December 4, 2001).

Future Force: The U.S. Army's Future Force Warrior Program is designed to improve battlefield effectiveness and soldier survivability by incorporating technological breakthroughs in miniaturized electronics, wireless communications, and ultra-low-power communications systems into soldiers' equipment and uniforms. The goal of the Future Force is to greatly reduce the weight and power consumption of the soldier's gear. Each Future Force soldier will have access to enormous volumes of battlefield information through a head-mounted unit. Smaller than a postage stamp, the new technology will provide a micro display that will be the highest density display of such size in the world (Training and Analysis Doctrine Command [TRADOC] (1990).

Grade Point Average (GPA): The average obtained by dividing the total number of grade points earned by the total number of credits attempted (Army Medical Department Education Center and School, Fort Sam Houston, 2001).

Instructor: Any personnel, military or civilian who represents an institution. An individual who teaches within the nursing profession. The position can be either clinical or didactic or both (AMEDD, 1996).

Licensed Practical Nurse (LPN): The National Association for Practical Nurse Education and Services (NAPNES) gives this definition of the practical nurse: "A trained practical nurse is a person prepared by an approved educational program to

share the care of the sick, in rehabilitation, and in the prevention of illness, always under the direction of a licensed physician and/or registered professional nurse" (Rosdahl, 1999, p. 8). Practical nurses do many of the same things that RNs do; the choice of the type of nurse assigned to a patient depends on the degree of the patient illness (Rosdahl, 1999, p. 8). A practical nurse is considered a valuable member of the health care team and uses the nursing process when planning or assisting with planning nursing care that meets the needs of people of all age groups in a variety of health care settings. An LPN is a nurse who is not a professional but rather an extension of the registered nurse role. Scope of practice is limited to physical care, which includes the nursing process (Watson, 1997).

Licensed Practical Nurse Program at AMEDD Center and School (91WM6): A 52-week course including two phases: Phase I and II. Phase I is taught at AMEDD. Phase II is taught at three different U.S. Army sites, one of which is BAMC (AMEDD, 2002).

Licensure: "Each profession is obligated to ensure society's safety. Licensure examinations are a valid and reliable measure of the knowledge that one must possess to practice safely in the profession" (Matassarin-Jacobs, 1989, p. 32).

Marginal Students: Students who meet the minimum requirements of a clinical evaluation but who are in a unclear zone (Verma & Patterson, 1998).

Military Setting: Includes the garrison or home-station environment, the forward-deployed environment for soldiers stationed at overseas locations or on ships, along with the deployed environment for troops on an actual mission. The military

setting includes the entire range of work settings associated with the military occupation, from office work to combat infantry and humanitarian missions. Further, the setting extends to lifestyle, cultural, and community aspects of the military occupation (Bartone, 1998).

Military Stressors: The very specific situations that occur serving in the military that evoke the primitive startle reaction of rising on balls of the feet and crouching forward (Leher & Wollfolf, 1993). For purposes of this study, the stressors are those that the student listed during their orientation and monthly counseling sessions.

National Council Licensure Examination for Practical Nursing (NCLEX-PN): A standardized written examination that measures knowledge required for providing safe care to patients. Scores are reported as pass or fail. Any applicant who is a graduate of an approved practical nursing education program is eligible for examination. Each candidate must achieve a passing score in order to practice nursing (Neuman, 1991).

91WM6: A health care specialist serving in the U.S. Army, National Guard, or Military Reserves holding an essential skill mix and advanced skills to support the Army on present and future battlefields (U.S. Army Medical Department, 2002).

Nursing: Either a vocation or a profession where an individual partakes in the art and science of caring for others. The role of the nurse as a health worker should be to assist individuals to attain equilibrium with both their internal and external environment as they strive to participate in the world (Antrobus, 1997). Further, nursing is practiced according to an organized systematic plan, which addresses the

health care needs of individuals, families, and communities. The plan of nursing care is an approach to resolving health problems (Watson, 1997).

Nursing Education: "A unique body of knowledge which is premised on scientific principles and the humanistic arts. Mastery of nursing's specialized knowledge is accomplished through continuous, sequential instruction, which progresses from simple to complex concepts and theories. The ultimate goal in practical nursing education is the application of nursing knowledge to clinical practice and the competent performance of nursing skills" (Watson, 1997, p. 21).

Nurse Education Expert: A Registered Nurse with a higher education background of at least a master's degree in Nursing Science preferably awarded a doctorate degree. Recognized for experience and background by assignment of a nursing instructor position, administrator, or educator position (K. Dunemn, personal communication, May 2, 2002).

Personal Characteristic of a Student: Clinical awareness, commitment, stamina, integrity, judgment, and leadership (K. Dunemn & J. Harris, personal communication, January 12, 2002).

Phase I of the Army Department 91WM6 Licensed Practical Nurse Program at AMEDD Center: A six-week course that is taught at the AMEDD Center and School Staff located at Fort Sam Houston Army Post, in San Antonio, Texas. The course covers the basic technical nursing skills of the LPNs' role (Devlin, 2001).

Phase II of the Army Department 91WM6 Licensed Practical Nurse Program: Is located at one of three major medical centers and training sites within the United

States Medical Commands. The one held at BAMC is affiliated with St. Philip's College School of Nursing, San Antonio, Texas (Devlin, 2001).

Predictors of Success: Those variables that lead a student to completion of the course along with successful completion of the National State Board for Licensed Practical Nurses (Ostrye, 2001).

Prior Academic Achievement: The level of accomplishment the student achieved at his/her high school level or higher education level with a successful outcome (Moore, 1996).

Registered Nurse Programs: Usually encompasses four years of study in a college or university. The focus of the baccalaureate nursing program is on the basic sciences and on theoretical and clinical courses, as well as course in the social sciences, humanities, and arts to support nursing theory. There are two other nursing programs for Registered Nurses (RNs): the associate degree and the diploma degree. The associate degree program is a two-year program usually offered by a junior college. The other is a two-year program usually associated with a hospital. Graduates of all three programs sit for the same national examination known as the NCLEX-RN to become eligible to practice as registered nurses (Kruzen, 2002).

*Satisfactory Results on the State Licensure Examination***:** The completion of the national examination (NCLEX-PN) with a passing grade in which the student meets the requirements for licensure as a practical nurse in the state of application (Moore, 1996).

Soldier: Human beings whose performance is influenced by various conditions under which they are required to function. These conditions – called soldier dimensions – may reside within the individual (e.g., fatigue), in the surrounding environment (e.g., extreme temperatures), or both (e.g., extreme stress as a result of numerous casualties). Soldiers are "fighting machines" to the extent that they have been properly trained to perform certain tasks under peacetime and wartime conditions (TRADOC, 1990).

Soldier Medic: A soldier who is the medical assistant role, an enlisted person who is at various levels of training (TRADOC, 1990).

Stress: The body's non-specific response to stressors in the environment (Buhler, 1993). "If we are to use this concept in a strictly scientific manner, it is especially important to keep in mind that stress is an abstraction; it has no independent existence" (Selye, 1974, p. 53). Stress is "the non specific response of the body to any demand made upon it" (Selye, 1974, p.54). Stress is extreme anxiety that results from fear of injury or loss of life during combat, a degree to which a soldier perceives a situation to be unpredictable or uncontrollable. (TRADOC, 1990).

Student Success: Successful completion of the academic and soldier requirements of the U.S. Army and Licensed Practical Nurse Training Program. Completion also includes a passing score on the National Council of Licensed Practical Nurse Examination (Thompson, 1988).

Subject Matter Expert (SME): An individual who has thorough knowledge of a job (duties and tasks). This knowledge qualifies the individual to assist in the training

development process, i.e., consultation, review, analysis, etc. Normally, an SME will instruct in his/her area of expertise (TRADOC, 1990).

Assumptions

Since this study encompassed retroactive review of data, along with interviews of nurse education experts, administrators, and instructors, it was assumed that:

1. Staff at the Army Medical Department (AMEDD) Licensed Practical Nurse Training Program (91WM6) were qualified as presented by their credentials for each task assigned and that they performed their tasks in an ethical manner.
2. Participation was voluntary, and those interviewed consented within all the guidelines of the Institutional Review Board.
3. Retention and career success were desirable program outcomes for all soldiers.
4. Successful completion and graduation along with board certification of Licensed Practical Nurse Licensure were the desired outcomes for the students.
5. Participants of the questionnaires using Delphi technique were ensured anonymity and their responses were reliable.
6. The individual who was mailed the questionnaire was the individual who completed the questionnaire.

7. The interpretations within this study accurately reflected the actual perceptions intended by those who were surveyed.
8. Surveys used in this study accurately measured the responses rendered by the respondents.
9. The school sites used in this study were not randomly selected, but volunteered to participate in this study.
10. The generalization of this study may be limited to the degree that other licensed practical nurse programs match the demographics of those involved in this study.
11. The researcher was impartial in collecting the study data.

Limitations

Constraints on this study consisted of the following:

1. Findings can be generalized only to the population from which the sample was drawn in San Antonio, Texas in years 2000-2002.
2. Student record review data for phase II training were obtained from only one source that was the Army Medical Department (AMEDD) Licensed Practical Nurse Training Program (91WM6), at Fort Sam Houston Army Post, San Antonio, Texas.
3. Impact of external pressures such, as stressors of military life may not be the same for all.

4. This study was limited to United States Army 91WM6 LPN students. No generalizations were drawn from this study regarding other groups of practical nurse students

Significance Statement

Despite efforts to downsize, the U.S. military continues to serve a vital role in protection the national interests of the United States. Although the services have been considerably downsized during the past few years, the number of deployments or Operational Tempo has remained very high. As a result, increased emphasis has been placed on improving the quality of training for soldiers, increasing the readiness of troops on active duty, and increasing the cost-efficiency of all training to meet budgetary restraints (Talcott, Haddock, Klesges, Lando, & Fiedler, 1999). Educating a soldier medic is expensive in terms of both time and resources to the student training program. Attrition from a training program, therefore, can be costly. The estimated cost of a student "wash back" to repeat course material is approximately $156.00 per day. In addition, the impact of personal failure can possibly negatively affect a student's emotional well-being. Given the enormous potential cost savings for determining characteristics of individuals who are successful versus individuals who are unsuccessful, surprisingly little research has been given to this topic (Talcott et al., 1999).

A review of the literature does not reveal current studies completed that determine predictors of success in the United States Army Licensed Practical Nurse

Program. However, there is a body of research that suggests predictors of success for the Registered Nurse passing the National Certification Licensing Examination (Byrd et al., 1999). According to Baker and Rylas (1999), military medicine trains personnel primarily to mobilize for war. Medical units and combat support hospitals are designed, configured, supplied, and staffed for the combat scenario, which emphasizes care of the young, healthy, adult male trauma patient. Further, military life often demands considerable physical and psychological robustness of the individual (Pope et al., 1999). The United States Army must provide trained combat medics (LPNs) to ensure battlefield superiority. Scarce time, personnel, and material resources limit the impact of the Army's current sustainment efforts. To maximize sustainment, commanders and leaders will need to utilize all available opportunities to improve training. This may require examining new and innovative approaches to training or utilizing resources outside of the traditional Army boundaries (DeLorenzo, 2000).

From predictors discovered from this study, there exists a possibility that demarcation points can be determined to provide direction for recruiters, instructors, and students. Using the determined parameters, proactive intervention by instructors and students would improve the success of 91WM6 student soldiers resulting in increased cost-effectiveness and much better utilization of dwindling training resources and budget. The results of the analyzed data will assist future military educational programs and policymakers in making decisions regarding Army educational programs for the soldier personally and professionally. These results have the potential of

addressing a critical issue for the U.S. Army and nation as a whole, i.e., impacting soldier success in the next millennium.

Organization of Dissertation

This dissertation is organized into five chapters. Chapter I provides an introduction and overview of the problem. Chapter II presents an overview of a conceptual framework of human occupation developed by Kielhofner (1980a, 1980b) that provides a representational tool to guide the research. A discussion of the review of pertinent literature follows with an overview of nursing along with the U.S. Army's 91WM6 Licensed Practical Nurse Training Program. Chapter III discusses the methods and procedures used in the data collection. Chapter IV reports the analysis of data that was collected in this study. Chapter V presents the researcher's conclusions and summary along with recommendations for future research.

CHAPTER II

REVIEW OF LITERATURE

Despite the amount of work done in the area of identifying predictors of success in registered nursing programs, the profession continues to witness failures as nursing graduates take the licensing examination for Registered Nurses (McKinney, Small, O'Dell, & Coonrod, 1988). Although an abundance of research exists on characteristics that are predictive of academic success for students enrolled in registered nurse training programs, corollary data for students in the vocational nursing arena is quite limited. Predicting student success is an important concept, but it can also be a vague one. The literature review for this study is organized into several sections as illustrated in Figure 2.1.

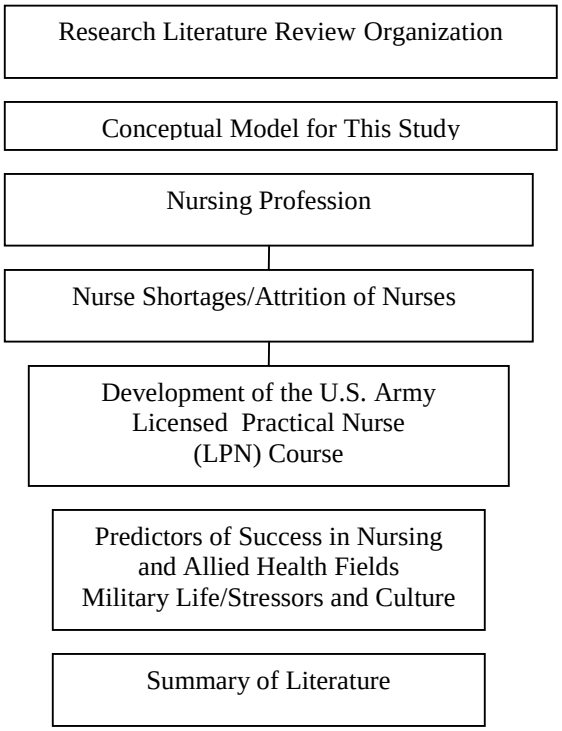
Conceptual Model for Study

A model is a representational tool. The usefulness of a model as a tool rests on its capacity to order, categorize, and simplify complex phenomena (Kielhofner & Burke, 1980). The researcher chose Kielhofner's conceptual model to organize the research.

In an attempt to clarify the predictors of student success, the researcher utilized the model of Human Occupation authored by Kielhofner and colleagues (1980a, 1980b). Kielhofner and colleagues (Kielhofner, 1980a, 1980b; Kielhofner & Burke, 1980; Kielhofner, Burke, & Igi, 1980) propose a model in the development of a paradigm of occupation in an attempt to provide a conceptual model for the field of

occupational therapy. The model integrates theoretical concepts into a representation of an occupation that can be applied to practice and research. It draws upon the theory of open systems to build a structural framework.

Figure 2.1. Illustration of the organization of the literature review for this dissertation.



The model of human occupation incorporates principles of an open systems theory to explain the interaction between humans and their surrounding environment. Within the model of human occupation, the environment is conceptualized as external objects, people, and events that influence the system's action. Humans are viewed as possessing an inner purpose that is complex and spontaneous within the Open Systems theory (Malanowski, 1997). Further, the theory cites that humans seek a certain balance, but that this process may involve constant and complex change (Kielhofner &

Burke, 1980). An open system interacts with its environment and is continually changing as a result of that interaction. Interaction of a system with its environment is represented by a cycle of input, throughput, output, and feedback. Information regarding the three aspects of the environment enters the system as it is acted upon (input) and as it acts on the environment (feedback). The open system utilizes an internal drive to interact with the environment and organizes its own behavior. The social organization of the human group allows its young members to play and requires adult members to produce for themselves. The group is a vital dimension of the environment that shapes occupation (Kielhofner & Burke, 1980).

Through input, an open system receives information about the environment. Input may consist of several different properties such as an object, event, or other people in one's environment. The human system must process information about objects, people, and events for competency. Complex images, expectations, experiences, and success and failure are also types of information that can be considered input (Kielhofner, 1985).

Information is processed in throughput and converted to maintain the system resulting in output. Output is the result of what the system does to or in the environment. This information is then processed and returned to the system as feedback. Feedback may be internal or external. Internal feedback is how one perceives actions in his or her own mind. External feedback is the opinion that others attribute to one's occupational behavior (Kielhofner, 1985).

Kielhofner (1985) describes humans as open systems and conceptualized the throughput phase of the human open system as consisting of three hierarchically arranged subsystems: (a) volition, (b) habituation, and (c) performance. Any change in the system resonates throughout the rest of the system. The system maintains a balance by directing the lower subsystems and constraining the higher ones; if disharmony occurs, the system resets itself automatically. The system changes throughout the lifespan and must continually reorganize to respond to the changing demands of the social group for occupational performance and behavior.

Volition is described as the highest-level subsystem and exerts a broad controlling influence over the entire system and represents to the system its achievement of success and failure when interacting with the environment. Volition describes how behavior is motivated. Volition is controlled by the innate spontaneous tendency toward mastery and exploration; in the volitional subsystem, choices are made based on personal values and interests.

Personal causation is the sense of one's influence on the environment and grows out of the basic urge to explore and master the environment. If desired outcomes are reached, then a sense of successful control over the environment develops. The span of control is described as the pawn and origin. Pawns doubt they are in control and do not seek challenges that would lead to mastery of occupation. A person's sense of control is based on actions that are very successful and transform into areas of competence (Kielhofner & Burke, 1980).

Orgins, on the other hand, are individuals who see themselves in control. They strive to explore and to master the environment and seek out a lot of challenges. The orgin develops skills that can be used in future situations that will increase his/her chances of success. Orgins see themselves as having control as they gravitate towards productive behavior, gaining discipline and competency over daily life tasks and events. The pawn and the orgin represent characterizations of persons who are either totally unable or totally able to carry out their desire toward mastery and exploration. Included in this perspective are the individuals' sense of internal versus external locus of control, their belief in the skills they possess, the skills that are relevant to their life situation, and the expectancy of success or failure (Kielhofner, 1985).

The following properties are associated with open systems: (a) circularity, which is the system acting upon itself; (b) purposefulness, or the ability of the system to act in response to goals or desires; (c) steady state, which are the system's ability to maintain itself in a certain equilibrium while in a constant state of change; (d) equinfinality, or the ability to achieve goals through various ways; and (e) differentiation, modularization, and centralization, which are the ability of the system to change from a simple to a compound structure, the ability of one element of the system to act independent of the others to perform other functions, and the ability to integrate functional subunits into a single governing body (Kielhofner, 1985).

Values are "images of what is good, right and important" (Kielhofner, 1985, p. 17), and they organize behavior by establishing an internal order of priorities. Values influence human behavior and are comprised of temporal orientation, meaningfulness

of activity, occupational goals, and personal standards. Temporal orientation is how time is viewed in an individual's own perspective, including the past, present, and future. Meaningfulness of activity relates to the importance and worthiness of a particular task to an individual. Occupational goals are the personal accomplishments an individual holds for him or herself. Performing in morally and socially acceptable ways are one's personal standards according to Kielhofner (1985).

Habituation coordinates behavior into patterns or routines that reflect environmental conditions and coalitional characteristics. These patterns and routines are termed by Kielhofner (1985) as roles and habits.

Roles are the perception that an individual holds of oneself in an occupation or a social organization. An individual may hold many roles at a given time. The dimensions or roles are perceived incumbency, internalized expectations, and balance. Perceived incumbency is "the belief that one has the status, rights and obligations of a role and that others also perceive one to be in the role" (Kielhofner, 1985, p. 26). The awareness of being in a role has an influence on one's behavior. Internalized expectations are the idea that one has of what is expected of him or her while being in a role. Further, role balance is the integration of the total number of roles in one's life. The balance of roles exists when one's roles do not conflict or compete for one's use of time (Kielhofner, 1985).

Habits are developed from the routine and usual ways in which an individual performs (Kielhofner, 1985). Habits provide an integrated consistency in the action of everyday life. Further, habits structure the use of time to achieve more efficiency in

daily occupation performance. The components of habits are the degree of organization, social appropriateness, and flexibility/rigidity. The degree of organization is important so that there is a consistent pattern and use of time in a given area of interest. Habits need to be socially acceptable in order for them to develop in the area of performance. Rigidity/flexibility is "the degree to which a person is able to change routines of behavior to accommodate periodic contingencies" (Kielhofner, 1985, p. 30). An individual must be consistent, yet be accommodating when things change.

According to Kielhofner (1985), the performance subsystem is "a collection of images and biological structures and processes which are organized into skills and used in the production or purposeful behavior" (p. 31). The performance subsystem is composed of internalized rules that assist an individual in how to perform including the biological constituents of skill. Constituents are elements that support the ability of skills; they are (a) perceiving a goal and the means of accomplishing the goal, (b) a mode for interpreting this information into appropriate actions, and (c) a mode of receiving feedback to modify or maintain appropriate action.

Skills are the capability that one has for the performance of various types of purposeful behavior. Types of skill for performance are: (a) communication/ interaction, (b) perceptual motor skills, and (c) process. Communication/interaction is the ability to receive and give information. Process skills are the abilities to problem solve and plan future events. Perceptual motor skills are the abilities to interpret sensory input and the manipulation of self and objects to respond. Performance is responsible for the enhancement, maintenance, and changes that occur in skill. These

dimensions make up an internal organizational system that is responsible for the entire output of the human system (Kielhofner, 1985).

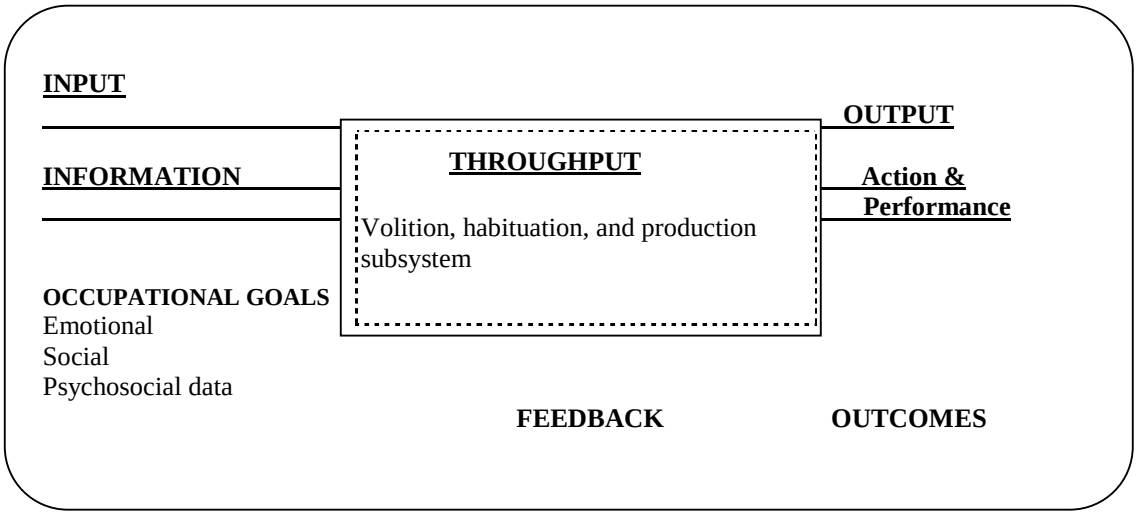
Roles and habits are built upon existing skills and are organized into meaningful behavior patterns. Every kind of open system represents a recognizable pattern of change. Although the general patterns of all living systems are demonstrated in birth, life, and death, the qualitative aspects of how they live is demonstrated by their individual pace, sequence of changes, and patterns of actions. The patterns of change in the human system are patterns of change in human occupation. They may be culturally determined; however, most societies include a pattern of childhood, followed by apprenticeship or a student period that prepares the human member for productive participation in adult life. Hopefully, the system changes constantly; and therefore, through the lifespan, it must be continually reorganized to respond to the changing expectations and demands of the social group for occupational behavior or performance (Kielhofner, 1985).

Kielhofner's Model of Human Occupation

It is important to note that Figure 2.2 provided by the researcher is merely a shorthand adaptation of Kielhofner and Burke (1980). The summary below does not do justice to either the complexity or richness of the entire framework. There exists an entire set of laws that govern human occupation.

Input. Several different properties such as object, event, or other people. As man engages his environment, his occupation guides feedback to guide future behavior (independent variables used in this study).

Figure 2.2. Researcher's shortened adaptation of Kielhofner's Model of Human Occupation.



Throughput. The open systems receive information about the environment and take the information and convert it to maintain the system to produce output (the clinical successful performance of Licensed Practical Nurse soldiers through the completion of the training program).

Feedback. Enters the system as information, and this is where actual performance is compared to expected outcomes (reflected with student soldier's frequent counselings from faculty along with test grades, and clinical performance feedback).

Volition subsystem. Its structural components are personal causation, interest, and valued goals. These are what govern the systems' choices for action (could be student's motivation to do well or what is important to the individual soldier student).

Habituation subsystem. Structure composed of habits and roles – individuals maintain behavior in routine patterns.

Performance subsystem. Structure that consists of skills.

Output. Subsystems together organize the output of the system. The output involves both information and action and is referred to as performance. Output of information and action to achieve purposeful ends is an occupation. Purposes may be either serious or playful, but they always guide occupation (Kielhofner, 1980a) (student soldier's successful performance on the first attempt on the National Council of Licensed Examination for Practical Nurses).

Kielhofner (1980a) refers to the importance of roles and how they influence and assist with guiding behavior. Roles allow a person to explore new areas or to aspire to competence or achievement. Hill and Miller (1991) describe an early adult transitional period (ages 18-22) where leaving the family of origin is the major task of the period. The young man/woman feels half in and half out of the family. A great deal of energy is expended during this period to reduce dependence on familial support and authority. Peer support becomes critical to this task; however, parental control is often replaced by peer control. Marriage and the military often function as major transitional mechanisms and symbolize the first step into the adult world.

Licensed practical nurse student soldiers are faced with several new roles and attempt to meet all the requirements placed before them. Those students who are able to maintain preexisting habits and roles, with the support of the performance subsystem, should be able to maintain the same level of skill during LPN training school. If one applies Kielhofner's (1980b) theory, past experiences of the LPN in an educational environment are vitally important to his or her current learning. Looking

further at the attributes of the "pawn" and "origin," an administrator could hypothesize regarding the predictors of student success that are sought.

Admission predictors for the U.S. Army Licensed Practical Nurse Program such as specific sections of the Armed Forces Vocational Tests (combination score of Skilled Technical [ST] and General Technical [GT] tests) are used to measure a student's performance and to predict student success in military education programs. If indeed the ST and GT and other admission criteria do not provide an accurate snapshot of success, then students may struggle or be dismissed from the program, whereas those students who perhaps would make excellent competent LVNs may be omitted from entrance into the program (Thompson, 1988).

The literature pertinent to this study can be conceptualized as falling into six areas as illustrated in Figure 2.1.

Nursing Profession

The word nursing originates from the Latin term *nutria*, which means "to nourish." The noun version of the world evolved to a meaning of a person, usually a woman who tends the sick. By the 19th century, the training of those who care for the sick was added to the verb meaning. Nursing is a concept that has evolved throughout the ages and continues to develop into larger and more specific concepts. In fact, much of nursing's history is rooted in caring for the wounded in war (Donahue, 1996). Florence Nightingale and Clara Barton, two of the world's most famous nurses, won

recognition for their steadfast efforts to organize heroic nurses to treat wartime casualties (Scannell-Desch, 1996).

Nursing is a process that possesses a goal-directed nature and demands that certain steps, actions, and performances occur between the individual who does the nursing and the person who is nursed (Peplau, 1988). Further, the process of nursing is essentially an interpersonal one that requires participation and communication between two or more people who may benefit from the interaction, therefore, becoming therapeutic (Antrobus, 1997).

To explain nursing even further, it is a human relationship between an individual who is in need of health services and a nurse who is educated to respond to that need for help. Nursing is a professional discipline that focuses upon the human health experience. Further, the goal of nursing is to enrich the quality of life of patients who then become experts on their own health care. According to Rosdahl (1999), nursing is explained as:

> A special kind of service that helps the patient, as a person, meet the daily needs of life that he or she cannot satisfy alone because of illness or injury. Nursing also assists the patient in meeting special needs that are a result of illness, injury, or age. Nursing has been defined simply as caring for a sick or disabled person or one unable to provide for basic needs. (p. 7)

Rosdahl (1999) goes beyond her basic definition to describe nursing as a conservation of the wholeness of a person, one which stresses care of the patient as a "whole person." There are various definitions of holistic health that include the concept of "being in harmony with the universe" and the "harmonious integration of body, mind and spirit" (Rosdahl, 1999, p. 7). The holistic health approach continues to

describe that a person in a large part is in control of his or her own health and that one can be somewhat active in the outcome of his or her own health (Rosdahl, 1999).

Antrobus (1997) cites that the relationship between medicine and nursing can be explained utilizing Foucault's notion of discourse and the way that power is manufactured by various subgroups in a culture. The power is not a fixed amount of physical force, but a small flow of energy that moves through everything living within a culture. Nursing is slowly using power and knowledge to move away from a strictly scientific framework to a holistic one.

Practical nursing, which is also referred to as vocational nursing, has been in existence for many years. The very first LPN program originated in a Young Women's Christian Association (YWCA) in Brooklyn, New York, in 1892, followed by other nursing programs in the 1900s. As a result of World War I and II, thousands of nurses needed to be trained quickly to care for casualties. The number of training programs increased as the demand for nurses increased. In 1942, an Association of Practical Nurse Education was initiated to serve the role of accrediting schools of practical nursing. Practical nurse training programs continue to educate students to provide basic nursing care. Completion of a program provides eligibility to take the National Council Licensure Examination for Practical Nurses (NCLEX-PN), and satisfactory results on this test qualify the candidate for licensure. A graduate of a practical nurse program provides direct patient care and performs all work functions under the direction and supervision of a registered nurse, physician, or other equivalent health professional (Deloughery, 1995).

Nurses constitute one of the largest single groups of practicing professionals in the health care delivery system. They bear the primary responsibility for the direct care of clients in almost all health subsystems (U.S. Department of Health, Education, and Welfare, 1990).

According to Hunt and James (1997), health care reform has exploded over the past decade. The reform shifts career paths for LPNs and well as RNs. Although the role of the LPN differs from state-to-state and from organization-to-organization, most LPNs are still employed as health care members working with both physicians and registered nurses. There are a great number of LPNs who continue to obtain advanced preparation and are taking positions in such specialty areas such as intravenous therapy, emergency medicine, and dialysis. They are also practicing in such settings as caring for critically ill patients, operating rooms, and coronary care units. Further, according to Hunt and James (1997), because of reductions in hospital staff, more LPNs are working in home health care neighborhood health clinics and with insurance firms where they arrange for care and coverage as a result of injuries. The shift of leadership has also changed; many LPNs are now serving in leadership roles in which they supervise certified nursing assistants who function as primary caregivers.

To differentiate between an LPN and an RN, the necessary academic preparation of both will be discussed.

Registered Nurse (RN)

In order to become licensed as a registered nurse, one must spend from two to four years learning the profession. In addition, registered nurses may seek specialized

training that prepares them to practice to be public health, psychiatric, pediatric, maternal child health, medical, or surgical specialists. RNs are (a) responsible for the care of patients, (b) mentoring and teaching both professional and practical nursing students, (c) directing fellow allied health members of the team, and (d) directing care in various health care settings (Rosdahl, 1999).

Registered nurses perform many duties today that only physicians performed 35 years ago. Registered nurses often continue their education to become nurse anesthetists, nurse-midwives, nurse clinicians, and nurse practitioners. A registered nurse can attain a baccalaureate, a master's, or a doctorate degree in nursing. (Rosdahl, 1999).

There are three common types of education that lead to the RN license. A two-year graduate attends a community college and receives an associate degree (AD) in nursing. The focus of the training is primarily in bedside nursing care of the client. A three-year program is located in a hospital and does not grant any college credits. The four-year program in a college or university leads to a Bachelor of Science degree that provides both nursing skills and a general education. Most of these programs seek to prepare professional nurses who will pursue advanced education to teach or to become administrators who will assume leadership roles (Rosdahl, 1999). Regardless of academic preparation, the same licensure examination is required by all graduates as entry into practice as a registered nurse (Wheeler, 1998).

Neuman (1991) explains that basic nursing programs are the foundation for the future of education and prepare students for practice as nurses. Further, basic nursing

education is organized into a two-tier system: practical nursing programs and registered nursing programs.

Licensed Practical Nurse (LPN)

Licensed practical nurses (LPNs) care for the sick, injured, convalescing, and handicapped, under the direction of physicians and registered nurses. The majority of LPNs provide bedside care. Their nursing duties include taking vital signs, such as temperature, pulse, respiration, and blood pressure. They minister physical care to treat bedsores, prepare and give injections and enemas, apply dressings, apply medications, apply heat therapy/ice packs, and insert Foley catheters. LPNs collect samples from patients and perform routine laboratory tests. They also help patients with bathing, dressing, personal hygiene, feeding and recording the amount and time, keeping them comfortable, and providing to their emotional needs. Additionally, LPNs administer prescribed medications and start intravenous fluids along with observing patients and reporting adverse reactions to medications or treatments (Golden State Career Videos [GSCV], n.d.).

Texas State law requires that LPNs be licensed under the provisions of the Vocational Nursing Practice Act, which is administered by the Board of Vocational Nurses and Psychiatric Technician Examiners. Vocational nursing programs must have at least 1530 hours of study and practice for at least 46 weeks. Most practical nursing programs last about one year. Classroom study covers basic nursing, concepts, and patient-care related subjects, including anatomy, physiology, medical-surgical nursing, pediatrics, obstetrics, psychiatric nursing, administration of drugs, nutrition, and first

aid. Clinical practice usually takes place in a hospital. The course of instruction includes classroom instruction, lab experience, and patient care. Intravenous certification must be obtained after licensing (GSCV, n.d.).

Nurse Shortage and Attrition

According to Mendez and Louis (1991), there are more practicing nurses than ever before. The problems arise with the widening scope of practice for nurses, the higher acuity of patients and the increased technology that results in a shortage of nurses.

America's demand for nursing care is expected to balloon over the next 20 years due to the aging population, advances in technology, and various economic and policy factors. In fact, the Bureau of Labor Statistics ranks the occupation of nursing as having the seventh highest predicted job growth in the U.S.

Three contributing factors are cited by Mendez and Louis (1991) for the severe shortage: (a) demographic changes resulting in fewer 18-year-olds for colleges to recruit, (b) other careers previously closed now being open to women, and (c) the image of nursing as one of a powerless profession with poor wages and working conditions. The combination of the increasing need for nurses and declining enrollment has made the shortage very acute. Further, the number of students enrolled in schools of nursing who did not successfully complete the program is also a contributor to the shortage. In fact, attrition rates in schools of nursing are extraordinarily high. It has

been reported that over 50% of all nursing students enrolled in institutions of higher learning either drop out or fail (Oliver, 1985).

According to Allchine and Bellucci (1981), a research study was completed and reported by the U.S. Health Resources Administration in 1976. Statistics were compiled from 13,410 institutions. The predominant reason for withdrawal from a nursing program given by participants was scholastic; 26% gave reasons such as less interest in nursing or personal problems. In baccalaureate programs, 34% withdrew because they were no longer interested in nursing and 18% because of scholastic work. Fewer than 5% of the baccalaureate withdrawals expressed dissatisfaction with the program of the school. After years of studying nursing programs, Allchine and Bellucci (1981) concluded that personality variables were inconsistent and somewhat unreliable as predictors of success in a nursing program.

Shortages in nursing are not new. According to Huston (2003), nursing shortages in this country are cyclical and have occurred every 8-15 years for at least the past 50 years. The current shortage differs than those of the past because it is more severe in scope, impact, and the potential ability to correct it. During the mid-1980s, the nursing shortage in this country was severe, widespread, and incrementally worsening. The trend was nationwide. Further, the U.S. Department of Health and Human Services predicted that by the year 2000, there would be only half as many registered nurses (RNs) needed (U.S. Department of Health, Education, and Welfare, 1990).

The Secretary's Commission on Nursing validated that there remains a significant and wide shortage of practicing nurses that will affect all of the sections of the health care system (White-Parson, 1993). The nursing shortage is now critical. There are over 2.6 million registered nurses in this country, and only 1.5 million of those work in nursing. The National Sample Survey of Registered Nurses projected that by 2005, 2.6 million full-time RNs will be needed in this country, a shortfall of 43% (Huston, 2003). The American Hospital Association reported over a decade ago that 85% of the hospitals surveyed reported critical shortages (Harrington, 1988).

Ninety-seven percent (97%) of all hospitals with an in-patient capacity of greater than 500 reported vacancies in RN positions (American Nurses Association [ANA], 2002). Recruiting of new nurses is not easy. The profession of nursing continues to experience a majority of females and women today have far more opportunities than 30 years ago. Most nurses retire at the age of 49; therefore, an exodus will start in 10 years, leaving a critical shortfall of nurses (Huston, 2003).

In past years, the "traditional" nursing student was an 18-year-old high school graduate entering college directly from high school. Since 1995, the national average age of graduates from all nursing programs is 30.9 years, which is an increase of 7 years in the previous decade. Further, according to information gleaned from those who study the various generations, disconnects often occur between the values and characteristics of current older faculty and younger students, according to the age of each. For example, mature faculty members as a whole have very different views about work, authority, relationships, responsibility, and the nature of learning than today's 20

something learners. These characteristic differences require new approaches to teaching/learning to meet the needs of various groups (Spratley, Johnson, Sochalski, Fritz, & Spencer, 2001).

Licensed practical nurses held over 702,000 jobs in 1994, a quarter of which worked part time. Two out of every 5 LPNs worked in hospitals, about one-quarter worked in nursing homes, and over one tenth worked in doctors' offices and clinics. Other areas in which LPNs worked include temporary help agencies, home health care services, or government agencies (GSCV, n.d.).

In 1993, approximately 1,098 state-approved programs provided practical nursing training. At least 6 out of 10 students were enrolled in either technical or vocational schools, while 3 out of 10 were in community colleges. Others were in high schools, hospitals, and colleges (GSCV, n.d.).

Job prospects for LPNs are excellent. Recently, the number of graduates from LPN training programs has increased in pace with the need for additional health care workers. It is predicted that if enrollments in LPN training programs level off or decline as they have on a cyclical basis in the past, job prospects will be even better. Employment of LPNs is expected to increase faster than the average for all occupations through the year 2005 in response to the long-term care needs of a rapidly aging and disabled population and to the recent explosion of health care in this country. Employment in nursing homes is expected to expand much faster than ever before. It is predicted that nursing homes will offer the most jobs to new LPN graduates as the

number of aged and disabled who have been released from a hospital and have not yet recuperated enough to return home increases (GSCV, n.d.).

As a result of the recent advances in technology, an increasing proportion of sophisticated procedures, which once were performed only in hospitals, are being performed in physicians' offices and clinics, including ambulatory surgicenters, emergency medical centers, and health maintenance organizations. The PEW Health Professions Foundation predicted that within the next decade, 80-90% of the insured population in this country will receive its care through health maintenance type of organization (Watson, 1997). LPN employment is projected to grow much faster than average as health care in general expands (GSCV, n.d.). Ensuring that the military will recruit, train, and retain LPNs is a difficult task at best. Predicting what will ensure success for students will benefit the economy, the individual, and the nation.

Development of the United States Army Licensed Practical Nurse Course 91WM6

The U.S. Army LPN dates back to the fall of 1947. The high competitiveness in all nursing fields between military and civilian hospitals in 1950 made it essential to evaluate the use of professional nurses in the Army. The Surgeon General of the U.S. Army directed the establishment of a 48-week course in practical nursing for enlisted personnel. In 1955, the Army requested an enlisted Military Occupation Specialty (MOS) for "Practical Nurse"(K. Devlin, personal communication, January 29, 1998). The modern licensed practical nurse role evolved from severe professional nursing

shortages of World War II. Shortages continued to be felt in the postwar years; therefore, the number of practical nurses grew even more. In 1947, Colonel Mary G. Phillips served as Chief of the U.S. Army Nurse Corps. The high competitiveness in all nursing fields between military and civilian hospitals in 1950 made it essential to evaluate the use of professional nurses in the Army. The Surgeon General of the United States Army directed the establishment of a 48-week course at Walter Reed Army Medical Center in practical nursing for enlisted soldiers. Colonel Phillips spearheaded this first practical nurse program for the Woman's Army Corps (WAC) personnel, which began October 5, 1950 (K. Devlin, LTC, personal communication, January 29, 2000). Obtaining the credential of "LPN" rapidly became the highly coveted crown jewel of the U.S. Army enlisted medical education. The role of the U.S. Army Licensed Practical Nurse (LPN) has been and will continue to serve as the backbone of field hospitals (Sarnecky, 1999).

The mission of the United States Army Practical Nurse Course is to educate and prepare highly trained battlefield medics in the ranks of Private through Specialist. The highly skilled medics graduate from the 91WM6 course with expanded knowledge and core competencies necessary to perform in a variety of patient care settings. Previously there existed two roles for combat medic soldiers: the 91B was actually out on the field and taking care of infantrymen, and the 91C with the same qualifications as the "B" along with a higher level of skills were usually in a hospital setting. The rates of promotion were much higher with the field combat medics (91Bs). The Army leveled the playing field for promotion by inventing one soldier medic, the 91WM6. In U.S.

Army jargon, 91M6 equals medically related field with hands on direct patient care, and the designator M6 equals Licensed Practical Nurse (91WM6) (J. Harris, personal communication, September 2, 2003). The Practical Nurse (91WM6) Course, coupled with Health Care Specialist training, results in the soldier's ability to maintain the skill set necessary to provide first-line trauma care on the front line of the battlefield, on the Forward Surgical Teams, and function in expanded roles in Combat Support hospitals and fixed medical facilities. The Army 300-M6 Course is accredited through Texas State Board of Vocational Nurse Examiners and upon successful completion, soldiers qualify to take the National Council Licensure Examination-Practical Nurse (NCLEX-PN) to obtain Texas State Licensure. The U.S. Army Practical Nurse Course prepares selected and qualified Army Medical Department enlisted personnel to provide entry-level practical nursing support during the delivery of medical and nursing care to patients during peacetime and mobilization and to function as first-level medical professionals in a variety of military settings. The 91W military occupational specialty is awarded upon successful completion of course requirements. During the course of training, the soldier is required to maintain his/her physical readiness in order to pass the rigorous Army Physical PT\Readiness Test (APFT), which is administered frequently throughout each block of training (U.S. Army Medical Department, 2001). There are two stages through which soldiers must pass in order to become practical nurses in the Army's health care system. The first stage is the application and selection screening process. Soldiers who desire to become practical nurses must apply for the

practical nursing program and meet the following criteria (U.S. Army Medical Department, 2001).

1. Be a high school graduate or successfully pass the General Education Development (GED) high school equivalency examination.
2. Possess a score of at least 100 on the General Technical (GT) and Skilled Technical (ST) composite of the Armed Services Vocational Aptitude Battery (ASVAB).
3. Be on active duty in the United States Army or in the Army Reserves or the National Guard and currently working in a medically related military occupation specialty (MOS).
4. Hold the military rank of E-3 to E-4. Persons with a rank of E-5 are considered on a case basis.
5. Meet physical and mental requirements which include (a) normal vision and hearing, (b) ability to pass the Army's annual physical training test and requirements, and (c) have no history of mental illness that require hospitalizations. Absolutely no history of drug use or abuse. The physical demand includes lifting requirement of 40 pounds constant and 80 pounds short term. Have no chronic limited mobility of joints, muscular and/or other musculoskeletal disabilities or disorders.
6. The course is available to Active Army and Army Reserve soldiers whose duty identifier is 91W or 91WY2. The minimum Service Remaining

Requirement upon completion of the course is 30 months for Active Army and 24 months for Army Reserve soldiers.

7. Female soldiers should not be pregnant (Army Training Requirements and Resource System [ATRRS], 2004).

Once solders who meet the admission criteria are selected, they are placed for their educational experience at one of the Army's six practical nursing schools. The schools are located throughout the United States and operate under a standardized curriculum that was developed and supervised by the Nursing Science Division at the Army Medical Division (AMEDD), The Academy of Health Sciences, Fort Sam Houston, Texas. The students' assignment to a particular location for practical nursing education is dependent upon factors that meet the U.S. Army's needs, such as funds available, staffing needs, and available student openings (Thompson, 1988).

Upon admission to the program, soldiers must meet rigorous educational and physical requirements necessary to become a practical nurse. When the soldier begins Phase I of studies toward LPN licensure, they must be prepared to devote long hours of study, as the pace is very rapid and intense (Thompson, 1988).

The Army's practical nursing curriculum has two basic components. The academic component consists of over 650 hours of theoretical subjects such as anatomy and physiology, pharmacology math, pharmacology theory, and content related to specific systems of the human body. During the clinical component, students are taught theory and practice concepts related to specific clinical specialties and are shown how to care for patients in a variety of clinical settings such as medical,

surgical, obstetrics, critical care, and pediatrics. Total clinical hours are 921, which include 71 hours of practical exercise. To be retained in the program, students must pass all theoretical and clinical courses with a minimum grade of 75% on examinations and 80% on Pharmacology examinations. Student evaluation is based on 29 written examinations, 12 pharmacology Calculation Quizzes and medication team pour practical examination (U.S. Army Medical Department, 2001).

The U.S. Army Practical Nurse Course consists of two phases: Phase I is a six-week course taught at the Academy of Health Sciences, 187th Medical Battalion, Fort Sam Houston, Texas. Phase I provides an expansion of basic anatomy and physiology presented in the primary Army Health Care Course and introduces the fundamentals of microbiology, nutrition, and pharmacological mathematic concepts fundamentals of nursing, field-nursing skills/tasks, setup and use of the Intensive Care Unit, field medical equipment instruction on set-up and storage of equipment, and computer/information systems used for patient and documentation such as Medical Communication of Combat Casualty Care and Composite Health Care System.

Phase II is held at six different sites and is 46 weeks long and affords the student the opportunity to acquire the skills necessary to be a practical nurse in a variety of community-based and acute care settings. Phase II is an integrated curriculum including clinical and didactic portions. The training includes (a) advanced anatomy and physiology, (b) expanding principles in microbiology, (c) integration of pharmacology and nutrition care, and (d) pathophysiology of the systems and its manifestations. Medication administration is an essential component throughout

training. The process provides the framework for the acquisition of knowledge and application of skills. Emphasis is placed on the student's ability to integrate concepts and perform skills in a variety of clinical settings. The clinical rotations are not limited to medical-surgical, pre-and postoperative settings, pediatrics, obstetrics, gerontology, emergency, and critical care management environments.

In Phase II, training continues for 46 weeks at one of the four phase sites located at medical centers across the country. The soldier then sits for the National Examination (NCLEX/LPN). The soldier continues to the 91W instructional program, which includes 704 hours of Initial Entry training with EMT-B certification requirement. The 91W Advanced Individual Training is a 16-week, modular schedule totaling 23,000 instructor contact hours. Emergency Medical Technician training, Cardiopulmonary Resuscitation training, invasive procedures, combat trauma treatment, evacuation, force health protection, supportive care, a combination of clinical and scenario training, and field training exercise are major features of the 91W initial-entry course. A sustainment course provides skills and knowledge to fully support qualified 91Ws in preparation for maintaining their skills and EMT-recertification (J. Harris, personal communication, September 2, 2003).

Since nurses constitute one of the largest single groups within the health care system and have the major responsibility for direct patient contact, it is vital to assure the preparation of its future nurses for effective performance (Schwirian & Gortner, 1979).

Predictors of Success in Nursing

Success for nursing students means that after completing the entire course of study, they also achieve a passing score on the licensing examination. Although an abundance of research exists on characteristics predictive of success on the registered nurse state board examination performance, corollary data for students in vocational nursing programs is limited (McKinney et al., 1988). A review of the literature indicates that the overwhelming majority of studies of student performance in nursing programs focused on the registered nurse. Research on Licensed Vocational Nurse predictors of student performance is insufficient (Bowman, 1992). Quality education for nurses is costly when compared to other academic courses. National studies reflect attrition rates in nursing as a career ranging from 30-40% (Rosenfield, 1988).

According to Crane, Wright, and Michael (1987), variables as applied to RNs would serve to assist in implementing academic support programs that may increase the success of LPN students. The variables describing nursing students in general are very similar to characteristics of LPN student populations. The following literature was used by the researcher to provide a foundation of understanding issues, trends, and possible solutions.

The body of knowledge identifying predictors of success on the National Council Licensing Exam (NCLEX-RN) has been growing since the exam was developed in 1982 (Jenks, Selckman, Bross, & Paquet, 1989). Beginning in 1989, the need for identification of predictors intensified because of the decrease in the quality of applicants and declining enrollment in schools of nursing that contribute to the current

rapidly growing shortage of practicing professional nurses. It follows then, that it has become essential to identify students at risk for failure and to initiate interventions that promote success for those students who are identified as high risk for failure, resulting in an increase in the number of licensed nurses available for practice. By determining what factors best predict failure on the licensing examination, faculty can identify potential times where planned intervention of special services may be introduced to interrupt the process. Exactly what the impact of the interventions and the points at which they are introduced will need to be measured at a future time (Jenks et al., 1989).

Review of LPN Predictors of Success

Kittner (1982) examined predictive capabilities of the Tests of Adult Basic Education (TABE) for Adult Vocational/Technical programs of Licensed Practical Nursing and Business Education. The researcher examined each of the three sections of the TABE to determine which contributed to the prediction of success in a licensed practical nursing program and a technical business program. The sample consisted of 100 students from each of the two programs. Discriminant analysis was used to ascertain the predictive capabilities of the variables as well as provide a means to assign group membership to the criterion variable. The TABE and the variables Sex and Race were found significant predictors of success in the LPN program. The three sections of the TABE together classified students better than any other combination of variables. None of the combinations of variables was found to be a significant predictor of success in the business education program.

As early as 1959, Rowan investigated the relationship of age and amount of formal education to scholastic achievement in the School of Practical Nursing in Indianapolis. Specifically, she attempted to answer the question of whether older students with relatively little formal education ranked as high scholastically as younger students with more education. One hundred records of previous students were utilized in the study. She concluded from her study that older students with less formal education rank higher scholastically than younger students with more formal education.

Bonte-Eley (2002) performed a quantitative research study utilizing archival student data from a six-year period of 137 practical nursing graduates. Eleven independent variables were selected for analysis. The variables examined were contained in three paradigms: (a) demographic characteristics (age, marital status, method of high school completion, presence of dependents, employment status, and financial status); (b) pre-entry variables (college basic assessment battery, remediation class requirements, NLN-pre-LPN assess scores); and (c) programmatic variables (Introductory Practical Nursing Course and certification as a basic nurse assistant) as predictors of Mosby Assess Test scores in her research question one and secondly as predictors of NCLEX-PN licensure rates for first attempt to pass the NLN licensure exam. The sample of 136 graduates used in the multiple regression analysis resulted in three variables of NLN pre-PN test scores, age, and Introduction to Nursing Course significantly predicted the Mosby Assess Test score. The final sample size for the logistic regression was 51. The results indicated the probability of passing the NCLEX-PN licensure examination without the predictor variables was 67%. Age entered as the

predictor variable increased the ability of the model to detect failures on state board examinations.

Meadow (1964) examined the relationships of age, marital status, and general intelligence with achievement test scores in a practical nursing school. The population consisted of 244 female students who were admitted to the Sinai Hospital School of Practical Nursing. The researcher discovered a significant positive relationship between age-marital status and achievement tests. Age-marital status was compared with several criteria variables: (a) final theory grade, (b) scores from the National League of Nursing Psychological Corporation achievement tests, (c) state board examination results, and (d) supervisor's ratings concerning the students personal adjustment. Meadow (1964) found that age-marital status had a high positive relationship in all cases. Further, a significant positive relationship between age-marital status and three dimensions of the personal Preference Schedule: (a) achievement, (b) orderliness, and (c) respectfulness. The researcher presumed that the "personality traits" were natural concomitants within the development of maturity of the student. The study suggested that both age and marital status should be factors in the prediction of success in a practical nursing program.

Baker (1975) conducted a study and used non-cognitive characteristics as predictors of success in associate degree nursing programs. Success was defined as graduating from the program. Subjects for the investigation were 112 students entering one of five associate degree nursing programs. Of the 112 students, 73 graduated, 32 dropped out, and 7 remained in the program but did not complete all requirements.

Baker discovered that the students who graduated had a different profile on noncognitive characteristics upon admission than did those students who dropped out of the program. Bakers' findings suggest that graduates had a higher level of maturity as measured by social criteria such as being older, married, more responsible, dependable, self-controlled, and achievement-oriented. Further, the graduates appeared to be more tolerant and flexible that non-graduates.

Booth (1992) utilized predictive discriminate analysis to determine the existence of variable subsets that predicted success in practical nursing programs. The analysis that was used to test the significance of differences between program completion rates of remediated and nonremediated groups of practical nurses was done through the use of chi-square analysis. The population consisted of 362 practical nursing students who entered a program in South Florida between 1988 and 1989, of which only 52% finished the program. The researcher found that the model that best predicated dropouts contained the variables of age, reading sub-test score, math sub-test score, and average nursing theory score. The best predictor set for the total sample contained the variable age, race, nursing theory score, and number of term one courses completed. Further, significant differences ($p<.05$) between the program completion rates of LPN students requiring remediation before program entry and those not requiring remediation were found for all of the sub-tests except reading (Booth, 1992).

Traditionally, a fair amount of research in nursing education has been directed at the examination and development of prediction criteria for registered nurse student selection with the anticipation that those students will potentially exhibit the greatest

success on the state licensure examination. Researchers have examined cognitive and non-cognitive variables along with pre-admission variables determined to demonstrate independent variables or a group of variables that will best predict student success. However, according to Bonte-Eley (2002), the results have reflected inconsistencies and often have limited application to practical nursing programs.

Ostrye (2001) examined demographic, pre-admission, and programmatic variables to determine their predictive value for the NCLE-PN success in a statewide two-year college system. She used a quantitative research design using archival data to analyze the impact of age, race, method of high school completion, and needs-based financial aid recipient and pre-admission variables (Psychological Services Bureau-Aptitude for Practical Nursing Examination, and type of remedial basic skill courses taken), and programmatic variables (course grade in a medial-surgical nursing course and cumulative nursing GPA at program completion) as predictors of success on the NCLEX-PN licensure examination.

According to Ostrye (2001), graduate success in nursing is most often defined in the literature as successful program completion, acceptable cumulative grade point average, or obtainment of a pass score on the NCLEX-PN licensure examination. That is the reason that she chose the NCLEX-PN as the dependent variable in her study.

Ostrye (2001) discovered that the average age in her study was 30.04. Further, she found that married students were less likely than single or divorced students to fail the NCLEX-PN. The odds of a student passing the NCLEX-PN on the first time was directly related to their cumulative nursing GPA. Also, the students' odds decreased

significantly if the student had enrolled and completed a basic reading remedial course. Further, she found that the percentage of students between the ages of 18-24 who passed the NCLEX-PN on the first time was 90.7%, ages 25-34, 94%, and 35-44 was 95.3%. Ostrye (2001) concluded that of the 13 variables that she studied, the strongest was the student's cumulative nursing grade point average. The researcher emphasized that further research should be done on focusing on students' predictors after admission instead of before.

Cloud-Hardaway (1988) conducted an ex post facto study and reported a significant positive correlation among Mosby scores, Nelson Denny Scores, semester averages, and NCLEX-PN scores. Older student graduates reflected higher mean NCLEX-PN scores than younger students. The mean NCLEX-PN score for minority students was below the mean for the entire group. The combined predictor variables that yielded the best estimate of the criterion variable NCLEX-PN scores for all graduates included the following: (a) mean semester average, (b) Mosby scores, (c) age above 33, and (d) Nelson Denny scores. According to the researcher, the results of this study could be of interest to nurse educators and nurse administrators who are connected with curricular revision and remediation procedures as they relate to the enhancement of graduates potential success on the NCLEX-PN.

Leitsch (1998) studied academic and demographic variables to predict success in licensed practical nursing programs. One of the criterion variables was student performance, with the values of program completion or attrition. The predictor variables included the Test of Adult Basic Education (TABE) reading and math scores,

age, race, gender, and highest level of educational attainment. The results of the study suggested statistically significant correlation between measures of success and Tests of Adult Basic Education (TABE) mathematics scores, age, gender, and ethnicity. However, there was no relationship between the level of educational attainment and any of the criterion variables.

An abundance of literature exists with information regarding the selection of students and the prediction of success for students enrolled in registered nurse training. Data for students in vocational nursing programs are limited and almost nonexistent regarding licensed practical nurse training in a military setting.

Student Demographics

Vocational nursing programs are usually located on community college campuses and cater to older, part-time, and commuter students (Moore, 1996). Within the body of literature, a debate continues as to whether or not age is a reliable predictor for success in post high school education. The findings of research studies examined were often inconclusive or contradictory. Research that suggested age was positively related to graduation and successful performance on nursing state board examinations was done by Aldag and Rose (1983) and Tedrow and Rust (1992). The researchers suggested that individuals over 21 years of age had a much better chance of succeeding (42%) as those who were under 21 years old (12%). According to Feldman (1993) and Hoyt (1999), students between the ages of 20-34 are most likely to drop out followed by students who are 36 or older.

Froman and Owens (1989) investigated admission and achievement variables related to predicting performance on the NCLEX. The admission variables were age, SAT verbal and math scores, along with transfer status of students. The achievement variables were grade point average in nonnursing courses and nursing clinical course grade average in nursing theory courses. The researchers found that the best predictors were nursing grade average and age. The researchers observed that the older students had typically been employed in a health-related field such as an LPN, a medical assistant, or a certified nursing assistant prior to entry into the BSN program. The researchers suggested that the students' work experience provided those students with admission cognitive skills that augmented their course performance. However, studies completed by Felts (1986) and McKinney et al. (1988) found that age was not correlated with NCLEX-RN performance.

The variable of age as a predictor of success is in line with Knowles' (1970) adult learning theory. Knowles emphasizes the significance of the learner's past experience in the educational environment. Implied in andragogy is a positive relationship between age, maturity, and abilities to reason, analyze, interpret, integrate knowledge, make decisions, and apply learning in problem-solving situations. Knowles points out that older learners have a greater volume and a different quality of experience as compared to younger learners (Neuman, 1991). It follows then that in the process of maturing, the person accumulates experiences that become the basis for which they relate new learning. New learning takes on meaning when it is related to past experience and organized around previous encounters with the subject.

The application of Kielhofner's (1980b) theory of human occupation is that one's roles and habits originate from existing skills and are organized into meaningful behavior. The patterns of change in the human system are patterns of change in human occupation. The student period reorganizes one's changing expectations and demands for occupational performance.

High School Completion

As early as 1972, Kochey performed a study at the Northampton County Area Community College using 12 independent variables and first semester GP's of nursing and dental hygiene students. A multiple regression analysis was done utilizing 144 students to attempt to formulate a prediction model. In the dental hygiene field, age and high school mathematics grade point average proved to be the best predictors of first semester success in school. Age and high school percentile rank were determined to be the best predictors for the nursing field.

There are several studies that have dealt with the importance of grades as predictors of success in college students. As early as 1979, a study of 525 community college students determined a Pearson product moment correlation coefficient of .45 for cumulative high school grade point average and college grade point average (Spiller & Hall, 1979). Another study completed by Shaughessy and Evans (1986) demonstrated final college grade predictability using the student's cumulative high school grade point average. Their finding reflected a .05 level of significance.

Many program directors consider high school rank, quartile, and/or grade point average to be the major indicator of successful program completion. As early as 1971,

Anderson (as cited in Wade, 2001) studied the predictability of high school grades and the Differential Aptitude Tests for success in vocational programs in health careers. Wade (2001) discussed that the study was undertaken to determine the validity of the Differential Aptitude Test (DAT), the differential validity of each score of the DAT, along with the effectiveness of high school rank as a potential measurement of past performance for predicting success in vocational programs in health careers. Data obtained for a sample of 127 students representing five health occupational programs consisted of HDR, DAT scores, results of an end of first quarter training comprehensive examination, final grade point average, scores on a vocational achievement test, and a certifying examination for two programs in the sample. Pearson Product Moment correlations reflected that HSR showed a higher correlation with each of the criterion measures than any of the DAT scores. It appears that HSR was a better predictor of success in the Theory subset of the DCE than of any of the skill-oriented subtests.

Lewis and Welch (1975) sought to determine an optimum method of predicting academic achievement in a bachelor of nursing degree program and found that the students' rank in their high school graduating class was a factor that reflected a significant correlation with a criterion of achievement. Allchine and Bellucci (1981) tested both cognitive and non\cognitive variables in two separate classes of freshman nursing students attending Wilkes College in Pennsylvania to determine predictors of success in the program. The findings proved that high school percentile rank was a significant cognitive predictor of achievement.

A study of indicators of potential success (passing the National Examination for the field) among radiography Licensed Practical Nurse students completed by Miller (1993) suggested that a significant relationship between students high school class rank, scores on the Scholastic Aptitude Test (SAT), and successful performance on the American Registry of Radiological Technologists (ARRT) examination was noted. In summary: "As the demand for radiographers increases and the number of applicants to schools over exceeds the available student capacity, any predictors of academic success that have demonstrated a degree of validity in screening candidates must be considered" (Miller, 1993, p. 376).

A study performed at Southwest Texas State University by Tompkins and Harkin (1998) examined admission criteria and predictors of academic success of 40 ethnically diverse, nontraditional respiratory care students. Historical data were retrieved from student records that included high school information, academic performance while in the program, and performance on the National Board of Respiratory Care credentialing examination (NBRC). The researchers discovered that high school rating quartile was the greatest predictor of program grade point average.

Often, in research, there exists some disagreement among research studies. Even in the area of high school GPA that has received the support of numerous studies, other studies have not shown a correlation to post secondary school education (Jensen, 1987). Mitchell (1975) discovered in a study of persisters and withdrawers that there was "no significant difference in high school rank between groups" (p. 51). Further, a researcher reported that "the average of high school grades is not related to State Board

performance, nor are most specific subject grades…High school performance is unrelated to Nursing grades" (Mitchell, 1975, p. 72).

ASVAB

The Armed Services Vocational Aptitude Battery (ASVAB) is used for education counseling and for military enlistment qualification. The tests of the ASVAB are aggregated into composites that reflect meaning for the user (Earles & Ree, 1992). When the focus of the literature review was narrowed to studies related to military population and use of the Armed Services Vocational Aptitude Battery (ASVAB) as a predictor of student success in the military Licensed Practical Nurse Training program, few studies were located. In the literature, information that exists pertaining to the ASVAB fell into three broad categories: (a) the development and history of the ASVAB, (b) critique of the ASVAB as an aptitude battery, and (c) studies that related to the use of the ASVAB in high school and military populations.

Development and history of ASVAB. Numerous problems were encountered with the need to rapidly direct and assign job classifications to hundreds of thousands of men mobilized during World War II. In response to the problem, Public Laws 759 and 90-40 were put in effect. The laws mandated aptitude testing for job classification and duty assignment by all branches of the armed services. Perhaps that was the greatest impetus for the creation and use of standardized psychological and intellectual tests such as the AFQT, (later compiled into the ASVAB) (Vitola, Mullins, & Croll, 1973). As a result, the Armed Forces Qualification Test (AFQT) became the sole instrument for screening enlisted in all branches of the service. The services continued

to design and use their own individual instruments and separate methodologies in the classification process of soldiers.

Initially, the Army was followed closely by the Air Force in using the battery of tests primarily to recruit high school students. The AFQT was originally developed to meet the requirement set by Congress for procedures to screen selective service registrants for military trainability. Beginning in the early 50's, the AFQT was the primary selection test used by all military services to determine enlistment eligibility. The AFQT battery scores were not only used as a military recruiting tool, but the results were shared with high school administrators for guidance and counseling purposes. Eventually, the Army followed the administration of the AFQT with more specific methods of their own. The Air Force used their specific measurements first and then administered the AFQT (Bayroff & Fuchs, 1970). However, with the creation and implementation of the ASVAB, the AFQT became a composite of three of the ASVAB subtests and is no longer a separate screening test. The AFQT test is now combined as an important component of the ASVAB (Wigdor & Garner, 1982).

Wigdor and Garner (1982) explain that the AFQT has five categories or ranges of scores. Individuals scoring in the lowest 9% of a standard reference group are placed in Category V (military jargon is Cat V). Individuals scoring from the 10^{th} to 30^{th} percentile are placed in Category IV. The 31^{st} to 64^{th} percentile makes up Category III, the 65^{th} to 92^{nd} percentile, Cat II, and the 93^{rd} to 100^{th} percentile, Cat I. Unless directed by the Secretary of Defense or by passing of legislation, the services each establish their own minimum breakpoints for selection and assignment to service. According to

the Selective Service Act of 1958, in time of war, the service must accept AFQT Cat V and above. Military services traditionally do not accept Cat V personnel.

According to Wigdor and Garner (1982), current entrance minimums are as follows:

- the Army requires a score at the 16th percentile for high school graduates and the 31st percentile for nongraduates;
- the Navy and Marine Corps require a score at the 21st percentile or higher to qualify for enlistment;
- the Air Force requires a score at the 21st percentile for high school graduates and the 65th percentile for nongraduates. (p. 156)

According to Vitola et al. (1973), in 1966, a service measurement team was established by the Department of Defense (DoD) to design and standardize an aptitude battery tool that would meet the needs of the military armed services. The need for a common battery test was established when the armed forces started testing high school students as part of their recruitment tactic.

According to Earles and Ree (1992), the military uses the ASVAB, a 10-test multiple aptitude battery to select applicants for enlistment and to classify them for job assignments and initial training (Table 2.1). ASVAB content is based on the concepts of differential measurement and validity. The content of the ASVAB is standardized, and contains measures of verbal, mathematical, clerical-speed, and technical aptitudes.

Table 2.1. Armed Services Vocational Aptitude Battery (ASVAB) Tests: Description, Number of Questions, and Testing Time*

ASVAB Test Title and Abbreviation	Description	Number of Questions	Testing Time in Minutes
Arithmetic Reasoning (AR)	Measures ability to solve arithmetic word problems	30	36
Word Knowledge (WK)	Measures ability to select the correct meaning of words presented in context and to identify best synonym for a given word	35	11
Mathematics Knowledge (MK)	Measures knowledge of high school mathematics principles	25	24
Paragraph Comprehension (PC)	Measures ability to obtain information from written passages	15	13
General Science (GS)	Measures knowledge of physical & biological sciences	25	11
Mechanical Comprehension (MC)	Measures knowledge of mechanical and physical principles & ability to visualize how illustrated objects work	25	19
Electronics Information (EI)	Measures knowledge of electricity and electronics	20	9
Auto and Shop Information (AS)	Measures knowledge of automobiles, tools, and shop terminology and practices	25	11

Table 2.1 (continued)

ASVAB Test Title and Abbreviation	Description	Number of Questions	Testing Time in Minutes
Coding Speed (CS)	Measures ability to use a key in assigning code numbers to words in a speeded context	84	7
Numerical Operations (NO)	Measures ability to perform arithmetic computations in a speeded context	50	3
Totals		334	144b

*Administrative time for the test is 36 minutes, for a total testing and administrative time of 3 hours.
From Eitelberg, 1988.

According to Jensen (1985), the ASVAB was developed for students (ages 16-23) in grades 11 and 12 of high school along with the first two years of community college. Each year the ASVAB is administered to over 1,3000,000 students in over 16,000 high schools (Prediger, 1987).

The subtests include General Science (GS), Arithmetic Reasoning (AR), Word Knowledge (WK), Paragraph Comprehension (PC), Numerical Operations (NO), Coding Speed (CS), Auto and Shop Information (AS), Mathematics Knowledge (MK), Mechanical Comprehension (MC), and Electronics Information (EI). A verbal measure, VE, is the sum of WK and PC and is also used as an 11^{th} test. Scores are not reported on individual tests but are on seven overlapping subjects called academic composites. They are Academic Ability, Verbal Ability, and Math Ability.

Critique of the ASVAB. The ASVAB is routinely validated against criteria by each of the services. New forms of the ASVAB are produced at regular intervals, and validation is required to demonstrate that the new tests remain useful for predicting the individuals' criteria of interest (Earles & Ree, 1992).

According to Jensen (1985), one of the greatest properties of the latest version (ASVAB-14) is the outstanding quality of the standardization. The reference population was changed in 1980 when the test was administered to a nationally representative sample of 12,000 men and women (ages 16-23). Jensen (1985) further asserts that minorities such as African Americans, Hispanics, and economically disadvantages were purposefully oversampled in order to provide detailed statistical analyses to evaluate the tests' psychometric properties, including cultural item biases. Reliability is "entirely satisfactory and on a par with the best commercially published tests of general ability and scholastic aptitude" (Jensen, 1985, p. 33).

Earles and Ree (1992) investigated the validity of the ASVAB subtests and composites for grades in 150 military technical schools. The subjects were 88,778 first-term male and female non-prior service USAF recruits tested with ASVAB parallel forms. Only those recruits who had completed technical training had course grade criterion measures and were included in the study. The aggregate for the study were predominately male (83%), non-minority (80%), and high school graduates or beyond (99%). The predictors were the scores from the ASVAB taken for enlistment qualifications. The criterion measures were the Final School Grades (FSG) earned by the recruits in 150 technical training courses. From the results of the study, the authors

recommended three future lines of research. The first is to develop optimal composites from the ASVAB subtests. The second is assigning classification composites to jobs to enhance validity, and the third is the exploration of predictors, which would not disparately affect female applicants.

Fairbank, Welsh, and Swain (1990) investigated the short- and long-interval validity of the ASVAB for prediction of high school course grades. Grades for more than 20 different high school courses for a sample of over 8,000 high school students from 50 high schools throughout the nation were used to analyze the predictive validity of 11 composites formed from the ASVAB. Students in the sample used for the validity analyses were grouped by academic year (AY) in which they obtained the course grades analyzed (AY 1984-1985 or AY 1985-1986), by grade level, and by course. The ASVAB was administered in the 1984-1985 school year. Separate validities for each of the resultant groups were computed for the criterion of final course grade, for each of the predictors – the 11 ASVAB-based composites – and a multiple regression predictor using all 10 ASVAB subtests. Results indicated that the Business and Clerical, Mathematics, and the Armed Forces Qualification Test (AFQT) composites were the most effective predictors of high school course grades for their sample. The most effective composites predicted general academic final course grades with mean validity coefficients of approximately 43. The prediction was slightly less effective for Business and Clerical final course grades, mean = 40; it was slightly less effective still for Trade and Specialty courses, mean =.38. The authors suggest that the results of the

study provide “clear evidence of the validity of the ASVAB in predicting high school course grades” (Fairbank et al., 1990, p. 3).

Hunter (1986) and Hunter and Hunter (1985) performed theoretical studies that addressed the construct validity of the ASVAB. Their studies suggested that the predictive validity of the ASVAB should generalize to civilian occupations because they explain that the ASVAB is a better measure of “g” than is the General Aptitude Test Battery (GATB) (Hunter & Hunter, 1985), and the “g” factor is suggested to be a predictor of job success. Further, the GATB has been shown to be a valid predictor of civilian occupational success. To summarize, Hunter and Hunter (1985) stated that “the validity of the ASVAB is even higher than the validity for batteries which are used in the civilian sector” (p. 1).

There are opposite evaluations for the use of the ASVAB in the literature. Interesting to note, that Prediger (1987) and Jensen (1985) reached conclusions in their summary of ASVAB validity studies that indicate that the ASVAB has serious limitations for career counseling. Douglas (1986) explored the ways in which the ASVAB might provide the college admissions counselor an additional set of test scores that could be used along with existing test scores such as the SAT. The findings suggested that a significant positive relationship existed between the ASVAB and the PSAT, SAT, and ACT. Further, the researchers suggest that their study indicated tat the ASVAB could be used as a valid counseling tool for college-bound students. The ASVAB should also be utilized as a tool to provide both academic and occupational information to help all students with their future career planning.

Wigdor and Garner (1982) assert that the present use of ASVAB scores leads to an understatement of the adequacy of the manpower pool in perhaps three ways:

1. The choice of pass/fail scores used to define eligibility – the applicant who does not qualify for training because his or her score is not high enough could be a victim of a pass/fail cutoff.
2. Multiple hurdles for training requirements – pass/fail cutoff scores on two or more ASVAB composites are used for admission to the large majority of training for enlisted in all branches of the service. It is recommended to use the one single best composite score, not multiple.
3. The choice of ASVAB composites – measurement experts suggest choosing a set of composites with minimum intercorrelation.

Wigdor and Garner (1982) continue with a discussion regarding the fact that each of the services uses different composites. The authors suggest that all the services should utilize the same composite scores as a tool for ensuring a quality manpower pool across the services.

Studies pertaining to the ASVAB and military populations. According to Caretta and Siem (1999), all applicants for Armed Forces enlisted jobs take the ASVAB prior to joining the military. The ASVAB is administered at Military Enlistment Processing Stations and other sites within the continental United States and designated locations overseas. In the field of the USAF enlisted air traffic controllers, the researchers examined the validity of the ASVAB against apprentice-level training. They found that

the ASVAB demonstrated acceptable validity for predicting apprentice-level training performance.

Maier and Truss (1984) investigated the validity of the high school composites for the prediction of success in 34 entry-level Marine Corps technical training courses. Using the final course grade as the criterion, they discovered that the average validity coefficients for the sample of over 16,000 Marine Corps recruits were between .57 for the Mechanical and Crafts composite and the Verbal composite, and .61 for the Health, Social, and Technology composite as well as the Electronics and Electrical composite. Validity coefficients for the Technical and the Perceptual Speed composites were .52 and .45.

Porter and Buckingham (1998) assessed the predictors of student's success in the 383 Training Squadron's Medical Service Apprentice course in the Air Force School of Health Science at Sheppard Air Force Base, Texas. Corrrelation and regression analysis provided seven predictors for their program of students' success. Their findings indicated that student status was significantly dependent on certain block grades, number of special instruction hours, ASVAB (mechanical composite score), Armed Forces Qualification Test (AFQT) scores, and the National Registry Emergency Medical Technician (NREMT) Test 1 grade. From the predictors, the researchers determined demarcation points to provide input for proactive intervention to students by instructional staff.

Dunai (2001) assessed the ASVAB's predictors of student success in the diagnostic imaging course at the USAF's School of Health Care Sciences. The

investigator suggested that regression analysis provided two significant predictors ($p < 0.05$) of student success identified by final grade. The electronics and mechanical scores proved to be predictors on the ASVAB. Dunai (2001) suggests that in the future, entry-level radiography programs should consider using the predictors for decisions about class candidate selection.

Aptitude predictors for students enrolled in the AMEDD Prosthodontic Laboratory Technician Course were studied by Parker, Brew, Smith, and Finstuen (1995). The investigators examined the extent to which results of a chalk carving test and ASVAB scores are predictive of course completion and course grades for a group of 61 students in an Army prosthodontic laboratory technician training course. Interesting to note, the researchers found that assessing manual dexterity with a chalk carving activity, proved to be a better predictor of student success than the ASVAB. The chalk carving exercise proved to be the best predictor because of the courses' heavy emphasis of manually dexterous hands-on exercises such as modeling of impressions and dentures.

Meadows, Stanton, Styles, and Finstuen (2002) examined predictors of successful completion of the AMEDD Pharmacy Specialist (91Q) training program. The sample consisted of 143 students from four course iterations, and only students enrolled in the course for the first time where included in the study. The relationship between 16 predictor variables and successful completion was assessed. The investigators discovered that five variables, the ranks of private (E-1) and specialist (E-4), cross-trainee status, gender, and ASVB General Technical (GT) score, were found

to be significant predictors using simple linear regression. Results of the study indicated that ASVXB GT scores were predictive of success ($p<0.01$) in the 91Q training program. The researchers suggested that the use of the above predictors could be modified to improve the likelihood of future student success in the course.

The most comprehensive investigations of the use of the ASVAB as predictors of vocational/technical training programs were conducted by Pawling (1981). The researcher investigated if the ASVAB contained variables that could be used to predict student successful performance, thereby assisting vocational counselors or administrators to guide prospective students about different vocational training programs. Three hundred ten (310) high school students completed the vocational/technical program during 1977-1978 and 1978-1979 school year. Step-wise analysis of regression was used to examine the relationship between each of the student's ASVAB sub scores as the independent variables and the course grades earned in the vocational programs as dependent variables. As a result of the regression testing, multiple correlation coefficients were tested using an F ratio to determine if the battery could predict success for the total school program. The results indicated that the F values exceeded the F at the 0.5 level of significance, indicating the ASVAB does contain elements that can be used to predict vocational student performance (Thompson, 1988).

Thompson (1988) attempted to determine if variables could be identified that would enable educators to predict more accurately soldier student performance in the U.S. Army's practical nursing program. The independent variables included: (a) age,

(b) sex, (c) marital status, (d) years of education completed, and (e) the Skilled Technical (ST) and General Technical (GT) composite test scores of the Armed Services Vocational Aptitude Battery (ASVAB). The dependent variables were: (a) success or failure, (b) the final course grade, (c) the academic and clinical phase grade point averages, and (d) the Skill Qualification Test score.

A sample of 182 successful and 151 unsuccessful students were randomly selected using the 1982, 1983, and 1984 academic records maintained at the U.S. Army Academy of Health Sciences, Fort Sam Houston, Texas. A logistic regression analysis was used to predict the probability of group membership in the success or failure group. The only independent variable that made a significant contribution to the efficacy of the regression model was the Skilled Technical (ST) composite score. A multiple regression analysis was used to determine the relationship between the independent variables and the dependent variables. There were significant positive relationships found between the ST and GT composite scores and all dependent variables (Thompson, 1988).

Based on the findings of his study, Thompson (1988) recommended that further research be done on exploration of high school rank as a predictor of student performance. His future recommendations for further researchers included using a Mathematics Knowledge subtest as a screening criterion along with screening other factors such as military life style characteristics that possibly influence soldier student success or failure.

In 1978, the ASVAB was administered to 601,7812 applicants for military service. In addition, 965,409 students took the ASVAB during the school year 1978-1979. Thus, it is the largest volume employment test in the nation today. Only two other tests come close to matching ASVAB in volume: the SAT and the ACT, which are used primarily for admissions to institutions of higher learning (Wigdor & Garner, 1982).

Years in Military/Experience

According to Meadow (1964), a National League of Nursing Education study in 1951 investigated the extent to which the National League for Nursing Pre-Entrance Test and personal characteristics of students were related to their performance in school and to their success on the state licensure examinations. The findings reflected significant positive relationships among entrance scores, achievement scores, and licensing examination scores. Further, there existed some positive relationships between personal factors and achievement but was not high enough to increase the predicting success from the entrance tests alone.

Meadow (1964) examined a variety of selection techniques and their effectiveness in predicting academic success and on-the-job success of a group of 264 students in a school of practical nursing. Efforts were made to determine whether there were variable characteristics that distinguished the successful nursing student from one who failed the school requirements and whether those characteristics could be predicted in advance.

Prediction of successful job performance was found to reflect very limited results. The lone variable that was found to be important in predicting job performance was intelligence as measured by the General Aptitude Test Battery (GATB) and age. The study suggested a confirmation of what is already known; that is that maturity and intelligence contribute to successful job performance. The study did not suggest how to predict which students would successfully graduate and which students would fail with a significant estimate of certainty (Meadow, 1964).

According to Barkley, Rhodes, and Dufour (1998), student success rate prediction is often reported as a multifaceted phenomenon. However, they assert that through examination of the scholastic profiles of students, various trends may emerge to assist in classifying students who are prone to either pass or fail.

Several variables have been studied and analyzed as predictors of performance on state board examinations. The factors that most often appear in predictive studies have been on verbal and reading ability, Scholastic Aptitude Test scores, nursing theory grades, college grade point average, and age. While there exist achievement studies, consistently stable predictive variables have not yet been identified (McKinney et al., 1988). Students who complete a nursing program successfully and subsequently fail the National Council Licensure Examination for Registered Nurses (NCLEX-RN) are a cause of concern to faculty members and administrators. A great deal of time, money and energy have been spent by both the faculty and the unsuccessful student to educate a person who is unable to enter the work force in his or her chosen profession. If predictors of success can be determined and applied early in the academic program,

or even prior to admission to the program, then appropriate actions such as counseling and/or early supplemental instruction can be utilized (Quick, Krupa, & Whitlery, 1985).

Achievement and admission variables have been discussed by McClelland, Yang, and Glick (1992) in an integrated curriculum for nursing to predict performance on the NCLEX. The admission variables examined were high school rank, high school grade point average, and individual and composite ACT scores. The achievement variables identified were prenursing and nursing course grades along with clinical nursing course grades. They found that grades in the clinical nursing courses and grades in the pathology course served as predictors of NCLEX performance.

Huerta (1990) examined the relationship of life-change event-stress in its relationship to academic achievement in nursing students. The variables of age, marital status, gender, ethnic origin, student level, and health-related experiences were explored as to their relationship to the stress and the academic achievement of nursing students. One hundred thirty-one (131) nursing students enrolled in an associate degree program in South Texas comprised the population for the study. After administration of The Life Experiences Survey, the results were compared to the student nursing grade point average. Through the use of a bivariate intercorrelation matrix and multiple regression, the researcher found that negative change stress had a significant relationship to academic achievement. Huerta (1990) discovered through supplemental data that students experienced negative life change stresses that included financial problems, support system conflicts, personal relationship changes, academic fears, and

personal illness. The results of the study suggested a framework for further identification of variables that affect nursing student attrition (Huerta, 1990).

Campbell and Dickson's (1996) analysis of the results of many NCLEX-RN studies is of particular interest. SAT and ACT scores often predicted NCLEX-RN studies, with the ACT significantly predicting NCLEX-RN success more often than the SAT. Grade point averages for subjects, including nursing courses, nursing clinical courses, and sciences, especially chemistry, reflected significant correlation with NCLEX-RN scores. The NLN Pre-Admission Examination-RN was also found to be a predictor of success. Of particular relevance was that test anxiety, self-concept, self-esteem, and a support group intervention strategy were also significantly correlated with NCLEX-RN.

According to Barkley et al. (1998), studies have also been completed that explore many nonacademic predictors of NCLEX-RN success, such as age, race, sex, self-esteem, primary language, and test anxiety. Further, they discuss the fact that the literature provides mixed results in attempts to categorize students according to potential performance. Additionally, the authors assert that overall, findings point out the particular difficulty in quantitatively identifying those students who are not likely to succeed.

Quick et al. (1985) examined the effectiveness of using certain indicators of student academic status available to nursing faculty members that was available at the time of the students' application for admission to clinical nursing courses in a baccalaureate program to predict performance on the NCLEX-RN. Graduates of a BSN

program were divided into two groups through determining whether they passed or failed the NCLEX-RN on their first attempt. Discriminate analysis was used to determine the students' grade point average at the end of the freshman year, scores on the verbal portion of the Scholastic Aptitude Test, and grades in an anatomy and physiology courses were directly related to successful NCLEX-RN performance. The authors suggested that attempts to predict NCLEX-RN performance using early available data in a student's academic career serve as a valuable education resource for nursing faculty.

Neuman (1991) examined variables identified in the literature as predictors of academic achievement and their relationship to performance of associate degree graduate nurses on the NCLEX-RN. Additionally, the researchers set out to analyze the variables for their ability to differentiate performance between types of graduates: licensed practical nurses and generic registered nurses. Neuman utilized data from 332 graduates of a Maryland community college upward mobility nursing program from 1982-1990 who took the licensing examination for the first time. The variables studied included admission criteria and academic achievement indicators. The specific variables were ACT composite score, admission GPA, nursing course grades, non-nursing course grades, and NLN Achievement Test Scores. Differences were reported in performance that definitely distinguished the LPNs, and non-LPNs. Neuman suggests that the findings from her study support giving advanced standing in upward mobility nursing programs for LPNs. The ACT consistently distinguished between pass/fail performance on NCLEX for all graduates, whereas admission GPA did not.

Military Life (Culture) and Related Stressors

A decade ago, the world was dominated by two superpowers, a group of significant but lesser military powers, and numerous second and third world countries. International politics were conducted with a cautious eye on the response of the United States and Soviet Union. Military planning focused on global war, with Europe as the most likely scene of action (U.S. Department of Defense, 1995).

The demise of the Soviet Union as an entity and collapse of communism in Eastern Europe permanently altered international relations. Animosities long suppressed under communism surfaced, creating tensions in places unheard of by Americans ten years ago. The United States became the world's only superpower, shifting the military's focus from deterrence of global war to numerous limited conflicts (U.S. Department of Defense, 1995).

American interests turned toward resolving domestic issues and congressional budgeting reflects the will of the people. Yet, the American public continues to expect that the Armed Forces be successful in any engagements. Faced with declining financial resources, the services have right-sized and reorganized to meet the unpredictable future environment. Drawing down has promoted drawing together, evaluating capabilities, and consolidating resources to form a smaller, more efficient military (U.S. Department of Defense, 1995).

The decline of the global war threat has not decreased the medical services' commitments throughout the world. Engagements in operations other than war such as peacekeeping, peacemaking, and humanitarian missions have resulted in many more

frequent deployments of medical manpower. Downsizing the force structure has resulted in smaller active duty medical services, yet the operational tempo has increased throughout the world. The continuing ongoing nature of the operations has led to deployment rotations between the services. Although most are termed peace operations, the volatility of players increases the potential for escalation into conflict, with resulting combat injuries (U.S. Department of Defense, 1995).

According to Artiss (2000), very early in a young enlistee's career, the military will make it quite clear that he/she is owned for the full 24 hours of each day. The soldier has almost immediately become an exact duplicate of a predetermined standard of behaviors, moves, codes of conduct, address, and uniformed clothing and gear. Even what freedom that the soldier enjoys will be only those that are predetermined.

Some time during the last half of the 13-week basic training, or in the first year of new Army life, soldiers will undergo a major change. From their previous acts being just a compromise, they will turn into enthusiastic members of the Army. They will stand straighter, swing along in exact rhythm with others, enjoy close order drills, wear their uniforms with pride, salute proudly and genuinely prove that they are becoming soldiers (Artis, 2000).

All soldiers in health-related occupations must be medically ready at all times. Medical readiness is defined as "the ability to mobilize, deploy, and sustain medical services for any operation requiring medical services; to maintain and project the continuum to healthcare resources required to provide for the health of the force; and operate in conjunction with beneficiary healthcare" (Bledsoe, 1996, p. 22).

One reason that soldiers are willing to expose themselves to hostile fire and enemy fire is that they know how excellent medical resources are available if they become injured (Gurney, 2001). Medical readiness is delivering healthcare to maintain wellness of the forces, preventing casualties from disease and injuries unrelated to battle, and implementing early trauma treatment to combat casualties. Readiness is a core of the Defense Health Program. The uniqueness of military medicine demands preparation beyond the typical healthcare skills. Environmental extremes, potential exposure to chemical, biological, and nuclear weapons, treating thousands of injuries from high velocity projectiles, or thermal injuries are challenges for the military medical provider. The effectiveness of the smaller, more agile combatant forces depends on the contribution of every member. A healthy, fit force is needed to contend with the various environmental challenges the military is now facing. While super technology and advanced weapon systems have made the United States military premiere in the world, it is powerless without the most vital element-effective personnel. All soldiers feel the pressure to provide top quality care to the Armed Forces. The contributions of each soldier are vital to the success of the military mission (Bledsoe, 1996).

One of the major military stressors identified in the literature is the continual threat of deployment that every soldier faces. Soldiers may have limited experience in such deployments, yet must be ready at a moment's notice to participate, in any military action involving their country. In fact, they are "suddenly ordered" to participate in a crisis military deployment and are removed from their known support

systems and separated from loved ones for an undetermined length of time. Conflicts between career, family, and military duties create stress. Military soldiers and their family have experienced the emotional trauma of deployment on an unprecedented scale since the end of the Gulf War (Peeble-Klieger & Klieger, 1994). Soldiers witness humanitarian missions and peace enforcements that have sent U.S. troops to Somolia, Cuba, Haiti, Bosnia, and Kosovo. Additionally, our recent Kurdish war relief efforts along with missions in Rwanda vividly demonstrate that military personnel remain on duty around the globe caring for people in need (Scannell-Desch, 1996).

Humanitarian and peace enforcements are often just as dangerous as war. Military personnel deployed to Somalia in 1993 found that they cared for as many combat trauma patients in a single day as had been cared for in Vietnam. The living conditions in Somalia were hot and dusty with water sources often containing fecal contamination. During a military deployment, military nurses practice in unique settings such as mobile or field hospitals where patient care is delivered under very difficult environmental situations such as monsoons, very hot weather conditions, rodent infested areas, and where the smells and sounds are often negative (Fry, Harvey, Hurley, & Farley, 2002).

Medical personnel who served throughout the Vietnam War from 1961-1973 describe horrifying conditions. According to Scannell-Desch's (1996) study, military nurses viewed their body as a tangle of emotions, fear, and physical sensations. The nurses described that they experienced heightened sensory awareness and contrasting visions of the gorgeous countryside with the black, bomb-cratered terrain of war. The

nurses carry with them forever images of standing ankle-deep in blood, of young men with their faces blown off, and of holding those hands of the men who were injured or dying. They have and continue to face frustration, anger, and sadness. Another commonality among staff is that they are usually physically exhausted from the preparation for deployment and hours of travel in less than comfortable conditions (Fry et al., 2002).

Military nurses are often exposed to dangerous environments that are under constant threats of violence, chemical and biological warfare, and missile attack. Further, they may also be exposed to sniper fire or minefield explosions. Staff need to wear helmets, flack vests, and gas masks, and may have to protect their patients from flying missiles and debris (Pincus, House, Christenson, & Adler, 2001). Over the last decade, military downsizing has guaranteed the likelihood that each soldier will eventually participate in an extended mission. The impact of long separations has been of increasing concern with two-thirds of soldiers now married and deployments to places like the former Yugoslavia nearing a decade (Fry et al., 2002).

According to Fry et al. (2002), military nurses are likely to experience the atypical patient when deployed such as mass deaths, trauma victims, and endemic diseases. Patients cared for are often severely mutilated and may have many emotional needs along with battlefield stress. Military nurses are aware that they may even be exposed to infectious diseases themselves or be expected to fight for their own survival despite others who have died.

Bartone (1998) described that perceived stress has been found to have a direct impact on success of students. The matter of perceived stress is more subjective and is determined by the individual and not the event (Lazarus, 1984). Further, personal variables that can affect or influence the stress-outcome relation include past experiences, pre-existing psychopathology and personality characteristics. While stress is a part of life and no one can really live without it, the effects are individual; one person can become ill, while another responds in an energizing manner (Bartone, 1998).

According to Bartone (1998), the military as an occupation can expose its members to a greater range of stressors, including those that are extreme, than perhaps any other human occupation. Performance in the military includes both individual and group tasks and functions. There are several excellent examples of reviews of stress and performance in the military which include Driskell and Salas (1991), Kruegar (1991) and Stokes and Jones (1996).

Bartone (1998) asserts that the ability to perform physical and mental tasks quickly and accurately is essential in the military. Further, the capacity to sustain effective performance over an extended period of time under adverse conditions is also vitally important. Stress in the military often facilitates a range of social adjustment problems. Studies have linked higher rates of alcohol abuse to certain occupational demands of military life. Preir and Gulley (1987) assert that the impact of military occupational stressors on family violence and fragmentation is an area that needs further research.

According to Bartone (1998), in the current all-volunteer U.S. military, the trend is for an increasing proportion of active duty personnel to be married with dependent children. Family members are a large part of the military community and must adapt to a series of unique demands related to a career. Frequent moves, living in foreign countries and cultures, periodic and unpredictable separations from family, and risk of injury or death are a few. The experience of forced separation has evolved to a very frequent occurrence in the military. A 1985 Department of Defense survey reported that 75% of enlisted personnel and 79% of officers with spouses and/or children had been separated from their families the preceding year (Bartone, 1998). Additionally, according to Segal and Harris (1993), data they reviewed from several studies reflect that retention in the U.S. Army is negatively affected by the large numbers of separations for missions and training.

Bartone (1998) summarizes military stress as illustrated in Table 2.2 into five dimensions that capture the detailed specific stressors. Bartone suggests that the model is useful for summarizing the range of stressors identified in military operations, along with modern, non-combat or peacekeeping operations.

The population in the military, both students and faculty alike, follow a standardized program of instruction in which the curriculum, academic and clinical grading methodologies, along with practice requirements are very similar, thus controlling, the influence of curriculum on performance (Thompson, 1988).

Table 2.2. Dimensions of Psychological Stress on Military Operations

Dimension	Summary
Isolation	Deployed to physically remote locations Encountering obstacles to communication Units are new, low cohesion Individuals are cross-attached from other units
Ambiguity	Mission not clear or well-defined Command structure is ambiguous Role and identity confusion, ambiguity
Powerlessness	Rules-of-engagement are restrictive Constraints on movement, action Exposure to suffering of local people Foreign culture and language Lack of privacy … little control over living arrangements Relative deprivation - "Double Standards"
Boredom	Repetitive, monotonous routines and schedules Lack of meaningful work Over-reliance on "busy work"
Threat/Danger	Danger of death, injury, threat to life or limb Mines, snipers, disease Exposure to death of others

According to Thompson (1988), there are significant factors specific to the military training environment that could affect academic performance: (a) stresses for the soldier and his family related to frequent re-locations and (b) constant requirements to perform military-related duties such as maintenance of quarters, lawn maintenance, and concurrent military training requirements. Such duties other than those required for practical nursing education could impact upon the time available for academic work.

Physical fitness is as familiar to today's soldier as brushing one's teeth. Every soldier must pass a physical readiness test to ensure the maintenance of a base level of physical readiness essential for every soldier in the Army, regardless of MOS [Military Occupational Specialty] or duty assignment. Because a broad range of physical attributes are necessary for optimal soldier performance, multiple assessments are required. Valid assessments must challenge strength, endurance and mobility. To further strengthen validity, the assessments must either predict the ability to perform critical tasks or closely simulate the actual tasks (Army Physical Readiness Test [APRT], 2002).

Soldiers are expected to perform a standing long jump, power squat, heel hook, 300-yard shuttle run, push-ups, and one mile run in a limited amount of time. The testing is rigorous, takes devoted daily preparation, and is performed by every soldier twice a year. The result of not being able to pass one's physical readiness test is punitive and can result in administrative action. Soldiers must pass two tests in order to pass the licensed practical nurse course (APRT, 2002).

In addition to the students' role of performing as a military soldier, there are studies that have examined the stress and strain in nursing education. One such study was study conducted by Birch (1979). The researcher utilized The Institute for Personality Testing and Ability Testing (IPAT) Anxiety Scale to measure anxiety among a sample of 207 nursing students. The 56-question instrument was administered four times over a two-year registered nurse program. Upon completion of the program, the researcher discovered that there was no significant difference between levels of

anxiety from the first test to the last. It is interesting to note that the areas that caused the most stress for the nursing students were identified as caring for patients in pain, being embarrassed on the unit, in front of patients and peers, time for study, caring for patients with terminal illnesses, and changing clinical rotations and units.

Another study by Gunter (1969) sought to report the concerns of nursing students as they progressed through a nursing education program. One hundred twenty (120) students enrolled in a baccalaureate nursing program participated. The study revealed that over 50% of the students identified the most stressful events as being academic. Forty-nine percent (49%) of the students revealed concerns about their marriage and career as being stressful. Students further expressed concerns about home and family responsibilities. More than 50% identified that they considered some aspect of delivering nursing care to patients to be stressful. Students also reported having experienced psychosomatic symptoms related to anxiety, nervousness, depression, and restlessness.

Student success must be maximized in any program. The literature reveals that the primary reason identified for leaving a nursing program before completion is stress. Attrition rates are the result of various factors that nursing students must endure (Hesselberg, 2000). The literature reflects that two important factors that may affect student success in nursing programs are perceived stress and feelings of frustration from multiple roles. Add all of these factors up along with a motivation for successfully completing the practical nurse program in the Army is that to succeed indicates a strong likelihood of a successful military career. Progression in rank, more

responsible positions, and ultimately, retention in the service for enlisted personnel can indeed be dependent upon successfully completing the practical nursing program (Thompson, 1988).

Summary

Licensed Practical Nurses (LPNs) have made and continue to make significant contributions to health care. Experts predict that this paraprofessional group will continue to serve in vital roles in the delivery of direct nursing care for a variety of populations in the future. Their success in educational programs will indeed be an influencing factor to ensure the availability of LPNs for future roles.

A plethora of research studies have been cited and include licensed practical nurse certification, associate degree, and baccalaureate students. Additionally, the researcher included studies of other occupations and presented information to assess where they fit into a model for predictors of a successful student soldier in the 91WM6 course.

The research and professional literature does not define predictors of success for today's military LPN populations. The availability of LPNs provides alternatives for ensuring access to health care for all populations, including the military. In order to maintain an adequate pool of 91WM6s, it is important to gain an understanding of those variables that could predict success for the student. The information may assist nurse educators to plan and implement programs to support student-learning needs and may begin to fill the gap of knowledge about the LPN student.

If student demographics, prior academic experience, high school cumulative grades, and stressors of military life are proven to be valid variables to predict student success in the licensed practical nurse program along with NCLEX-PN success on first attempt, then unidentified students who may struggle or be dismissed from the program could receive guidance. The number of student soldiers' who might make competent soldier medic-licensed nurses may be greatly increased.

This study included multiple independent variables. Independent variables used for demographic characteristics already exist throughout student records. Variables in this study were gender, age, military rank, method of high school completion, months served in military, months of experience that the student has had in the medical area, General Technical Score (GT), Skilled Technical Score (ST), military composition, marital status, number of dependents, time counseled, college credits accumulated, career goals, stressors listed by the students during their orientation survey, clinical performance, NCLEX pass or fail, number of times a student failed the U.S. Army fitness test, number of times student failed to meet the maximum allowable weight standards, and number of Article 15s administered.

Of this review of related literature gaps to explore are predictors of success including literature involving RN studies. The researcher reviewed how various established studies may or may not have indicated predictors of student success and how other demographic and academic factors play an important role in the prediction.

The Academy of Health Sciences, Army Medical Division Center and School provides students with the learning experiences that enable students to develop

independent learning skills and also provides the amount of didactic sessions that best render that information, whether relevant to the exam or not. In the Kielhofner's model of human occupation, he continually refers to the importance of roles and how they help guide performance. He further explains that roles allow individuals to explore new areas or to aspire to a level of competence or achievement. Licensed practical nursing student soldiers are faced with new roles and surely aspire to meet the requirements to which they are challenged. Student soldiers who are able to maintain preexisting habits and roles, with the support of the performance subsystem, should be able to maintain the same level of skill and performance during the 91WM6 training program. The school does not bear the ultimate burden of the success or failure of a student on those examinations but are surely responsible for seeing that the student has all the opportunities and training to learn the appropriate information.

Because all states require all nurses to take the National Board of Nurse Examiners-LPN examination, success on the licensure examination, NCLEX-PN, is a fundamental outcome criterion for practical nursing programs as well as a state requirement for professional practice. The stress of success and failure for all students taking this form of examination is very high. Success in the military licensed practical nurse training program suggests strongly that the 91WM6 student soldier has gained the information necessary for success in practice. Nurse educators and administrators have an interest in identifying factors that predict success on the licensure examination. Since all student soldiers do not succeed in passing the National Licensing Practical Nurse Examination, then the challenge to find predictors of student success is vital.

The role of the M6/Licensed Practical Nurses is an essential component of military healthcare and also has prominence in the civilian sector. Information gained from this study can add to the body of professional literature and also can be used by faculty to increase student potential for success.

CHAPTER III

METHODOLOGY

Following a review of the literature, this study was designed to identify the potential indicators of student success in the U.S. Army Licensed Practical Nurse Training Program. The methodology chapter provides an overview of the research process utilized for this investigation to expand the empirical body of knowledge related to predictors of success of U.S. Army 91WM6 student soldiers.

Chapter III is divided into four sections. The first section examines two populations utilized for the study. The second section describes the instrument and validation procedures. The third section reports the data collection procedures. The fourth section looks at the procedures for the analysis of the data.

Population

There were two sources of data and two populations for this study. Part One is a Delphi questionnaire from nurse educators/experts/administrators (including former military Army course LPN graduates). Three Delphi discussions (rounds) were administered. Part Two is a 91WM6 Soldier Student Record Review from a retrospective audit of the U.S. military student soldier records of Licensed Practical Nurse Training Program graduates from four iterations of classes in the years 2000 to 2002.

Population for Part One of Study

The first population to develop predictor variables for this study was a total of 88 nurse expert/educators and administrators who comprised the selected pool for two rounds of the Delphi questionnaire. The third round of the questionnaire was completed for the purpose of a final confirmation of the information and consisted of 8 nurse expert/educators and administrators from the pool.

Comprising the population was a plethora of clinical site directors, associate directors, and clinical expert instructors associated with the U.S. Army Licensed Practical Nurse Training Program who were invited to participate in the study. The education and administrative faculty manages assignments, evaluation, and progress of each soldier student. The population was comprised of a range of individuals from junior and senior enlisted, junior and senior officers, and civilian educators serving the United States Army who met the researcher's inclusion criteria. Many of the individuals in the group of professionals were or have been directly responsible for the training of military practical nurses. All of the participants were volunteers from a master roster of those who met the inclusion criteria that was obtained from the Director of Nursing at the AMEDD Center and School, Fort Sam Houston, Texas.

Before a nurse can teach at the U.S. Army Licensed Practical Nurse training program they must have first completed a rigorous Technical Instructor training course and have gained experience in the field of nursing practice. Each of the U.S. Army clinical site directors, associate directors, and clinical instructors have completed the process; therefore, panelists chosen have "expert" knowledge of the education process

and experience with LPN student soldiers enrolled in the AMEDD Center and School. Each has experienced the long difficult course of nurse training and indeed knows what it took for them to finish. Additionally, they have acquired experience in the field along with experience working with students which is precisely the rationale the researcher used in concluding that they were the best source from which to glean information about characteristics and variables that contribute to student soldier success within the military.

For the nursing experts utilized in this study, the researcher studied a roster of names and areas of expertise, along with information about the individual's rank, assignments, etc. For this study, there were a total of 58 participants for Delphi Round I, and 59 participants for Delphi Round II, and 8 participants for Round III. The inclusion criteria for participation in the study were, therefore, developed to focus on those with an increased level of expertise through either additional training and clinical expertise of educators of Licensed Practical Nurses (Table 3.1).

Inclusion criteria for Delphi participants for this study were at least two of the following three criteria:

- Experience working with LPNs (91WM6) for at least four years.
- Hold a current LPN license and have the award of the 91WM6 and six years of clinical experience.
- Be currently employed in a job that describes the executive positions of administration, education, and leadership as critical job performance elements.

Table 3.1. Description of Delphi Panelists in Rounds I, II, and III

Participants' Rank	Delphi Round I	Delphi Round II	Delphi Round III
Field Grade Officers (Major through Colonel)	32	31	8
Company Grade Officers (Second Lieutenant through Captain)	7	6	0
Senior Enlisted (E-6 through E-9)	14	14	0
Junior Enlisted (E-1 through E-5)	2	1	0
Civilian Instructors (Employed b the U.S. AMEDD Center and School)	2	3	0
Former Students	2	3	0
Total	59	58	8

Population for Part Two of Study

The second population for the study was 91WM6 enlisted soldier student records from four iterations of the U.S. Army Licensed Practical Nurse Training Program at Ft. Sam Houston Army Post in San Antonio, Texas, from 2000 to 2002. One hundred and twenty four (124) 91WM6 soldier student records were retrospectively reviewed. Of those records, 101 were found to be complete and/or the student finished the course of study.

U.S. Army soldiers are continually recruited for the U.S. Army 91WM6 program, which is considered the best program in the nation for military licensed practical nurse training. Twice each year the Department of Nursing at the AMEDD Center and School, Fort Sam Houston, Texas, admits selected soldier students into the practical nursing program. The United States LPN student soldier represents a population highly heterogeneous in several dimensions. Their origin and divergent backgrounds reflect a wide range of socioeconomic status, race, age, educational levels, and work experiences. The mean age of the soldiers was 24 years of age, the minimum age was 18, and the maximum was 45 years old. Thirty-nine were female and 50 male. Forty-one of the soldiers were married, 3 divorced, and 45 were single at the time of the records review.

The criteria established for inclusion of student records in this study required that each of the soldiers had entered the graduate practical nurse and completed the U.S. Army 91WM6 13-month educational programs and had scores for all of the study variables.

Instrumentation

Part One of the Study – Delphi Technique

Overview of the Delphi technique. The qualitative methodology utilized was the Delphi technique. The Delphi comprises the first main empirical component of the study. Greek mythology introduced the Delphi oracle, which could predict future events.

The Delphi technique was developed in the 1950s by Olaf Helmer and Norman Dalkey, scientists at the RAND Corporation (Linestone & Turoff, 1975). It was initially used as a long-range forecasting tool but since has been developed to include a number of other uses. One of the earliest uses of the technique was to predict winners of horse races. This technique can also be used as a method to elicit consensus of expert opinion through group process and has been shown to be a good method of measuring these norms of current professional practice (Ashton, Kuykendal, Johnson, Wun, & Bush, 1994).

Linestone and Turoff (1975) provide the following definition: "Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole to deal with a complex problem" (p. 13). Predicting future change is one of the main motivations for using the Delphi technique (Roberts-Davis & Read, 2001). Another main reason for its use is the need to provide a sound base for policy-making where "unminity of opinion does not exist owing to a lack of scientific evidence on an issue." The role, education, and success predictors of future students in the U.S. Army Licensed Practical Nurse Training Program are just such a field.

According to Bardecki (1984), the Delphi technique is a questionnaire method for organizing and sharing opinion through feedback. The basis for the method is the iterative administration of a questionnaire to each member of an invited expert panel of individuals. According to Goodman (1987), there are four features that characterize the Delphi technique and distinguish it from other group decision-making processes. They

are (a) anonymity, (b) iteration with controlled feedback, (c) statistical group response, and (d) expert input. The method may begin with open-ended questions (Knight & Knight, 1992) or a prepared questionnaire (Lester & Thomson, 1989). The Delphi technique is performed in a series of rounds with experts. It solicits ideas and fosters discussion about them. The experts then provide opinions about the statements. These opinions are analyzed by the researcher to determine if a group consensus exists. Subsequent questionnaires are modified and focused based upon responses from the first questionnaire reached among participants (Sadhara, Beach, Aw, & Sheikh-Amend, 2001). Measures of Central Tendency are normally the feedback given in the Delphi technique (Bardecki, 1984). Each time participants are asked for responses, it is known as a "round." The questionnaire can be designed for the participants to respond with a "yes/no" response or a graded response, such as a Likert scale. The opinions are annotated using a Likert-type scale ranging from "Strongly Disagree" to "Strongly Agree" and for "Very Important" or "Not So Important" (Kochtanek & Hein, 1999; Linestone & Turoff, 1975). The method may begin with open-ended questions (Knight & Knight, 1992) or a prepared questionnaire (Lester & Thomson, 1989).

The iterative process of rounds and analyses continues until a consensus or a stabilization point has been reached. Stabilization indicates that inter-round answers have not changed beyond an appreciable amount. Two to four rounds are usually needed to develop consensus of experts' opinions on an issue (Holcomb, 2000).

The content validity of a Delphi study is measured by the adequacy of the selection of experts. The expert panelists should be knowledgeable about the content

under study (Goodman, 1987), or in the very least, interested in the topic under discussion and motivated to respond and share information. Random selection and response rates are not as important with this technique as are other survey methods (Mobily, 1993).

Delphi is an excellent means of accurately eliciting and combining the opinion of a group of experts using a controlled series of information exchange with a group of people who do not meet face-to face. It involves sending individuals questionnaires (nonidentifiable by respondent) with open-ended questions to elicit opinions and give feedback of the summarized respondents to identify the degree of consensus (Peters, Hutchinson, MacKinnon, McIntosh, & Cooke, 2001). Mailing questions to participants is less expensive and eliminates the scheduling difficulties of face-to-face discussions. Mailing or e-mailing questionnaires allows time for thoughtful consideration, which indeed can promote independent thought and considered opinion. Additionally, mailing also allows participants to remain anonymous to other panelists, reducing the possibility of biased results due to the prestige or persuasive verbal styles of other participants. Multiple rounds permit refinement of thought through feedback (Holcomb, 2000).

According to Crisp, Pelletier, Duffield, Adams, and Nagy (1997), there exist several types of Delphi techniques that have been identified and developed. The classic Delphi is a forum for gathering facts. The method involves anonymity for the panelists and iteration with controlled feedback. Feedback may assume the form of a statistical group response, such as a measure of variance, along with that of central tendency,

with or without comments made by individual panel members. According to Crisp et al. (1997), all Delphi studies have two rounds, whereas many may use several. Reasons for the cessation of rounds vary from the consensus criteria.

According to Mitchell (1990), few studies have been conducted in which the Delphi technique has been used in nursing education planning. Further, a review of nursing literature documents revealed the limited use of the Delphi technique in four areas: (a) research, (b) practice, (c) professional issues, and (d) education.

The Delphi technique has been demonstrated as appropriate in a variety of health care settings in order to establish priorities and predict future trends (Hudak, Brooke, & Finstuen, 2001). According to Butterworth and Bishop (1995), the number of participants in published Delphi studies varies widely, between less than 20 to more than 2000, which suggests that what matters is whether the number can be justified in the end as the general population.

At a fundamental philosophical level, it has been proposed that the Delphi technique builds on the Lockean notion of the function of human experience and agreement as the basis for truth (Mitroff & Turoff, 1975). The Delphi is clearly dependent on the experiential knowledge of its expert panel. Therefore, scientific merit of the findings may reflect Mitroff and Turoff's (1975) assertion that, "An empirical generalization is judge objective, true or factual if there is sufficient widespread agreement on it by the group of experts that participate" (p. 21).

There were several reasons that the researcher chose to administer the Delphi via e-mail. E-mailing questions to participants is less expensive and eliminates the

scheduling and geographical difficulties of face-to-face discussions. E-mailing also allows participants to remain anonymous to other panelists, reducing the possibility of biased results due to the prestige or persuasive verbal styles of other participants.

Table 3.2 shows the advantages and disadvantages of the Delphi Technique as explained by Griffin (1999).

Table 3.2. Advantages and Disadvantages of the Delphi Technique According to Griffin

Advantages	Disadvantages
More information and knowledge are available.	The process takes longer than individual Decision-making, so it is costlier.
More alternatives are likely to be generated.	Compromise decisions resulting from indecisiveness may occur.
More acceptance of the final decision is likely.	One person may dominate the group.
Enhanced communication of the decision may result.	Groupthink may occur.
Better decisions generally emerge.	

Having briefly explained the Delphi Technique, the next section will describe the use of the technique for the Pilot study. Utilizing electronic mail made using the Delphi Technique far more practical than postal mail because of time constraints.

Part Two of the Study – Pilot Study

Two-researcher designed instruments were utilized for this study.

First instrument, Part One of study - Delphi questionnaire. A researcher designed Delphi questionnaire instrument (Appendix A) was created from the literature and key experts concerning student predictors of success. The first Delphi questionnaire contained three open-ended questions with definers listed to provoke thought from the participant. The first question was "What do you think are the predictors of student success in Phase I of the 91WM6 program? (Age, gender, time in military, aptitude test scores, high school completion, previous academic experience such as college or trade school, marital status, academic grades?) Question two was "What do you think are the predictors of success in Phase II of the 91WM6 program? (Academic and/or clinical grades, study habits, stress or anxiety level, self-esteem scores?) The last question stated, "What do you think are predictors for students to successfully pass the national licensing examination?"

Second instrument, Part Two of study - Data retrieval information sheet. The second instrument, a data retrieval information sheet was utilized to gather information from records about variables related to students in the 91WM6 program. The literature guided the researcher to gather the information as listed in Table 3.3 from the soldier 91WM6 student records.

Data Collection Procedures

Procedures for the Pilot Study

Part One of the study - Delphi technique. In the Winter of 2002, the researcher obtained permission from Department of Army Headquarters, U.S. Army Medical Department Center and School, Fort Sam Houston, Texas, Chief, Clinical Investigation

Regulatory Office, the Institutional Review Board of Clinical Investigations (Appendix B) to conduct research that would lead to identification predictors of student success for the U.S. Army 91WM6 soldiers enrolled in the Licensed Practical Training Program from 2000-2002. Additionally, permission was also obtained from the Texas A&M University Investigational Review Board (Appendix C).

After several meetings with U.S. Army Executive Staff along with faculty, administration and information systems personnel, the researcher marketed her study for participation and support on a video teleconferencing for the United States Army Nurse Corps. "To complete any research study, you as a student must receive and get guaranteed buy in from the organization involved "(S. Stark, personal communication, Fall, 2001). The researcher obtained two letters of support for the study. The first letter of support was from Colonel Janet R. Harris, U.S. Army Nurse Corps, Ph.D., Chief, Department of Nursing Science, Department of The Army Headquarters, U.S. Medical Department Center and School (Appendix D). The second letter of support for the study was received from Colonel Kathleen K. Dunemn, Ph.D., CNMW, Senior Staff Officer, The United States Army Surgeon Generals' Office, The United States Center for Army Directed Strategic Studies, Fort Sam Houston, Texas, from California (Appendix E).

According to Gall, Borg, and Gall (1996), whenever possible, the researcher should include a pilot study as part of the investigation. Further, the authors explain that a pilot study involves small-scale testing of the procedures that the researcher plans to use in the study, and the procedures are revised based on what the pilot study

reveals. Additionally, the pretest included a small sample of individuals from the population that a researcher planned to utilize for administration of study instruments. The researcher utilized the pilot study to gain an understanding of the predictors of success of student soldiers in a practical nursing program and to assist with development of study predictor variables.

Five experts composed of two nurse educators and three administrators who were actively involved with education and administration of the U.S. Army 91WM6 course volunteered for the pilot study. The experts were asked to critically review the Delphi questionnaire, to examine the readability, clarity, and usefulness of the instrument. The researcher e-mailed guidelines for reviewing the instrument (Appendix F), a copy of the Delphi questionnaire (Appendix A) and the demographic data retrieval collection form the researcher had created (Appendix F) on February 2, 2002.

The researcher requested that the participants complete the questionnaire, review each item, and add any information that they thought would enhance the instrument. Additionally, they were asked to review the demographic/fact sheet for both usability and clarity for data collection. Lastly, the reviewers were asked to record the amount of time it took to complete the review for each instrument.

Based upon the suggestions of the reviewers, minor adjustments were made. One important suggestion regarding the Delphi questionnaire was that all questions address both phases of the training program instead of delineating Phase I and Phase II. The expert further explained that the change would emphasize to participants the

importance of looking at the whole concept of the student. The reviewers reported that the questionnaire took 15 minutes to complete.

A master list was utilized to track responses. Each participant was assigned a code to protect his or her identity.

Part Two of study - Data retrieval sheet. Five experts examined the data retrieval sheet for clarity and reported that recording data from one students' record took from 20-30 minutes.

The study included the following variables as shown in Table 3.3, which were investigated as predictors of student success in the 91WM6 training program.

Table 3.3. Predictors of Success for 91WM6 Student Soldiers – Part One of the Study

Variable	Recommended By	Gathered From
Positive study habits	Delphi, literature	Record review
Student demonstrates diligence	Delphi, key reference person	Interview
Motivation	Delphi	
Demonstrates discipline	Delphi	Record review
Test-taking abilities	Delphi	Interview
Demonstrates flexibility	Delphi	Interview
Positive coping skills	Delphi, literature	Interview
Manages personal stressors	Delphi, literature	Record review
Previous academic experience	Delphi, literature	Record review

Table 3.3. (continued)

Variable	Recommended By	Gathered From
Successfully passed natural sciences and math in high school	Literature	
Positive self-esteem	Literature	
General technical and skilled technical scores	Literature	Record review
Age	Delphi, literature	Record review
Time in service	Delphi	Record review
High school GPA	Literature	Record review
Recycle status (Repeating (Phase I or Phase II of the program)	Delphi	Record review
Marital status	Delphi, literature	Record review
Gender	Delphi, literature	Record review
Demonstrates ability to think critically	Delphi, literature	Record review
Prepared specifically for the NCLEX-PN examination	Delphi, literature	Record review
Understands basic Pathophysiology of body systems	Delphi, literature	Record review
Test-taking abilities	Delphi, literature	Record review
Phase II academic grades	Delphi	Record review
Motivation	Delphi	

Table 3.3. (continued)

Variable	Recommended By	Gathered From
Exposure to complex patients during clinical phase of training	Delphi	
Relationship of Phase II questions to NCLEX-PN test questions	Delphi	
Student's confidence in their own knowledge	Delphi, literature review	
Recycle status	Delphi	Record review

Several variables were collected from the student records by the researcher and recorded on the data collection retrieval form as depicted in Table 3.4.

Table 3.4. Variables of Phase II of the Study: Record Review Obtained From Soldier Students' Records and Recorded on the Data Collection Instrument

Variable	Gathered From
Gender	Student's record
Age	Student's record
Rank	Student's record
Number of months of military service	Student's record

Table 3.4 (continued)

Variable	Gathered From
Number of months medical experience, medical assistant, nursing assistant medical transport	Student's record
General Technical Score (GT)	Student's record
Skilled Technical Score (ST)	Student's record
Military composition (branch of military soldier is serving in)	Student's record
Marital status	Student's record
Number of dependents	Student's record
Number of times solider was counseled	Student's record
Number of college credits that the soldier lists on their initial student orientation sheet	Student's record
Stressors as described by the soldier student during counseling sessions: passing course, adapting to U.S. Army, confusion about policies in the U.S. Army, childish treatment of soldier students, screaming drill sergeants, passing physical fitness tests, family stress, financial difficulty, geographical separation from loved ones, family or spouse	Student's record
Clinical performance	Student's record
Number of tests student failed	Student's record
NCLEX examination results	Student's record
Failed Physical Fitness Test	Student's record

Table 3.4 (continued)

Variable	Gathered From
Failed weight standards	Student's record
Number of Article 15"s student received (judiciary punishment as issued by the soldier's commander for disciplinary reasons)	Student's record

The criterion variable for this study was a successful score on the NCLEX-PN examination on the first attempt. Pass/Fail results of the NCLEX were obtained by the researcher from the AMEDD Center and School administration office and the Texas State Board of Nursing Office. Since not all of the students who graduate from the program take the NCLEX-PN, only those students who successfully completed the examination were counted as successful for this research.

The study consisted of three iterations of the Delphi questionnaire separated by content analysis by the expert panel. The first round is usually unstructured and seeks an open response. This allows the participants relatively free scope to elaborate on the topic under investigation (Rowe, 1994). The role of the first round is to identify issues to be addressed in later rounds. Open-ended questions are a way to increase the richness of the data collected. However, using semi-structured questions in the first round are widely found in the Delphi literature (Bond & Bond, 1982).

Prior to the data collection beginning, the researcher presented on two VTC presentations to an audience that included those individuals who are currently involved

as administrators or educators for the 91WM6 Army program within the United States. The purpose of the study and explanation of Investigational Review Approval from both the U.S. Army and Texas A&M University were presented. A question and answer period was held immediately following the presentation. A second presentation was given to include anyone who had an interest in the study and who had missed the first presentation. The marketing technique proved to be very valuable to the researcher in terms of gaining support and understanding from those who would serve as "expert panel" members for the Delphi questionnaire rounds.

Part One – Collection of Study Data for Delphi Data

In preparation for Round One of the Delphi questionnaire, a letter was sent to the Director of Nursing Education and Training of the AMEDD Center and School requesting a list of all assigned educators and administrators assigned to the AMEDD Center and School U.S. Army Licensed Practical Nurse 91WM6 training program. Because the list received did not identify which personnel were going to deploy, for purposes of recruitment, all of the personnel who were selected who met the study inclusion criteria were sent a letter (Appendix G) explaining the purpose, method, and criteria of the study and invited the personnel to participate. Further, the letter explained that consent to participate in the Delphi process was assumed by the return of the questionnaire instrument. Information regarding the Institutional Review Board was provided to participants. With the researcher cover letter, Round I of the Delphi questionnaire (Appendix A) was attached for the participant and sent via e-mail. The

researcher sought to recruit at least 30 participants for the Delphi Round I questionnaire.

The special challenges of conducting research during a time when the nation was at war imposed several limitations on this study. Originally designed to be conducted during peacetime, the initiation of the first Delphi questionnaire was at the start of Operation Induring Freedom. There were unforeseen delays related to organizational approval along with obtaining a sample of participants, which pushed data collection completion back six months.

In the first round, the researcher queried the Delphi participants to identify what they thought were the predictors of a successful 91WM6 student. The response format was designed utilizing open-ended questions along with areas for responses. To shorten the response time, rank and grade were determined from the e-mail address and the U.S. Army career ladder eliminating the requirement for the participant to complete a demographic question area. The deadline stated for the first round of Delphi I was ten days from the date sent. If the information/response was not received within two weeks, one trigger was sent as a reminder to potential participants.

If the Delphi method is to be successful in achieving its goals, it is vital that expert panel members are willing and able to make a valid contribution. Linestone and Turoff (1975), note that potential users of the findings may be willing and useful members. Additionally, they suggest that a diversity of viewpoints will help to generate interest and involvements. Most Delphi users suggest that experts should be chosen for their work in the appropriate area and credibility with the target audience.

Round I. The first Delphi questionnaire administered consisted of three open-ended questions asking the respondents to identify three broad priority areas regarding predictors of student success in the 91WM6 training program and success on the NCLEX examination (Appendix A). The researcher utilized a Microsoft Word format so the panelists could list all of the information they desired without space restriction. A cover letter thanked the panelists for agreeing to participate and requested that they return the information within ten days. Identifying code numbers were assigned to the completed questionnaires.

The primary purpose of the first round of the Delphi was to allow the participants to express themselves freely. Eighty-nine (89) questionnaires were e-mailed from March 2, 2002 to April 18, 2002.

Less than a month after the study began, the pool to be used for the study population decreased suddenly due to the unexpected world events that led to the Iraqi Freedom War. U.S. Army personnel were rapidly relocated for unknown periods of time to unknown locations in the world. Because of United States National Security, addresses, e-mails, and the whereabouts of United States Army personnel were not available to anyone who did not have an official security reason and permission to know. That category did not include the researcher.

Further, any forwarding addresses or whereabouts for the soldiers who deployed were secretly guarded and not available to the researcher due to heightened security and protection of soldiers and their families. As a result, the researcher had a decreased number of responses, which could not be predicted or controlled. Of the 89,

due to aforementioned circumstances, only 62 were available to participate in the study. Of the group of Nurse Expert/Educator and Administrators, there was a response rate of 58 of 62 potential participants for the study. Questionnaires returned via e-mail "not deliverable" were sorted and several futile attempts were made to obtain a forwarding address.

Although panel sizes have varied widely in different studies, it is customary for "Delphi" questionnaires to seek the views of at least 20 independent experts in rounds of discussion ranging from two to five (Misener et al., 1997; Mucklow, 2002).

A total of 58 Delphi questionnaires were returned, and the responses were entered into an excel data spreadsheet for examination by the researcher. Responses were tallied and placed into like categories. Frequencies of responses were then entered for each answer in the questionnaire. Using these frequencies, a common core/theme of predictors of student success were compiled. For the purposes of statistical analysis, any predictor with a frequency of 25% or higher was considered a theme for a student success predictor. Responses were provided to each participant regarding the aggregated results in preparation for Delphi Round Two.

Round II. The second Delphi round was developed from the consensus or differences in responses the first Delphi questionnaire. Consensus combined with the findings of literature resulted in researcher created menu of the type of variable and corresponding codes related to each level of the applicable variables (Appendix H). The resulting opinions were sorted by the researcher and distilled into statements that formed the basis of the second round of the questionnaire. The members of the Delphi

group were asked to rate each predictor of student success on a five-point Likert scale with the condensed results and to refine their opinions regarding the predictors of success for the 91WM6 program (Appendix I).

The Likert scale was designed to allow the participants to choose between "not a predictor" to "excellent predictor" as shown in Figure 3.1.

Figure 3.1. Importance scale used for Round Two of the Delphi questionnaire.

Not a Predictor	Weak	Moderate	Good	Excellent Predictor

Consensus is a measure of how much people agree with one another (Kelly, 2001). For this Delphi assessment, consensus for agreement was defined as a median of one-half a point above the middle of the Likert scale or higher. The median is a useful measure of central-tendency – the best representation of a group of responses – because it "reflects the middle value" of responses and it "takes into account all of the observations" (Dooley, 1995, p. 21).

It is interesting that the according to Moreno-Casbas, Martin-Arribas, Orts-Contes, and Comet-Contes (2001), there is no agreement or adequate explanation of when a "good" level of consensus is given so the level used depends upon sample numbers, aims of the research, and resources. Consensus levels can fluctuate between 51 to 80%. In this study, the researcher established a priori, that the meaning of consensus was agreement among at least 65% of the panel members.

For data collection purposes, the researcher assigned scores to each of the levels of importance as depicted on the scale. A score of 0 indicated that the item was not considered a predictor of success for the student and a 5 indicated that the item was a most important predictor of the students' success. Results were entered into a database package on a personal computer and analyzed with the Statistical Package for the Social Sciences (SPSS).

Panelists who completed Round I were e-mailed Round II from May to June 2003. Round I results were shared with the panelists in generality. One reminder was sent after May 14, 2003 if the researcher did not receive a response.

The literature demonstrated that the most commonly used method of analyzing data from a Delphi survey, and one that is most easily understood among nurses is the Likert scale – at what level of agreement/disagreement is "consensus" reached. Levels of agreement using Likert scales as acceptable to earlier researchers are quoted in the literature by McKenna (1994) as 51-55%. A third round of Delphi typically contains statements where consensus has not been reached. Participants are allowed to rerank their responses with opportunity to further expand and explain their responses (Roberts-Davis & Read, 2001). The second round reflected that consensus had been reached. A third round was performed only to confirm that the results reflected that a consensus had been reached.

Round III. This round was a verification round that consisted of sending out the Second Round Report, included as Appendix J. Eight panelists of senior status were asked to comment on it for accuracy and completeness and to state if they agreed with the overall list of predictors. Consensus was agreed upon.

Table 3.5 is a summary of all the responses for the three Delphi rounds.

Table 3.5. Summary of Number of Participant Responses for the Three Delphi Rounds

Round	Questionnaires E-mailed	Trigger Notes	Total Received	Response Rate
I	89	16	59	0
II	62	8	57	0
III	8	1	8	100%

Figure 3.2 depicts a flow diagram of the Delphi technique used in the study that was used to elicit opinions from experts regarding predictors of success for the 91WM6 students.

Figure 3.2. Flow diagram of the process of the Delphi technique.

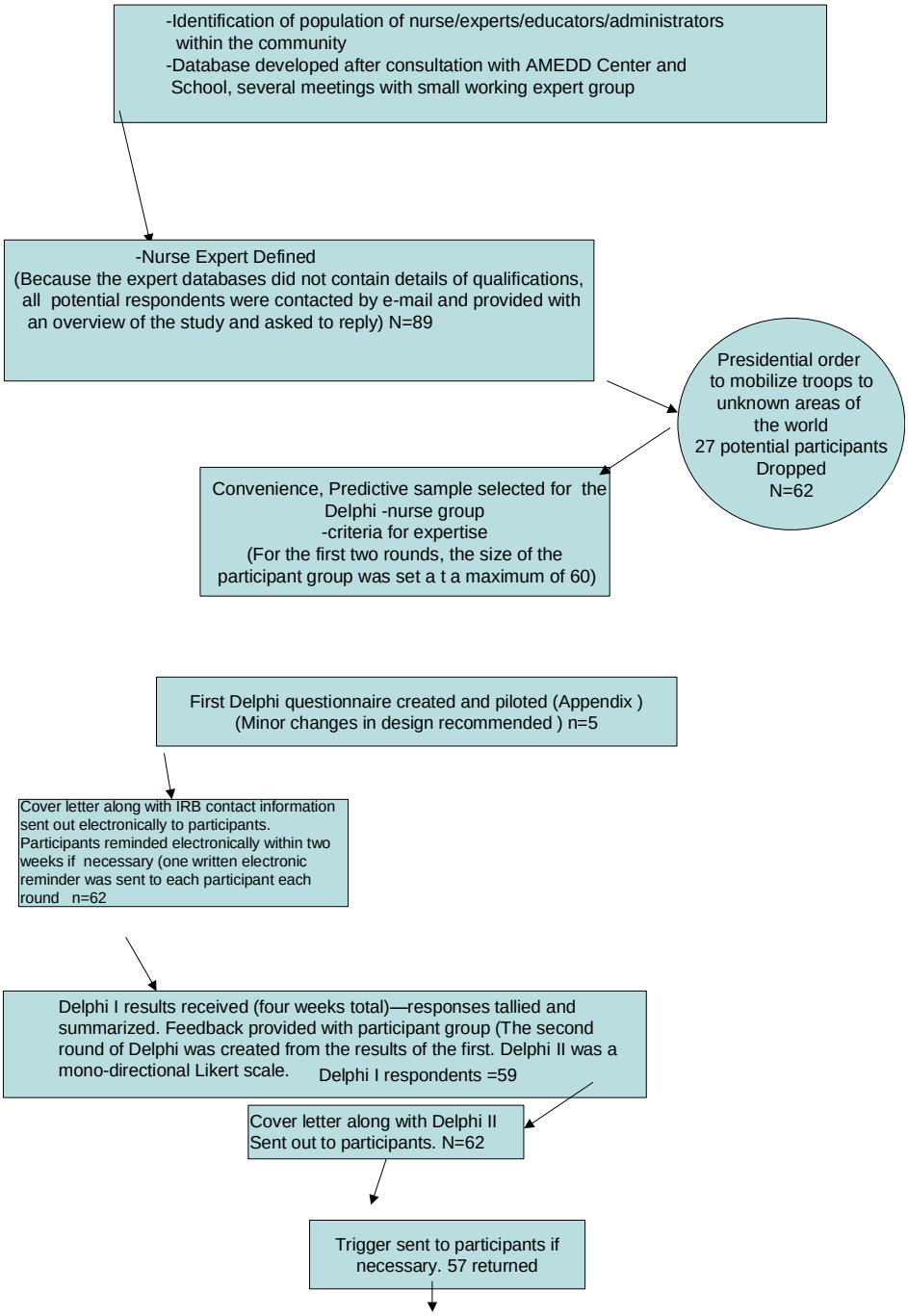
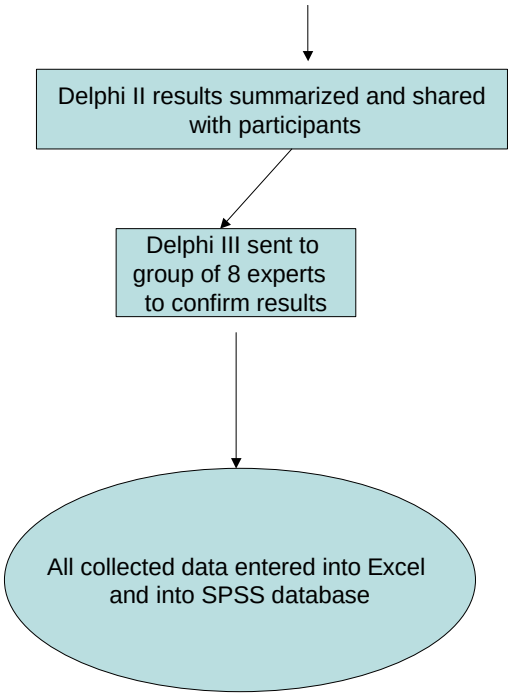


Figure 3.2 (continued)



An important and frequently discussed limitation of the Delphi technique that could represent a source of observer bias is that the investigators may subconsciously influence responses in the way questions are stated or by omission of topics, they themselves, do not perceive as important. This did not occur in this study because health professionals with divergent backgrounds and representative of both civilian and military backgrounds were involved in reviewing and testing questions in the study pilot of the questionnaire.

Part Two of the Study – Student Record Review

The researcher gathered 91WM6 soldier records of those who had attended the program in 2000 and 2002. One hundred and twenty-one (121) records were available

to the researcher and of those, all were reviewed. Randomly missing parts of the record and data from records reduced the number of student records eligible for the study to 89. Sensitivity to and strict compliance to the Protection of Human Rights were noted by the researcher throughout the study (Appendix K).

Assignment of a random identifier to all student records maintained student confidentiality throughout the study. Demographic variables collected included those listed previously. All soldiers had taken the ASVAB as a pre-enlistment requirement, which included the skilled technical (ST) and General Technical (GT) portion. Composite scores were recorded for each student. Finally, students were recorded as successfully completing the program or not. Complete data were available for the 89 of the 121 students. For the students with missing data, ST and GT scores were the only variables not found.

The dependent variable of the research study was successful completion of the 91WM6 course. Attrition may result from students being recycled or relieved from the program for either academic or administrative reasons. Academic recycle or relief may result from unsuccessful completion of a critical block of instruction or from failure to maintain a cumulative average above 75%. Administrative recycle or relief may result from unauthorized (e.g., incarceration, absent without leave) or extended (e.g., medical, emergency leave) absences. Unacceptable personal behavior and illegal drug use are also grounds for administrative relief from the Fort Sam Houston, Texas. U.S. Army Medical Department Center and School, May 3, 2003). The students pass or fail status on the NCLEX was obtained from the AMEDD Center and School Administrative

Office. All identifying information on individual students was eliminated to ensure confidentiality. As all information was reported to aggregate, no information on any single individual is discernable. These procedures were implemented to ensure the student's right to privacy. The researcher collected and recorded all of the data. After the information was extracted and recorded, student files were taken from the school conference room and locked back up in a secure trailer storage unit. The data were coded and a data menu was created and entered directly into SPSS version. The data were entered by the researcher and then 100% verified by a non-interested person for accuracy. The researcher spent approximately 37 hours collecting the data from student records and another 22 hours entering the data into SPSS.

Data Analysis

The dissertation study was an exploratory, predictive study designed to review the variables that predict success in the U.S. Army Licensed Practical Nurse training program. Gall et al. (1996) describe descriptive research as important in education: "Descriptive studies are concerned primarily with determining 'what is'" (p. 174). Exploratory is a method of discovering patterns in sets of scores. Correlational research is a type of investigation that seeks to discover the direction and magnitude of the relationship among variables through the use of correlational statistics. Correlational coefficients are utilized to understand the meaningfulness of the correlation coefficient. And lastly, prediction research is that which seeks to predict future events from variables measured at an earlier point in time. Prediction is an activity that computes

future outcomes from present ones. To predict one variable from another, the correlations between two variables must be computed (Salkind, 2000). Prediction research is done to determine which criteria to incorporate into a selection process for success The goal of many prediction studies is to develop measures with sufficient predictive validity to be useful in practical selection programs in education (Gall et al., 1996). Both quantitative data and qualitative data were gathered.

Results of the study have been reported using quantitative and qualitative techniques as outlined in *Educational Research: An Introduction* by Gall et al. (1996). The data collected from the questionnaires along with the data collected form the retrospective 91WM6 soldier student record review were entered into both a spreadsheet and into a statistical program entitled Statistical Package for Social Sciences (SPSS) on the researcher's personal laptop computer. Several statistical procedures were performed to answer the research questions including frequencies, mean scores, descriptive, standard deviation, t-test, and Fishers' exact test. Data analysis included specific statistical procedures for use in answering each research question.

Research Question One

The question "To what extent do selected student demographics impact the successful completion of the U.S. Army Medical Department (AMEDD) 91WM6 Licensed Practical Nurse Training Program?" was addressed by analysis of data from the retrospective student record review. The t-test for independent means comparisons or those who passed versus those who failed and mean scores, standard deviation, and

chi-square were noted. This procedure has been discussed in further detail in Chapter IV.

Research Question Two

The question "To what extent do selected stressors of military life and serving on active duty in the U.S. Army impact the successful completion of the Army Medical Department (AMEDD) 91WM6 Licensed Practical Nurse Training Program?" was addressed from analysis of data from the retrospective student record review. Frequencies, percentages, and Fisher's exact test probability were noted. This procedure has been discussed in more detail in Chapter IV.

Research Question Three

The question "What is the relationship of student training success with expert panel predictors of success?" was addressed through analysis of the Delphi technique questionnaire. Mean, standard deviation, and a summary of the variables were noted. This procedure has been discussed in more detail in Chapter IV.

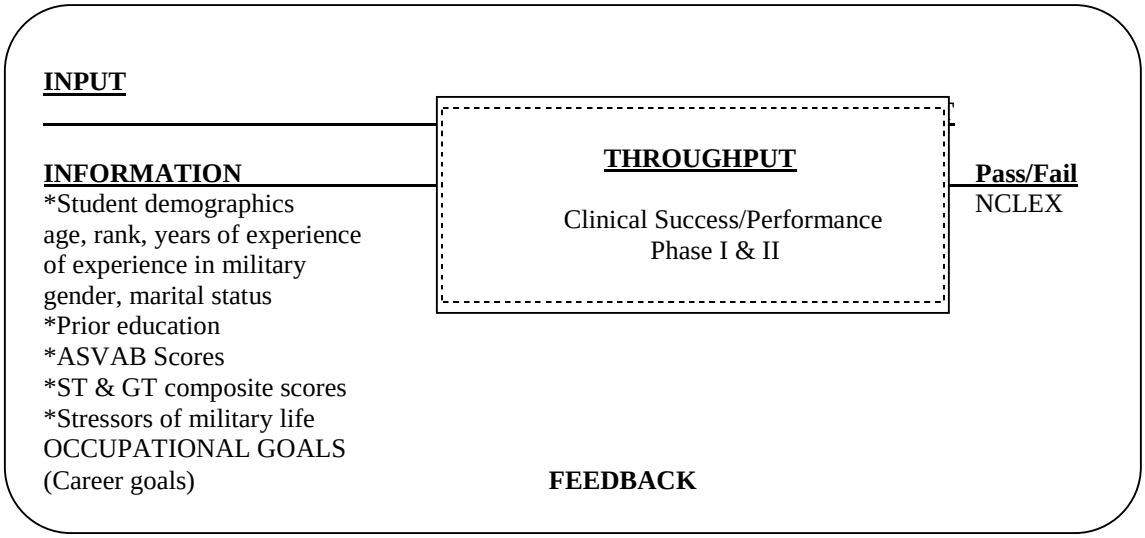
In summary, three research questions along with the literature guided this study. For Part One of the study, a total population of 89 was identified and a total of 57 were utilized for the Delphi expert panels. For Part Two of the study, of 121 records, 89 were utilized.

The instruments used in this study to identify possible predictors of student success were developed by the researcher under the supervision of both Dr. Stephen Stark and Dr. Walter Stenning, tenured professors at Texas A&M University.

This was a descriptive study detailing frequencies and percentages of both expert panel participants and 91WM6 soldier student demographic data. Results for the population were reported in table presentations for frequencies, percentages, means, standard deviations, and analysis of variances. Analysis and interpretation of the data followed the principles detailed by Gall et al. (1996).

Three rounds of Delphi questionnaires, along with a data collection retrieval format, were used to gather data for the study. It is unfortunate, that although several contacts were made with both the Texas State Board of Nursing Director and a local community college dean of the school of nursing, only those personnel associated with the U.S. Army chose to participate. Perhaps, a glance at civilian student variables would have proved beneficial to the results and comparison of study data. Lastly, the researcher has integrated the variables from this study into the conceptual framework and Kielhofner's model of occupation that was utilized for this study (Figure 3.3).

Figure 3.3. Adaptation of Kielhofner's model of occupation incorporating the criteria and predictor variables.



CHAPTER IV

DATA PRESENTATION AND ANALYSIS

The purpose of this study was to identify and delineate student characteristics that significantly predict success and successful passage of the Licensed Practical Nurse state licensure examination on the first attempt by graduates of the U.S. Army Medical Department (AMEDD) Center and School 91WM6 Licensed Practical Nurse Program over a two-year period. Based upon a review of available literature, the researcher hypothesized that there would indeed be variables that could significantly predict student success.

The purpose of this chapter is to present the results of the statistical analysis of the data obtained during this research. The data were used to ascertain answers to the three research questions that provided the framework for the study. An analysis of demographic factors is also included to describe the population inherent in this research.

The Delphi expert panel was recruited in 2003. Out of a total number of 81, several moved, several did not continue in the study, as their location was unknown for Delphi II. Figure 4.1 depicts the Delphi participant process. A total of 101 student records were reviewed and 81 met the inclusion criteria of the study and were used for purposes of study data.

The chapter will present an analysis of the data developed in the study and will be organized to answer the three research questions originally posed. This chapter is

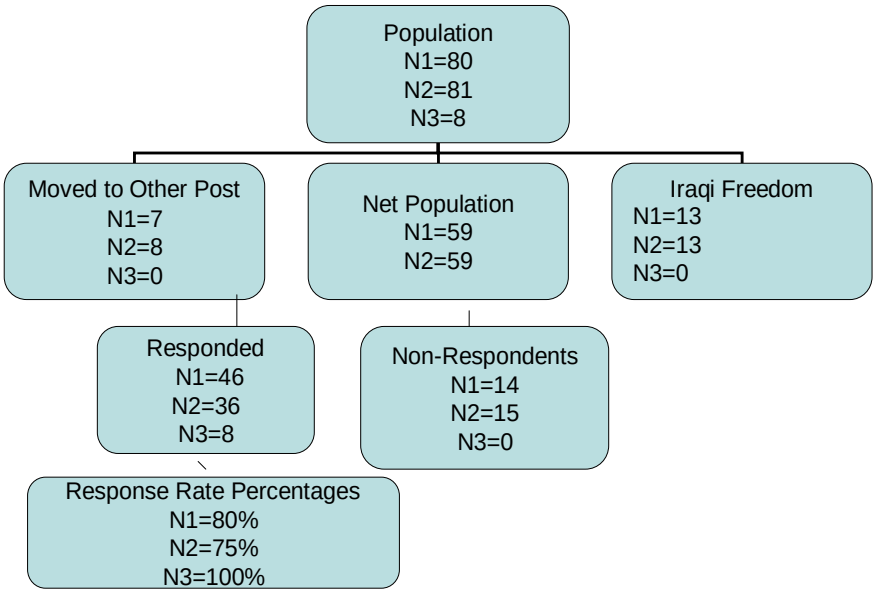
divided into three sections: (a) provides a description of the subjects in this study and presents descriptive and statistical analyses, (b) findings related to the selected Research Questions One, Two, and Three, and (c) a summary.

Descriptive Data

Demographic Characteristics

The study involved three rounds that were conducted using a computer-assisted Delphi technique. The number of respondents for each Delphi round is shown in Figure 4.1.

Figure 4.1 Description of the Delphi participants' response rate, non-response rate, and reason for attrition for expert panel participants who completed rounds of the Delphi questionnaire during the 2003 data collection period for Part I of the Predictors of Success in the U.S. AMEDD 91WM6 study.



Note. N=number.

Limited demographic information from the Delphi participants was gathered through identification of their rank in the United States Army or their position in Civil Service. The description of the 81 students' whose records were reviewed is described below in Tables 4.1-4.2.

Analysis of Data

Frequencies and descriptive statistics were calculated as appropriate using the Statistical Package for Social Sciences (SPSS) to summarize the closed questions of the survey section of the questionnaire. Comparisons between the groups were carried out using t-tests for continuous data and a chi-square test.

The Fisher exact test was also used. The reason a researcher uses this test is because it computes the exact probability of outcomes in a 2x2 table (Salkind, 2000). In round two, levels of agreement on each opinion item by the expert group were compared using nonparametric statistical tests, including the chi-square test.

This study examined the demographic factors and stressors related to completing the Army Medical Department Licensed Practical Nursing Training Program. For this study, 89 of 101 student records were complete and the data utilized and examined. The overall pass rate for the NCLEX was 86.5%.

Research Question One

Research Question One asked, "To what extent do selected student demographics impact the successful completion of the U.S. Army Medical Department (AMEDD) 91WM6 Licensed Practical Nurse Training Program?" Table 4.1 displays

the *t*-test for independent means comparisons for those who passed the test versus those who failed the test. Those who had passed the test had been in the military a significantly shorter length of time ($p = .001$), tended to have a better general technical score ($p = .065$), had a significantly higher skilled technical score ($p = .005$), had failed the test significantly fewer times ($p = .001$), and had earned significantly more college credits ($p = .007$).

Table 4.1. Comparison of the Impact of Selected Demographic Factors of U.S. Army Practical Nurse Soldier Students Achieving a Passing Score on the National Council Licensure Examination for Practical Nurses on the First Attempt Upon Completion of the U.S. Army 91WM6 Practical Nurse Training Program at the U.S. Army AMEDD Center and School From the Time Period of Either Year 2000 to 2001 or Year 2001 to 2002 (t-Tests for Independent Means, N= 89)

	Failed Test $n = 12$		Passed Test $n = 77$			
	M	*SD*	*M*	*SD*	*t* (87)	*p*
Months of Military Service	60.17	16.33	25.27	27.86	4.21	.001*
Months of Medical Experience	23.17	31.61	14.36	29.42	0.96	.342
General Technical Score	115.08	5.25	118.95	6.83	1.87	.065*
Skilled Technical Score	112.00	5.69	118.68	7.68	2.88	.005*
Number of Dependents	1.08	1.51	1.05	1.29	0.08	.939
Number of Times Counseled Regarding Performance	3.08	1.98	2.21	1.98	1.43	.157
Number of Tests Failed	2.83	1.95	1.29	1.34	3.49	.001*

Table 4.1 (continued)

	Failed Test $n = 12$		Passed Test $n = 77$			
	M	*SD*	*M*	*SD*	*t* (87)	*p*
Number of College Credits	9.50	13.90	45.74	44.56	2.78	.007*
Age	25.17	4.39	24.14	4.42	0.75	.457

*Significant at the .05 level.

Table 4.2 displays the NCLEX pass rate, based on demographic factors. Chi-square tests of significance were used. Significant differences in pass rate were found based on rank ($p = .002$). Inspection of Table 4.2 revealed higher pass rates for a private first class (97.3% pass rate) and specialist (95.2% pass rate), as compared to lower pass rates corporals (72.7%) and sergeants (50.0%). Significant differences were found on pass rate based on clinical performance ($p = .002$). Those who had "excellent" clinical performance ratings had significantly higher pass rates (91.8% versus 62.5%). The number of months in the military was significantly related to pass rate ($p = .001$). Those who had been in the military less than 48 months had a 98.4% pass rate, compared to those who had been in the military more than 48 months (59.3% pass rate). The number of units completed was significantly related to pass rate. Personnel who had completed at least one college unit, had a 91.7% pass rate, as compared to those who had not completed any college units (75.9% pass rate) ($p = .041$). The difference in pass rate was even greater when the number of college units was divided into less than 30 units and more than 30 units completed ($p = .009$).

Inspection of Table 4.2 revealed that those with 30 or more units of completed college courses had a 95.7% pass rate, as compared to those with less than 30 units (76.7% pass rate) (Table 4.2).

Table 4.2. Comparison of Demographic Factors of U.S. Army Practical Nurse Soldier Students and the Soldier Students Passing the National Council Licensure Examination for Practical Nurses Upon Completion of the U.S. Army 91WM6 Practical Nurse Training Program at the U.S. Army AMEDD Center and School From the Time Period of Either Year 2000 to 2001 or Year 2001 to 2002 (Chi-square Tests of Significance, N = 89)

	Passed the NCLEX	
	n	%
Rank[a]		
Private (*n* = 3)	2	66.7*
Private First Class (*n* = 37)	36	97.3*
Specialist (*n* = 21)	20	95.2*
Corporal (*n* = 22)	16	72.7
Sergeant (*n* = 6)	3	50.0*
Method of High School Graduation[b]		
Diploma (*n* = 81)	70	86.4
GED (*n* = 8)	7	87.5
Component of Military[c]		
Active duty Army (*n* = 51)	43	84.3
Army reserve (*n* = 34)	30	88.2
National Guard (*n* = 4)	4	100.0
Clinical Performance[d]		
Excellent (*n* = 73)	67	91.8*
Good (*n* = 16)	10	62.5
Number of Times Failed Weight Standard[e]		
No failures (*n* = 55)	50	90.9
At least one failure (*n* = 34)	27	79.4

Table 4.2 (continued)

	Passed the NCLEX	
	n	%
Number of Times Article 15 Administered[f]		
None (*n* = 76)	67	88.2
Once (*n* = 13)	10	76.9
Marital Status[g]		
Not married (*n* = 48)	39	81.3
Married (*n* = 41)	38	92.7
Months of Military Service[h]		
0 – 47 months (*n* = 62)	61	98.4*
48 or more months (*n* = 27)	16	59.3
College Units[i]		
No units completed (*n* = 29)	22	75.9
At least one unit completed (*n* = 60)	55	91.7
College Units[j]		
Less than 30 units (*n* = 43)	33	76.7
30 or more units (*n* = 46)	44	95.7
Gender[k]		
Female (*n* = 39)	33	84.6
Male (*n* = 50)	44	88.0

Note. Overall pass rate was 86.5%.
*[a]χ^2 (4, *N* = 89) = 16.51, *p* = .002.
[b]χ^2 (1, *N* = 89) = 0.01, *p* = .932.
[c]χ^2 (2, *N* = 89) = 0.92, *p* = .631.
*[d]χ^2 (1, *N* = 89) = 9.65, *p* = .002.
[e]χ^2 (1, *N* = 89) = 2.38, *p* = .123.
[f]χ^2 (1, *N* = 89) = 1.20, *p* = .273.
[g]χ^2 (1, *N* = 89) = 2.48, *p* = .115.
*[h]χ^2 (1, *N* = 89) = 24.69, *p* = .001.
[i]χ^2 (1, *N* = 89) = 4.19, *p* = .041.
[j]χ^2 (1, *N* = 89) = 6.81, *p* = .009.
[k]χ^2 (1, *N* = 89) = 0.22, *p* = .643.
*Rank[a], Clinical Performance[d], and Months of Military Service[h] suggest a significant difference as a result of chi-square tests of significance.

Significant interactions were noted between the gender of the respondents and other variables as they were related to their NCLEX pass rate. Tables 4.3 through 4.8 display those significant interactions for failed weight standard, stressor of passing course, stressor of family stress, clinical performance, marital status, and college units completed. A significant interaction was reported when differences in pass rate were found for one gender but not the other. Table 4.3 displays the significant interactions of pass rate for gender and failed weight standard. For the female sub-sample (n = 39), no differences in pass rate were noted whether or not those women had failed the weight standard (p = .887). However, for the male sub-sample (n = 50), significant differences in pass rate were noted based on whether they had also failed the weight standard (p = .021). A 96.7% NCLEX pass rate was noted for men who had not failed the weight standard, as compared to a 75.0% pass rate for men who had failed the weight standard at least once.

The stressor of passing the course was significant for females (p = .046), but not for males (p = .447) as seen in Table 4.4. Those women who reported feeling that passing the course was a stressor (n = 25) had a 76.0% pass rate, as compared to those women who did not report passing the course to be a stressor (n = 14) who had a 100% pass rate.

Table 4.3. Significant Interactions of U.S Army 91WM6 Practical Nurse Soldier Students' Passing Rate on the National Licensure Examination for Practical Nursing and Gender and Whether They Failed or Passed the Required U.S. Army Weight Standard During Their Enrollment in the U.S. Army 91WM6 Practical Nurse Training Program at the U.S. Army AMEDD Center and School From the Time Period of Either Year 2000 to 2001 or Year 2001 to 2002 (Chi-square Tests of Significance, N = 89)

	Passed the NCLEX	
	n	%
Failed Weight Standard (Females Only)[a]		
No failures (*n* = 25)	21	84.0
At least one failure (*n* = 14)	12	85.7
Failed Weight Standard (Males Only)[b]		
No failures (*n* = 30)	29	96.7*
At least one failure (*n* = 20)	15	75.0*

Note. Overall pass rate was 86.5%
[a] χ^2 (1, *n* = 39) = 0.02, *p* = .887
[b] χ^2 (1, *n* = 50) = 5.34, *p* = .021
*Significant at the .05 level; there was a significant difference with the male gender and not the female gender.

Table 4.4. Significant Interactions of the U.S. Army Practical Nurse Soldier Students' Passing Rate on the National Licensure Practical Nurse Examination and Students' Gender and Whether They Experienced the Stressor of Passing the U.S. Army Practical Nurse Course During Enrollment in the U.S. Army 91WM6 Practical Nurse Training Program at the U.S. Army AMEDD Center and School From the Time Period of Either Year 2000 to 2001 or Year 2001 to 2002 (Chi-square Tests of Significance, N = 89)

	Passed the NCLEX	
	n	%
Stressor – Passing Course (Females Only)[a]		
Yes (*n* = 25)	19	76.0
No (*n* = 14)	14	100.0
Stressor – Passing Course (Males Only)[b]		
Yes (*n* = 35)	30	85.7
No (*n* = 15)	14	93.3

Note. Overall pass rate was 86.5%.
*[a]χ^2 (1, *n* = 39) = 3.97, *p* = .046.
[b]χ^2 (1, *n* = 50) = 0.58, *p* = .447.
*Significant at the .05 level.

Table 4.5 displays the gender-specific comparisons in pass rate, based on the stressor of family stresses. Differences in pass rate were found for the male sample (*p* = .025), but not the female sample (*p* = .398). For the male sample, reporting a family stressor was related to a 71.4% pass rate, compared to a 94.4% pass rate for those who did not report having family stress.

Table 4.5. Significant Interactions of U.S. Army Practical Nurse Soldier Students' Passing Rate on the National Licensure Practical Nurse Examination and Students' Gender and Whether They Experienced the Stressor of Family Stress While Enrolled in the U.S. Army 91WM6 Practical Nurse Training Program at the U.S. Army AMEDD Center and School From the Time Period of Either Year 2000 to 2001 or Year 2001 to 2002 (Chi-square Tests of Significance, N = 89)

	Passed the NCLEX	
	n	%
Stressor – Family Stress (Females Only)[a]		
Yes (*n* = 8)	6	75.0
No (*n* = 31)	27	87.1
Stressor – Family Stress (Males Only)[b]		
Yes (*n* = 14)	10	71.4*
No (*n* = 36)	34	94.4

Note. Overall pass rate was 86.5%.
[a]χ^2 (1, *n* = 39) = 0.72, *p* = .398.
*[b]χ^2 (1, *n* = 50) = 5.06, *p* = .025.
*Significant at the .05 level.

Table 4.6 displays the gender-specific comparisons of pass rate based on clinical performance. Significant differences were noted in the male only sample (*p* = .002), but not the female sample (*p* = .185). Inspection of Table 4.6 revealed a 35-percentage point difference in pass rate between those rated "excellent" and "good" in the male sample (95.0% versus 60.0%), as compared to only a 21.2% difference in the female sample.

Table 4.6. Significant Interactions of U.S. Army Practical Nurse Soldier Students' Passing Rate on the National Licensure Practical Nurse Examination, Gender, and Students' Rating of Either "Excellent" or "Good" in Clinical Performance as Determined by U.S. Army Practical Nurse Program Course Instructors During Enrollment in the U.S. Army 91WM6 Practical Nurse Training Program at the U.S. Army AMEDD Center and School From the Time Period of Either Year 2000 to 2001 or Year 2001 to 2002 (Chi-square Tests of Significance, N = 89)

	Passed the NCLEX	
	n	%
Clinical Performance (Females Only)[a]		
Excellent (*n* = 33)	29	87.9
Good (*n* = 6)	4	66.7
Clinical Performance (Males Only)[b]		
Excellent (*n* = 40)	38	95.0*
Good (*n* = 10)	6	60.0

Note. Overall pass rate was 86.5%.
[a]χ^2 (1, *n* = 39) = 1.76, *p* = .185.
*[b]χ^2 (1, *n* = 50) = 9.28, *p* = .002.
*Significant at the .05 level.

Table 4.7 displays the gender-specific comparisons for pass rate, based on marital status. Differences in pass rate were noted in the male sample (*p* = .007), but not for the female sample (*p* = .528). Men who were married had a 100.0% pass rate, compared to those men who were not married (75.0% pass rate).

Table 4.7. Significant Interactions of U.S. Army Practical Nurse Soldier Students' Passing Rates on the National Licensure Practical Nurse Examination and Students' Gender and Marital Status During Enrollment in the U.S. Army 91WM6 Practical Nurse Training Program at the U.S. Army AMEDD Center and School From the Time Period of Either Year 2000 to 2001 or Year 2001 to 2002 (Chi-square Tests of Significance, N = 89)

	Passed the NCLEX	
	n	%
Married (Females Only)[a]		
No (*n* = 24)	21	87.5
Yes (*n* = 15)	12	80.0
Married (Males Only)[b]		
No (*n* = 24)	18	75.0
Yes (*n* = 26)	26	100.0*

Note. Overall pass rate was 86.5%.
[a]χ^2 (1, *n* = 39) = 0.40, *p* = .528.
*[b]χ^2 (1, *n* = 50) = 7.39, *p* = .007.
*Significant at the .05 level.

Table 4.8 displays the gender-specific comparisons, based on units completed. Significant differences were noted in pass rates for the males (*p* = .041), but not for the female sub-sample (*p* = .359). In the male sub-sample, pass rates for no units were 75.0%, for 1-29 units, the pass rate was 85.7%, and for 30 or more units the pass rate was 100.0% (Table 4.8).

Table 4.8. Significant Interactions of U.S. Army Practical Nurse Soldier Students' Passing Rates on the National Licensure Practical Nurse Examination, Students' Gender, and the Number of College Units Completed While Enrolled in the U.S. Army 91WM6 Practical Nurse Training Program at the U.S. Army AMEDD Center and School From the Time Period of Either Year 2000 to 2001 or Year 2001 to 2002 (Chi-square Tests of Significance, N = 89)

	Passed the NCLEX	
	n	%
College Units (Females Only)[a]		
None (*n* = 9)	7	77.8
1 – 29 units (*n* = 7)	5	71.4
30 or more units (*n* = 23)	21	91.3
College Units (Males Only)[b]		
None (*n* = 20)	15	75.0
1 – 29 units (*n* = 7)	6	85.7
30 or more units (*n* = 23)	23	100.0*

Note. Overall pass rate was 86.5%.
[a]χ^2 (1, *n* = 39) = 2.05, *p* = .359.
*[b]χ^2 (1, *n* = 50) = 6.37, *p* = .041.
*Significant at the .05 level.

Research Question Two

Research Question Two asked, "To what extent do selected stressors of military life and serving on active duty in the U.S. Army impact the successful completion of the Army Medical Department (AMEDD) 91WM6 Licensed Practical Nurse Training Program? Table 4.9 displays the frequency of reported life stressors, based on test performance. Due to small cell sizes, Fisher's exact probabilities were used. Those who passed the test tended to be less likely to note passing the course as a stressor (*p* =

.094). Those who passed the course also tended to be less likely to report family stress (p = .065). No other differences in the pattern of reported stressors were noted (Table 4.9).

Table 4.9. Frequency of the U.S. Army Practical Nurse Soldier Students' Reported Life Stressors Based on Test Performance of the Soldier Students on the National Licensure Practical Nurse Examination Upon Completion of the U.S. Army 91WM6 Practical Nurse Training Program at the U.S. Army AMEDD Center and School From the Time Period of Either Year 2000 to 2001 or Year 2001 to 2002 (Fisher's Exact Test Used Due to the Small Cell Sizes of Aggregate, N = 89)

Reported Stressor	Failed Test n = 12		Passed Test n=77		Fisher's Exact Probability
	n	%	*n*	%	
Passing Course	11	91.7	49	63.6	.094*
Adapting to Army Life	3	25.0	13	16.9	.446
Confused About Army Policies	1	8.3	5	6.5	1.00
Childish Treatment	1	8.3	10	13.0	1.00
Screaming Drill Sergeants	0	0.0	8	10.4	.591
Passing Physical Fitness	5	41.7	19	24.7	.293
Family Stress	6	50.0	16	20.8	.065*
Financial Difficulty	2	16.7	17	22.1	1.00
Geographical Separation	1	8.3	9	11.7	1.00

*Significant at the .05 level.

Research Question Three

Research Question Three asked, "What is the relationship of student training success with expert panel predictors of success?" Table 4.10 summarizes the variables found to be significantly related to improved NCLEX training success.

Table 4.10. Summary Table of Delphi Results of Expert Opinions of the U.S. Army Practical Nurse Soldier Student Variables Who Enroll and Complete the U.S. Army 91WM6 Practical Nurse Training Program That Are Significantly Related to the Soldier Completing the Program and Then Successfully Passing the National Licensure Practical Nurse Examination on the First Attempt (N = 89)

Variable	Table
Being in the military fewer months	(Tables 4.1 & 4.2)
Having a higher Skilled Technical Score	(Table 4.1)
Having failed fewer NCLEX tests	(Table 4.1)
Completing more college credits	(Tables 4.1 & 4.2)
Having a Rank of Private First Class or Specialist and not a higher rank	(Table 4.2)
Receiving "Excellent" Clinical Performance Ratings	(Tables 4.2 & 4.6)
Men specifically not failing the weight standard	(Table 4.3)
Women specifically not reporting "passing the course" as being a stressor	(Table 4.4)
Men specifically not reporting "family stress" as being a stressor	(Table 4.5)
Men specifically receiving an "excellent" clinical rating	(Table 4.6)
Being a married man	(Table 4.7)
Men specifically having passed more college units	(Table 4.8)

Table 4.11 displays the Delphi method expert opinion ratings predicting completing the program and passing the NCLEX. Predictors were rated on a five-point Likert scale: 0 = Not a Predictor to 4 = Excellent Predictor. Based on expert opinion, the highest-rated predictors in completing the course were positive study habits (*M* = 3.58), demonstrating diligence (*M* = 3.49), and motivation (*M* = 3.45). The lowest rated predictors in completing the course were male gender (*M* = 0.74), female gender (*M* = 0.86), and student marital status – single (*M* = 1.11). For the predictors related to passing the NCLEX, the highest rated were the ability to think critically (*M* = 3.30) and specific preparation for the NCLEX (*M* = 3.26). The lowest rated predictors in passing the NCLEX were recycle status (*M* = 1.96) and the student's confidence in their own knowledge (*M* = 2.84).

Table 4.11. Results of Part Two of the Study: The Delphi Expert Opinion Round Two and Three Questionnaire Likert Scale That Identified the Predictors of Success for the U.S. Army Practical Nurse Soldier Students to Complete the U.S. Army 91WM6 Practical Nurse Training Program and Then Successfully Pass the National Licensure Practical Nurse Examination on the First Attempt

	M[a]	*SD*
Predictors in Completing Course		
Positive study habits	3.58	0.65
Demonstrates diligence	3.49	0.66
Motivation	3.45	0.74
Demonstrates discipline	3.25	0.63
Test-taking abilities	3.16	0.73
Demonstrates flexibility	3.16	0.65
Positive coping skills	3.11	0.70
Manages personal stressors	2.95	0.83
Previous academic experience	2.84	0.92
Successfully passed natural sciences and math in high school	2.74	1.01

Table 4.11(continued)

	M[a]	*SD*
Positive self-esteem	2.74	0.72
GT/ST	2.58	1.15
Age	2.44	1.05
Time in service	2.26	1.08
High school GPA	2.25	0.83
Recycle status (Phase I and/or II)	2.04	1.00
Married	1.33	1.01
Single	1.11	0.99
Female	0.86	1.16
Male	0.74	0.94
Predictors in Passing NCLEX		
Demonstrates ability to think critically	3.30	0.73
Prepared specifically for NCLEX	3.26	0.72
Understands basic pathophysiology of body systems	3.16	0.65
Test taking abilities	3.14	0.69
Phase II academic grades	3.04	0.65
Motivation	3.04	0.73
Exposure to complex patients during clinicals	2.89	0.84
Phase II clinical grades	2.88	0.71
Relationship of phase II questions to NCLEX test questions	2.86	0.88
Student's confidence in their own knowledge	2.84	0.77
Recycle status	1.96	1.05

[a]Rating scale: "0" = "Not a Predictor" to "4" = "Excellent Predictor."

Summary

Data collected and organized for all study research questions were presented in tables and explained in terms of statistical significance in Chapter IV. A summary of major findings with conclusions, implications, and recommendations for future research are presented in Chapter V.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The primary purpose of this study was to identify and delineate demographic characteristics and variables, along with criterion that significantly predict soldier student success in the U.S. Army 91WM6 Licensed Practical Nurse Program the Army Medical Department Center and School, along with passing the NCLEX-PN examination on the first attempt.

The first part of the study examines "expert" panelists' assessment of exactly what the predictors of success are for 91WM6 soldier students. The researcher analyzed participants' responses on three rounds of a Delphi technique questionnaire. The second part of the study pertains to a retrospective soldier student record review of those 91WM6 soldiers who attended the program from 2000-2002. The researcher anticipated that the identification of predictors of student success for this population would significantly add to the body of literature available.

The United States Army Licensed Practical Nurse is vital on the battlefield and in forward tempo peacekeeping missions. The LPN is the extension of the professional nurse. Needless to say, if the predictors of student success could be identified, admission criteria and curriculum changes could be instituted to hopefully decrease the attrition and failure rate. From predictors discovered from this study, there exists a possibility that demarcation points can be determined to provide further direction for

recruiters, instructors, and soldier students. Both financial and readiness benefits could result from this study.

Part One of the Study – Delphi

To identify the predictors of 91WM6 soldier student success, the researcher created a Delphi questionnaire from interviews with education experts, consultation with Dr. Stark and Dr. Stenning, and the literature. The researcher piloted the Delphi questionnaire with five participants and made the recommended minor adjustments. The questionnaire was then e-mailed to 62 expert educators, administrators, and selected 91WM6 graduates. A total of 58 questionnaires in Round One of the Delphi were received. Central themes emerged from the collective opinions of the panels of experts that the researcher utilized to provide feedback to the participants. A Likert scale type questionnaire was developed from the collection of opinions for the second Delphi round. 59 questionnaires were received from the second round. The researcher sent a third Delphi round to eight experts to ensure accuracy of the consensus. Eight questionnaires were sent out and eight were returned for Round Three.

Part Two of the Study – Student Record Review

Part Two of the study was a retrospective soldier 91WM6 student record review from the years 2000-2001. A total of 124 records were reviewed and data were collected on the researcher created instrument, the data retrieval information sheet. Data of concern were extracted from the permanent records of the soldier graduates of the 91WM6 course and were analyzed using the SPSS computer program for analysis.

Research and other professional literature concerned with describing predictor variables for student success in nursing programs included associate degree and baccalaureate registered nurse students. These sources of literature served as a basis for this study because of the scarcity of literature about LPN students.

Summary

The shortage of nurses in hospitals and other health care agencies, including the United States Army, has become critical over the past decade. The need to fill the U.S. Army 91WM6 positions has continued, and due to the world situation, may escalate rapidly. The current and the projected nursing shortages give clear-cut reasons for the need of additional Licensed Practical Nurses that serve as extenders of the registered nurse and assist in meeting the demands that currently exist.

Nursing education can have an impact on increasing the number of available nurses. One contributing factor to student retention problems in the U.S. Army 91WM6 program has been difficulty experienced by soldier students in the required course work coupled with the additional requirements of being a soldier. Research findings have indicated that further research is needed to continue to identify predictors of student success after enrollment in the AMEDD U.S. Army Licensed Practical Nurse Training Program. Such identification would allow implementation of appropriate interventions for preventing failure. Indicators of student success would promote early identification of both at-risk students and the students most likely to succeed. If the student at-risk of failure were identified, individual counseling and individual program

and remedial action could be instituted early to prevent unnecessary attrition. Early identification of a potentially successful soldier student could allow his/her progression in the program without intervention unless requested by the particular soldier. The investigation of factors as predictors of success in the 91WM6 Licensed Practical Nurse Training Program provided the focus for this study.

Conclusions

Research Question One

Research Question One asked, "To what extent do selected student demographics impact the successful completion of the U.S. Army Medical Department (AMEDD) 91WM6 Licensed Practical Nurse Training Program?"

Findings. The researcher discovered that there was not one central database with student information for the entire training program. The Phase One faculty initiates a hard copy record on students that contains the information that was utilized for the study. When the researcher attempted to review computer-generated databases, they were either not available or incomplete, which significantly decreased the pool of data variables available.

As discussed earlier, within the body of literature, a debate continues as to whether or not age is a reliable predictor of student success. The results from this study suggest that soldier students who were older in chronological age along with higher military rank were not as successful as those who were chronologically younger and held a lower rank.

The findings from this study suggest the opposite of the study results found by Aldag and Rose (1983) and Tedrow and Rust (1992). The researchers suggested that individuals over 21 years of age had a much better chance of succeeding in school (42%) than those under 21 years of age (12%). Further, Froman and Owens (1984) reported a positive relationship between age and NCLEX performance, citing that older students most often have prior nursing-related experience. The findings in this study revealed higher pass rates for a private first class (97.3%) and specialist (95.2%) pass rate, as compared to lower pass rates corporals (72.7%) and sergeants (50.0%). Soldier students in this study who had completed at least one college unit, had a 91.7% pass rate, as compared to those who had not completed any additional education or college after high school (75.9% pass rate) (p=.041). The researchers suggested that prior experience may enhance entry cognitive skills that enhance academic performance along with the student's achievement.

The study data revealed that those soldier students who tended to have higher GT and ST scores failed program tests significantly fewer times (p=.001). These findings are in agreement with Caretta and Siem (1999), Thompson (1988), and Meadows et al. (2002) who found that applicable ASVB subtests were predictive of student success in the various military allied health-training programs. The findings have clearly shown that enforcing or raising the bar on existing admission standards, such as increasing the cutoff scores required for the ST or GT composites may decrease attrition of soldier students. Then the challenge becomes one of values. If the standards are raised to reduce attrition, then individuals who may have been successful in the

program may be denied admission. If administrators raise the standards, then there is a greater number of potentially successful students who must be denied entrance. Through further research, an acceptable balance can be reached.

Implications for practice. Relative to the study population results, one suggestion would be that educators should take a closer look upon the group of students who have been out of either high school or other technical school for a long period of time, such as 8-10 years. This soldier may have been out of school for longer than the generic student and may be lacking study skills. The faculty should attempt to identify those students so they may be referred to appropriate services available within the military system to assist in developing or improving study habits.

Research Question Two

> Research Question Two asked, "To what extent do selected stressors of military life and serving on active duty in the U.S. Army impact the successful completion of the Army Medical Department (AMEDD) 91WM6 Licensed Practical Nurse Training Program?"

A significant interaction was reflected when differences in pass rate were found for one gender but not the other along with pass rate for gender and failed weight standard. The students' perception of whether or not they would pass the course as a major stressor appeared to have a significant negative impact on their successful completion of the NCLEX-PN examination. For males, the impact was the opposite.

Findings. One finding from the study that is of significant interest to educators is the fact that there were significant differences noted in pass rates for the males

(p=.041), but not for the female sub-sample (p=.528). Men who were married had a 100% pass rate. Meadow (1964) discovered a significant positive relationship between age-marital status and achievement tests in her study in population of practical nurse students.

Implications for practice. All married men (100%) in this sample passed the course and NCLEX successfully, perhaps due to the fact that they had a spouse and were settled and more focused. Another view one can propose is that if the men are married, then perhaps they are more desirable human beings to begin with. Further, married men have at least a spouse to support, and perhaps other dependents; therefore, they are perhaps more motivated to do well. Another view may be that if a military man is married, then perhaps, they are in a traditional marriage, that is, they are a traditional couple where even if the wife is employed outside the home, her responsibilities increase as a direct result of the husband's responsibilities decreasing.

In line with the study's conceptual framework as developed by Kilehofner (1985), roles are the perception that an individual holds of oneself in an occupation or a social organization. Individuals can hold many roles at any given times. According to Keilhofner (1985), the dimensions of the roles include internalized expectations and balance. The internalized expectations are the ideas that one has of what is expected of him or her while they are in that role. Role balance then exists when one's roles do not compete for one's personal time.

Instructors could take an in-depth look at their enrollment rosters at the beginning of each module, to review their marital status and gender to adequately

prepare for the students who are potentially at risk. It is important, however, to also keep in mind that in some instances, soldier students may be experiencing other than intellectual difficulties when exhibiting academic problems. Soldiers may instead be experiencing either physical, social, psychological, and/or spiritual difficulties. In those cases, the significant discriminating predictors can be a symptom of the problems experienced at that particular time. Therefore, a holistic approach utilizing various interventions and support systems for financial, academic, and personal problems needs to be identified and in place to be readily accessible when deemed necessary.

As reported in the relationship of soldier student reported life stressors based on successful NCLEX-PN performance, 91% of students who were concerned about passing the 91WM6 course were reported as not passing the NCLEX-PN. Further, 50% of those who were concerned regarding family stressors were not successful on NCLEX-PN. As stated previously, the impact and probability of long separations associated with performing as a military soldier is of increasing concern to the two-thirds of the soldiers who are now married. Over the last decade, military downsizing has guaranteed the likelihood that every soldier will eventually deploy on an extended military mission.

Research Question Three

Research Question Three asked, "What is the relationship of student training success with expert panel predictors of success?"

Findings. Based on the results of the expert opinions of the panelists who participated in the study, the highest-rated predictors in completing the course were

positive study habits (M-3.58), demonstrating diligence (M= 3.49), and motivation (M= 3.45). For predictors related to passing the NCLEX-PN, the highest rate was the ability to think critically (M= 3.30) and specifically preparing for the NCLEX examination.

Results of the study suggested that the students' prior developmental education may not have provided the necessary preparation needed for successful completion of the training course. Additionally, although the researcher attempted to collect data on such abstract terms as "critical thinking," "motivated," and "mature," it was difficult to interpret the results.

Implications for practice. It is suggested that students have such areas as diligence, motivation, and positive study habits incorporated into a pre-workshop and that such refresher workshops be integrated throughout the 53 weeks of training

Recommendations

Recommendations Based on the Study

1. Fundamental to a prediction study of this type is the assumption that the results from previous classes can be applied to future classes and that academic support can be offered to those for whom failure or near failure is predicted if no corrective action is taken. The assumption of applicability to future classes is tenable as long as the admission criteria remain essentially the same and there are no major curriculum changes. This study should be updated annually and predictors should be current so they will reflect the

changes in data of succeeding classes and thus serve as more reliable predictors of military student success in the LPN training program.

2. Forward-thinking educators and administrators in academic centers must recognize the strategic value of collective data that currently reside in a multitude of records and databases. Providing easy access to information for research into the next century. Because of the difficulty in collecting data from a central database for 91WM6 student soldiers and graduates, it is recommended that one central database be established for collecting and storing all relevant data for students. Hard copies of soldier student records are destroyed after two years in storage. To provide comprehensive data for future studies, a complete database including all class grades and complete scores on the ASVAB should be compiled utilizing information technology. This study should be repeated examining student course grades as possible predictors. The researcher originally sought to examine three years of records.
3. AMEDD Center and School, Division of Nursing Science could establish a method of collecting and storing relevant data for a random sample of 91WM6 soldier students so that predictive data could contribute to ongoing program evaluation.
4. This study could be replicated to include all of the six Phase II training sites in the U.S. Army. Perhaps a larger number of subjects would yield more statistics. An experimental design comparing successful student soldiers

who have experienced program probation or dismissal might reveal variables that would further provide understanding about characteristics that may be predictive of successful completion of vocational nursing programs. Such a study would add to the body of knowledge regarding a model of a remedial program that would assist such students.

5. One goal indeed for nursing educators is to prepare qualified, competent, and safe practitioners who cannot only pass the NCLEX, but for graduates to also function effectively within their work environment. Nursing administrators and educators should consider further research comparing LPN graduate work performance to determine the comprehensive picture of program effectiveness.
6. Similar research should be conducted and continued in other courses that are offered within the unique military environment.
7. Future research should be conducted to identify those faculty characteristics that influence student success on the NCLEX-PN and throughout the military training program.
8. Researchers should replicate and expand this study with an equal or larger sample to validate the influences and explain the wide differences in variables.
9. Administrators should establish a strong network with support resources such as counselors and innovative educators to ensure that student soldiers receive adequate help and counseling to reduce stress.

10. Additional research with this population could be conducted in order to compare the faculty's and students' perceptions of organizational climate and the relationship to student success on the NCLEX-PN.
11. The use of nonintellective factors should be studied as part of the variables for predictors of success for the Licensed Practical Nurse Training Program. The study may be enhanced by the inclusion of personality variables. Other factors might include measures of learning style preference and related aptitudes and their application to the program.

Recommendations for Further Research

A gap exists in the literature as related to predictors of student success in Licensed Practical Nurse training programs, including the U.S. Army 91WM6 program. With fiscal restraints for both civilian and military education programs, along with the threats to this nation's health care:

1. Nursing faculty should continually examine their role in the admission and support of students and continue to demonstrate a kaleidoscope of talent, caring, and creativity in education. Use of predictors of student success are useful in identifying students who will require assistance to get through the program and pass the National Licensure examination. Future research should be conducted related to students to include issues such as identifying skill level differences, limitations the student may encounter, social barriers or hardships that hinder students and student outcomes.

2. There should be further research that may prove valuable would be to continue to investigate non-academic student success predictors that would identify students' attitude and/or motivation and which could result in improving understanding of a wider range of LPN student success predictors.
3. There should be further study of LPN students during their matriculation to identify variables that most clearly indicate success.
4. Further study on predictors of student success in Licensed Practical Nurse Courses to include civilian programs. Such a study could lead to identification of predictors of student success and could add to the review of literature.
5. Further research should be conducted related to students to include issues such as identifying skill level differences, limitations the student may encounter, barriers including hardships that hinder soldier students, and soldier student outcomes. Nursing faculty should continually examine their role in the selection, admission, and support of students.
6. Design a similar study of this nature to include other training sites utilizing a similar population in a different school setting to compare results for further analysis.
7. Nurse educators and administrators must develop their definition of and identify at-risk students. The may consider emphasizing the need for both a realistic self-appraisal and for sufficient preparatory activities. The at-risk

> student, however, often has difficulty recognizing that a problem exists and does not seek help in time to gain benefits. Therefore, nurse educators should consider actively encouraging realistic student self-appraisal, especially during the transition of soldier to student soldier.

Through ongoing and carefully planned assessments, guidance, and advisement, nurse educators may help make students less vulnerable to misperceptions, failure, and attrition.

According to Jeffreys (1998), early identification of the at-risk student can allow for treatment interventions aimed at maximizing strengths, recognizing weaknesses, and preparing for future educational challenges.

Findings

For schools of practical nursing, success on the NCLEX-PN is one of the long-range goals for student practical nurses. Since licensure is required in all states, schools of practical nursing strive to have 100% of their graduates achieve success on the licensure examination. In the United States Army, medical readiness and human lives are dependent on the successful graduation and attainment of skills of the 91WM6 LPN. If certain demographic characteristics and academic variables indicate the likelihood of success on the NCLEX-PN, the practical nursing school faculty should use these predictors as evaluative tools to identify marginal students. Early identification of marginal students would allow for advisement of students in a way that they could participate in programs very early in their training program to

strengthen their area of weakness in the nursing curriculum and achieve success their first attempt on the NCLEX-PN. Such an approach could reduce high attrition and failure rates in the program and on the NCLEX-PN among graduates and strengthen the soldier student while in the program.

Critics decry the horizontal research bias, that is, the tendency of researchers to replicate rather than to extend existing research. Further, they maintain that execution of a given study in multiple settings does little to further scientific knowledge, and that introducing variation in theory and method in research, indeed, contributes to expanding scientific knowledge. In context of assessing prediction systems in nursing, horizontal research indeed has merit (Mitchell, 1990).

Research problems encountered were few. One time-consuming problem was gathering the second round of the Delphi questionnaire after Operation Iraqi Freedom was initiated. The second major delay was finding information on the soldier students. A limitation of the study was that the population at only one training site was studied. The findings cannot be generalized to other training sites.

The researcher's hypothesis was soundly supported and more research is urgently needed to ensure success for 100% of the United States Army Practical Nurse soldier students. With further research, educators may be able to (a) predict those students who are at-risk for failure, (b) design extra programs that will foster achievement and facilitate training completion, and (c) continue the evaluation of such a model until a point is reached where all students who aspire to become licensed practical nurses in service to our great nation are assisted successfully.

The quest for complete answers to research questions is a challenge because it is linked to many other ethical, educational, social, and philosophical issues. However, results from research studies, including those such as this, have the potential of providing educators with empirical data to assist them in making accurate, equitable, and just learning plans that ultimately benefit both the soldier student and the educational institution outcomes.

In addition to the psychosocial cost of academic failure, the estimated cost to the United States Army and the security of this nation is at best immeasurable. In light of the current world turmoil and the vital role the United States military has, increased emphasis has been focused on improving the quality of training for soldiers, increasing the medical readiness of troops on active duty, and increasing the cost-efficiency of all training to meet budgetary restraints (Talcott et al., 1999). It cannot be overlooked, that educating a Soldier Medic is significantly expensive in terms of both time and resources to the student-training program. The goal of military medicine is to train personnel primarily to mobilize for war (Baker & Rylas, 1999). Attrition, therefore, is very costly and preventable. According to Talcott et al., 1999, the estimated cost of a student "wash back" to repeat cost material is $156.00 per day. The figure has risen since.

Recent years have seen 91WM6s active throughout the world, both in armed conflicts and in humanitarian endeavors. Soldiers continue to die on today's battlefield. Military medical personnel are currently trained to care for combat casualties. As early as 1844, Colonel Senn stated, "The fate of the wounded lays with those who apply the

first dressing" (Bartone, 1993). It is vital that trained 91WM6 soldiers be present on the frontline. They are frequently alone with multiple wounded soldiers to care for and the time until help and transport arrives is more than likely unknown. The 91WM6 soldiers may initially need to assist in returning fire instead of stopping to care for the causalities. Keeping the casualty from sustaining additional injures is one of the medic's first objectives. The 91WM6s decrease the rate of soldiers killed in action by at least 25% due their rendering of appropriate care at the point of wounding. Throughout its history, medics have earned the lasting respect and gratitude of the American public because of their dedication to providing the best care to soldiers while serving our country in war, and peace. The 91WM6s have unselfishly come to the aid of victims of disease, war and disaster throughout the world. A motto that is often stated by members of the U.S. Army Medical Service is "to protect our fighting strength." It is impossible to visualize how that mission would be met without the Army 91WM6 soldier.

From this study, the body of knowledge regarding military soldier 91WM6 students predictors for success, there exists the opportunity to use demarcation points that can provide direction for recruiters, instructors, and students. Using the information gained from this study, parameters can be determined and proactive intervention by instructors, administrators, and students would improve the success of 91WM6 student soldiers resulting in increased cost-effectiveness and better use of diminished resources and funds. The current cost has more than likely significantly increased.

The final challenge the researcher faced was to report the results of the study to the faculty and executive team of U.S. Army Nurse Researchers of the AMEDD Center and School and to the dissertation chairman and committee members and visitors at Texas A&M University. It is hoped that through use of the data obtained through this research study, that educators will build an explanatory model of predictors of success for the 91WM6 soldier student.

A comprehensive revision of the curriculum of the 91WM6 course was recently completed. It is anticipated that AMEDD Center and School Leadership will consider the results of this study and perhaps incorporate the findings to the benefit of future soldiers that will take care of our nation's brave wounded into the next millennium. Those who have served this nation can testify that wearing the uniform makes one stand just a little bit taller and prouder. The 91WM6s are professional soldiers who serve this country with dedication and selfless service to others.

REFERENCES

Aldag, J., & Rose, S. (1983). Relationship of age, American testing scores, grade-point average, and state board examination scores. *Research in Nursing and Health, 6*(1), 69-73.

Alexander, G. A. (2000, January 16). Ecoterrorism and nontraditional military threats. *Military Medicine, 5*(1), 1-5.

Allchine, M. C., & Bellucci, J. T. (1981). Prediction of freshman students' success in a baccalaureate nursing program. *Nursing Research, 30*(1), 49-53.

American Nurses Association. (ANA). (2002). *A report on the nursing shortage and crisis in the United States.* Retrieved on December 27, 2002, from http://www.nursing world.org/readroom/supp2htm

Antrobus, S. (1997). Developing the nurse as a knowledge worker in health, learning the artistry of practice. *Journal of Advanced Nursing, 25*, 829-835.

Army Medical Department (AMEDD). (1996, February). *Practical nurse course* (MOS 91C20 RC, MD1317, CMP). Washington, DC: Author.

Army Medical Department (AMEDD). (2000, May). *91W health care specialist.* [U.S. Army brochure]. Retrieved May 2, 2000, from http://www.cs.amedd.armymil/91W

Army Medical Department (AMEDD). (2001, February 23). *Manning the force brief.* Copy of slide presentation given to U.S. Army leaders, Health Services Branch, Enlisted Personnel Management Directorate, PERSCOM, Washington, DC.

Army Medical Department (AMEDD). (2002, December 31). *Recruiting bulletin.* United States Total Army Personnel Command. Washington, DC: Author.

Army Medical Department Education Center and School. (2001). *Fort Sam Houston Regulation 351-10*. Fort Sam Houston, TX: Department of the Army.

Army Physical Readiness Test. (2002). The United States Army Portal. Retrieved on December 19, 2003, from https:/www.us.army.mil/portal/portal_home

Army Training Requirements and Resource System (ATTRS). (2004). *Information for Course 300-M6*. Retrieved June 8, 2004, from https://www.atrrs.army.mil/attrscc/courseinfo.asp

Artiss, K. L. (2000). The combat soldier. *Military Medicine, 165,* 32-39.

Ashton, C. M., Kuykendal, D. H., Johnson, M. L., Wun, L., & Bush, G. R. (1994). A method of developing and weighing explicit process of care criteria for quality assessment. *Medical Care, 32,* 755-770.

Baker, E. J. (1975). Associate degree nursing students: Nonintellective differences between dropouts and graduates. *Nursing Research, 24,* 42-43.

Baker, M. S., & Rylas, P. A. (1999). The medical department in military operations other than war. Part I: Planning for deployment. *Military Medicine, 164,* 572-579.

Bardecki, M. J. (1984). Participant's response to the Delphi method: An attitudinal perspective. *Journal of Technological Forecasting and Social Change, 25,* 281-292.

Barkley, T. W., Rhodes, R. S., & Dufour, C. A. (1998). Predictors of success on the NCLEX-RN. *Nursing and Health Care Perspectives, 19*(3), 132-137.

Bartone, P. T. (1993, June). *Psychosocial predictors of soldier adjustment to combat stress*. Paper presented at the Third European Conference on Traumatic Stress, Bergen, Norway.

Bartone, P. T. (1998). Stress in the military setting. In C. Cronin (Ed.), *Military psychology* (pp. 113-138). Needham Heights, MA: Simon & Shuster.

Bayroff, A. G., & Fuchs, E. F. (1970). *The Armed Services Vocational Aptitude Battery* (Technical Research Report 1161). Arlington, VA: The U.S. Army Behavior and Systems Research Laboratory.

Birch, J. (1979). Stress: The crucial factor in nurse wastage. *Nursing Mirror, 147*(24), 1-16.

Bledsoe, P. (1996, September-October). Total health care support, medical readiness requirement. *Army Medical Department Journal.* Retrieved December 22, 2003, from http://www.acs.amedd.army.mil/das/J9652.HTMX

Bond, S., & Bond, J. (1982). A Delphi survey of clinical nursing research priorities. *Journal of Advanced Nursing, 7*, 565-575.

Bonte-Eley, S. M. (2002). *Utilizing selected criteria in a community college setting for predictors of NCLEX success by practical nursing students.* Unpublished record of study, Indiana State University, Terre Haute, IN.

Booth, E. (1992). *Predicting success in practical nursing programs.* Unpublished record of study, Florida Atlantic University, Boca Raton, FL.

Bowman, E. V. (1992). *LPN preference for BSN and ADN and criteria utilized by faculty as predictors of success*. Unpublished record of study, Kansas State University, Kansas City, KS.

Briscoe, V. J., & Anemma, M. G. (1999, July/August). The relationships of academic variables as predictors of success on the National Council Licensure Examination for Registered Nurses (NCLEX-RN). *The American Black Nurse Foundation*, pp. 80-83.

Brooke Army Medical Center (BAMC). (1998). *Developing, testing, and administering questionnaires: A guide for clinical investigation* (U.S. Army Publication No. 1-216). San Antonio, TX: Department of the Army, Headquarters, U.S. Army Medical Department Center and School and Fort Sam Houston Army Post, Clinical Investigative Regulatory Office.

Brooke Army Medical Center (BAMC). (2002). *Provider handbook,* Ft. Sam Houston, TX. Retrieved April 17, 2002, from http://www.gprmc.amedd.army.mil/BAMC/home.htm

Buhler, A. (1993, May). Managing in the 90's: Stress management. *Supervision, 54*(5), 17-19.

Bureau of Health Professions. (1994). *A report from the PEW Foundation on the state of nursing practice and the national crisis and projections for the future.* Rockville, MD: U.S. Department of Health and Human Services, Division of Nursing.

Butterworth, T., & Bishop, V. (1995). Identify the characteristics of optimum practice and findings from a survey of practice experts in nursing, midwifery and health visiting. *Journal of Advanced Nursing, 22,* 24-32.

Byrd, G., Garza, C., & Nieswiadomy, R. (1999). Predictors of successful completion of a baccalaureate nursing program. *Nurse Educator, 24*(6), 332-337.

Campbell, A. R., & Dickson, C. J. (1996). Predicting student success: A 10-year review using integrative review and meta-analysis. *Journal of Professional Nursing, 12*(1), 47-49.

Caretta, T. A., & Siem, F. M. (1999). Determinants of enlisted air traffic controller success. *Aviation, Space and Environmental Medicine, 70*(9), 910-918.

Cloud-Hardaway, P. L. (1988). *Relationship among Mosby's assess test scores, academic performance, and demographic factors and associate degree nursing graduate's NCLEX scores.* Unpublished doctoral dissertation, North Texas State University, Denton, TX.

Crane, P., Wright, C., & Michael, W. (1987). School-related variables as predictors of achievement on the National Council Licensure Examination (NCLEX-RN) for a sample of 418 students enrolled in a diploma nursing program. *Educational and Psychological Measurement, 47,* 1055-1069.

Crisp, J., Pelletier, D., Duffield, C., Adams, A., & Nagy, S. (1997). The Delphi method? *Nursing Research 46*, 116-118.

DeLorenzo, R. A. (2000). 91W health care specialist sustainment in the new millennium. *Army Medical Department Journal, 10,* 33-36.

Deloughery, G. (1995). *Issues and tends in nursing* (2nd ed.). St Louis: Mosby.

Devlin, F. (2001). *U.S. practical nurse course*. Retrieved April 3, 2001 from http://www.dns.amedd.army.mil/91W/Program-Director/index.htm

Donahue, M. P. (1996). *Nursing, the finest art of an illustrated history* (2nd ed.). St. Louis: Mosby.

Dooley, D. (1995). *Research methods*. Trenton, NJ: Prentice Hall.

Douglas, B. E. (1986). Relationships among the Armed Services Vocational Aptitude Battery (ASVAB) and the PSAT, SAT, and ACT. *Journal and Studies in Technical Careers, 3*(3), 199-207.

Driskell, J. E., & Salas, E. (1991). Overcoming the effects of stress on military performance: Human factors, training, and selection strategies. In R. Gal & A. D. Mangelsdorff (Eds.), *Handbook of military psychology* (pp. 183-193). New York: Wiley & Sons.

Dunai, F. A. (2001). Armed services vocational aptitude battery predictors of entry-level radiography students' success. *Military Medicine, 166*(5) 422-426.

Earles, J. A., & Ree, M. J. (1992). The predictive value of the ASVAB for training grades. *Educational and Psychological Measurement, 54*, 721-725.

Edenfield, S. M., & Hansen, J. R. (2000). Relationships among dental hygiene course grades, a mock board dental hygiene examination, and the National Board Hygiene Examination. *The Journal of Dental Hygiene, 74*(11), 124-129.

Ehrenfeld, M., Rotenberg, A., Sharon, R., & Bergman, R. (1997). Reasons for student attrition in nursing. *Nursing Standard, 11*(23), 34-38.

Eitelberg, M. J. (1998). Manpower for military operations. In C. Cronin (Ed.). *Military psychology and introduction* (pp. 34-128). Washington, DC: Office of the Assistant Secretary of Defense Management and Personnel.

Fairbank, B., Welsh, J. R., & Swain, L. L. (1990, September). *Armed Forces Vocational Aptitude Battery* (ASVAB). *Validity of ASVAB 14 for the prediction of high school grades* (United States Air Force Technical Report). Brooks Air Force Base, TX: Air Force Systems Command, Human Resources Laboratory.

Feldman, M. J. (1993). Factors associated with one-year retention in a community college. *Research in Higher Education, 34*(4), 503-511.

Felts, J. (1986). Performance predictors for nursing courses and NCLEX-RN. *Journal of Nursing Education, 25*, 98-103.

Froman, R., & Owens, S. (1989). Predicting performance on the National Council Licensure Examination. *Western Journal of Nursing Research, 11*(3), 334-346.

Fry, S. T., Harvey, R. M., Hurley, A. C., & Farley, B. J. (2002). Development of a model of moral distress in military nursing. *Nursing Ethics, 9*(4), 373-387.

Gall, M., Borg, W., & Gall, J. (1996). *Educational research: An introduction* (6th ed.). New York: Longman.

Golden State Career Videos. (n.d.). *Licensed Practical Nurses* (OES Code: 325050). Retrieved on August 27, 2003, from http:/www.californiacareers.info/CALGOLD2/calcareer/lic_nrs.html

Goodman, C. M. (1987). The Delphi technique: A critique. *Journal of Advanced Nursing, 12*, 729-734.

Griffin, R. W. (1999). *Management.* Boston: Houghton Mifflin.

Gunter, L. M. (1969). The developing nursing student. *Nursing Research, 18*(3), 237-243.

Gurney, C. A. (2001). Adaptation of medical personnel to combat. *Army Medical Department Journal, 10/11/12*, 7-24.

Harrington, C. (1988). A policy agenda for the nursing shortage. *Nursing Outlook, 36*(3), 118-119.

Hesselberg, B. J. (2000). *Perceived stress, role strain and role involvement, predictors of academic achievement in associate degree nursing students.* Unpublished doctoral dissertation, University of South Florida, Tampa, FL.

Hill, N., Wolf, K. N., Bossetti, B., & Saddam, A. (1999). Preceptor appraisals of rewards and students' preparedness in the clinical setting. *Journal of Allied Health, 29*(7), 86-90.

Hill, R. E., & Miller, E. L. (1991). Job change and middle seasons of a man's life. *Academy of Management Journal, 24*(1), 114-117.

Holcomb, L. O. (2000). A Delphi survey to identify activities of nurse practitioners in primary care. *Journal of Clinical Excellence for Nurse Practitioners, 4*(3), 163-172.

Hoyt, M. F. (Ed.). (1999). *Constructive therapies*. New York: Guilford Press.

Hudak, R. P., Brooke, P. P., & Finstuen, K. (2001, Spring). Identifying management competencies for health care executives: Review of a series of Delphi studies. *The Journal of Health Administration Education, 18*(2), 213-240.

Huerta, C. G. (1990). *The relationship between life change events and academic achievement in registered nurse education students.* Unpublished doctoral dissertation, Texas A&M University, College Station, TX.

Hunt, B. H., & James, M. K. (1997). Tomorrow's LPN understanding the role. *Nursing, 97*, 52-55.

Hunter, J. E. (1986). Cognitive ability, cognitive aptitudes, job knowledge and job performance. *Journal of Vocational Behavior, 9*, 340-362.

Hunter, J. E., & Hunter, R. F. (1985). Validity and utility of predictors of job performance and success. *Psychological Bulletin, 96*(1), 72-98.

Huston, J. C. (2003, September 27). A four-pronged approach to the nursing shortage. *Nursing Spectrum, 4*(9), 37.

Jenks, J., Selckman, J., Bross, T., & Paquet, M. (1989). Success in NCLEX-RN: Identifying predictors and optimal timing for intervention. *Journal of Nursing Education, 28*(3), 112-118.

Jensen, A. R. (April, 1985). Test reviews, Armed Services Vocational Aptitude Battery. *Measurement and Evaluation in Counseling and Development*, pp. 32-37.

Jensen, S. (1987). *Relationships among nine predictor variables and three criterion variables as measures of success in three allied health programs.* Unpublished record of study, Southern University at Carbondale, IL.

Kelley, D. M. (2001, March). *A Delphi assessment of the digital Rosetta stone model*. Unpublished master's thesis, Department of the Air Force University, Air Force Institute of Technology, Wright-Patterson Air Force Base, OH.

Kielhofner, G. (1980a). A model of human occupation (Part 2). Ontogenesis from the perspective of temporal adaptation. *American Journal of Occupational Therapy, 34,* 657-663.

Kielhofner, G. (1980b). A model of human occupation (Part 3). Benign and vicious cycles. *American Journal of Occupational Therapy, 34,* 731-737.

Kielhofner, G. (1985). *A model of human occupation; Theory and application.* Baltimore: Williams & Wilkins.

Kielhofner, G., & Burke, J. P. (1980). A model of human occupation (Part 1). Conceptual framework and content. *American Journal of Occupational Therapy, 34,* 572-581.

Kielhofner, G., Burke, J. P., & Igi, C. H. (1980). A model of human occupation (Part 4). Assessment and intervention. *American Journal of Occupational Therapy, 34*, 777-788.

Kittner, M. L. (1982). *Validating the use of the tests of adult basic education for predicting success in selected vocational/technical programs.* Unpublished doctoral dissertation, University of South Florida, Tampa, FL.

Knight, C. F., & Knight, P. F. (1992). Developing a certificate course for hospice nurses: A Delphi survey of subject areas. *The Hospice Journal, 8*(3), 45-47.

Knowles, M. (1970). *The modern practice of adult education.* Chicago: Follett.

Kochey, K. C. (1972). *The development of predictive grade point average models for community college dental hygiene and nursing programs and the application of*

these models in a computerized admissions system. Unpublished doctoral dissertation, University of Florida, Gainesville, FL.

Kochtanek, T. R., & Hein, K. K. (1999, May). Delphi study of digital libraries. *Journal of Information Processing and Management, 35*(3), 245-254.

Kruegar, G. P. (1991). Sustained military performance in continuous operations: Combatant fatigue, rest and sleep needs. In R. Gal & A. D. Mangelsdorff (Eds.), *Handbook of military psychology* (pp. 225-277). New York: Wiley & Sons.

Kruegar, G. P. (1998). Military performance under adverse conditions. In C. Cronin (Ed.), *Military psychology: An introduction* (pp. 89-110). Washington, DC: Library of Congress.

Kruzen, C. (2002). *Contemporary practical and vocational nursing*. Philadelphia: Lippincott Press.

Lazarus, R. S. (1984). *Stress, appraisal and coping.* New York: Springer.

Leher, P. M., & Woolfolf, R. L. (1993). *Stress management*. New York: Guilford Press.

Leitsch, P. K. (1998). *Relationship between selected academic and demographic variables and success in licensed practical nursing programs (TABE).* Unpublished doctoral dissertation, Southern Illinois University at Carbondale, IL.

Lester, R. C., & Thomson, W. A. (1989). Perceptions of CRNA's: Current and future roles-Part II. *Journal of American Association of Nurse Anesthetists, 57,* 417-425.

Lewis, J. & Welch, M. (1975). Predicting achievement in an upper-division bachelors degree nursing major. *Educational and Psychological Measurement, 35*(2), 467-469.

Linestone, H., & Turoff, M. (1975). *The Delphi method: Techniques and applications.* Merlo Park, CA: Addison-Wesley.

Lowry, M. (1992). Attrition, attrition – We all fall down. Re-evaluating staff selection and retention. *Professional Nurse, 7*(12), 791-793.

Maier, M. H., & Truss, A. R. (1984). *The ASVAB score scales: 1980 and World War II (CNR 116).* Alexandria, VA: Center for Military Analyses.

Malanowski, K. E. (1997). *An examination of SAT scores and student performance and retention in an OT program.* Unpublished master's thesis, Buffalo, NY.

Matassarin-Jacobs, E. J. (1989, November-December). The nursing licensure process and the NCLEX-RN. *Nurse Educator, 14*(6), 32-35.

McClelland E., Yang, J., & Glick, O. (1992). A statewide study of academic variables affecting performance of baccalaureate nursing graduates on licensure examination. *Journal of Professional Nursing, 8*(6), 342-350.

McKenna, H. P. (1994). The Delphi technique: A worthwhile research approach for nursing? *Journal of Advanced Nursing, 19, 1221-1225.*

McKinney, J., Small, S., O'Dell, N., & Coonrod, B. (1988). Identification of predictors of success for the NCLEX and students at risk for NCLEX failure in a baccalaureate nursing program. *Journal of Professional Nursing, 4*(1), 55-59.

Meadow, L. (1964). Assessment of students for schools of practical nursing. *Nursing Research, 13*(3), 222-229.

Meadows, A. B., Stanton, B. K., Styles, J. R., & Finstuen, K. (2002). *Predictors of course completion for the U.S. Army pharmacy specialists course* (Report for the U.S. Army-Baylor University Graduate Program). Fort Sam Houston, TX: Academy of Health Sciences.

Mendez, H., & Louis, M. (1991, September). College students' image of nursing as a career choice. *Journal of Nursing Education, 30*(7), 311-319.

Miller, A. C. (1993). Indicators of potential success among radiography students, *Radiologic Technology Journal, 64*(6), 373-376.

Misener, T. R., Alexander, J. W., Blaha, A. J., Clarke, P. N., Cover, C. M., Felton, G. M. et al. (1997, First Quarter). National Delphi study to determine competencies for nursing leadership in public health. *Image - The Journal of Nursing Scholarship, 29*(1), 47-51.

Mitchell, K. J. (1990, March). Traditional predictors of performance in medical school. *Academic Medicine, 65*, 149-158.

Mitchell, T. M. (1975). *Persisters and withdrawals: An analysis of the differences.* Kansas City, MO: Research Medical Center. (ERIC Document Reproduction Service No. ED 121217)

Mitroff, I., & Turoff, M. (1975). Philosophical and methodological foundations of Delphi. In H. Linestone & M. Turoff (Eds.), *The Delphi method: Techniques and applications* (pp. 17-35). Reading, MA: Addison-Wesley.

Mobily, P. R. (1993). An examination of role strain for university nurse faculty and its relation to socialization experiences and personal characteristics. *Journal of Nursing Education, 30*(2), 73-80.

Moore, M. A. (1996). *Vocational nurse students.* Unpublished doctoral dissertation, The University of San Francisco, San Francisco, CA.

Moreno-Casbas, T., Martin-Arribas, C., Orts-Contes, I., & Comet-Contes, R. (2001, September). Identification of priorities for nursing research in Spain: A Delphi study. *Journal of Advanced Nursing 35*(6), 857-863.

Mucklow, J. C. (2002). What knowledge and skills are essential for specialists in clinical pharmacology and therapeutics? Results of a Delphi study. *Journal of Clinical Pharmacology, 53*, 341-346.

Neuman, L. H. (1991). *The relationship between admission/academic achievement variables and pass/fail performance on the National Council Licensure Examination for Registered Nurses (NCLEX-RN) in an LPN-RN program.* Unpublished doctoral dissertation, The University of Maryland, College Park, MD.

Oliver, D. H. (1985). The relationship of selected admission criteria to the academic success of associate degree nursing students. *Journal of Nursing Education, 24*(5), 196-207.

Ostrye, M. E. (2001). Predicting NCLEX-PN performance for practical nursing students. *Nurse Educator, 26*(4), 170-177.

Parker, M. H., Brew, M. E., Smith, D. M., & Finstuen, K. (1995, March-April). Prosthodontic laboratory technician training: Aptitude predictors of success. *Army Medical Department Journal, PB 8-95-3/4*, 27-33.

Pawling, R. R. (1981). Predicting student success in vocational technical programs with the Armed Services Vocational Aptitude Battery. *Dissertation Abstracts International, 42,* 42071. (University Microfilms No. DDJ81-27880)

Peeble-Klieger, M. J., & Klieger, J. H. (1994, April). Reintegration stress for Desert Storm families: Wartime deployments and family trauma. *Journal of Traumatic Stress, 7*(2), 173-194.

Peplau, H. (1988). *Interpersonal relations in nursing*. New York: Macmillan.

Peters, J. B., Hutchinson, A. F., MacKinnon, M., McIntosh, A., & Cooke, J. B. (2001, April). What role do nurses play in Type 2 diabetes care in the community: A Delphi study. *The Journal of Advanced Nursing*, *34*(2), 179-188.

Pincus, S. H., House, R., Christenson, R., & Adler, L. E. (2001, May). The emotional cycle of deployment: A military family perspective. *Army Medical Department Journal*, *PB-8-01-4/5*, 15-23.

Pope, R. P., Herbert, R., Kirwan, J. D., & Graham, B. J. (1999, October). Predicting attrition in basic military training. *Military Medicine, 164*(10), 710-714.

Porter, R. D., & Buckingham, R. S. (1998). Predictors of students' success in the Air Force School of Health Care Science. *Military Medicine, 163*(1), 36-39.

Prediger, D. J. (1987). Validity of the new Armed Services Vocational Aptitude Battery job cluster scores in career planning. *The Career Development Quarterly, 36*(2), 113-125.

Preir, R. E., & Gulley, M. I. (1987). A comparison of rates of child abuse in U.S. Army families stationed in Europe and the United States. *Military Medicine, 152,* 437-440.

Quick, M., Krupa, K., & Whitlery, T. (1985). Using admission data to predict success on the NCLEX-RN in a baccalaureate program. *Journal of Professional Nursing, 1*(6), 364-368.

Reeves, D. L. (1997). A licensed practical nurse, licensed vocational nurse's (LPN/LVN) guide to the changing healthcare system. *Gastroenterology Nursing, 20*(2), 54-56.

Roberts-Davis, M., & Read, S. (2001, January). Clinical role clarification: Using the Delphi method to establish similarities and differences between nurse practitioners and clinical nurse specialists. *Journal of Clinical Nursing, 10*(1), 33-43.

Rosdahl, C. B. (1999). *Textbook of basic nursing* (5th ed.) St. Louis: Lipincott.

Rosenfield, P. (1988, April). Measuring student retention: A national analysis. *Journal of Nursing and Health Care, 9,* 199-202.

Rowan, H. (1959, May). The older the better. *Practical Nursing,* 13-14.

Rowe, E. (1994). *Enhancing judgement and decision making: A critical and empirical investigation of the Delphi technique.* Unpublished doctoral dissertation, University of Western England, Bristol, England.

Sadhara, S., Beach, J. R., Aw, T. C., & Sheikh-Amend, L. (2001, July). Occupational health research priorities in Malaysia: A Delphi study. *Occupational and Environmental Medicine, 58*(7), 426-431.

Salkind, N. J. (2000). *Statistics for people who (think they) hate statistics*. Thousand Oaks, CA: Sage.

Sarnecky, M. (1999). *A history of the U.S. Army Nurse Corps*. Washington, DC: Library of Congress.

Scannell-Desch, E. A. (1996, Summer). The lived experience of women military nurses in Vietnam during the Vietnam war. *The Journal of Nursing Scholarship, 28*(2), 1-12.

Schwirian, P. M., & Gortner, S. R. (May, 1979). How nursing schools predict their successful graduates. *Nursing Outlook, 27*, 352-358.

Segal, M. W., & Harris, J. J. (1993). *What we know about Army families* (Special Report #21). Alexandria, VA: U.S. Army Research Institute for Behavioral and Social Sciences.

Selye, H. (1974). *Stress without distress*. Philadelphia: Lippincott Press.

Shaughessy, M. F., & Evans, R. (1986). *Word/world knowledge: The prediction of college GPA*. Paper presented at the Rocky Mountain Educational Research

Conference, Rocky Mountain, CO. (ERIC Document Reproduction Service No. ED 174631)

Spiller, L. J., & Hall G. L. (1979). *Reading tests as predictors of academic success in community college English courses*. Paper presented at the 62th annual meeting of the American Educational Research Association, Toronto, Ontario, Canada. (ERIC Document Reproduction Service No. ED 174631)

Spratley, E., Johnson, A., Sochalski, J., Fritz, M., & Spencer, W. (2001). *The registered nurse population, March 2000 findings from the national sample survey of registered nurses*. Washington, DC: U.S. Department of Health and Human Services, Health Resources and Service Administration, Bureau of Health Professions, Division of Nursing.

Stephen, H. (1999, January). Education: The shape of things to come. *Nursing Standard, 13*(17), 12-13.

Stokes, J. W., & Jones, F. D. (1996). Combat stress control in joint operations. In F. D. Jones, L. R. Sparacino, V. L. Wilcox, J. M. Rothberg, & J. W. Stokes (Eds.), *War psychiatry: Textbook of military medicine, Part I, Warfare, weaponry, and the casualty* (pp. 53-75). Washington, DC: U.S. Army: Office of the Surgeon General.

Talcott, W. G., Haddock, K. C., Klesges, R. C, Lando, H., & Fiedler, E. (1999). Prevalence and predictors of discharge in the United States Air Force Basic Military Training. *Military Medicine, 64*(4), 269-274.

Tedrow, J. W., & Rust, J. O. (1992). *Retention and graduation rate of students from a college developmental reading programs.* Murfreesboro, TN: Middle State University Psychology Department.

Thompson, C R. (1988). *Success of U.S. Army Schools of Practical Nursing: The predictive validity of selected admissions criteria and the Armed Services Vocational Aptitude Battery*. Unpublished doctoral dissertation, American University, Washington, DC.

Tompkins, L., & Harkin, C. (1998). Predicting academic success in a nontraditional program. *Journal of Allied Health, 19*(1), 15-24.

Training and Analysis Doctrine Command (TRADOC). (1990). *Student reference glossary*. Retrieved on April 2, 2002, from http//:www.adtdl.army.mil/gi-bin/atdl.dll/sg/131-itc-//appc.htm

Treich, M., & Boss, M. (1997). Predictors of success in LPN/RNA programs. *The Journal of Practical Nursing, 37*, 44-47.

U.S. Army Medical Department. (2001, November 14). *Student evaluation plan, U.S. practical nurse course*, Center and School Academy of Health Sciences, Department of Nursing Science, Fort Sam Houston, TX.

U.S. Army Medical Department. (2002). *Brochure, 91W health care specialist - Far forward medicine*. Washington, DC: Author. Retrieved August 1, 2003, from http://www.cs.amedd.armymil/91W

U.S. Department of Defense. (1995). *Population representation and dispersion in the active duty military services' deployments.* Washington, DC: Office of the Assistant Secretary of Defense (Manpower, Installations).

U.S. Department of Health, Education, and Welfare. (1990). *Prediction of successful nursing performance* (Part 2 & Part 4). Hyattsville, MD: Health Resource Administration, Division of Nursing.

Verma, S., & Patterson, M. (1998). Evaluating the marginal student: A workshop for clinical faculty. *Journal of Allied Health, 27*(3), 162-166.

Vitola, B. M., Mullins, C. S., & Croll, P. R. (1973). *Validity of the ASVAB, Form 1 to predict technical school success* (AFHRL-TR-73-7). Washington, DC: U.S. Educational Resources Information Center. (ERIC Document Reproduction Service No. ED 082053)

Wade, C. L. (2001). *Predictors of success in an associate degree dental hygiene program: Significant variables in an open door, multi-cultural, urban/suburban community college.* Unpublished doctoral dissertation, Wayne State University, Flint, MI.

Watson, M. C. (1997). Transitions in nursing education. *The Journal of Practical Nursing, 47*(4), 18-24.

Wheeler, M. L. (1998). *The impact of selected academic and demographic predictors of the success on the NCLEX-RN by licensed practical nurse students in an associate degree nursing program*. Unpublished doctoral dissertation, Ohio University, Dayton, OH.

White-Parson, W. F. (1993, Fall). LPN to AND/BSN: Accelerated curriculum for LPN. *The Association of Black Nursing Faculty Journal*, *4*, 80-84.

Wigdor, A., & Garner, W. R. (1982). *Committee report on ability testing, assembly of behavioral and social sciences*. Washington, DC: National Academy Press, National Research Council.

Wynd C. A., & Gotschall, M. (2000). Knowledge attainment, perceptions and professionalism in participants completing the didactic phase of an Army Reserve critical care nursing residency program. *Military Medicine, 165*(4), 243-251.

APPENDIX A

A RESEARCHER'S DESIGNED DELPHI

QUESTIONNAIRE INSTRUMENT

TO INDIVIDUAL:

Dear___

This e-mail is the beginning of the first round of discussion for the discussion on identification of predictors of student soldier success in the Army Medical Department (AMEDD) Licensed Vocational Nurse Training Program (91WM6). I estimate that completion of this round will take you around 15 minutes. **Again, your insight in each of these areas is greatly appreciated.**

Remember your answers will remain anonymous. Your answers and ideas for each will provide the basis for the next round of discussion. Please reply to antonia.scialdo@cen.amedd.army.mil

1. What do you think are the predictors of student success in Phase 1 of the 91WM6 program?
(Age, gender, time in military, aptitude test scores, high school GPA, previous academic experience such as college or trade school, marital status, academic grades?)

2. What do you think are the predictors of success in Phase 2 of the 91WM6 program?
(Academic and/or clinical grades, study habits, stress or anxiety level, self-esteem scores?)

3. What do you think are predictors for students to successfully pass the national licensing exam?

APPENDIX B

DEPARTMENT OF THE ARMY HEADQUARTERS, U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL AND FORT SAM HOUSTON IRB OF CLINICAL INVESTIGATION APPROVAL

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL
AND FORT SAM HOUSTON
2250 STANLEY ROAD FORT SAM
HOUSTON, TEXAS 78234-6100

REPLY TO
ATTENTION OF

MCCS-GCI (40-38a)

24 November 2002

MEMORANDUM FOR RECORD

SUBJECT: Research Study Exemption

1. I have reviewed the description (enclosed) of a research study proposal concerning "Predictors of student success in the AMEDD licensed practical nurse training program (91WM6) as identified by expert nurse educators, instructors, and administrators of this program" with Lt Col(Ret) Antonia Scialdo as principal investigator and COL Kathleen Dunemn as associate investigator.

2. This anonymous questionnaire study of the 91WM6 faculty meets the AR 40-38 definition of an educational methods study and is therefore exempt from the requirements for institutional review board review and study subject signed informed consent. Furthermore, the AMEDDC&S Chief of Nursing Science endorses this study proposal.

3. I am the POC for questions regarding this exemption (telephone 210-221-2511 or e-mail james.lamiell@amedd.army.mil).

Lamiell

JflMES
4ES M. LAMIELL Colonel, MC
Chief, Clinical Investigation
Regulatory Office

Enclosure

APPENDIX C

TEXAS A&M UNIVERSITY IRB APPROVAL

VPR Office of the Vice President for Research

Ofik-e of Research Complian

March 3, 2003

Academic for Advanced Telecommunication and learning Technologies

Institute for Scientific Computation

Laboratory Animal Resources and Research

Microscopy and Imaging Center

Office of Business Administration

Office of Graduate Studies

Office of Sponsored Project

Texas A&M University Research Park

College Station, Texas

University

MEMORANDUM

TO: Antonia Scialdo
EDHRD
MS 4226

SUBJECT: Predictors of Student Success in the Army Medical Department (AMEDD) Licensed Practical Nurse Training Program (91WM6) as Identified by Expert Nurse Educators, Instructors, and Admin, at Fort Sam Houston, Texas 2003-0086

Approval Date: March 3, 2003 to March 2, 2004

The Institutional Review Board - Human Subjects in Research, Texas A&M University has reviewed and approved the above referenced protocol. Your study has been approved for one year. As the principal investigator of this study, you assume the following responsibilities:

Renewal: Your protocol must be re-approved each year in order to continue the research. You must also complete the proper renewal forms in order to continue the study after the initial approval period.

Adverse events: Any adverse events or reactions must be reported to the IRB immediately.

Amendments: Any changes to the protocol, such as procedures, consent/assent forms, addition of subjects, or study design must be reported to and approved by the IRB.

Informed Consent/Assent: All subjects should be given a copy of the consent document approved by the IRB for use in your study.

Completion: When the study is complete, you must notify the IRB office and complete the required forms.

ey, CIP, Advisor
Institutional Review Board -
Human Subjects in Research

APPENDIX D

RESEARCH PROPOSAL SUPPORT LETTER FROM COLONEL HARRIS, CHIEF, DEPARTMENT OF NURSING SCIENCE, DEPARTMENT OF THE ARMY HEADQUARTERS, U.S. MEDICAL DEPARTMENT CENTER AND SCHOOL

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL
AND FORT SAM HOUSTON
2250 STANLEY ROAD FORT SAM
HOUSTON, TEXAS 78234-6100

REPLY TO
ATTENTION OF

February 3, 2002

Department of Nursing Science

Ms. Antonia Scialdo
Doctoral Candidate Texas A & M University
College Station, TX

SUBJECT: Research Proposal, Predictors of Student Success in the Army Medical Department (AMEDD) Licensed Practical Nurse Training Program (91 WM6) as Identified by Expert Nurse Educators, Instructors, and Administrators at Fort Sam Houston, Texas"

Dear Ms Scialdo:

I fully support your research proposal to identify predictors of student success in the 91WM6 program. Identification of predictors of success will allow proactive future direction for recruiters, instructors, and students. The result s of this research study have the potential of addressing a critical training issue for the U. S. Army Medical Command (AMEDD) and ultimately impacting soldier success.

I fully support your working closely and under the direct supervision of your on site supervisor, COL (Dr.) Kathleen Dunemn, AN, CNM, Ph.D., Senior Staff Officer, AMEDD Center and School, Center for Healthcare Education and Studies, Analysis Branch, Ft Sam Houston, TX. Dr. Dunemn is fully capable of acting as a consultant and mentor to you in this research project. COL Dunemn' s extensive clinical and research background along with her dynamic interpersonal skills will provide you with a wealth of knowledge for your research study.

I look forward to supporting you in this research. Please feel free to contact me at (210) 221-8231 if you need further assistance.

Sincerely,

Janet

Janet R. Harris
Colonel, U.S. Army Nurse Corps
Chief, Department of Nursing Science

APPENDIX E

RESEARCH PROPOSAL SUPPORT LETTER FROM COLONEL DUNEMN, CHIEF, DEPARTMENT OF NURSING SCIENCE, DEPARTMENT OF THE ARMY HEADQUARTERS, U.S. MEDICAL DEPARTMENT CENTER AND SCHOOL

DEPARTMENT OF THE ARMY
ACADEMY OF HEALTH SCIENCES
2250 STANLEY ROAD FORT SAM
HOUSTON, TEXAS 78234-6130

REPLY TO
ATTENTION OF

10 February 2002

MEMORANDUM FOR Dr. Stephen Stark, Chairman of Graduate Committee for Antonia Scialdo, Tenured Professor College of Education and Human Resources,Texas A & M University College Station, TX

SUBJECT: Research Protocol Titled: "Predictors of Student Success in the Army Medical Department (AMEDD) Eicensed Practical Nurse Training Program (91WM6) as Identified by Expert Nurse Educators, Instructors, and Administrators at Fort Sam Houston Army Post, San Antonio, Texas".

1. I am pleased to serve as a consultant and on-site supervisor on this important research project. There is an urgent need to fill the soldier requirements in the critically undermanned health care area such as 91 WM6, US Army Eicensed Practical Nurse.

2. Military medicine trainees its personnel primarily to mobilize for war. Medical units and combat support hospitals are designed, configured, and supplied, and staffed for the combat scenario. Further, military life often demands considerable physical and psychological robustness of the individual. The United States Army must provide trained combat medics with practical nurse skills to ensure immediate access to health care on today's battlefield. Using the determined parameters and predictors discovered from this research study, proactive intervention by instructors and military leaders along with students would improve and enhance the success of 91WM6 soldier students resulting in better utilization of dwindling training resources and budgets.

3. I have mentored Ms. Scialdo throughout the past three years in both research and class work toward completion of her degree. I have reviewed Ms. Scialdo's research proposal. She is fully capable of conducting this research project. It is an excellent fit with her clinical background, along with her education and research training.

4. My role as a consultant in this research study is based on my previous experience in conducting research related to the sensitive topic of student characteristics. Further, I have served as a consultant on numerous research studies, along with conducting research as the Principal Investigator.

5. In numerous visits to the performance site, I will assist with the details surrounding startup of the project. Careful planning, anticipation of potential problems, and organization are critical to the success of the study. I will perform periodic "self-evaluation" of the progress of the study, lending my previous experiences with research study audits. I will also encourage and participate in the development of publications from this research study.

Encl

KATHEEEN N. DUNEMN
COE, AN, CNM, PhD
Senior Staff Officer
Center for AMEDD Strategic Studies
Fort Sam Houston, TX
(210)221-2088

APPENDIX F

PILOT STUDY: GUIDELINES FOR REVIEWING DELPHI ROUND ONE AND THE STUDENT RECORD DATA INFORMATION SHEET

Dear Pilot Study Participants:

Thanks for agreeing to review the Delphi Questionnaire and data gathering form I plan to use in my dissertation research study.

I am a doctoral candidate at Texas A&M University, College Station, TX. I am interested in identifying predictors of student success in the Army Medical Department AMEDD Licensed Vocational Nurse Training Program (91WM6). (Col Harris is working with me on this project).

One part of my research will come from experts like yourself in rounds of Delphi discussion. I am limiting my questionnaires to educators, administrators and select soldiers who have successfully completed the program. Using information from professional literature along with information garnered from communication with AMEDD personnel, I have created the first round of the Delphi questionnaire.

I am asking you to review both the Delphi and the student record data gathering form that I plan to send to the intended participants. Please answer the questions as they relate to your current role or past experience working with the 91WM6 student soldiers and record the amount of time it takes to complete the form in the blanks below. Please feel free to write any suggestions to change wording or improve clarity of the items in either form. Additionally, please answer the questions at the bottom of this letter and return the questionnaire, the data information sheet to me via e mail.

If you have any questions, you may contact me at 210-916-2482 or my committee chairman, Dr. Stephen Stark, (979) 845-2656, or the U. S. Army Education Consultant/Advisor, Kathleen Dunemn, Col, CNM, Ph.D., at (210) 221-2088. Please return the information to me by April 21, 2003: antonia.scialdo@amedd.army.mil
Thank you for your support in this research study.

Antonia Scialdo, RN
Doctoral Candidate
Texas A&M University

1. How long did it take you to complete the Delphi questionnaire?

   _____minutes

2. Are the instructions and information clear?

   _____yes_____no

3. Is the Delphi round easy to read?

   _____yes_____no

4. Which method of delivery would you be more likely to participate in this study and to fill out the Delphi questionnaire?

   Mail delivery_____ E-Mail_____

5. What would you add or delete to the Student Record data collection form?

6. Add any suggestions or comments.

APPENDIX G

LETTER TO ALL INCLUSION CRITERIA PERSONNEL INVITING THEM TO PARTICIPATE EXPLAINING THE PURPOSE, METHOD, AND CRITERIA OF THE STUDY

Please note that this study has been reviewed and is fully supported by Col (Dr.) Janet Harris

Dear

I am a doctoral candidate at Texas A&M University, College Station, TX. I am doing my research on identification of predictors of student soldier success in the Army Medical Department (AMEDD) Licensed Vocational Nurse Training Program (91WM6).

Part of my research involves a group of experts (approximately 30+) commenting on a topic in rounds of discussion in which I would like you to participate. Through your years of teaching and performing as nurses, instructors and Directors you have been exposed to a variety of students varying in ability and personality. Your experience with students, along with your own clinical experience has given you insight to identify students who possess characteristics leading to strong performance early in the LVN training program. Your input is valuable and will help with the completion of this study.

The research I am doing is designed to explore predictors of success with 91WM6 student soldiers and add the results to the body of professional literature. Your anonymity will be safeguarded to permit open discussion. I will use electronic mail, and estimate a three-month period of time from start to completion. Attached is the first of three rounds of discussion..

Your consent to participate will be assumed through the return of the first survey I send you. Further, the following statement pertains to you and applies if you assent to participate in this study. ***"I understand that this research study has been reviewed and approved by the Institutional Review Board-Human Subjects in Research, Texas A & M University. For research-related problems or questions regarding subjects' rights, I can contact the Institutional Review Board through Dr. Michael W. Buckley, Director of Support Services, Office of the Vice President for Research at (979) 458-4067."***

If you have any questions, please feel free to contact myself antonia.scialdo@cen.amedd.army.mil, or my committee chairman, Dr. Stephen Stark, (979) 845-2656, or my adviser, Kathleen Dunemn, COL, AN, CNM, PhD, at Kathleen.dunemn@cen.amedd.army.mil. (210) 221-2088.

Thank you for your time, I look forward to working with you

****PLEASE RETURN THE ATTACHED ROUND 1 BY THURSDAY 11 APRIL 2003**

Respectfully,

Antonia Scialdo, RN, Retired LTCOL USAF
Graduate Student
Department of Educational Administration
Texas A&M University, College Station
407 Abiso Avenue
San Antonio, TX
78209
DSN: 471-2482 COM: (210) 916-2482

APPENDIX H

RESEARCHER CREATED MENU OF THE TYPE OF VARIABLE AND CORRESPONDING CODES RELATED TO EACH LEVEL OF THE APPLICABLE VARIABLE

DATA MENU	DATA MENU DEFINITIONS
SS#	**Social security last four numbers (numbers recoded to protect privacy of students and to provide information for researcher only**
Gender	**Student's gender** **1=female** **2=male**
Age	**Student's age**
Rank	**Student's rank** **(Army enlisted rank)** **1=private** **2=private first class** **3=specialist** **4=corporal** **5=sergeant** **6=staff sergeant** **7=platoon sergeant (sergeant first class)** **8=command sergeant major** **9=sergeant major** **10=sergeant major of the US Army**
Hsg	**Method of student's high school graduation** **1= Diploma** **2= GED**
Momil	**Months military service-number of months the student identified regarding his/her service time on Phase II (Licensed Practical Nurse Training Program) orientation survey**
Moexp	**Number of months of experience that the student has had in the medical area/emergency medical technician, certified nursing assistant, enrollment in nursing school including clinical, paramedic, hospital patient care**

Gtscore	**General Technical Score (a composite of the ASVAB exam)**
Stscore	**Skilled Technical Score (a composite of the ASVAB exam)**
Milcomp	**Component of military student serves in:** **1=Active Duty Army** **2=Army Reserve** **3=National Guard** **4=other service**
Dms	**Marital status of student while enrolled in the Phase II Licensed Practical Nurse Training Program** **1=Divorced** **2=Married** **3=Single**
Numdepts	**Number of the dependents that the student listed on orientation sheet**
Timecoun	**The number of times the student was counseled regarding school performance, or other life events**
College	**The number of college credits that the student lists on their orientation sheet**

INPUT	**OUTPUT**
INFORMATION	**Pass/Fail NCEX**
*Student demographics gender, age, rank, method of high school completion, months served in military, months of medical experience, GT and ST score, military composition, marital status, number of dependents, times counseled college credits, career goals, stressors, tests failed, clinical performance, success, times failed fitness, weight, Article 15's (Occupational Goals)	
OCCUPATIONAL GOALS	**FEEDBACK**

Stressors listed by students during their	**psgcrse=passing course** **adpa=adapting to army** **cfsd=confused about policies in the army** **ct=childish treatment** **sds=screaming drill seargents** **psgpt=passing physical fitness** **fmstr=family stress** **findiff=financial difficulty** **geosep=geographical separation from loved ones, family or spouse**
Clinical	**Clinical performance** **1=excellent** **2=good**
THROUGHPUT Clinical Success/Performance Phase I & II	**Number of tests the student failed**
Testfld	
NCLEX	**1=fail** **2=pass**
Fldafpt	**how many times the student failed the fitness test**
Fldweigh	**Failed weight standards for the USA—that is exceeded the maximum allowable weight**
Article 15	**The number of times an article 15 was administered to the student**

APPENDIX I

DELPHI II LIKERT-SCALE DESIGN INSTRUMENT

Delphi Discussion Round Two

Thanks again for your valuable participation. Please rate the possible predictors of student success in completing the 91WM6 course (phases I and II) and successfully passing the NCLEX by placing an "X" below your opinion of the predictor.

Example:

Not a Predictor	Weak	Mod	Good	Excellent Predictor
		X		

Possible predictors of student success in completing the requirements of the 91WM6 course (phases I & II).

Previous academic experience (college, trade school)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

High School Grade Point Average

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Successfully passed courses in natural sciences and math in high school

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Students Age (older students have a higher rate of success)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Student's Gender (female)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Student's Gender (male)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Aptitude Test Scores (GT/SG)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Student's marital status (single)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Student's marital status (married)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Length of time serving in the military

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Motivation (desires a career in nursing)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Consistently prepares ahead for class and studies for tests (good study habits)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Test taking abilities

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Predictors of success in passing the NCLEX:

Phase II academic grades

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Phase II clinical grades

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Motivation (desires a career in nursing)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Relationship of phase II course test questions to NCLEX test questions

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Preparation for NCLEX (participating in test taking practice and review)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Test taking abilities

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Understanding of basic pathophysiology of body systems

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Ability to positively manage personal stressors (e.g., family issues, financial issues, anxieties)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Demonstrates positive coping skills

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Demonstrates diligence, a willingness to put time and effort forth; persistent application to one's studies

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Demonstrates discipline—shows ability to focus on task at hand

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Demonstrates flexibility—shows ability to prioritize demands

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Positive self esteem

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Re-cycle status (e.g. re-cycled in Phase I and/or II)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Exposure to a diversity of complex patients during clinical experiences

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Demonstrates ability to critical think

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Student's confidence in their knowledge (academic and clinical)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Re-cycle status (e.g. re-cycled in Phase I or II)

Not a Predictor	Weak	Mod	Good	Excellent Predictor

Thank you for your participation please feel free to add any additional comments you wish to add in the space below.

Please return this survey to antonia.scialdo@cen.amedd.army.mil

APPENDIX J

SECOND ROUND REPORT FROM EXPERT OPINIONS TABULATED FROM RESULTS OF DELPHI I & II

«^-Qijginal-Unsortecl Data

0=Not a Predictor
- 4=Excellent
Predictor

Predictors in completing	Mean	Std Deviation	#001	#002	#003	#004	#005
Prev Acad Exp	2.84	0.92	0	2	4	3	3
HSGPA	2.25	0.83	2	2	2	3	1
Succ Passed NS & Math in HS	2.74	1.01	1	1	3	3	2
Age	2.44	1.05	3	3	3	2	2
Gender- Female	0.86	1.16	0	1	4	1	1
Gender- Male	0.74	0.94	0	0	4	1	1
GT/SG	2.58	1.15	1	1	4	3	2
Student Marital Status - Single	1.11	0.99	0	1	4	2	1
Student Marital Status - Married	1.33	1.01	0	1	3	2	1
Time in Service	2.26	1.08	3	2	4	1	2
Motivation	3.45	0.74	4		3	3	2
Pos Study Habits	3.58	0.65	4	4	4	3	4
Test Taking Abilities	3.16	0.73	4	2	3	3	3
Manages personal stressors	2.95	0.83	4	3	3	2	3
Positive Coping Skills	3.11	0.70	3	2	J5	3	3
Demos Diligence	3.49	0.66	3	3	S^" 3	3	4
Demos Discipline	3.25	0.63	3	3	3	3	4
Demos Flexibility	3.16	0.65	4	2	4	3	4
Pos Self-Esteem	2.74	0.72	4	1	4	3	3
Re-Cycle Status	2.04	1.00	0	3	4	1	1
Predictors in passing NCLEX	Mean	Std Deviation					
Phase II Academic Grades	3.04	0.65	2	4	3	3	3
Phase II Clinical Grades	2.88	0.71	2	3	3	3	3
Motivation	3.04	0.73	3	3	4	3	1
Relationship of p II questions to NCLEX	2.86	0.88	3	1	3	2	3
Prep for NCLEX	3.26	0.72	4	3	4	3	2
Test Taking Abilities	3.14	0.69	4	3	3	3	3
Understanding of Basic Pathophysiology of body systems	3.16	0.65	4	3	3	3	3
Exposure to Complex Pts during Clinicals	2.89	0.84	4	2	3	3	3
Demos ability to Critically Think	3.30	0.73	4	2	3	3	4
Student's confidence in knowledge	2.84	0.77	3	1	3	3	3
Re-Cycle Status	1.96	1.05	0	2	3	2	1

APPENDIX K

PROTECTION OF HUMAN RIGHTS

All of the data from the Delphi discussions along with the data from the student soldier records were stored in a master computer file in Excel format along with a SPSS Version 6. The data were maintained by the researcher in a locked file cabinet and office. To maintain confidentiality, student names and social security numbers were not recorded with the database and the use of a three digit code was implemented. In addition, since the researcher is an employee of the Brooke Army Medical Center, Fort Sam Houston Post, San Antonio, TX, the guidelines of HIPPA along with Great Plains Command of the United States Army Medical Division research guidelines were strictly adhered to. Additionally, the researcher followed the guidelines set forth by Texas A&M University policy and procedures for the protection of human subjects.

VITA

ANTONIA SCIALDO
407 Abiso Avenue
San Antonio, Texas 78209

EDUCATION

2004	Doctor of Philosophy, Educational Administration Texas A&M University, College Station, Texas
1998	Master of Science, Nursing The University of the Incarnate Word, San Antonio, Texas
1978	Master of Science, Education Florida Atlantic University, Boca Raton, Florida
1975	Bachelor of Science, Nursing Barry University, Miami, Florida
CERTIFICATION	Registered Nurse, Licensed in California, Texas, & Florida Licensed Practical Nurse, Licensed in California & Texas

EXPERIENCE

1998 – Present	Clinical Practice Guideline Facilitator, Research Grant Project Coordinator, Grant Writer Brooke Army Medical Center, Fort Sam Houston, Texas
1994 – 1998	Associate Deputy Command Nurse, Air Education and Training Command, Office of the United States Air Force Surgeon General, Randolph AFB, San Antonio, Texas
1990 – 1994	Senior Nurse Executive, Castle Air Force Base Hospital, Atwater, California

This dissertation was typed and edited by Marilyn M. Oliva at Action Ink, Inc.