

Student Retention in Higher Education:
Examining the Patterns of Selection, Preparation, Retention, and Graduation of
Nursing Students in the Undergraduate Pre-licensure Nursing Program
at Arizona State University
by
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ABSTRACT

This study is designed to understand the patterns of selection, preparation, retention and graduation of undergraduate pre-licensure clinical nursing students in the College of Nursing and Health Innovation at Arizona State University enrolled in 2007 and 2008. The resulting patterns may guide policy decision making regarding future cohorts in this program.

Several independent variables were examined including grades earned in prerequisite courses; replacement course frequency; scores earned on the Nurse Entrance Test (NET); the number of prerequisite courses taken at four-year institutions; race/ethnicity; and gender. The dependent variable and definition of success is completion of the Traditional Pre-licensure Clinical Nursing Program in the prescribed four terms. Theories of retention and success in nursing programs at colleges and universities guide the research.

Correlational analysis and multiple logistic regression revealed that specific prerequisite courses—Human Nutrition, Clinical Healthcare Ethics, and Human Pathophysiology—as well as race/ethnicity, and gender are predictive of completing this program in the prescribed four terms.

DEDICATION

This dissertation is dedicated to all those who supported my educational efforts over the years including: my beautiful daughters Lauren and Christine; my deceased mother Joni Schultz, my brother Kasey; my sister Lisa; my significant other Chris Miller, and many friends including Jennifer Blair, Lori Reed, Mike Chafin, Rosanna Johnson, Betty Dunaway, and the Herrera family.

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CHAPTER ONE

INTRODUCTION

Background

Higher education is important to democratic societies yet almost half of those who start college do not complete a baccalaureate degree (Consortium for Student Retention Data Exchange Retention Report, 2009). This startling attrition rate is also true of students in Bachelor of Science in Nursing (BSN) programs (American Association of Colleges of Nursing, 2011). Given the shortage of nurses in the United States and the cost to educate nurses, this attrition rate is especially concerning. The United States is projected to have a nursing shortage which could intensify as the population ages, and the need for health care grows. Nursing colleges and universities across the country are struggling to expand enrollment levels to meet the rising demand for nursing care. The cost per nursing student in baccalaureate programs compounds this problem because it is higher than the cost for most other disciplines. This is due in large part to the labor intensive, low faculty to student ratios required in nursing education of approximately 1:10 (American Association of Colleges of Nursing, 2011).

Because of the need to graduate increasing numbers of baccalaureate prepared nurses in cost-intensive programs, baccalaureate nursing programs must be able to accurately and efficiently identify students most likely to succeed in these programs, graduate with a BSN and pass the National Council Licensure Examination-Registered Nurse (NCLEX-RN). Research indicates that there is a

need for a parsimonious explanation of BSN readiness and attrition to guide policy makers in nursing programs in institutions of higher education to decrease the attrition rate and boost the BSN graduation rate (Byrd, Garza, & Nieswiadomy, 1999, p. 1).

Purpose of the Study

The purpose of this study is to answer some important questions about one particular baccalaureate nursing program in the College of Nursing and Health Innovation at Arizona State University the results of which could be generalizable to other nursing programs. The important questions, then, are:

1. What is the pattern of success for nursing students in this program?
2. What factors best predict which students will be most likely to complete the Bachelor of Science in Nursing, pass the NCLEX-RN, and practice as a registered nurse?

Nursing programs across the country use a variety of factors to determine which students will be the best prepared to pursue nursing studies, complete the BSN, and pass the NCLEX-RN. Among these factors are scholastic aptitude measures such as grade point average (GPA) and standardized aptitude tests. Moderating effects also exist and are referred to as contextual environmental factors or CEFs (Byrd, et al., 1999, p. 35). These include factors such as the number of hours that nursing students work outside of their studies and the number of students with English as a second language. Aptitude has also been shown to be predictive of BSN student success and should be carefully examined

as a predictor of program completion (Byrd, et al., 199, p. 37). Entrance tests such as the Nurses Entrance Test (NET) or the Test of Essential Academic Skills (TEAS) usually measures aptitude.

Statement of the Problem

As the largest producer of baccalaureate prepared nurses in the state of Arizona, the College of Nursing and Health Innovation at Arizona State University (ASU) graduates approximately 300 BSNs each year through the pre-licensure baccalaureate clinical nursing program and the RN to BSN completion program (<http://nursingandhealth.asu.edu/>). Nationally, approximately 20% of the students who begin nursing studies do not complete them. While this 20% attrition rate is much better than the 50% national attrition rate for all majors, it represents lost investment in those students who began a nursing program but did not complete it. In addition, for the pre-licensure nursing program at Arizona State University approximately 500 students meet the minimum eligibility criteria for the 200 or so clinical spaces available each year (Herrera, 2012). Because of the need for more nurses and due to budgetary concerns, it is critically important to correctly identify the 200 students who will be granted space in the undergraduate pre-licensure program that are most likely to complete the BSN and pass the NCLEX-RN. The online RN to BSN program currently has unlimited capacity so is not included in this study.

The College of Nursing and Health Innovation (CONHI) at Arizona State University has used the grade point average (GPA) in prerequisite courses and an

aptitude test to determine which students will be given clinical space in the undergraduate pre-licensure nursing program. These are quantitative factors and the nursing faculty recognize that other more qualitative considerations might provide additional, predictive information (Morris, 2012). Some qualitative factors that were considered for inclusion in the decision making were essays prepared by students to estimate their understanding of the nursing profession; interviewing students; and resumes that would indicate health-related experiences. Given the time intensive nature and related expenses of evaluating these other factors, they have not been included in the placement decision making, to date. Therefore, this research will focus on the quantitative factors used to determine which students will be given the coveted clinical nursing spaces in the BSN.

This study is designed to understand the patterns of selection, preparation, retention and graduation of undergraduate pre-licensure clinical nursing students in the College of Nursing and Health Innovation at Arizona State University enrolled in 2007 and 2008. These patterns include prerequisite course grades, course location, course replacement, entrance test scores, demographics, and outcomes and are identified and described. The intent is to understand the contribution of course grades, select GPA, course replacement, NET scores, race/ethnicity, and gender to successful completion of the program in the prescribed four terms.

Arizona State University, a large, urban, public university includes the College of Nursing and Health Innovation and the largest producer of

baccalaureate nurses in the state of Arizona. Current models of retention and graduation in higher education will be described, research on success in nursing programs examined, and relevant variables will be considered.

The independent variables examined include the grades earned in prerequisite courses; replacement course frequency; scores earned on the Nurse Entrance Test (NET); the number of prerequisite courses taken at four-year colleges versus two-year colleges; race/ethnicity; and gender. The dependent variable is dichotomous and is: completion of the upper division nursing curriculum in the prescribed four terms, thus earning the BSN, or interruption in progress toward the BSN such as failing a nursing course or discontinuation of the degree program.

Definition of Terms

Retention: There is currently one standard national retention definition established by the federal government that must be reported by all colleges on an annual basis. That definition is: Program retention tracks the full-time student in a degree program over time (in six years for four-year colleges and in three years for two-year colleges) to determine whether the student has completed the program (Consortium for Student Retention Data Exchange, 2009). This definition of retention does not include students who start as part-time students then move to full-time attendance or those who are attending college part-time which in many cases is over 50% of some college populations, especially at community colleges nor students taking distance education courses.

Course Retention: The number of students enrolled in each credit course after the course census date and the number of students who successfully complete the course with a grade of A, B, C, D or fail at the end of the term.

Student Retention: Students without a two-term consecutive absence are considered retained. For students with two or more terms of absence, the college may determine whether they have achieved their academic and/or personal goals.

Attrition: Reduction in the college student population as a result of transferring or dropping out.

Diploma Nursing Programs: A Diploma in Nursing or Nursing Diploma is an entry-level nursing credential. Diploma programs existed before colleges and universities added nursing programs to their curricula. In the United States, diploma programs are usually offered by hospital-based programs. These programs include classroom and clinical experiences. The number of diploma programs in the United States is declining (American Association of Colleges of Nursing, 2011). Associate degree programs in nursing: The associate degree in nursing is offered by two-year colleges known as Community Colleges. Sometimes this degree is referred to as an Associate Degree in Nursing or ADN. These programs usually require that students take prerequisite courses and then a nursing curriculum including clinical experiences. This is currently the most common nursing degree granted in the United States (American Association of Colleges of Nursing, 2011).

Bachelor of Science in Nursing (BSN): The BSN is a four-year degree that also prepares students for graduate level study in nursing. Most programs require prerequisite courses in the first two years and then upper level nursing and clinical courses for two years. The BSN is considered the professional degree and is preferred by hospitals.

RN to BSN Programs: These programs are for students who have earned an Associate of Applied Science degree (AAS) or ADN in nursing from a community college or a Nursing Diploma from a diploma program and then pursue the BSN. Upon completion of the BSN, students are prepared for graduate study. RN to BSN programs build on the knowledge and skills the student learned in the associate degree or diploma program.

Pre-Licensure Nursing Programs: Pre-licensure nursing programs (or “Generic Nursing Programs”) refer to the nursing programs at the baccalaureate level for students who do not have a nursing diploma or associate degree in nursing who wish to complete a four-year BSN.

Nursing Aptitude: Nursing aptitude is the complexity of knowledge needed by nursing students and is differentiated from scholastic aptitude. Scholastic aptitude can be defined as scores earned on standardized tests such as the ACT or SAT or the GPA earned in high school or college. Nursing aptitude is more specific knowledge than scholastic aptitude and can be operationalized as college-level competencies in English, math, science, and reading comprehension.

NCLEX-RN: The National Nurse Licensure Exam for Registered Nurses may be taken after completing a nursing diploma, associate degree in nursing or a bachelor's degree in nursing. It allows those who pass it to practice as a registered nurse.

Registered Nurse (RN): A person who has earned a diploma, associate's degree, or bachelor's degree in nursing and successfully passed the NCLEX-RN is a registered nurse. RNs can work in a variety of settings including hospitals, schools, long term care facilities, and doctor's offices as well as many other locations.

Evidence-based Practice (EBP): EBP refers to the integration of research evidence with clinical expertise and patient needs and values. "In nursing, the research evidence must focus on the description, explanation, prediction, and control of phenomena important to practice" (Burns and Grove, 2009, p. 11).

Governing and Policy Making Bodies

Arizona Board of Regents (ABOR): The Arizona Board of Regents is the governing board for Arizona's public universities: Arizona State University, Northern Arizona University, and the University of Arizona. The Board provides policy guidance in such areas as: academic and student affairs; financial and human resource programs; student tuition, fees, and financial aid programs; university capital development plans; strategic plans; legal affairs; and public and constituent outreach (<http://www.azregents.edu/>). The Board consists of twelve members, eleven voting and one non-voting. This includes the Governor and

Superintendent of Public Instruction as ex-officio members, each serving while they hold office, and two Student Regents.

Arizona State University Academic Assembly: The Academic Assembly consists of all tenured and tenure-eligible faculty, academic professionals, and full-time contract faculty (i.e. lecturers and senior lecturers, instructors, clinical faculty, research faculty, and professors of practice).

University Senate: The University Senate is the representative body of the Arizona State University Academic Assembly and is empowered by the Arizona State University Constitution to act for the Academic Assembly in matters relating to: academic affairs, personnel policies, faculty-student policies, finances and University services and facilities. The policies considered by this body include most of the academic operations of the university such as course title and number standards, course prerequisites, course loads allowed for students, registration periods, final exam schedules, and so on (https://provost.asu.edu/committees/univ_senate).

College and University Standards Committees: When students wish to ask for an exception to one of the major, college, or university policies, they may submit standards committee petitions with the requests. Decisions are made by the standards committees from each of the colleges. Requests for exceptions to university policies that are denied are automatically reviewed by the university standards committee. The Vice Provost for Academic Affairs oversees the university standards committee. It has been noted at Arizona State University that

there are inconsistencies in how standards committees handle certain requests. For example, some colleges routinely approve of students taking courses for a third time in which they have received "D"s or "E"s. Other colleges routinely deny these requests. Arizona State University strives for consistency/congruency of standards committee petitions across colleges.

Academic Policies: Academic policies will be defined as those policies made by the Arizona State Board of Regents (ABOR), the Arizona State University Faculty Senate, and through university administrative mandates. ABOR policies cover such areas as minimum requirements for admission to the state universities, courses allowed to transfer from other higher education institutions, and degree conferral.

Faculty Policy Actions: Arizona State University Faculty Senate policy actions include such things as pedagogy, grading practices, standards for academic progression, accessibility to students, and overall expectations of student performance. Administrative mandates usually refer to mandates made by the University President or the Provost and Senior Vice President.

Aspirational Peers: Aspirational peers are those institutions identified by the College of Nursing and Health Innovation as universities that are similar or more highly ranked than it. They include Indiana University, University of California at Los Angeles, University of Iowa, University of Michigan, University of North Carolina at Chapel Hill, University of Pittsburgh, University of Texas at Austin, University of Texas at Houston, and University of Virginia (Morris, 2012).

Student Support Services: Student support services include non-academic services such as admissions, financial aid, residence life, American Indian Student Support Services, bookstores, Arizona State University family resources, the Council of Religious Advisors (Student Religious Organizations), commuter services, disability services, graduate student resources, the Intergroup Relations Center, international student services, the Multicultural Student Services Office, and veteran benefits and certification (<https://students.asu.edu/supportservices>).

Grade Related Terms

Grading Options: Ordinarily a grade of "A+," "A," "A-," "B+," "B," "B-," "C+," "C," "D," or "E," (E is a failing grade), is given upon completion of a course, unless another grading option such as "audit" or "pass/fail" is indicated at the time of registration. Although the plus/minus scale includes a grade of A+ with a value of 4.33, the cumulative GPA is capped at 4.00. Grading options cannot be changed after the close of the drop/add period. The instructor of a course has full discretion in selecting which grades to use and report from the available grading options. An undergraduate course taken at Arizona State University may be repeated for credit if the grade or mark of "D", "E", "W," or "X" is received. To be eligible for the deletion of "D" or "E" grades from calculations of the GPA, the course must be repeated at Arizona State University (<https://students.asu.edu/grades>). Independent Learning courses may not be used to repeat "D" or "E," or failing, grades. Students who have graduated are not eligible to delete the grade for a course taken before the award of the Arizona State University bachelor's degree. Undergraduate courses in which grades of "D" or "E" are received may be repeated only once. Generally, students may not repeat an undergraduate course for credit when a grade of "C" or higher is earned.

The following grades and their values are used in computing the semester and cumulative Arizona State University GPA:

Table 1: Grade Values at Arizona State University

Grade*	Grade Point Value
A+	4.33
A	4
A-	3.67
B+	3.33
B	3
B-	2.67
C+	2.33
C	2
D	1
E**	0
*Other grades (W, X, Y, etc.) are not included in the GPA calculation.	
**Grades E1, E2, E3, E4, E5, and E8 are equivalent to an E.	

GPA Calculation: The GPA is calculated as follows:

The grade point value is multiplied by the number of semester hours for which the course was taken to determine the honor points.

- The honor points are added together.

- The semester hours are added together for courses that received one of the above grades to determine net hours.
- The honor points are divided by the net hours to calculate the GPA.
- $\text{Honor Points} \div \text{Net Hours} = \text{GPA}$
- GPAs are rounded to the nearest 100th of a decimal point.
- Semester GPA is based on semester net hours. Cumulative GPA is based on total net hours.
- Although the plus/minus scale includes a grade of A+ with a value of 4.33, the cumulative GPA is capped at 4.00.

Attendance: Some instructors/faculty require that students attend class and call roll to keep track of attendance and some count attendance as a portion of the course grade.

Probation and Disqualification: Students must maintain a minimum GPA in order to be considered in "good standing." The university standard is that freshmen maintain a 1.60 GPA or above; sophomores maintain a 1.75 GPA or above; and that juniors and seniors maintain a 2.0 GPA or above. Freshmen are considered those students with fewer than 25 hours. Sophomores are those students with 25 to 55 hours. Juniors are those students with 56 to 86 hours. Seniors are those students with 87 hours or more. Students who do not maintain the minimum GPA, are placed on academic probation. If their academic achievement does not improve in the next academic semester, they will be disqualified and will not be allowed to register at the university. Some colleges

have higher GPA standards such as 2.00 or 2.50 for all students in order to be considered in good standing.

Grade Point Average Requirements for Professional Programs: Some of the professional colleges at Arizona State University including the W.P. Carey School of Business, the Herberger Institute for Design and the Arts, the Ira A. Fulton Schools of Engineering, Nursing and Health Innovation, and Public Programs require that students achieve a 2.50 to 3.50 GPA or higher and complete certain courses before they will be allowed to take the upper division courses in their major. Some even require that students apply for professional status.

Other Terms:

Academic Student Services: Academic student services include academic advising, adult learner resources, computing services, libraries, and student success tutoring.

Mandatory Academic Advising: Arizona State University requires that certain students be advised before they are allowed to register. Different colleges have different requirements but virtually all new students and students on academic probation must be advised before registering. Some students find this reassuring since they know that they are progressing in their course of study. Other students find this burdensome and would rather make their own course choices and proceed through a course of study independently.

General Studies Course Requirements: Arizona State University requires that all students, regardless of major or college, take a set of general studies

courses. These include courses in composition; science with laboratory; social and behavioral sciences; humanities/fine arts/design; mathematics; computers or statistics; global awareness; cultural diversity in the United States; and historical awareness.

Class Size: At Arizona State University, some courses are very small—as small as eight students—while others are extremely large—as large as 500 or more students.

Prerequisites: These are courses that must be taken and passed before proceeding to another course. For example, ENG 101 English Composition I is a prerequisite to ENG 102 English Composition II.

Nursing Prerequisites: There are 17 prerequisite courses for the BSN: BIO 201 Anatomy and Physiology I, BIO 202 Anatomy and Physiology II, CHM 101 Introduction to Chemistry, CDE 232 Human Development, ENG 101 First Year Composition I, ENG 102 First Year Composition II, HCR 210 Health Care Ethics, HCR 220 Introduction to Nursing and Healthcare Systems, HCR 230 Culture and Health, HCR 240 Human Pathophysiology, MAT 142 College Mathematics, MIC 205 and 206 Microbiology with laboratory, NTR 241 Human Nutrition, Statistics, Humanities/Fine Arts, PGS 101 Introduction to Psychology, and an elective.

Prerequisite GPA: The prerequisite GPA for the BSN is the grade point average for the seventeen nursing prerequisites courses and must be at least a 3.25.

Traditional Pre-licensure Clinical Nursing Program (TPCNP): This is a four year curriculum that includes prerequisite courses taken in approximately four semesters and an upper division nursing curriculum consisting of in-class didactic experiences, laboratory, and clinical experiences. Students who successfully complete these requirements earn the Bachelor of Science in Nursing (BSN) and are eligible to take the NCLEX-RN.

Course Levels: Lower division courses are those numbered in the 100 and 200 levels and are usually at a more introductory level and broader in scope. Upper division courses are numbered at the 300 and 400 level and are usually more difficult and more in-depth. Courses numbered as 500, 600 and 700 level are graduate level courses.

Grade Replacement: Students are allowed to repeat most courses in which they receive a grade of "D" or "E" (E means failing). New grades may either replace the original grade or be averaged.

Course Prefixes: The course prefix refers to the three-letter abbreviation used to list courses. For example, the prefix MAT is used to designate mathematics courses.

Course Descriptions: The language used to describe the courses offered at Arizona State University. The relevant course descriptions for this study are:

BIO 201 Anatomy and Physiology I. Studies the structure and function of the human body. Topics include cells, tissues, integumentary system, skeletal system, muscular system, and nervous system.

BIO 202 Anatomy and Physiology II. Studies the structure and function of the human body. Topics include cardiovascular, respiratory, lymphatic/immune, endocrine, renal, digestive, and reproductive systems.

CHM 101 Introduction to Chemistry. Elements of general chemistry. Adapted to the needs of students in nursing and kinesiology and those preparing for general chemistry.

CDE 232 Human Development. Lifespan development from conception through adulthood, with emphasis on family influences. Recognition of individuality within the universal pattern of development.

ENG 101 First Year Composition I. Discovers, organizes, and develops ideas in relation to the writer's purpose, subject, and audience. Emphasizes modes of written discourse and effective use of rhetorical principles.

ENG 102 First Year Composition II. Critical reading and writing; emphasizes strategies of academic discourse. Research paper required.

Alternatives to ENG 101 and 102 are ENG 105 or ENG 107 and 108:

ENG 105 Advanced First Year Composition. Concentrated composition course for students with superior writing skills; intensive reading; research papers; logical and rhetorical effectiveness.

ENG 107 English for Foreign Students. For students from non-English-speaking countries who have studied English in their native countries, but who require practice in the idioms of English. Intensive reading, writing, and discussion.

ENG 108 English for Foreign Students. For foreign students; critical reading and writing; strategies of academic discourse. Research paper required.

HCR 210 Health Care Ethics. Healthcare ethics emphasizing analysis and ethical decision making at clinical and health policy levels for healthcare professionals.

HCR 220 Introduction to Nursing and Healthcare Systems. Introduces the social, political, and economic contexts in which the nursing profession and healthcare systems in the United States evolved.

HCR 230 Culture and Health. Cultures of diverse groups and health/illness. Cross-cultural communication, awareness of own cultural influences, indigenous and alternative healing practices.

HCR 240 Human Pathophysiology. Chemical, biologic, biochemical, and psychological processes used in study of structural and functional alterations in health with selected therapeutics.

MAT 142 College Mathematics. Applies basic college-level mathematics to real-life problems. Appropriate for students whose major does not require college algebra or pre-calculus.

MIC 205 and 206 Microbiology with laboratory. Introductory microbiology, emphasizing basic principles of microorganisms (bacteria, protozoa, algae, fungi, and viruses) and the role they play in health, ecology, and applied fields. Principles and lab techniques used in identifying and handling microorganisms.

NTR 241 Human Nutrition. Principles of human nutrition. Emphasizes nutrient metabolism and the relationships between diet and disease.

PGS 101 Introduction to Psychology. Major areas of theory and research in psychology. Requires participation in department-sponsored research or an educationally equivalent alternative activity.

Humanities, Fine Arts, and Design (HU) and Social and Behavioral Sciences (SB): The study of the humanities and the disciplines of art and design deepen awareness of the complexities of the human condition and its diverse histories and cultures. Courses in the humanities are devoted to the productions of human thought and imagination, particularly in philosophical, historical, religious, and artistic traditions. Courses with an emphasis in fine arts and design are devoted to the study of aesthetic experiences and the processes of artistic creation. They may also feature a design emphasis in which material culture is studied as a product of human thought and imagination. The social and

behavioral sciences provide scientific methods of inquiry and empirical knowledge about human behavior, within society and individually. The forms of study may be cultural, economic, geographic, historical, linguistic, political, psychological or social. The courses in this area address the challenge of understanding the diverse natures of individuals and cultural groups who live together in a world of diminishing economic, linguistic, military, political and social distance.

Elective: Any course offered for college credit that students may choose that is not intended to meet a particular requirement. Electives are courses that are not defined as courses required for a major or minor.

Prerequisite GPA: The prerequisite GPA is the GPA calculated for the 17 required prerequisite courses for the pre-licensure nursing program.

Select GPA: The select GPA is the GPA calculated for 13 of the 17 prerequisite courses for the pre-licensure nursing program and includes both composition courses and three of the four science courses with laboratory.

Replacement Courses: Students who earn grades of “B” or “C” in the prerequisite courses may opt to take a different course at a higher level to attempt to earn a higher grade of “B” or “A” to improve their prerequisite and select GPA. For example, a student who earns a “C” in ENG 101 may opt to take ENG 217 and earn an “A” so that the “A” will be calculated in the prerequisite and select GPA rather than the “C” earned in ENG 101.

Two-year and Four-year Institutions: These refer to colleges and

universities and the kinds of degrees offered. Most two-year institutions do not offer bachelor's degrees but offer associate's degrees. Four-year institutions may offer baccalaureate and graduate degrees.

Upper Division Nursing Curriculum: The pre-licensure BSN at Arizona State University requires 17 prerequisite courses and four terms of upper division nursing coursework. The nursing curriculum is referred to as the "upper division nursing" because all courses in that four term curriculum are numbered in the 300 and 400 range.

Nursing Entrance Test (NET): The NET is a computer based test consisting of six parts: math skills, reading comprehension, test taking skills, stress level, social interaction, and learning style. All six parts must be completed in order to receive scores and be considered for admission to the pre-licensure nursing program. However, only the math and reading scores are used to calculate application eligibility. A reading score of 50% or higher and a math score of 50% or higher must be achieved for admission for most schools. The College of Nursing and Healthcare Innovation requires a 65% or higher on the math section and a 60% or higher on the reading section.

Test of Essential Academic Skills (TEAS): The TEAS is a multiple-choice assessment of basic academic knowledge in reading, mathematics, science and English and language usage. The objectives assessed on the TEAS exam are those which nurse educators deemed most appropriate and relevant to measure entry level skills and abilities of nursing program

applicants. Composite scores, as well as several sub-scores, are computed in each of the four content areas to assess specific content comprehension. All students considered in this study were required to take the NET. The TEAS was adopted in 2010 to replace the NET.

Student Data Management System (SDMS): This is a database maintained in the College of Nursing and Health Innovation with information about students who have been advised about nursing programs as Arizona State University. The database has fields for the prerequisite courses taken, the NET or TEAS scores earned, whether and when students were advanced to the clinical or upper division portion of the degree program and demographic data such as race/ethnicity, and gender.

My Reports: My Reports is Arizona State University's implementation of Hyperion BI+. Arizona State University Data Warehouse users can use My Reports to run queries against the data warehouse. Personnel and researchers use this program to gather data relevant to their interests.

Abbreviations Used

ABOR: Arizona State Board of Regents

ASU: Arizona State University

CONHI: College of Nursing and Health Innovation

GPA: Grade Point Average

NET: Nursing Entrance Test

SDMS: Student Data Management System

TEAS: Test of Essential Academic Skills

TPCNP: Traditional Pre-licensure Clinical Nursing Program

Limitations

This is a descriptive study that helps explain how the nursing program at Arizona State University operates and to explain the performance of the student participants. The most obvious limitation of this study is the sole use of quantitative data rather than multimethods. This is mostly a correlational study that helps to describe and predict success in the program. Therefore, there are many other factors that contribute to the operation of the Arizona State University nursing program and its participants than those variables included in this study. However, with the data examined here a better understanding of the patterns of selection, preparation, retention and graduation can be achieved.

Delimitations

A delimitation of this study is the use of data from only one university. Arizona State University is an urban institution located in the downtown Phoenix center, which is a dynamic environment. There is a significant Hispanic population and a concentration of American Indian students. Arizona State University is more like its aspirational peers, but less like smaller, private, and non-research schools. Therefore, the results will be less generalizable to the latter.

Assumptions

The methods used to analyze the data in this research include frequency distributions, correlational analysis, cross tabulation and multiple logistic regression analysis. The assumptions of logistic regression analysis are described below.

When the dependent variable is dichotomous, as it is in this research, a regression analysis technique needs to be identified that takes into account the probability of being in one of the outcomes as opposed to the other. Having a restricted range can make it difficult to model such a variable. Logistic regression allows researchers to predict such a discrete outcome whether the other variables are continuous, discrete, or a mix of the two. Logistic regression is often used in the health sciences where the outcome is measured as either presence of absence of disease. In addition, logistic regression makes no assumptions about the distributions of the predictor variables. The variables do not have to be normally

distributed, linearly related, or of equal variance within each group (Tabachnick and Fidell, 1996, pp. 575-577).

The linear regression equation is the (natural log of the) probability of being in one group divided by the probability of being in the other group. The procedure for estimating coefficients is maximum likelihood, and the goal is to find the best linear combination of predictors to maximize the likelihood of obtaining the observed outcome frequencies...The researcher uses goodness of fit tests to choose the model that does the best job of prediction with the fewest predictors (Tabachnick and Fidell, 1996, pp.575-576).

This method is particularly well suited to this study since the dependent variable is dichotomous where students have either completed the nursing program in the prescribed four terms or they have not. In addition, the independent variables may not be normally distributed but do not need to be for this method.

Significance of the Study

Public administrators, including college and university administrators, need research to identify policies at their institutions that affect student degree completion. These policies can be amended, as needed, to maintain academic integrity while increasing the number of students that persist and graduate. Specific populations of students may be identified and policies developed to assist

them in completing the degree.

Summary and Research Questions

Research indicates that there is a need for a parsimonious explanation of BSN readiness and attrition to guide policy makers in nursing programs in institutions of higher education to decrease the attrition rate and boost the BSN graduation rate.

The research questions asked in this study are:

1. What is the pattern of success for students in the upper division nursing program at Arizona State University in 2007-08?
2. What academic variables are associated with upper division nursing program success?
 - 2.1. Are the grades earned in each of the prerequisite courses associated with success in the upper division nursing program?
 - 2.2. Is the Select GPA associated with success in the upper division nursing program?
 - 2.3. Is the number of replacement courses taken associated with success in the upper division nursing program?
 - 2.4. Are the math and reading scores and composite score from the NET associated with success in the upper division nursing program?
 - 2.5. Is the number of prerequisite courses taken at four-year institutions associated with success in the upper division nursing program?

3. Are selected demographic factors associated with success in the upper division nursing program?
 - 3.1. Is race/ethnicity associated with success in the upper division nursing program?
 - 3.2. Is gender associated with success in the upper division nursing program?

Chapter Two examines the literature that provides the theoretical underpinning for the research.

CHAPTER TWO

LITERATURE REVIEW

The Importance of Higher Education in Democracies

Higher education is important to democratic societies yet almost half of those who start college do not complete a baccalaureate degree (Consortium for Student Retention Data Exchange, 2009). According to a 2006 study,

Only about 42% of students now graduate within four years even at the best public institutions, and the commonly reported six-year rate at the best publics reaches only 71%. The average four-year graduation rate including all public institutions is 20%, while the six-year rate is 45% (Capaldi, Lombardi, & Yellen, 2006, p. 44).

The roots of democratic commitment to education are made explicit in John Dewey's *Democracy and Education: An Introduction to the Philosophy of Education* (1916). Dewey explains that education is important in a democracy because we live in societies that must interact with those different from ourselves.

The devotion of democracy to education is a familiar fact. The superficial explanation is that a government resting upon popular suffrage cannot be successful unless those who elect and those who obey their governors are educated. Since a democratic society repudiates the principle of external authority, it must find a substitute in voluntary disposition and interest; these can be created only by education. (Dewey, 1916, p. 101)

Dewey states that democracy is more than a form of government calling it,

"a mode of associated living, of conjoint communicated experience" (Dewey, 1916, p. 101). Individuals have to consider their own actions and the actions of others in many different situations since the barriers of class, race, and national territory are broken down in democratic societies. Since democratic societies do not stratify their citizens into social classes, these societies must ensure that all of their citizens have easy access to education. In Dewey's words, "A society which is mobile, which is full of channels for the distribution of a change occurring anywhere, must see to it that their members are educated to personal initiative and adaptability" (Dewey, 1916, p. 102)."

What is the value of *higher* education in a democratic society? Is it important that citizens continue educational achievement after completing high school? Is there a threat to democratic systems if students enter higher education but do not persist to the completion of a college degree?

A partial answer to those questions is that higher education yields benefits to individuals and to society at large. Arthur M. Cohen lists several of these benefits in his book *The Shaping of American Higher Education: Emergence and Growth of the Contemporary System* (1998). Regarding higher education:

- It helps individuals move between social classes. Education or the level of schooling attained is a major determinant of a person's social-class placement.
- It yields better products and intellectual capital through research.
- It enhances community welfare. College graduates are less likely

to engage in health-damaging, activities, more likely to support cultural events, and be active in civic affairs...It develops the economy. A region's industry relates not only to its trained workforce but also to the multiplier effect of businesses and entire industries started by university staff in collaboration with entrepreneurs.

- It enhances personal income. The more schooling people receive, the more money they make, and the less likely they are to be unemployed or the recipients of social welfare.
- It develops literacy. The community colleges and comprehensive institutions especially have been engaged in direct language training for immigrants and in enhancing the basic skills of students who completed high school without mastering these abilities.
- It is an economic engine, employing over two million people and spending \$190 billion per year...It develops human capital, increasing the skills, energy, abilities, and tendencies in the population that lead to greater productivity and less deviant behavior.
- It enhances personal development. Young people are assisted toward maturity. They broaden their outlook; they learn to delay gratification and to appreciate differences among individuals.

They gain access to a society that welcomes them as worthy citizens. (Cohen, 1998, pp. 456-57).

So, higher education "...serves many functions, provides something for anyone seeking it, and is a national asset of incomparable value." (Cohen, 1998, pp. 457).

Dennis Hoffman, an economics professor at Arizona State University, illustrates many of these societal benefits. Universities provide numerous benefits to the community in which they are located (Hoffman: 2008a). These benefits include individual financial benefits, social financial benefits, and societal benefits.

The individual financial benefits indicate that those with a bachelor's degree earn an average of \$17,000 per year higher than those with only a high school diploma. If students graduate at age 22 and work until they are 65, they will earn, on average, about \$750,000 over their lifetime (Hoffman, 2008a, p. 1).

Hoffman states that the social financial benefits of higher education "spillover" to all workers in the area. For example, an increase of 1% in the proportion of college-educated workers in an area has been estimated to raise wages by 1.9% among those with less than a high school diploma, 1.6% among high school graduates, 1.2% among those with some college, and 0.4% among university graduates (Hoffman, 2008b, p. 1).

Finally, society benefits from a better educated populace. Regions with high proportions of college graduates have lower crime rates, greater and more

informed civic participation, and improved performance across other socioeconomic measures (Hoffman, 2008, p. 1).

The benefits of a college degree also point to the importance of retaining college students until they have completed a bachelor's degree. Similarly, limiting the drop out, or attrition, rate is important.

Retention in Higher Education

In the winter of 1975, the *Review of Educational Research* published an article by Vincent Tinto titled "Dropout from Higher Education: A Theoretical Synthesis of Recent Research." This article set the stage for research on retention that followed. In subsequent publications, Tinto (1986, 1993) listed structural properties of organizations that might affect college student departure decisions including: bureaucratic structure, institutional size, faculty-student ratios, and institutional resources and goals.

J. M. Braxton included other organizational characteristics such as admissions selectivity and control (Braxton, 2000, p. 260). Organizational *behavior* that might affect social integration includes: presidential and administrative styles (Berger and Braxton, 1998); organizational functions; effects of organizational models on various student outcomes (Berger, 2000); organizational attributes such as institutional communication, fairness in the administration of rules and policies, and participation of students in decision making (Braxton and Brier, 1989; Berger and Braxton, 1998).

A drive to establish outcomes indicators that would inform state legislators

and boards of regents of the efficiency and efficacy of institutions of higher education became important to states, colleges, and universities in the 1990s. The impetus was to retain students until they completed a college degree. Most states developed statewide indicators to examine degrees awarded and the cost of instruction. Statewide indicators included:

- Instructional inputs: test scores of entering freshmen; number and performance of remedial students
 - Instructional processes: time to degree; class size; faculty workload
 - Instructional outcomes: graduation rates; student performance on licensure examinations
 - Efficiency: student-faculty ratios; program costs
 - Condition: research activity; proportion of accredited programs; campus facilities
 - Access: enrollment, persistence, and graduation rates subdivided by students' ethnicity
 - Articulation: student transfer rates
 - Relation to state: employment rates and salaries for graduates
- (Cohen, 1998, p. 455).

Some universities experienced external pressures to increase graduation rates (Moseley, 1995). State legislatures and/or boards of regents were expecting universities to account for their graduation rates if they are deemed to be too low. Universities were also compared to their peer institutions. If their graduation

rates were lower than their peer institution graduation rates, they were expected to improve. Universities were also pressured to decrease the time that it took students to graduate. University officials are also concerned about students completing their degrees for another reason—they have invested resources in the students and want to see a return for their investment.

How many, or what percentage, of students who enter college should we expect to complete a degree? We know that not all students who enter college will complete a four-year degree and that there are some good reasons why students leave college, including: medical conditions (including childbirth); moving for work; and, financial circumstances that require that the student work more hours. In addition, a populist argument is that universities should be accessible. Universities should try to raise the expectations of students to encourage them to strive to excel and to consider loftier goals than they had before. It is not unreasonable to take the view that it should be the goal of the institution to encourage all entering students to aspire to the completion of a four-year degree. If students do not enter with this goal, the institution should foster this goal in the students.

Early Literature on Student Departure from Higher Education

The earliest literature on student departure from higher education is found in the early 1900s. Johnson (1926) conducted research in 1917 in an attempt to predict the success of students in college at the time that they entered based on several factors including: "...high school scholarship, psychological tests, the

proportion of advanced studies elected in the high school and the first three themes written in freshman English." (p. 82). Johnson found that using this combination of variables resulted in a more reliable prediction of success in college than the use of any one of these.

While much research on retention and graduation was conducted and published after Johnson's piece, a 1962 piece by Summerskill took the most comprehensive view up to that point in time. Summerskill (1962) reviewed over 180 research studies dating back to the 1910s. He set out to answer the question of why approximately half the students who begin studies in American colleges and universities leave before completing an undergraduate degree and only about 40% graduate in four years. Another 20% graduate at some college, someday (Summerskill, 1962, p. 631). He came to the conclusion that, "The extensive literature addressing this question yields neither adequate nor conclusive answers." (Summerskill, 1962, p. 627)

Summerskill identified several factors that are associated with dropping out of college. These included: *biological and social factors*: age at matriculation, gender; socio-economic factors; and, hometown location and size. The second set of factors included *academic factors*: secondary school preparation; scholastic aptitude; and, academic performance at college. He also suggested two *motivational factors*: lack of motivation; and, change and conflict in motivation. Finally, other factors were suggested including *adjustment; illness and injury; and, finances*. It is to these factors that he devotes most of his attention.

Summerskill also cautioned that institutional characteristics and values are important. He wrote,

... it is inadequate to ask whether a student has sufficient and appropriate motivation for college. The more meaningful question is: does the student have sufficient and appropriate motivation for a specified college with specified characteristics and objectives. (Summerskill, 1962, p. 640).

He suggested that we distinguish between a student's motivation to attend college and that student's motivation to graduate from that college. Some students never intend to graduate when they begin college studies. In addition, students' interests, needs, and goals will change during their college years. Students may enter college with one set of goals or motivations and they may change over time.

Vincent Tinto's Theoretical Model of Departure from Higher Education

The publication of "Dropout from Higher Education: A Theoretical Synthesis of Recent Research" by Vincent Tinto in 1975 set the stage for research on retention that followed. Tinto pointed out that previous literature failed to explain dropout from higher education adequately because of two shortcomings: (1) inadequate attention given to questions of definition and, (2) the lack of development of theoretical models that sought to explain, not simply to describe, the processes that bring individuals to leave institutions of higher education. (p. 89).

Tinto (1975) claimed that the dropout process had been inadequately conceptualized and that not enough longitudinal models had been produced. He showed that most previous studies were descriptive and were limited to how individual or institutional characteristics related to dropping out. A theoretical longitudinal model could link individual and institutional characteristics to the process of dropping out from college (p. 90).

So, Tinto (1975) created a theoretical model that explained the interaction between individual students and the college attended. He said that these interactions resulted in some students dropping out. He also distinguished between processes that result in different kinds of drop out behavior and referred to his model as "institutionally-oriented" (p. 90).

Tinto continued to research the issue of college student departure and studied economic, organizational, psychological, and sociological theoretical

perspectives (Tinto, 1986, 1993). According to another researcher, J. M. Braxton, Tinto's original interactionist theory "enjoys near paradigmatic stature" (2000). As of 2000 more than 170 dissertations and 400 citations pertinent to his theory are cited (Braxton, 2000).

Tinto's 1975 model includes condition variables on precollege entry. These are: family background, individual attributes, and pre-college schooling. Each of these influences each of the others and also affects the individual's goals and commitment to the college attended. These, in turn, will affect how well the students do in their college courses—grade performance—and how they develop intellectually. They will also affect the interactions the student has with peers and faculty. The grade performance and intellectual development variables are called the academic system. The peer and faculty interactions are called the social system. The academic and social systems interact with each other, as well.

The academic system helps to shape how well the student is integrated academically at the college. The social system helps shape how well the student is socially integrated into the college. Academic and social integration and the original goal commitment and institutional commitment all shape the student's subsequent goal and institutional commitments. These, in turn, affect whether the student drops out of or persists in the college.

Academic Integration. Tinto (1975) stated that academic integration could be measured in terms of grade performance and intellectual development (p. 104). Grade performance refers to meeting certain standards of the academic system

and proved to be the single most important factor in predicting persistence in college in a number of studies that Tinto reviewed.

Tinto (1975) defined intellectual development as, "... the student's identification with the norms of the academic system" and as "...an integral part of the person's personality development and as a reflection of his intellectual integration into the academic system of the college..." (pp. 104-105). He also found that intellectual development is related to persistence in college (pp. 104-105). Some researchers found that students who persisted were, "...more likely to value their college education as a process of gaining knowledge and of appreciating ideas than as a process of vocational development..." (p. 105).

Tinto (1975) cites Summerskill regarding intellectual development. Summerskill argued that what was important was the degree of congruency with the intellectual development of the individual and the prevailing intellectual climate of the institution (p. 106). Some students would withdraw if they felt that the fit between themselves and the institution was not a good one.

Social Integration is another important factor. Tinto (1975) stated that, "...social integration, like academic integration, involves notions of both levels of integration and of degrees of congruency between the individual and his social environment." (p. 107). Most social integration will occur through peer group associations, extracurricular activities, and in interactions with faculty and other personnel at the college. If students have positive social interactions, they will

include them in their evaluation of the costs and benefits of college attendance and their commitment to the institution.

Tinto (1975) reminded us that it is the student's *perception* of social integration that is important. Those who drop out perceive themselves as having less social interaction than do college persisters (p. 107). So, social integration could be summarized as the student perceiving congruency with some part of the social system of the college. If there is not social integration, there is more likely to be voluntary withdrawal. Social integration can also be excessive, and, as such, would detract from time spent on academics. This, in turn, could lead to academic dismissal.

Academic and social system influences could also coalesce. If students made friends with other students who had a strong academic orientation, then the social and academic orientations could be reinforced. Many of the studies reviewed by Tinto (1975) indicated that students who participated in extracurricular activities had less of a strain between the demands of the social and academic systems. In fact, those more involved in extracurricular activities were more likely to persist.

A number of the studies reviewed found that social interaction with the college's faculty was related to persistence in college (Tinto, 1975, p. 109). The researchers suggested that this was due to an increase in social integration and institutional commitment as well-as the student's academic integration (Tinto, 1975, p. 109). Tinto (1975) cited research that indicated that interacting with

faculty from the student's major was more important than with faculty from other disciplines since the major faculty would have interests similar to the student. In addition, the major faculty could have an impact on the student's future career.

Tinto (1975) concluded his discussion of social integration and institutional commitment by indicating that academic integration most directly affects goal commitment. Social integration most directly affects institutional commitment. Colleges have both social and academic systems but they are really institutions of academic achievement. Rewards to students are given for academic excellence, not social attainment (pp. 110-111).

Institutional Characteristics and Dropout

Characteristics of the institution were also shown to relate to the differential rates of dropout from college. Such institutional characteristics included the colleges' resources, facilities, structural arrangements, and composition of its members (Tinto, 1975, p. 111). These characteristics could lead to the development of academic and social climates at colleges.

Tinto (1975) pointed out that there had not been as much research on institutional characteristics and dropout as there had been on individual characteristics. However, he offered general statements about some of these characteristics and their effect on persistence,

Public institutions of higher education tended to have higher dropout rates than private institutions given the greater selectivity of private colleges.

Two-year colleges had higher dropout rates than did four-year colleges.
(Tinto, 1975, pp. 111-112).

The quality of the college was also related to dropout rates. Higher quality colleges had higher persistence rates. Colleges with a greater percentage of faculty with doctorates and/or institutions with higher income per student also had higher persistence rates. Tinto (1975) referred to the "social status" effect of educational institutions that says that, "... the higher the average social status composition of the institution, the higher will be the perceived value of that education by the individuals within that institution." (p. 114). Therefore, rates of dropout would be lower at colleges of higher quality. Tinto stated,

...Since quality of institution (and type of institution, e.g., two-year, four-year, university, graduate) is presumably related to the degree to which academic achievement is valued in the collegiate environment, one would expect academic integration to be increasingly more important for persistence, relative to social integration, the higher the quality of the institution. (Tinto, 1975, p. 115).

Tinto (1975) concluded by saying that when studying drop out behavior, it is important to distinguish between the different types of drop out behavior: voluntary withdrawal and dismissal for academic reasons. This is especially important because there are individual and institutional characteristics that affect the students' ability to integrate themselves into the academic and social systems of the colleges that they attend. Voluntary withdrawal is not associated with

grade performance. Academic dismissal is related to grade performance.

Voluntary withdrawal is more closely associated with a lack of congruence between the student and the intellectual climate of the institution and the social system composed of the students' peers (Tinto, 1975, p. 117).

Students also use cost benefit analysis in their decisions regarding persisting or dropping out. Once students have completed one or more years of college, they have more vested in the college degree and the nearer they are to completion, the less likely they are to drop out. Therefore, goal and institutional commitment are expected to increase as a function of nearness to the completion of the degree. Those students who are academically dismissed tend to have both lower aptitude and lower levels of intellectual development and to be of a lower social status (Tinto, 1975, p. 118). Tinto concluded, based on this information, that,

...given sufficient social interaction, programs designed to influence the academic performance of persons from lower social status backgrounds (backgrounds frequently of inferior schooling prior to college) seem to be aimed in the proper direction to enhance their persistence in college.

Whether this applies equally well to the various racial minorities that are disproportionately represented in the lower social status categories of college students remains, however, to be determined. (Tinto, 1975, pp. 118-119)

Dropping Out Due to External Factors

Tinto (1975), of course, recognizes that students drop out of college for reasons external to the college. One of the external factors that he considered was the state of the job market. Tinto utilized cost-benefit analysis to explore this factor. According to this theory, individuals will decide whether or not to participate in an activity based on the perceived costs and benefits of that activity relative to alternative activities. Cost-benefit analysis can help to explain a student's decision to drop out of college. Students who believe that they will receive greater benefits from spending their time and energy elsewhere will be more likely to drop out of college.

Evaluating the Tinto Model

Tinto's review is a thorough review of all previous literature on the topic of departure from higher education. It was also the first research to develop a theory of dropping out that was explanatory, not merely descriptive. He made it clear that researchers had to be precise in their definitions of terms like "drop out" and that research needed to be longitudinal in order to really understand the individual and institutional characteristics related to dropping out.

The "institutionally-oriented" theoretical model that Tinto developed allows researchers to better understand the social process of dropping out of institutions of higher education. By viewing colleges as academic and social systems, it followed that students may drop out because they did not share the same values or social structures as the college. If students do not feel integrated

into the social and/or academic systems in the college, they would be more likely to drop out.

Tinto's model is inclusive. He includes family background, individual characteristics of students, and pre-college schooling experiences in the model as variables in their own right as well as variables that could affect the student's goal commitment and institutional commitment. These goals, in turn, will affect how students will perform in terms of grades, how they will develop intellectually, how they will interact with their peers and with faculty. These experiences will determine how integrated students will be academically and socially. All of this will serve to strengthen or weaken students' commitments to their goals and to the institution. Finally, students will decide to persist with their education or to drop out.

Tinto's explanation of the model was detailed and intuitive. He provided a very tangible explanation of social integration that included peer group associations, extracurricular activities, and interactions with faculty and other personnel at the college. He also reminded us that students' *perceptions* of their social integration were important.

His explanation of academic integration was less satisfying. He defined grade performance as "meeting certain standards of the academic system." This may refer to the threshold that colleges have for defining "good academic standing" for their students. At many colleges this is defined as maintaining a grade point average of 2.0 or above. Students who fall below this threshold can

face certain penalties such as "academic probation" and/or "dismissal or disqualification" from the institution.

Intellectual development was defined as "the student's identification with the norms of the academic system" (Tinto, 1975, p. 104). He found that those that persisted in their college education were "more likely to value their college education as a process of gaining knowledge and of appreciating ideas than as a process of vocational development" (Tinto, 1975, p. 105). While understanding grade performance is somewhat straightforward, understanding intellectual development and how to assess it is less so.

The definitions of social integration are easier to understand and measure than are those offered under academic integration. It is easier to understand and determine how to measure "peer interactions" and "interactions with faculty" than it is to pinpoint what are "the student's identification with the norms of the academic system." Perhaps one way to understand this would be to ask the students directly whether they were expecting to gain vocational skills or to develop intellectually in the college and whether they believe that they had achieved one of these.

Tinto's discussion of institutional characteristics was new. He included such variables as resources, facilities, structural arrangements, and composition of its members. He stated that all of these lead to a "social climate" at the institution. I might rephrase this as "organizational culture."

Organizational culture is defined as a system of learned, shared values, beliefs, and norms that are used to understand the elements in the environment and serve as a guide for all kinds of behavior. It is developed by the organization not imposed on it. (Harris and DeSimone, 1994).

Another definition of organizational culture is

...the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems" (Schein, 1984, p. 14).

Leaders may, then, foster this culture by communicating it to members of the organization and rewarding those that successfully demonstrate the desired behavior.

Testing Tinto's Student Integration Model

Since 1975, there have been volumes of research testing Tinto's theory/model and other models have been proposed. Tinto himself reexamined his theory and also reviewed research conducted by others after 1975. Mallette and Cabrera concluded that many post-1975 studies that tested Tinto's student integration model found that precollege ability and background factors exerted no significant direct effects on retention and found that background characteristics influence, at most, initial institutional commitments and, to some extent, academic

and social integration (Mallette and Cabrera, 1991, p. 181). Other researchers found that precollege ability and background factors did predict withdrawal behavior (Anderson, 1981; Getzlaf, Gordon, Kearney, and Blackwell, 1984; Pascarella and Terenzini, 1980; Terenzini, Lorang, and Pascarella, 1981).

Mallette and Cabrera (1991) also found that other researchers reported contradictory results. Specifically, researchers differed in their conclusions about what role variables in the model play in academic integration, social integration, final goal commitment, and final institutional commitment.

Mallette and Cabrera (1991) reviewed other research that looked at distinguishing between different types of withdrawal behavior. Some voluntary drop outs could actually be considered transfers since they left their original college to attend another college. They found that academic performance helped to discriminate between persisters and drop outs, but failed to do so with transfers and persisters.

Mallette and Cabrera (1991) also argued that colleges/universities that sponsor programs that focus on academic ability, interactions with faculty, institutional commitment, and student finances are likely to reduce the propensity to drop out. Colleges that sponsor programs that emphasize institutional and goal commitments are likely to reduce the propensity of students to transfer to other colleges/universities (p. 191).

Other researchers found that institutional commitment did not affect persistence (Munro, 1981); that final goal commitment and persistence were not

connected for females (Pascarella and Terenzini, 1983); that neither final goal commitment nor final institutional commitment affected persistence, that neither of these commitments was affected by academic integration or social integration, and that the effect of social integration on persistence was negative (Pascarella, Duby, and Iverson, 1983); and that neither academic integration nor social integration had a significant effect on retention among Chicano students attending three community colleges in southwest Texas (Nora, 1987).

The Student Attrition Model

Research by Bean (1980), Metzner and Bean (1987), and Bean and Vesper (1990) proposed an alternative to Tinto's Student Integration Model. Their work built upon process models of organizational turnover (March and Simon, 1958), and models of attitude-behavior interactions (Bentler and Speckart, 1979; and Bentler, 1981) and is called the Student Attrition Model. Bean, as quoted by Cabrera, et al. (1992), argued that, "... student attrition is analogous to turnover in work organizations" and they stressed "...the importance of behavioral intentions (to stay or leave) as predictors of persistence behavior" (Cabrera, et al., 1992, p. 145). Bean's model also included factors external to the college that could play a major role in affecting student attitudes and decisions such as student perceptions of institutional quality, institutional fit, and opportunity to transfer.

In evaluating the Student Attrition Model, Mallette and Cabrera (1991) state that adding these constructs to the student integration model might help us to understand transfer decisions (p. 191). In addition, if the college studied the institutions where their students were most likely to transfer, it helped them to identify their competition and to assess the extent to which their academic programs meet the needs of their students (p. 191).

According to Cabrera, et al. (1992), research shows that there is support for the propositions that organizational, personal, and environmental variables shape the attitudes of students, and student's intents to persist (p. 144). Research done by Bean and Vesper (1990) found that factors other than those related to

intelligence play a major role in students' decisions to persist or drop out of college. They also found that family approval had both a direct and indirect effect on persistence.

Cabrera, et al. (1992) argued that a major gap in Tinto's Student Integration Model and theory was the role of *external* factors in shaping student perceptions, commitments, and preferences. Some of the external factors affecting persisting behavior that they considered included parental encouragement, support from friends, finances, and perceptions about opportunity to transfer to other institutions. They state that the role that factors external to the institution play on the college persistence process is by far more complex and comprehensive than the one portrayed by Tinto's Student Integration Model (p. 159). They also state that their results support Bean's assertion that the influence of environmental, organizational, and personal variables on persistence is more likely to be indirect, mediated through behavioral intentions to stay or remain at the institution.

Limitations of the Interactionist Theories

The Tinto (1975) and Bean (1980) models are considered interactional models. Ruddock, et al. (1999) conducted research to determine if there were variables in addition to those reported in the literature that would help predict whether students would persist and point out the limitations of interactionist theories of student departure developed by such researchers as Tinto and Bean: external forces such as working off campus, the effects of commuting, and

volunteer participation in community events had not been considered (p. 2). In addition, little attention had been paid to internal organizational policies and procedures of the colleges and universities in the research. Citing Tinto (1986, 1987) and Hossler (1991), Ruddock et al. (1999) indicate that there was a call for, ...a more comprehensive *theory* of student departure, one that includes a more detailed definition of "dropping out," accounts for the rich variety of ways students are involved and interactive with the formal and informal aspects of the institution, incorporates the time-specific nature of the departure process, includes the relative impact of institutional policy and procedures, as well as some measure of the quality and intensity of student effort in the academic experience. (Ruddock, 1999, p. 2)

Using University of Texas at Austin for their study, the researchers controlled for variables that had been reported in the literature as influencing retention. These included high school rank, SAT total score, major, race/ethnicity, gender, on-campus versus off-campus housing, and whether or not the student attended orientation. They also looked at background factors, issues concerning academic and career aspirations, institutional factors, faculty attitudes, student support services, finances, persistence, diversity, personal factors, and involvement along with the academic status of the student that was obtained from student records (p. 20). Seven other factors were considered including:

- Why the student decided to attend the University of Texas at Austin
- Where they lived during their first year

- Whether they were employed during their first year
- How many hours per week they worked
- How many hours per week they studied outside of class
- How many times they skipped class because it did not seem worth going (in the last semester)
- And, an estimation of the number of times since coming to the University of Texas at Austin that they met with a faculty member outside of the classroom (pp. 6-7).

They found that these variables did not predict which students would stay and which would leave. Those students that persisted did not look different than those students that dropped out.

The most striking finding was that the Leavers did much worse academically than the Stayers. Given that academic preparation was controlled for, Leavers experienced greater academic difficulty than could have been predicted ahead of time. (Ruddock, et al., 1999, p. 15)

Adding ethnicity to the study did not add to their ability to predict retention.

They also offered the following academic findings:

- A larger percentage of students who left had grade point averages below 2.00 than did students who stayed.
- There was a high rate of enrollment in retention activities by both Stayers and Leavers.

- Stayers generally did better in gatekeeper courses, whether they were enrolled in sections with supplemental instruction or not.
- When the group of Leavers was divided into three subgroups based on academic standing at the time they left, generally, Stayers and Leavers in Good Academic Standing gave similar responses, while Leavers on Academic Probation and Leavers Dismissed for Academic Reasons gave similar responses.

Regarding the nonacademic findings, Ruddock et al. (1999) state that, "Leavers reported greater difficulty adjusting to the university and were more likely to cite health and personal issues as reasons why they left the university" (p. 17). In addition, self-reported interactions with faculty and staff, finances, and goals did not differ significantly between the groups of Stayers and Leavers. They also found very little support for the interactional models of student departure.

Ruddock et al. (1999) stated that approximately half of the students who left the university were having academic difficulty but they were unable to determine if that was due to poor adjustment to the university, personal problems, or "less than optimum learning conditions" (p. 18). They recommended that the university:

- Identify, as early as possible, those students who are having academic difficulty

- Provide training for faculty, TAs, AIs, academic advisors, resident hall advisors, pledge trainers, etc., to spot and intervene on behalf of these students... Maintain present retention programs.
- Provide programs for those students identified early in their first semester who appear to be having academic difficulty.
- Review current academic policies to determine possible effects on freshman retention.
- Study the faculty in terms of attitudes and culture towards grading, philosophy on gatekeeper courses, etc.
- Study how faculty attitudes toward student success influence who does or does not succeed (p. 19).

Ruddock et al. (1999) recommended that researchers look at academic policies of the institution, retention program activities and services, and the faculty's role in retention and student persistence, (pp. 20-21).

Future Research Needs

The models developed to understand student retention in college include many variables that may in fact have an effect on whether students stay in college until they complete a degree. However, many of these variables cannot be influenced by college officials and must be taken as given. These include the background characteristics of students, environmental variables, student commitment to the college that they choose to attend, and, to some extent, how well students do once they have completed studies at that college. What

researchers need to do now is find those other factors that influence the student decision to stay or leave over which they might have some control.

Concluding Remarks about Departure from Higher Education

It is in the best interest of our country for students to attend higher education and to complete their college degree once they have entered. Yet, approximately half of the students that enter college will not complete their degrees. Student departure from higher education has been the subject of much research. The first theoretical model to describe leaving behavior was prepared by Tinto who produced an interactional, institutional model to explain why students leave college. His main premise was that students may or may not become academically and socially integrated into college. The level of integration will affect their commitment to their goal of college completion and to their commitment to the college that they chose to attend.

The Tinto model has been modified many times and many other aspects of the student departure puzzle have been examined. We now know much more about why students leave college than we did before. Many of the reasons that students leave are beyond the control of others, including officials at colleges and universities that would like for their matriculated students to persist and graduate. It should now be the focus of researchers to find those variables that we do have some control over so we can attempt to attract, keep, and graduate students. Some of the variables that should be considered are the academic policies, faculty actions, and student services on college campuses.

Predicting Successful Completion of Baccalaureate Nursing Programs

While many nurses believe that nursing research should focus on acquiring knowledge related to clinical practice, others feel that nursing research should be broader than that and also include research on nursing education, nursing administration, and nurses' characteristics, and roles. Taking this broader perspective can result in research being conducted that can directly or indirectly influence the practice of nursing. Burns and Grove (2009, p. 3) developed a framework to depict the connections between research and the elements of nursing.

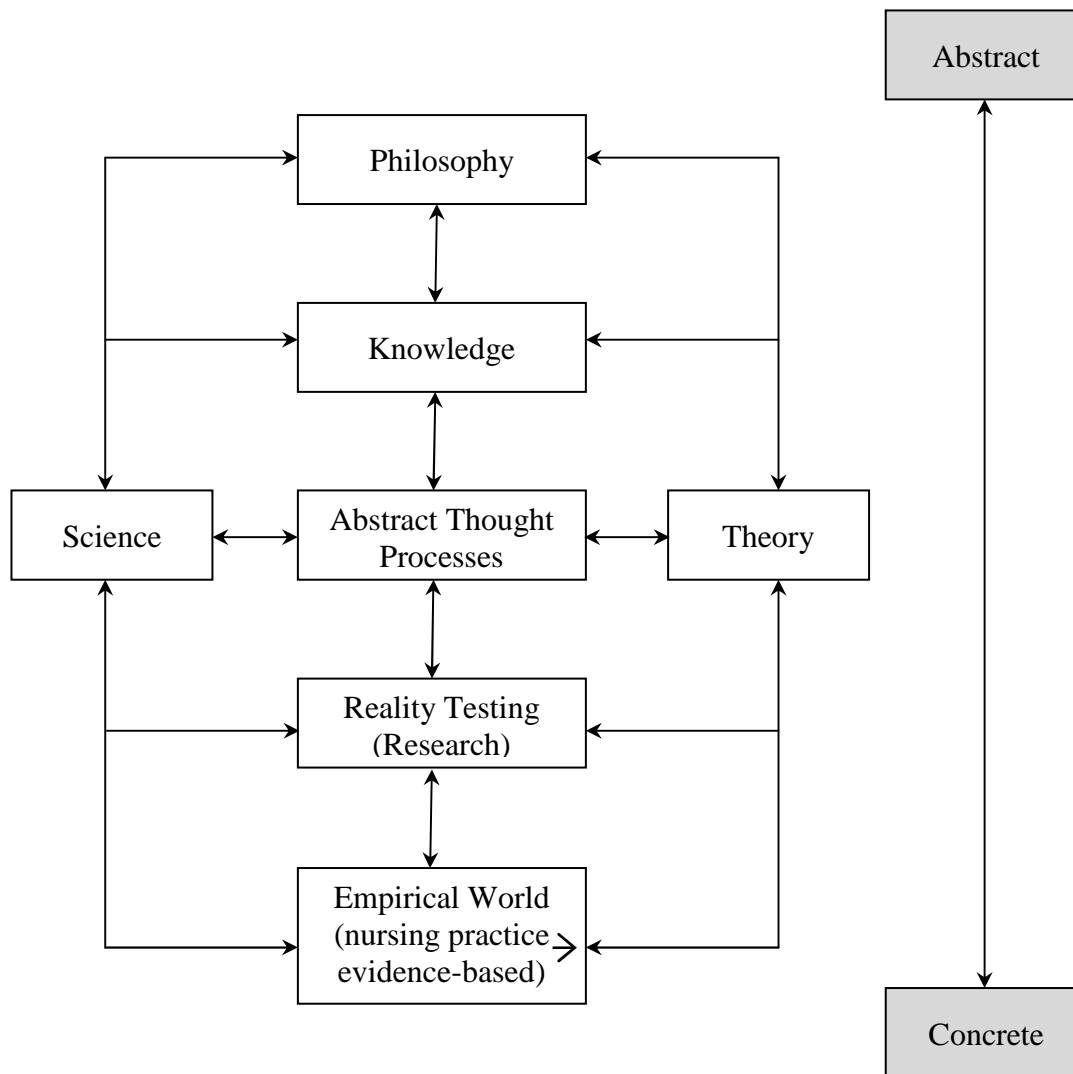


Figure 1: Framework Linking Nursing Research to the World of Nursing.

Attrition in nursing programs is a serious problem and is usually defined as, ...departure from a nursing program without successful completion of the program; but also can be defined to include students who are delayed in their progress toward program completion (California Postsecondary Education Commission (CPEC), 2003, p. 12).

Much of the research on attrition in nursing programs concludes that for students to be successful in a baccalaureate nursing program colleges must admit academically strong candidates. Students that are not prepared for the rigor of baccalaureate nursing programs will suffer financial and emotional difficulties if they are admitted to a nursing program and then fail.

While the National League for Nursing Accrediting Commission suggests that 80% is an acceptable retention rate for nursing programs, graduation rates for these programs are less than 50% nationwide (Brown and Marshall, 2008). Many researchers attribute high rates of attrition from nursing programs to the caliber of the students admitted to these programs citing that those students that left were not academically prepared for the nursing major. (Brown and Marshall, 2008; CPEC, 2003; Newton & Moore, 2008; Newton et al., 2007; Symes et al., 2005). Those nursing programs with more stringent admission policies may have a lower attrition rate since they are choosing more academically prepared students. (DiBartolo and Seldomridge, 2005; Newton et al., 2007).

Because there are limited clinical training spaces in health agencies, limited nursing faculty, and limited financial resources, and because there is a looming nursing shortage, it is essential to identify the best possible students for nursing education. In addition, Byrd, (1999) et al., point out that there is an, “...increased emphasis on outcome criteria in nursing education (which) gives added importance to determining predictors of success in baccalaureate nursing

programs.” (Byrd, et al., 1999, p. 1). The outcome criteria include passage of the NCLEX-RN and safe practice as a registered nurse.

Early research on retention and attrition of nursing students found that the most frequently studied variables were IQ tests, aptitude tests and rank in high school (Plapp, Psathas, & Caputo, 1965, p. 566). Students with higher numbers were more likely to be successful in nursing programs.

More recent research on nursing school attrition looks at several variables. The variables most commonly used fall into the categories of nursing aptitude measured by grades in particular pre-nursing courses, standardized tests, and whether pre-nursing courses were taken at two- or four-year colleges.

Other factors considered in the literature are rolling admission policies (Newton et al., 2007), allegiance to the institution attended and integration into the social and intellectual life of the university. The latter is reminiscent of Tinto’s theory of academic and social integration.

Much of the research points to the importance of course grades in pre-nursing courses. Newton & Moore (2009) found that pre-nursing grades of less than 2.5 are associated with having a weak scholastic aptitude (Newton & Moore, 2009). “Nursing aptitude” refers to grades earned in specific pre-nursing courses,

Aptitude is the complexity of knowledge needed by today’s nursing students and cannot be determined by GPA alone. Aptitude must be broken down into nursing and scholastic aptitude. Nursing aptitude is more specific knowledge than scholastic aptitude and can be

operationalized as college-level competencies in English, math, science, and reading comprehension (Newton, Smith and Moore, 2007).

The literature indicates that BSN students who are admitted with strong scholastic and nursing aptitudes are less likely than students admitted with weak aptitudes to have progression/retention issues (Brown and Marshall, 2008; Newton et al.; 2007; Symes, Tart and Trafis, 2005). Specific courses cited as being the most predictive of success include science courses (Potolsky, Cohen, & Saylor (2003) and human pathophysiology (Uyehara, et al., 2007). The higher the grade, the higher the probability of program success. (35).

Standardized nursing aptitude tests are widely suggested for use with other admission data (Crow, et al., 2004; Newton, Smith Moore, et al., 2007). Tests such as pre-college scores on the SAT or ACT, or nursing aptitude tests such as the Nurse Entrance Test (NET) or the Test of Essential Academic Skills (TEAS) were expected to be important predictors of success in nursing programs. A study by Newton, Smith, Moore, et al. (2007) reported that the TEAS was able to predict first semester nursing program success and that the TEAS was a more reliable predictor of first semester success than was pre-nursing GPA.

Wolkowitz, and Kelley (2010) found when studying TEAS as a predictor that the science section of the TEAS is,

...both a statistically significant predictor and the strongest of the four content areas in the prediction of early nursing program success (of science, mathematics, reading, and English content areas) (498). The

strongest predictor in overall and unique variance explained is the science subtest of the TEAS followed by reading, written/verbal, and mathematics, respectively.

Nationwide, many BSN programs use commercially available standardized nursing aptitude tests along with scholastic aptitude to select candidates for admission to the nursing major (Assessment Technologies Institute (ATI), 2007; Newton et al., 2006; Newton, et al., 2007). However, little empirical data exist that describes whether long-term retention in a BSN program and readiness for the NCLEX-RN can be predicted using student aptitude data (Newton, and Moore, 2009).

Transferring to a four-year institution from a two-year institution, like a community college, can be a risk factor for attrition (Newton, et al., 2006). Townsend (1995) reasons that this is due to the differences between four year institutions and that, "...the milieu of community colleges tends to be student centered and designed to raise self-esteem" (Townsend, 1995). In addition, Newton suggests that BSN students who initiate their post-secondary educations at community colleges are potentially at higher risk for attrition than students who initiate their post-secondary educations at a four-year college or university (2005).

In Newton and Moore's words (2009),

Thus, it behooves nurse educators to ...focus their attentions on the core predictor variables that are known and that continue to be predictive of BSN student attrition and NCLEX-RN readiness, namely, aptitude.

Tentative theory developed from the findings of this and other studies in the literature (e.g., Crow, Handley, Morrison, and Mitchell, 2004; Newton et al., 2007; Newton, et al., 2006; DiBartole and Seldomridge, 2005) should be used to develop an explanatory model of the phenomena for use by BSN programs, nationwide, to curtail BSN student attrition and promote NCLEX-RN success.

Focus of this Thesis

It is to nursing aptitude variables that this study will now focus. We will examine variables found in Tinto's model under Academic Systems: academic performance, or grades. From the Ruddock, et al., 1999 model the study addresses some of the variables needing further examination: faculty definitions of academic competence, academic policies on grade replacement, and retention policies regarding gateway courses.

CHAPTER THREE

METHODOLOGY

Introduction

This study is designed to understand the patterns of selection, preparation, retention and graduation of undergraduate pre-licensure clinical nursing students in the College of Nursing and Health Innovation at Arizona State University enrolled in 2007 and 2008. These patterns include prerequisite course grades, course location, course replacement, entrance test scores, demographics, and outcomes and are identified and described.

Restatement of the Problem

The questions asked in this study are: What are the patterns of selection, preparation, retention and graduation in the undergraduate pre-licensure clinical nursing program?

Is graduation in the prescribed four terms related to:

- grades earned in individual prerequisite courses?
- the composite GPA of those courses?
- entrance test scores?
- the number of replacement courses taken?
- the number of prerequisite courses taken at four-year colleges?
- race/ethnicity?
- gender?

The predictor variables for this study are grades earned in prerequisite

courses, the Select GPA which is a composite of the prerequisite courses, the Nurses Entrance Test (NET) subject test scores in reading and math and the composite score, the Select GPA, the number of replacement courses taken, the number of prerequisite courses taken at four-year institutions, race/ethnicity, and gender. The dependent variable is defined as the completion of the prescribed four-term Traditional Pre-licensure Clinical Nursing Program (TPCNP) without course failure or interruption in progression. It is a dichotomous variable with values of either yes or no.

Variables of Interest

The faculty of the College of Nursing and Health Innovation at Arizona State University identified 17 prerequisite courses that are required for the Traditional Pre-licensure Clinical Nursing Program (TPCNP). They are considered gateway courses to the upper division nursing coursework. Thirteen of the 17 are averaged into a Select GPA, which includes three of four required science with laboratory courses and two semesters of English composition. Eight courses are then chosen by the students. The 17 prerequisite courses are: 1) Anatomy and Physiology I, 2) Anatomy and Physiology II, 3) Introduction to Chemistry, 4) Human Development, 5) First Year Composition I, 6) First Year Composition II, 7) Clinical Health Care Ethics, 8) Introduction to Nursing and Healthcare Systems, 9) Culture and Health, 10) Human Pathophysiology, 11) College Mathematics, 12) Microbiology with laboratory, 13) Human Nutrition, 14) Statistics, 15) Humanities/Fine Arts/Design, 16) Psychology, and an 17)

elective.

For students to be considered for the TCPNP they must earn a grade of “C” (2.00) or higher in each of these courses. The combined grade point average (GPA) for all 17 courses must be at least a 3.25, and the Select GPA (13 of 17 courses) must be at least a 3.25 for students to be considered for the TPCNP. The range for both the prerequisite and select GPA is 3.25 to 4.00.

The faculty have identified fifteen of the seventeen courses that they believe are the most predictive of success in the TPCNP. Humanities/Fine Arts/Design and the elective are excluded in the prediction. The researcher will determine the correlations among courses and Select GPA and success in the program.

If students earn grades of “C” or “B” in prerequisite courses they may be allowed to take replacement courses. Replacement courses are identified by the faculty as courses at a level higher than the original prerequisite. So, for example, if a student earns a “C” in First Year Composition 1, the faculty could allow the student to take a higher level composition course, say, ENG 216 Persuasive Writing on Public Issues, and use the grade earned in that course in the computation of the Select GPA rather than the original “C” grade earned in First Year Composition 1. Some students opt to take replacement courses to maximize the Prerequisite and Select GPAs. The possible range of courses is from 0 to 15, but in reality is three or less. The nursing faculty believe that students who take replacement courses are less likely to be successful than those who earn high

grades initially in the prerequisite courses (Morris, 2012). This hunch will be examined.

Prerequisite Course Location. The next variable considered will be the number of prerequisites courses (of the 15 identified as best predictors) taken at four-year colleges. The nursing faculty and this author believe that students who have taken all or most of their courses at four-year colleges will be more successful than those students who took all or most of them at two-year colleges (Morris, 2012; Herrera, 2012).

The Nurses Entrance Test. The faculty of the College of Nursing and Health Innovation at Arizona State University also require that students earn at least minimum scores on an entrance test. Until 2010, the Nurses Entrance Test (NET) was the prescribed entrance test. The NET is a computer based test consisting of six parts: math skills, reading comprehension, test taking skills, stress level, social interaction, and learning style. Students must have completed all six parts in order to receive scores and be considered for admission. However, only the math and reading scores are used to calculate application eligibility. Math skills problems consist of whole numbers, decimals, fractions, percentages, number system conversions, and algebra equations (60 problems in 60 minutes). Reading comprehension involves reading selections and answering questions (33 questions in 30 minutes) (http://www.testprepreview.com/net_test_breakdown.htm). A reading score of 60% or higher and a math score of 65% or higher is required for TPCNP

consideration so the range of the reading portion of the NET is .60 to 1 and the range of the math portion of the NET is from .65 to 1.00.

Demographic Factors. Race/ethnicity and gender are nominal variables identified in the following way: Asian, Black, Hispanic, Native American, or White. Gender is identified as male or female.

Independent Variables in the Study

Grades in Prerequisite Courses. Grades earned in 15 prerequisite courses listed earlier and Select GPA (SELECT), Replacement courses (REPL), Number of Prerequisites at 4 Year School (PRQ4YR), Nurses Entrance Test Math (NETMATH), Nurses Entrance Test Reading (NETREAD), Nurses Entrance Test Composite (NET), Race/Ethnicity (RACE), and Gender (GEND) are used as independent variables.

Research Design and Procedures

The frequencies for each variable will be displayed and the descriptive statistics for all variables will be calculated showing the mean, and standard deviation. Correlational analysis will be conducted and statistics reported. Crosstabulations will be run on race/ethnicity and NET scores as well as for gender and Completion of the Program in Four Terms. Multiple logistic regression analysis will then be employed to determine the patterns of participation and graduation of students.

Summary Table. Table 1 depicts the research questions asked in Chapter One, the corresponding source of information, data analysis procedures, and the

expected outcomes.

Table 2: Research Questions, Source of Information, Data Analysis, and Expected Outcomes

Research Questions	Corresponding Data Analysis Procedure	Expected Outcomes
1. What is the pattern of success for students in the upper division nursing program at ASU in 2007-08?	Descriptive statistics, X^2 standard deviation, correlational analysis or Pearson's r , regression analysis.	There will be more women than men in the study. There will be more White and Asian students followed by Hispanic, Native American, and Black. The following expected outcomes in 2.1 to 3.2 below.
2.1. Are the grades earned in each of the prerequisite courses associated with success in the upper division nursing program?	Descriptive statistics, X^2 standard deviation, correlational analysis or Pearson's r , regression analysis.	Yes. Some courses will be better predictors of graduation than others: Expect courses to be associated from highest to lowest association as follows: 1. PATHO, 2. CHM, AP1, AP2, MIC, 3. COMP1, COMP2, 4. MATH, STATS, 5. ETH, NUR. Others to follow.
2.2. Is the Select GPA associated with success in the upper division nursing program?	Descriptive statistics, X^2 standard deviation, correlational analysis or Pearson's r , regression analysis.	Yes. The Select GPA will have a positive correlation where the higher the SELECT, the higher the rate of success.
2.3. Is the number of replacement courses taken associated with success in the upper division nursing program?	Descriptive statistics, X^2 standard deviation, correlational analysis or Pearson's r , regression analysis.	Yes. The number of replacement courses (REPL) will have a negative effect where the higher the number of REPL the lower the rate of success.
2.4. Are the math and reading scores from the NET associated with success in the upper division nursing program?	Descriptive statistics, X^2 standard deviation, correlational analysis or Pearson's r , regression analysis.	Yes. NET scores (NETMATH, NETREAD) will have a positive correlation with success with higher NET scores resulting in higher success rates.

Table 2 (continued): Research Questions, Source of Information, Data Analysis, and Expected Outcomes

Research Questions	Corresponding Data Analysis Procedure	Expected Outcomes
2.5. Is the number of prerequisite courses taken at four-year institutions associated with success in the upper division nursing program?	Descriptive statistics, X^2 , standard deviation, correlational analysis or Pearson's r , regression analysis.	Yes. The number of prerequisites taken at 4-year colleges (PRQ4YR) will have a positive correlation where the more courses taken at four year institutions the higher the success rate.
3.1. Is race/ethnicity associated with success in the upper division nursing program?	Descriptive statistics, X^2 , standard deviation, correlational analysis or Pearson's r , crosstabs, regression analysis.	Yes. White and Asian students will have higher rates of success than Hispanic, Black or Native American students.
3.2. Is gender associated with success in the upper division nursing program?	Descriptive statistics, X^2 , standard deviation, correlational analysis or Pearson's r , regression analysis.	Yes. Females will have a higher rate of success than males.

Sources of Information

The data for this research were obtained from records maintained by the College of Nursing and Health Innovation in the Student Data Management System (SDMS) on students who were advanced to the Traditional Pre-licensure Clinical Nursing Program (TPCNP) in spring 2007, fall 2007, spring 2008, and fall 2008. The entire population of 584 students advanced to the upper division nursing program were included in the study. This time period was selected so that enough students would be included in the population to yield a large enough sample size of students who do not progress without interruption for the

prescribed four terms to meet confidence levels and significance criteria of multiple logistic regression analysis. This time period was also chosen because all students admitted/advanced during this period would have taken the NET.

Data Collection Procedures

Student data from the SDMS regarding course grades; Select GPA; NET Reading, Math and Composite scores; race/ethnicity; and gender were saved into spreadsheets. A manual count of the number of replacement courses was conducted and added to the spreadsheets.

Additional information cited in this study is based on an interview with a senior program administrator conducted in January 2012. The interview helped the researcher to understand information about college standards and faculty views of the undergraduate pre-licensure clinical nursing program.

Other information about the nursing program was available based on the knowledge of the author in her role as Director of Undergraduate Student Academic Services for the College of Nursing and Health Innovation.

Statistical Analysis Procedures

The identifying information from the spreadsheets was removed to protect the identity of the students. The data were then loaded into IBM SPSS so that frequencies, descriptive statistics, and regression analysis could be conducted. Frequencies were run for each variable and the mean and standard deviation calculated. Crosstabulations were prepared for the race/ethnicity variable with completion of the program and with NET scores. Multinomial logistic

regression analysis was run for all independent variables on the dependent variable.

Summary

This research was undertaken to understand the patterns of selection, preparation, retention and graduation in the undergraduate pre-licensure clinical nursing program at Arizona State University using data obtained on students enrolled in this program in 2007-08. This is an *ex post facto* study of the entire population of students enrolled in this program in 2007-08 who, thus, had four terms or more to complete the four term program. The variables examined included grades earned in 15 prerequisite courses; the composite Select GPA; the entrance test, or NET, scores; the number of replacement courses taken; the number of prerequisite courses taken at four-year institutions; the race/ethnicity of the students; and, the gender of the students.

CHAPTER FOUR

FINDINGS AND RESULTS

Analyses

Correlational Analysis

The first step taken in analyzing the data collected for this research was to run correlational analysis. Correlation is a measure of linear dependency between two variables. The Pearson product-moment correlation coefficient, typically denoted by r and called Pearson's r , is widely used in the sciences as a measure of the strength of linear dependence. Pearson's r has a value between +1 and -1 and a value of +1 means that the variables are perfectly correlated. A value of -1 means that the variables are perfectly, inversely correlated. In the social sciences, Pearson's r coefficients of .7 to .9 may be considered to be high correlations and values of 0.4 to .6 are considered to be moderate correlation values (Steel & Torrie, 1960, p. 187). Pearson's r coefficients of 0.4 to 1.0 were examined in this study and represent moderate to high levels of correlation.

Resulting correlations, or Pearson's r , are considered "statistically significant" if the correlation is unlikely to have occurred by chance. Tests of statistical significance refer to the likelihood that the variables are significantly related. Or, that a null hypothesis that two variables are *not* correlated can be rejected with a certain level of confidence. The lower the level of significance the higher the confidence that the null hypothesis can be rejected. Popular levels of significance are 10% (0.1), 5% (0.05), 1% (0.01), 0.5% (0.005), and 0.1% (0.001)

(Steel, 1960, p. 287) and the .05 or lower were reported as significant in this study.

Correlational analysis was performed for all variables in this study to determine the level of correlation among the independent variables as well as with the dependent variable. Because of the size of and complexity of the data, the entire correlational table is included in Appendix B. Table 2 below shows only those variables where the Pearson's r was 0.4 or higher.

Table 3: Correlations Showing Significant Variables Only

	<u>Anatomy/Phys 2</u>		<u>Select GPA</u>		<u>NET Composite</u>	
	r	Count	r	Count	r	Count
Anatomy/Phys 1	.419	582	.499	584		
Anatomy/Phys 2			.578	582		
Human Patho			.462	583		
Microbiology			.573	583		
Human Nutrition			.432	584		
NET Math					.690	584
NET Reading					.806	584

Note. All correlations are statistically significant, $p < .001$

The variables with the highest Pearson's r were NET Reading and NET Composite scores, $r = .806$, $p < .001$, and NET Math and NET Composite scores, $r = .690$, $p < .001$. These findings are not surprising given that the NET Composite score is made up of the NET Reading and NET Math scores. We expect a high level of correlation between the two parts of the composite score

and the composite score itself. The Pearson's r coefficients indicate that either the NET Reading and NET Math should be used in the regression analysis, or the NET Composite score, but not both. Therefore, the NET composite will not be used in further analysis.

Because the Select GPA is comprised of Composition 1, Composition 2, and three lab science courses from Anatomy and Physiology 1 and 2, Chemistry, and Microbiology, we expect a high correlation between these variables and the Select GPA. In fact there were no moderate to high correlations between the Composition courses and the Select GPA nor Chemistry and the Select GPA. The data indicate, though, that Anatomy and Physiology 1, Anatomy and Physiology 2 and Microbiology were moderately correlated with select GPA as follows: Anatomy and Physiology 2, $r = .594$ at $p < .001$, Microbiology with a Pearson's $r = .584$, $p < .001$, and Anatomy and Physiology 1 with a Pearson's $r = .510$, $p < .001$. This indicates that the grades earned in these three courses are correlated with the Select GPA. Again, this finding is not surprising given that three lab science courses must be included in the Select GPA. Because some of the course grades are moderately correlated with the Select GPA, either the individual course grades should be used in regression analysis or only the Select GPA but not both. Therefore, the Select GPA will not be used in subsequent analysis. All other variables had Pearson's r correlation coefficients of less than 0.4 and were, therefore, not highly correlated. Some correlations were statistically significant and others were not.

Multicollinearity can pose a problem in regression analysis so the absence of this finding does not detract from the research. This analysis indicates that there is a high level of correlation among a few of the variables and so two variables were eliminated, Select GPA and NET Composite Score. Low multicollinearity allows for predictive testing such as logistic regression analysis which will be described later in this chapter.

Frequencies and Descriptive Statistics

The next step in analyzing the data was to run frequencies and descriptive statistics for each variable. The results are found in the tables and figures below.

Table 4: Grades Earned in Fifteen Prerequisite Courses Required for Admission to the Nursing Program

		A (4.0)	B (3.0)	C (2.0)	Total	Mean Std Dev
Culture and Health	Count	554	29	1	584	3.95
	Percent	94.86%	4.97%	0.17%	100.00%	0.23
Clinical Health Care Ethics	Count	507	75	2	584	3.86
	Percent	86.82%	12.84%	0.34%	100.00%	0.35
Human Development	Count	493	82	8	583	3.83
	Percent	84.56%	14.07%	1.37%	100.00%	0.41
Intro Nursing/ Health Systems	Count	492	82	10	584	3.83
	Percent	84.25%	14.04%	1.71%	100.00%	0.42
Composition 2	Count	456	85	12	553	3.80
	Percent	82.46%	15.37%	2.17%	100.00%	0.45
Human Nutrition	Count	426	138	20	584	3.70
	Percent	72.95%	23.63%	3.42%	100.00%	0.53
Composition 1	Count	408	131	20	559	3.69
	Percent	72.99%	23.43%	3.58%	100.00%	0.53
Statistics	Count	425	127	25	577	3.69
	Percent	73.66%	22.01%	4.33%	100.00%	0.55
Psychology	Count	405	135	37	577	3.64
	Percent	70.19%	23.40%	6.41%	100.00%	0.60
Mathematics	Count	405	131	40	576	3.63
	Percent	70.31%	22.74%	6.94%	100.00%	0.61
Microbiology	Count	322	229	32	583	3.50
	Percent	55.23%	39.28%	5.49%	100.00%	0.60
Chemistry	Count	330	203	45	578	3.49
	Percent	57.09%	35.12%	7.79%	100.00%	0.64
Anatomy and Physiology 1	Count	335	206	43	584	3.50
	Percent	57.36%	35.27%	7.36%	100.00%	0.63
Anatomy and Physiology 2	Count	296	202	84	582	3.36
	Percent	50.86%	34.71%	14.43%	100.00%	0.72
Human Pathophysiology	Count	244[1]	237	102	583	3.24
	Percent	41.85%	40.65%	17.50%	100.00%	0.73

[1] Two grades of 3.50 were rounded to 4.00 in this table.

The frequencies for the other variables in the study—Select GPA, Number of Replacement Courses Taken, NET Math scores, NET Reading scores, NET Composite scores, Number of Courses Taken at Four-Year Colleges, Race/Ethnicity, and Gender—are depicted in the tables and figures below.

Descriptive Statistics. Number of Replacement Courses Taken. Figure 2 below shows that the vast majority of students, more than 400 of 584, did not take any replacement course. About 100 students took one replacement course. Fewer than 50 took two replacement courses and very few took three replacement courses.

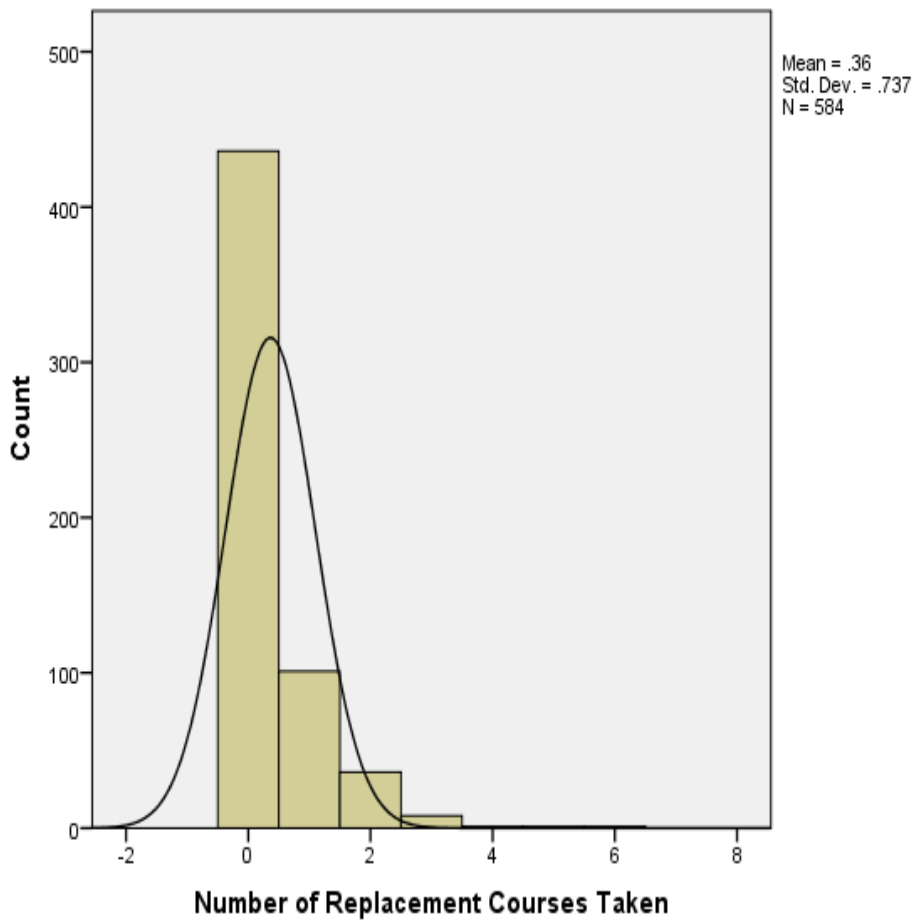


Figure 2: *Number of Replacement Courses Taken, or Courses Taken at a Higher Level than the Originally Required Course.*

NET Math Scores. Figure 3 below depicts the data for NET math scores and shows that the data are negatively skewed. The lowest score earned was a 68% and the highest was 100%. Many more students earned scores in the 90s than below that. The mean is 92.14 and the standard deviation is 5.735.

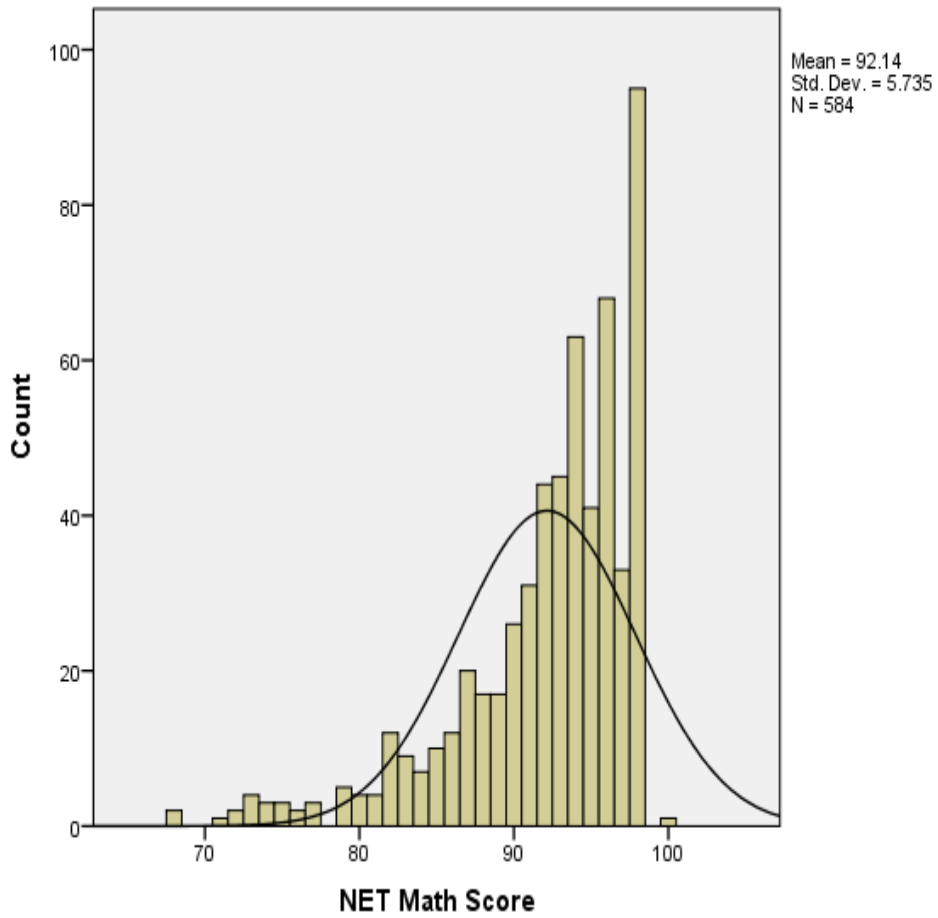


Figure 3: *Nurses Entrance Test (NET) Math Scores Earned by Students in the Study*

NET Reading Scores. Figure 4 below depicts the data for NET reading scores and shows a normal distribution of grades ranging from 60 to 94. The mean is 75.62 and the standard deviation is 7.025.

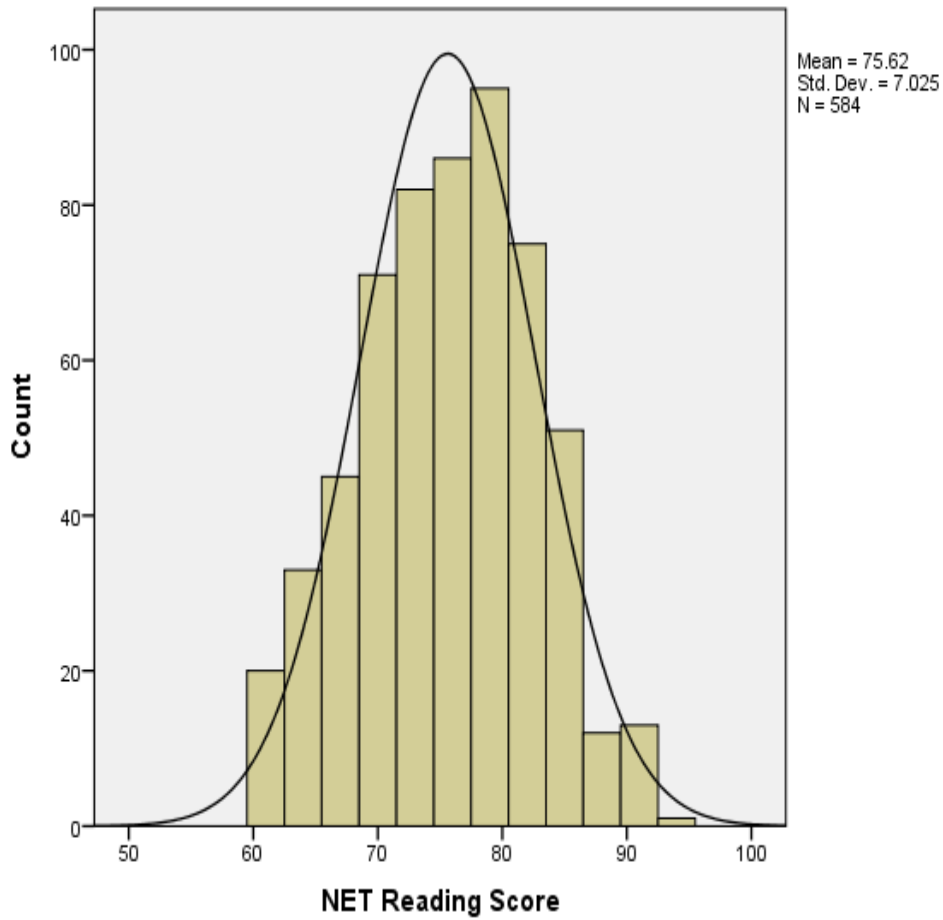


Figure 4: *Nurses Entrance Test (NET) Reading Scores Earned by Students in the Study*

Courses Taken at Four-Year Colleges. Arizona State University has a large transfer student population that includes many transfer students from two-year colleges. The presumption here is that students with more courses from four-year colleges will be more likely to complete the program in the prescribed four terms than those with many courses from two-year colleges.

Figure 5 below shows that more than half of the students in the study took eight or more prerequisite courses at four-year colleges. Approximately 90 students took all of the prerequisite courses at four-year colleges. The mean is 9.21 and the standard deviation is 4.702. The data are negatively skewed.

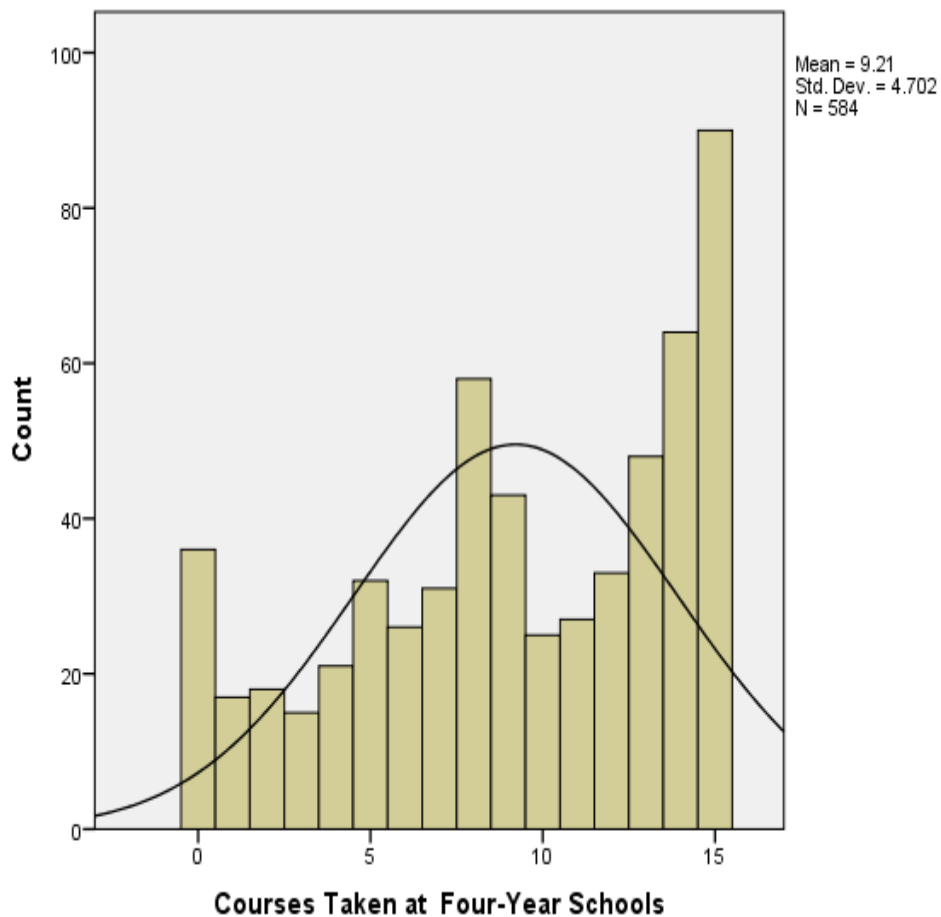


Figure 5: *Prerequisite Courses Taken at Four-Year Colleges vs. Two-Year Colleges*

Race/Ethnicity. In Table 4 below frequencies for race/ethnicity are depicted and show that there are 42 Asian students, or 7.5% 14 Black students, or

2.5%; 61 Hispanic students, or 10.9%; 10 Native American students, or 1.8%; and, 432 White students, or 77.3%. This means that there are 22.7% non-White students in the study.

Table 4: Frequencies for Race/Ethnicity

		Race/Ethnicity		
		Frequency	Percent	Valid Percent
Valid	Asian	42	7.2	7.5
	Black	14	2.4	2.5
	Hispanic	61	10.4	10.9
	Native American	10	1.7	1.8
	White	432	73.6	77.3
	Total	559	95.2	100.0
	Missing	Missing Data	25	4.3
System		3	.5	
Total		28	4.8	
Total		587	100.0	

Gender. Nationwide, nurses are predominantly female. Of the 2.1 million registered nursing in the United States only 5.4% are male. Men also make up only 13% of all new nursing students (Chung, 2012). This pattern is observed in this data where a vast majority, 88.2%, of the students in the study are female. The remaining 11.8% are male.

Table 5: Frequencies for Gender

		Frequency	Percent	Valid Percent
Valid	Male	69	11.8	11.8
	Female	515	87.7	88.2
	Total	584	99.5	100.0
Missing	System	3	.5	
Total		587	100.0	

Completion of the Program in Four Terms. At the outset of this research, success was defined as completion of the program in a prescribed four term sequence with no interruptions in progression. Reasons for delay in completion vary from those students who missed a term or more for personal or family medical situations to failure of one or more courses which then needed to be repeated (Herrera).

Five hundred forty eight of 584 students, or 93.8%, in the study completed the program in four terms. The remaining 36 students, or 6.2%, did not complete the program in four terms. Based on anecdotal evidence gathered by the researcher some students returned to complete the degree in five or more terms which raises the success rate over five or more terms. Very few did not complete the program at all.

Table 6: Frequencies for Completed in Four Terms

	Frequency	Percent	Valid Percent
Valid			
Did complete program in 4 years	548	93.4	93.8
Total	584	99.5	100.0
Missing System	3	.5	
Total	587	100.0	

Crosstabulations

The nursing faculty at Arizona State University have expressed an interest in determining the success of specific races/ethnicities of nursing students (Morris, 2012). Therefore, the frequencies for race/ethnicity are displayed in Table 7, below, and are depicted as crosstabulations with success in the program.

The second to last row shows the count for each race/ethnicity category and the last column shows the total reported. Of the 584 students in the study, 559 had race/ethnicity reported.

Race/Ethnicity and Completion of the Program in Four Terms. Only 36 students, or 6.4%, of the 559 students did not complete the program in the prescribed four terms. The remaining 523 students, or 93.6%, did complete the program in the prescribed four terms. All ten of the Native American students completed the program in the prescribed time period. They are followed by the White students with a 94.7% completion rate; Asian students with a 92.9%

completion rate; Hispanic students with an 88.5% completion rate; and Black students with a 78.6% completion rate.

The National League for Nursing Accrediting Commission (NLNAC, 2008) recognizes programs with an 80% or higher completion rate as successful programs. Therefore, Arizona State University's program is successful with a 93.6% completion rate. Of note is that the completion rates of each race/ethnicity do not differ significantly from each other at the .05 level. However, the completion rates for Black and Hispanic students are lower than expected, albeit not significantly, and raises some concern.

Table 7: Race/Ethnicity and Completion of the Program in the Prescribed Four Terms Crosstabulation

		Ethnicity/Race					Total
		1 Asian	2 Black	3 Hispanic	4 Native American	5 White	
1 Did complete program in 4 terms	Count	39 _a	11 _a	54 _a	10 _a	409 _a	523
	Expected Count	39.3	13.1	57.1	9.4	404.2	523.0
	% within Ethnicity/Race	92.9%	78.6%	88.5%	100.0 %	94.7%	93.6 %
Total	Count	42	14	61	10	432	559
	Expected Count	42.0	14.0	61.0	10.0	432.0	559.0
	% within Ethnicity/Race	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %

Each subscript letter denotes a subset of Ethnicity/Race categories whose column proportions do not differ significantly from each other at the .05 level.

Race/Ethnicity and NET Scores. In Figure 6 below we see that Native American students have the lowest scores on the math portion of the NET and, yet, had the highest completion rate at 100%. Black students have the highest mean NET math score and, yet, have the lowest completion rate at 78.6%.

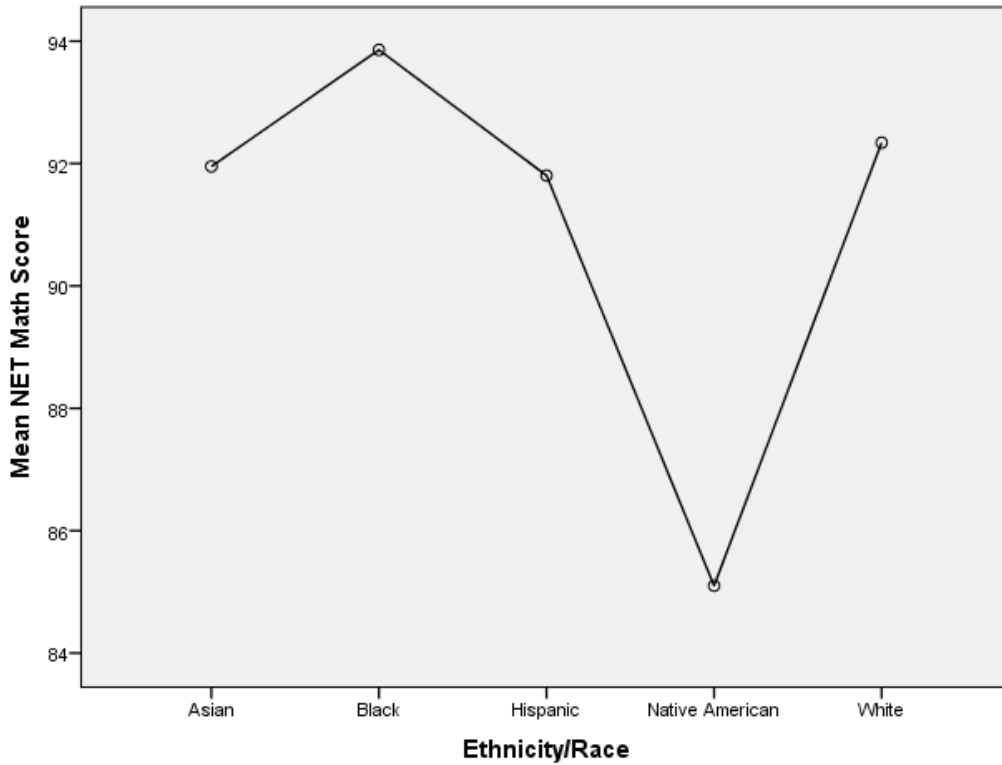


Figure 6: *Race/Ethnicity and Mean Scores on the Math Portion of the Nurses Entrance Test (NET).*

In Figure 7 below we see that Native American students have the lowest mean NET reading score but, again, have a 100% completion rate. Hispanic students have the second highest mean NET math score after White students, yet the second lowest completion rate at 88.5%.

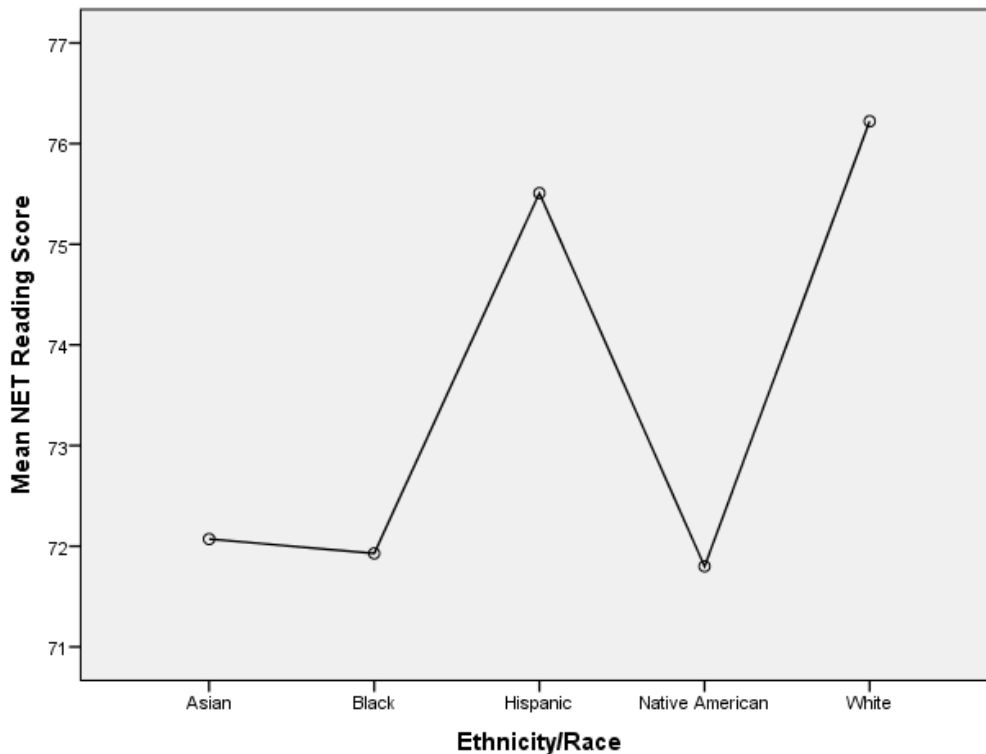


Figure 7: Race/Ethnicity and Mean Scores on the Reading Portion of the Nurses Entrance Test (NET).

Descriptive Statistics for the Other Variables in the Study. Table 8 contains the descriptive statistics for the other variables studied including: 1) Select GPA, 2) Number of Replacement Courses, 3) NET Reading, 4) NET Math, 5) NET Composite, and 6) Number of Courses Taken at Four-Year Colleges.

Select GPA. The select GPA is calculated on 13 of 17 prerequisite courses including Composition 1 and 2 and three lab science courses. The range for the Select GPA is from 3.182 to 4.00 with a mean of 3.803. The standard deviation is .1696.

Number of Replacement Courses. The variable Number of Replacement Courses has a range of 0 to 6 with a mean of .36 and a standard deviation of .737. This indicates that most students did not take replacement courses or, if they did take them, they usually took only one replacement course. Of the 584 students in the study 439 took no (0) replacement courses, 98 took one replacement course, 38 took two replacement courses, and eight took three replacement courses.

NET Reading. The variable NET Reading has a minimum value of 60 and a maximum value of 98. The mean is 75.62 and the standard deviation is 7.025.

NET Math. The variable NET Math has a minimum value of 68 and a maximum value of 100. The mean is 92.14 and the standard deviation is 5.735.

Number of Courses Taken at Four-Year Colleges. The variable Number of Courses Taken at Four-Year Schools indicates how many of the 15 courses in this study were taken at four-year colleges as opposed to two-year colleges. The range is 0 to 15 with a mean of 9.21 and a standard deviation of 4.702. This means that 57.7% of all courses taken were taken at four-year schools rather than at two-year schools and 95% of students took between four and ten courses at four-year schools.

Table 8: Descriptive Statistics for the Other Variables

	N	Minimum	Maximum	Mean	Std. Deviation
Select GPA	582	3.18	4.00	3.80	.16
Number of Replacement Courses	584	0	6	.36	.73
NET Reading	584	60	98	75.62	7.02
NET Math	584	68	100	92.14	5.73
Number of Prerequisite Courses taken at 4-Year Colleges	584	0	15	9.21	4.70

Race/Ethnicity, Gender, and Completed the Program in Four Terms.

Minimums, maximums, means and standard deviations are not reported for

Race/Ethnicity, Gender, and Completed the Program in Four Terms.

Race/ethnicity and Gender are nominal level variables and Completed the

Program in Four Terms is dichotomous therefore, the descriptive statistics are not

meaningful.

Multiple Logistic Regression Analysis

Regression analysis includes techniques for modeling and analyzing

several variables when the focus is on the relationship between one or more

independent variables and a dependent variable. Regression analysis helps

researchers understand how the value of the dependent variable changes when any

one of the independent variables is varied, while the other independent variables

are held fixed. The estimation target is a function of the independent variables called the regression function and is referred to as R^2 (Steel, 1960, p. 287).

The coefficient of determination R^2 is used in the context of statistical models whose main purpose is the prediction of future outcomes on the basis of other related information. It is the proportion of variability in a data set that is accounted for by the statistical model (Steel, 1960, p. 187). It provides a measure of how well future outcomes are likely to be predicted by the model.

In linear regression, R^2 is the square of the sample correlation coefficient between the outcomes and their predicted values, or in the case of simple linear regression, between the outcomes and the values of the single regressor being used for prediction. In such cases, the coefficient of determination, R^2 , ranges from 0 to 1. R^2 is a statistic that will give some information about the “goodness of fit” of a model. In regression, the R^2 coefficient of determination is a statistical measure of how well the regression line approximates the real data points. An R^2 of 1.0 indicates that the regression line perfectly fits the data.

Chi-squared coefficients are also reported with regression analysis. A chi-squared test, also referred to as X^2 , is any statistical hypothesis test in which the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true, or any in which this is asymptotically true, meaning that the sampling distribution (if the null hypothesis is true) can be made to approximate a X^2 distribution as closely as desired by making the sample size large enough (Greenwood & Nikulin, 1996).

Because regression analysis allows researchers to test specific hypotheses about the relationship between independent variables and a dependent variable, the list of research questions is used here in place of hypotheses and appears below.

Research Questions Tested

1. The grades earned in fifteen prerequisite courses will have a significant positive predictive effect on completion of the program in four terms. The higher the grade earned, the more likely the student will complete the program in the prescribed four terms.
2. The number of replacement courses taken will have a significant negative predictive effect on completion of the program in four terms. The more replacement courses taken the less likely the student will be to complete the program in the prescribed four terms.
3. The number of courses taken at four-year institutions, rather than at two-year institutions, will have a significant positive predictive effect on completion of the program in four terms. The more courses taken at four-year colleges the more likely the student will be to complete the program in the prescribed four terms.
4. NET scores will have a significant positive predictive effect on completion of the program in four terms. The higher the NET scores the more likely the student will complete the program in the prescribed four terms.

5. The race/ethnicity of students will have a significant predictive effect on completion of the program in four terms. White and Asian students will complete the program in four terms at a higher rate than Blacks, Hispanics, and Native Americans.
6. Gender is associated with completion of the program in four terms. Female students will complete the program in four terms at a higher rate than male students. This prediction is based on a belief that the smaller critical mass of male students will detract from successfully completing the program in the prescribed four terms.

In Table 9 below the results of the multiple logistic regression analysis are displayed.

Table 9: Logistic Regression Analysis Results

	<i>B</i>	<i>S.E.</i>	Wal d	Sig.	Odds Ratio (<i>OR</i>)	95% C.I. for EXP(B)(<i>OR</i>) Lower Upper	
Human Nutrition	1.03	0.381	7.32 5	0.007* *	2.801	1.329	5.907
Gender(1) Male	-1.502	0.575	6.82 6	0.009* *	0.223	0.072	0.687
Ethnicity(2) Black	-2.323	0.967	5.76 8	0.016* *	0.098	0.015	0.652
Clin Health Ethics	1.34	0.563	5.66 7	0.017* *	3.818	1.267	11.50 6
Pathophysiology	0.748	0.349	4.58 5	0.032* *	2.112	1.065	4.188
Ethnicity(3) Hispanic	-1.192	0.602	3.92 3	0.048* *	0.304	0.093	0.988
Psychology	0.62	0.335	3.42	0.064	1.859	0.964	3.588
CoursesatFourYe ar	0.103	0.056	3.40 3	0.065	1.109	0.994	1.237
Anat/Phys 1	-0.822	0.471	3.05 2	0.081	0.439	0.175	1.105
Human Dev	0.89	0.515	2.98 8	0.084	2.435	0.888	6.677
Microbiology	0.594	0.405	2.15	0.143	1.811	0.819	4.003
Composition 1	0.545	0.437	1.55 7	0.212	1.725	0.732	4.063
Replace Course	0.545	0.458	1.41 3	0.235	1.724	0.702	4.235
NETMath	0.047	0.043	1.20 6	0.272	1.048	0.964	1.139
Statistics	-0.448	0.432	1.07 3	0.300	0.639	0.274	1.491
Intro Nursing	-0.587	0.576	1.03 8	0.308	0.556	0.180	1.720
Culture/Health	-1.394	1.636	0.72 6	0.394	0.248	0.010	6.121
Anat/Phys 2	-0.263	0.361	0.52 9	0.467	0.769	0.379	1.561

Ethnicity(1) Asian	-0.312	0.878	0.12 6	0.723	0.732	0.131	4.097
Chemistry	0.114	0.384	0.08 8	0.767	1.121	0.528	2.378
NETRead	0.005	0.036	0.01 9	0.891	1.005	0.936	1.079
Math	0.05	0.381	0.01 7	0.895	1.051	0.498	2.218
Composition 2	0.048	0.446	0.01 1	0.915	1.049	0.437	2.516
Ethnicity(4) Native	19.76 7	12035.7 4	0	0.999	3.84E 8	0	.
Constant	- 10.23 6	8.757	1.36 6	0.242	0		

Note: All tests have 1 df. ** significant at <.01. * significant at <.05

This model has an R^2 value of 0.43. In other words, the dependent variables explain 43% of the variance in the dependent variable. The first six variables in the table above are statistically significant at the .05 level or below. These variables include the courses Human Nutrition, Clinical Healthcare Ethics, and Human Pathophysiology; male students; Black students, and Hispanic students.

The sign for the coefficients reported in column two of the table (B) is negative for male students, Black students, and Hispanic students. This indicates that students from those categories are less likely to complete the program in the prescribed four terms compared to female students, in the case of males, and all other races with respect to Black and Hispanic students. The odds ratio (*OR*), for male students is 0.223 which means that the as we move from female students to male students the odds of being in the category completed in four terms for male

students is reduced by a rate of 0.223. In other words, males students are .223 times less likely to complete the program in four terms.

The odds ratio for Black students is 0.098. This means that if we compare Black students to all other races of students, Black students are 0.098 times less likely to complete the program in four terms.

The odds ratio for Hispanic students is 0.304. This means that if we compare Hispanic students to all other races of students, Hispanic students are 0.304 times less likely to complete the program in four terms.

For Human Nutrition, Clinical Healthcare Ethics, and Human Pathophysiology the *B* values in column two are positive. This indicates that as the grades earned in the courses moves up one level, from a “C” to a “B” or a “B” to an “A”, that the likelihood of being in the category completed in four terms increases. The odds ratio for Human Nutrition is 2.801. So, as the student grades moves up one level, the students are 2.801 times more likely to complete the program in four terms.

The odds ratio for Clinical Healthcare Ethics is 3.818. That means that as the student grades move up one level they are 3.818 times more likely to complete the program in four terms.

The odds ratio for Human Pathophysiology is 2.112. That means that as the student grades move up one level they are 2.112 times more likely to complete the program in four terms.

The other variables in the logistic regression analysis were not statistically significant at the .05 level or below

Male, Black and Hispanic students are less likely to complete the program in four terms than their counterparts. The higher the grades earned in Human Nutrition, Clinical Healthcare Ethics, and Human Pathophysiology the higher the rate of completion of the program in four terms.

Summary

Correlational analysis exhibited moderate to high correlations among the NET Reading and NET Math Scores and the NET Composite Score. Therefore, the NET Composite Score was eliminated from further analysis.

Some of the courses in the study taken separately and the Select GPA, a composite of 17 prerequisite courses also exhibited moderate to high correlations. Those courses were Anatomy and Physiology 1 and 2, and Microbiology. Therefore, the Select GPA was eliminated from further analysis.

Because the Traditional Pre-licensure Clinical Nursing Program (TPCNP) had many more applicants than spaces available, usually about 300 applicants for 80 to 100 spaces in 2007-08, the students that are advanced to the clinical coursework have superior grades and entrance test scores (Morris, 2012; Herrera, 2012). The following frequencies and descriptive statistics demonstrate the academic excellence of these students.

Courses. Frequencies and descriptive statistics computed for each of the courses in the study showed that for all courses except Human Pathophysiology

more than half of the students received grades of “A” so they showed negative skewness. The range of percent of “A” grades earned ranged from 50.86% for Anatomy and Physiology 2 to 94.86% for Culture and Health. The percent of “A” grades earned in Human Pathophysiology was 41.85%. The mean grades earned in the 15 courses ranged from 3.95 for Culture and Health to 3.24 for Human Pathophysiology.

Multiple logistic regression analysis showed that the only courses that were statistically significantly related to the dependent variable, Completion of the Program in Four Terms, were 1) Human Nutrition, 2) Clinical Health Care Ethics, and 3) Human Pathophysiology. For each of these courses, the higher the grade earned, the more likely the student would complete the program in four terms.

Very few students took replacement courses. Four hundred of 584 students took no replacement courses. Another 100 students took only one replacement course. This variable was positively skewed. The Replacement Course variable was not significant in the regression analysis. Therefore, the number of replacement courses taken did not affect the likelihood of completing the program in four terms.

The NET Math scores ranged from 68 to 100 with a mean of 92.14 and a standard deviation of 5.735. The NET Reading Scores ranged from 60 to 94, had a mean of 75.62 and a standard deviation of 7.025.

Of the 584 students in the study 90 took all of the prerequisite courses at four-year colleges. Fewer than forty students took all of their courses at two-year institutions. More than half of the students took half of the prerequisites at four-year colleges. The regression results showed that the number of replacement courses taken at four-year colleges was not predictive of completion of the program in four terms.

Race/ethnicity. The frequencies for race/ethnicity revealed that there were 77.3% White students and 23.7% non-White students broken down as 7.5% Asian students, 2.5% Black students, 10.9% Hispanic students, and 1.8% Native American students. Native American students had the lowest scores on the NET Math and Reading yet the highest completion rate at 100%.

Gender. Most of the students in the study were female, 88.2% with 11.8% male. Table 9 showed that female students completed the program at higher rates than the male students. This finding was statistically significant.

Completion of the Program in Four Terms. Only 36 students, or 6.2% did not complete the program in four terms. The success rate was 93.8%. Success rates varied by race/ethnicity, however. Native American students had a 100% completion rate; White students had a 94.7% completion rate; Asian students had a 92.9% completion rate; Hispanic students had an 88.5% completion rate; and Black students had a 78.6% completion rate. The regression analysis showed that race/ethnicity was a predictive variable where Hispanic and Black students completed the program at lower rates. This was statistically significant.

Overall, the analyses show that the TPCNP at Arizona State University is a successful program with a 93.8% completion rate. This exceeds the goal stated by the National League for Nursing Accrediting Commission (NLNAC, 2008) of an 80% completion rate. However, the analysis shows that the student's race plays a role in the likelihood of completing the program and that issue should be addressed and will be discussed further in Chapter Five.

The analyses also show that three courses are best predictors of successful completion of the program. This will also be discussed further in Chapter Five.

CHAPTER FIVE
SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND
IMPLICATIONS

Introduction

The United States is projected to have a nursing shortage which could intensify as the population ages and the need for health care grows. Nursing colleges and universities across the country are struggling to expand enrollment levels to meet the rising demand for nursing care.

Because of the need to graduate increasing numbers of baccalaureate prepared nurses in cost-intensive programs, baccalaureate nursing programs must be able to accurately and efficiently identify students most likely to succeed in these programs, graduate with a BSN and pass the National Council Licensure Examination-Registered Nurse (NCLEX-RN).

Research indicates that there is a need for a parsimonious explanation of BSN readiness and attrition to guide policy makers in nursing programs in institutions of higher education to decrease the attrition rate and boost the BSN graduation rate (Byrd, et al., 1999, p. 33). Thus, the important questions asked in this research are: what is the pattern of selection, preparation, retention, and graduation of nursing students in the College of Nursing and Health Innovation at Arizona State University? What factors help to predict which students will be most likely to complete the BSN in preparation for the NCLEX-RN and

subsequent practice as a Registered Nurse? What policy changes could be made to assist those students who complete the program at lower rates?

Summary of the Study

This study examined the quantitative factors used to evaluate students meeting eligibility requirements for placement in the pre-licensure clinical nursing program in the College of Nursing and Health Innovation at Arizona State University. Specifically, several independent variables were examined including: grades earned in prerequisite courses; replacement course frequency and grades; scores earned on the Nurse Entrance Test (NET); the number of prerequisite courses, of the fifteen studied, taken at four-year institutions; race/ethnicity; and, gender. The dependent variable is a dichotomous variable and is: completion of the Traditional Pre-licensure Clinical Nursing Program in four terms with no interruption in progression toward the BSN, such as failing a nursing course or discontinuation of the degree program.

Because this research employed data from one large public university, the results should be generalizable to other large public universities but perhaps not to smaller private institutions.

Summary of the Findings and Conclusions

Almost 94% of the 584 students in the study completed the program in the prescribed four terms. According to this metric, the Arizona State University nursing program succeeds beyond the National League for Nursing Accrediting Commission (NLNAC, 2008) expectation of an 80% completion rate. This result

also supports Tinto's (1986, 2003) explanation of academic integration into the institution and commitment to academic goals discussed in Chapter Two. By the time the students are accepted into this program through a highly competitive process, they have committed to studying nursing and are only four terms away from earning the bachelor's degree.

However, not all variables included in this research were predictive of success in the program. This research allows readers to see which of the factors better predict success than others and to contemplate policy changes, if needed. In addition, the research disclosed uneven completion rates for some categories of race/ethnicity and gender within the small subset of students that did not complete the nursing program in four terms.

A summary of the results of the frequencies and descriptive statistics, correlational analysis, and multiple logistic regression analysis will be discussed in the context of the research questions tested.

Research Questions. We now return to the research questions tested in this research.

1. The grades earned in fifteen prerequisite courses will have a significant positive predictive effect on completion of the program in four terms. The higher the grade earned, the more likely the student will complete the program in the prescribed four terms.

This research question was only partially upheld. Only three of the fifteen prerequisite courses predicted the successful completion of the program: 1) Human Nutrition, 2) Clinical Healthcare Ethics, and 3) Human Pathophysiology.

Three of the four courses that had the highest mean GPA are courses that are taught by the College of Nursing and Health Innovation: 1) Culture and Health, 2) Clinical Healthcare Ethics, and 3) Introduction to Nursing and Healthcare Systems. In each of these courses, over 90% of students earned grades of A. Of these, only Clinical Healthcare Ethics was statistically significantly related to completing the program in four terms. There are multiple interpretations of what this means that are beyond the scope of this study.

One possible explanation for why only Clinical Healthcare Ethics was statistically significantly related to outcome but the other pre-nursing courses with high mean GPAs were not is that the content in Culture and Health and Introduction to Nursing and Healthcare Systems is less closely tied to the academic requirements of the upper division nursing curriculum than Clinical Healthcare Ethics. Clinical Healthcare Ethics has a humanities focus and covers the Nurses Code of Ethics including such topics as respect for human dignity, the nurses' relationship to patients, privacy, confidentiality, moral self-respect and responsibility for the healthcare environment (nursingworld.org). Culture and Health has a broader social and behavioral science orientation and focus on intercultural communication and healthcare. Introduction to Nursing and Healthcare Systems is an introductory level course which covers the social,

political and economic context in which the nursing profession and healthcare systems evolved. The curriculum in Clinical Healthcare Ethics, including the Nurses Code of Ethics, is integrated into the clinical nursing courses and students are graded in those courses, in part, based on their understanding of that code and use in the clinical setting.

Human Pathophysiology had the lowest mean GPA, is a rigorous course, and was also statistically significantly related to completion of the program in four terms. It is the study of the human body in disease. Since that is the primary focus of most of the upper division nursing curriculum it is not surprising that it is also more closely related to success in the program.

Finding the limited number of course grades that are correlated with completion of the program supports some of the research cited in Chapter Two. However, the broad spectrum of courses included in the study, including composition, math, statistics, science courses and others, was not supported. Potolsky, et.al., (2003) found that science course grades were predictive of success in nursing programs and this study did not support that finding. Uyehara, et al. (2007) found grades in Human Pathophysiology to be predictive of success and that finding was supported by this research.

2. The number of replacement courses taken will have a significant negative predictive effect on completion of the program in four terms. The more replacement courses taken the less likely the

student will be to complete the program in the prescribed four terms.

This research question was not upheld. Replacement course frequency had no statistically significant effect on completion of the program. This may be due to the fact that students were able to take a course at a higher level than the original prerequisite course and, therefore, were able to gain additional mastery in that discipline. It may also be that the content of the course taken most closely to the time of beginning the upper division nursing coursework had a more immediate effect on success in the program. So, for instance, a student may have earned a “C” in Introduction to Psychology as a freshman but then earned an “A” in Social Psychology as a sophomore. The sophomore student may be more mature and more integrated into the college experience, and may have drawn on the basic knowledge learned in the introductory course to achieve a higher mastery of basic psychology needed to succeed in the upper division nursing courses. Most students did not take replacement courses and, the few who did, took only one, two or three replacement courses.

3. The number of courses taken at four-year institutions, rather than at two-year institutions, will have a significant positive predictive effect on completion of the program in four terms. The more courses taken at four-year colleges the more likely the student will be to complete the program in the prescribed four terms.

This research question was not upheld. Whether the prerequisite courses were taken at two-year or four-year colleges had no statistically significant effect on completion of the program. This finding contradicts the findings of Newton (2008) regarding the lower success rates for transfer students from two- to four-year colleges. However, in the current study, most of the students (more than half) took more than half of the prerequisite courses at four-year colleges.

4. NET scores will have a significant positive predictive effect on completion of the program in four terms. The higher the NET scores the more likely the student will complete the program in the prescribed four terms.

This research question was not upheld. The NET math and reading scores did not have a statistically significant effect on completion of the program. Interestingly, American Indian students had the lowest scores on the sections of this exam yet completed the program at the highest rate.

5. The race/ethnicity of students will have a significant predictive effect on completion of the program in four terms. White and Asian students will complete the program in four terms at a higher rate than Blacks, Hispanics, and Native Americans.

This research question was partially upheld. Although the numbers are small, Black and Hispanic students completed the program at statistically significantly lower rates than the other categories of students. However, the Native American students had the highest completion rate at 100%.

The College of Nursing and Health Innovation at Arizona State University has a special program for Native American students called American Indian Students United for Nursing (ASUN). The purpose of ASUN is to increase the number of American Indians/Alaskan Natives studying nursing at Arizona State University and the number of nurses providing care to American Indians/Alaskan Natives. ASUN is not a separate nursing program but rather provides scholarship support to American Indian/Alaskan Native students studying nursing at Arizona State University (<http://nursingandhealth.asu.edu/asun/>). This program provides tutoring, computer laboratories, reading rooms, and mentorship to Native American students. This nurturing program appears to have a positive effect on the ability of Native American students to complete the program. If the goal is to raise completion rates for Black and Hispanic students, similar programs to nurture those students are likely to have positive outcomes.

6. Gender will have a significant association with completion of the program in four terms. Female students will complete the program in four terms at a higher rate than male students. This prediction is based on a belief that the smaller critical mass of male students will detract from successfully completing the program in the prescribed four terms.

This research question was upheld. Male students completed the program at statistically significantly lower rates than female students. It is not clear why that is the case since only quantitative data were used in the study and no

interviews were conducted with individual students. A possible reason for this outcome is that men only represent about 10% of the student population in this program. There is not a critical mass of male students nor are there support programs for them.

Recommendations

This research sheds light on the questions of patterns of selection, preparation, retention and graduation in the undergraduate pre-licensure clinical nursing program at Arizona State University. Since the National League for Nursing Accrediting Commission has suggested that an 80% completion rate in nursing programs is acceptable, we can conclude that this nursing program is successful because there was a 93.7% completion rate for the four student cohorts in 2007 and 2008.

In Chapter Two, the literature suggested that there were many factors that affect students over which college personnel have no control. One of those factors was the academic preparation that students have up to the point of attending college. Other factors are student commitment to a particular college and personal time constraints. A recommendation is to focus on those factors over which policy makers at colleges have some control to attempt to affect outcomes. So, this research may allow for policy makers, such as the nursing faculty, to ask whether the selection process and support programs as they exist are aligned with the expected outcomes. Faculty, and administrative personnel, could use this research to make adjustments to the selection process and support

groups to improve the success rate for selected student populations, such as Black, Hispanic and male students. Some recommendations regarding these kinds of factors follow.

Recommendation One. Since this research established that Human Nutrition, Clinical Healthcare Ethics, and Pathophysiology are related to successful completion of the program in the prescribed four terms, the faculty may want to consider including those courses in the Select GPA. This would require careful scheduling of the prerequisite courses by students with the advice of their academic advisors so that they would be completed at the time of selection consideration.

Conversely, the faculty could consider *excluding* some of the courses from the Select GPA. Perhaps the Select GPA could be made up of Human Nutrition, Clinical Healthcare Ethics, Human Pathophysiology and five courses from the remaining prerequisites. Since some research did find that composition and science courses were predictive of success, students could choose from the following to make up the Select GPA: Composition 1 and 2, Anatomy and Physiology 1 and 2, Chemistry, and Microbiology. Nursing faculty may also want to consider having the pre-nursing courses Culture and Health and Introduction to Nursing and Healthcare Systems on this list. None of the research indicated predictive effects for psychology, human development or elective courses so while they could remain as prerequisites, they may be excluded from the Select GPA.

Recommendation two. In 2007 and 2008, there were six points possible in the ranking of students in the selection process. The Select GPA (made up of 13 of the 17 prerequisite courses) was assigned four of the six points possible. Two of the six points were possible assigned to the NET scores (one point for reading and one for math). In 2011 the relative weight of the Select GPA and the TEAS was adjusted. The points used for ranking changed from six to two with one point for the Select GPA and one point for the TEAS. Given the disparate success rates on standardized tests for some minority groups this may need to be examined more closely to determine if there is a detrimental effect for these groups of students of having equal weight for the standardized test and the Select GPA.

Recommendation three. Additional research should be done to determine if the TEAS is predictive of successful completion of the program in the prescribed four terms. There was not a statistically significant relationship between NET scores and successful completion of the program in the prescribed four terms. Further research could determine if there is such a relationship between the TEAS and completion of the program. If there is not, then the standardized test may need to be reconsidered.

Newton, et.al. (2006) found that the TEAS was a good predictor of success in the first semester nursing curriculum. All of the students used in this research took the NET as required for consideration for the program. In 2010 the TEAS replaced the NET as the required entrance exam for students since the NET

was discontinued. This research could be duplicated for more recent cohorts of students to determine if the TEAS is a good predictor of success in the program.

Recommendation four. The American Indian Students United for Nursing (ASUN) is credited with the 100% completion rate of Native American students. Should the faculty wish to increase the completion rates of Black, Hispanic and male students, they may wish to consider supports groups for those groups as well.

Recommendation five: The 100% completion rate by Native American students should be marketed. This is a remarkable achievement that should reflect on this grant-funded program.

Recommendation six. This research did not look at NCLEX-RN passage rates. While the Arizona State University program celebrates rates of between 80% and 95% for first time takers of the NCLEX-RN, a follow up study could help determine which factors predict success on that licensure exam since passage of that exam ultimately determines practice as a Registered Nurse. Further research on NCLEX-RN passage rates is recommended.

Recommendation seven. Almost 94% of the 584 students in the study completed the program in the prescribed four terms. That means that only 36 students did not complete the program in that time frame. Further examination revealed that all but two students completed the program in six terms. That represents a 99.6% completion rate in that longer time period. It is not known why those two students did not complete the program at all.

Anecdotal information indicates that some students are delayed due to personal medical situations or ill family members for which they must care. These students then “step out” for a semester or more and then petition to return to progression. Other students who are “out of sequence” have failed to complete an upper division nursing course with a grade of “C” or higher. Those students must then petition the college standards committee for permission to repeat that course. If successful the second time, they petition to return to progression in the next term. Two course failures results in disqualification from the program but students may also petition for return to reinstatement and return to progression.

Students who are out of progression due to medical or compassionate withdrawals are given priority in the return to progression decision making.

Further research on students who take five or more terms to complete the program would reveal the reasons why it takes some students longer than the four prescribed terms to complete the program and assist the nursing faculty in decision making about the number of course failures and repeats allowed.

Recommendation eight. There is a limited number of spaces available in the pre-licensure clinical nursing program at Arizona State University. The Select GPA, made up of 13 of 17 prerequisite courses, and the entrance test are used to determine the students who will be given those coveted spaces. No qualitative factors are considered. While the selection process yields student cohorts that complete the program at rates beyond expectations, it may be that the students that are not given spaces would be just as successful in completing the program as

those that are selected. Arizona State University administrators, nursing faculty, and prospective students have all recommended that additional factors be used in the decision making process. This researcher concurs. If resources allow, student interviews with nursing faculty should be added to the selection process.

Implications

The entire population of students enrolled in the program was employed, so there is no risk of sampling error.

There may be some misperceptions on the part of faculty, community members, or those outside of the college regarding expected completion rates of different races/ethnicities, expecting Hispanic, Native American or Black students to succeed at lower rates, this research shows that that is in fact a misperception regarding Native American students. The completion rates of Native American students could be more clearly communicated. Marketing the success of Native American students is recommended.

This research also supports the selection process currently in place. If the metric for defining success is an 80% or higher completion of the program in four terms, then the selection process is successful since almost 94% of the students did complete the program in that time frame. Anecdotal information indicates that the success rate is higher if we consider five or six terms to complete the program. Therefore, if the selection process is questioned by policy makers within the university, college, community, students, or parents, this research supports the selection process in place for the years 2007 and 2008.

Further research is recommended in the following areas: 1) research to determine if the TEAS is predictive of success in the program since the NET was not predictive; 2) research to determine if the relative weights of the Select GPA and the TEAS scores affects the selection of students to participate in the program and if those weights negatively affect certain categories of race/ethnicity; 3) continuous tracking of American Indian students to determine if the ASUN program continues to contribute to their success in the program; 4) research to determine which of these, or other, factors contribute to passage of the NCLEX-RN; 5) research to determine why some students take longer than the prescribed four terms to complete the program; and, 6) research that includes qualitative factors such as student commitment outside of their education.

This research contributes to the literature on BSN readiness and attrition in the following ways. Tinto's 1975 near-paradigmatic theory of departure from higher education and further research in 1986 and 2003 regarding academic integration into the institution is supported by the findings that the students who are committed to the institution and the academic major are more likely to persist than those that are not. The nursing students in this study completed the program in prescribed four terms at a rate of 93.7%.

This research is at odds with research conducted by Potolsky (2003) who found that science course grades were predictive of success in nursing programs but supportive of the research conducted by Ulehana (2007) who found that grades in Human Pathophysiology are predictive of success in nursing programs.

The finding that there is a lower success rate for students who transfer from two- to four-year colleges by Newton (2008) was not supported by this research.

Conclusion

This research has provided some insight into the patterns of selection, preparation, retention and graduation for students in the Traditional Pre-licensure Clinical Nursing Program in the College of Nursing and Health Innovation at Arizona State University. Quantitative data analyses revealed that specific prerequisite courses, certain categories of race/ethnicity, and gender are predictive of completing this program in the prescribed four terms. Recommendations were made for further research and for policy considerations to further improve this program.

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APPENDIX A
CODEBOOK

AP1 = BIO 201 Anatomy & Physiology 1

AP2 = BIO 202 Anatomy & Physiology 2

CHM = CHM 101 Introduction to Chemistry

HDEV = CDE 232 Human Development

COMP1 = ENG 101 English Composition 1

COMP2 = ENG 102 English Composition 2

ETH = HCR 210 Health Care Ethics

NUR = HCR 220 Introduction to Nursing and Healthcare Systems

CUL = HCR 230 Culture and Health

PATHO = HCR 240 Human Pathophysiology

MATH = Any mathematics course

MIC = MIC 205/206 Microbiology

NTR = NTR 241 Human Nutrition

PSY = PGS 101 Introduction to Psychology

STATS = Any statistics class

For the above courses: 4 = A; 3 = B; 2 = C

Pre-ReqGPA = The GPA earned for 15 prerequisite courses. Values range from 3.25 to 4.00.

SelectGPA = The GPA for three science courses, two composition courses and eight other prerequisite courses. Values range from 3.25 to 4.00.

REPL = Courses taken to replace a required prerequisite course in which a grade of “B” or “C” was earned. Value indicates the number of replacement courses the student took.

PRQ4YR = Of the 15 prerequisite courses, the number taken at a 4-year institution.

NET Math = The score earned on the math portion of the Nurses Entrance Test which ranges from 65 to 100.

NET Read = The score earned on the reading portion of the Nurses Entrance Test which ranges from 60 to 100.

Ethnicity = Asian = 1; Black = 2; Hispanic = 3; Native American = 4; White = 5;

Unknown = 99

Gender = Male = 1; Female = 2.

Terms = The number of terms that the student took to complete the upper division nursing Curriculum. The curriculum is designed for four terms. Those who took longer did not earn a “C” or greater in a NUR course and, therefore, had to repeat it. Thus, the number of terms taken is greater than four for those students.

APPENDIX B

HUMAN RESEARCH CURRICULUM COMPLETION REPORT

CITI Collaborative Institutional Training Initiative

Human Research Curriculum Completion Report Printed on 3/7/2012

Learner: Cheryl Herrera (username: CLHerrera)
Institution: Arizona State University
Contact Information: Arnold Danzig
 Department: College of Nursing and Health Innovation
 Phone: 6024960707
 Email: cheryl.herrera@asu.edu

Group 2 Social & Behavioral Research Investigators and key personnel:

Stage 1. Basic Course Passed on 01/06/12 (Ref # 7226346)

Required Modules	Date Completed	Score
Introduction	01/06/12	no quiz
History and Ethical Principles - SBR	01/06/12	3/4 (75%)
Defining Research with Human Subjects - SBR	01/06/12	5/5 (100%)
The Regulations and The Social and Behavioral Sciences - SBR	01/06/12	4/5 (80%)
Assessing Risk in Social and Behavioral Sciences - SBR	01/06/12	5/5 (100%)
Informed Consent - SBR	01/06/12	5/5 (100%)
Privacy and Confidentiality - SBR	01/06/12	3/5 (60%)
Research with Prisoners - SBR	01/06/12	4/4 (100%)
Research with Children - SBR	01/06/12	2/4 (50%)
Research in Public Elementary and Secondary Schools - SBR	01/06/12	3/4 (75%)
International Research - SBR	01/06/12	3/3 (100%)
Internet Research - SBR	01/06/12	3/4 (75%)
Research and HIPAA Privacy Protections	01/06/12	3/5 (60%)
Vulnerable Subjects - Research Involving Workers/Employees	01/06/12	4/4 (100%)
Conflicts of Interest in Research Involving Human Subjects	01/06/12	3/5 (60%)
Arizona State University	01/06/12	no quiz

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
 Professor, University of Miami
 Director Office of Research Education
 CITI Course Coordinator

Return

BIOGRAPHICAL SKETCH

Cheryl Herrera was born Cheryl Lyn Doss on March 27, 1960 in La Mesa, California. She attended elementary and secondary schools in Southern California then received her bachelor's and master's degrees at California State University, Stanislaus. She achieved ABD status at the University of California, Santa Barbara in Political Science in 1989. She has worked at Arizona State University in Tempe and downtown Phoenix since 1989, mostly as Director of Student Services. She began her doctoral studies in Public Administration in 1998. Cheryl has two daughters—one in law school at the University of California, Davis and the other about to begin her college career. She enjoys spending time with her family and friends and the beauty of Arizona.