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Examining student achievement and curriculum in a nursing program at a Midwestern community college

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Examining student achievement and curriculum in a nursing program
at a Midwestern community college

by

Sandra E. Cooper

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Education (Educational Leadership)

Program of Study Committee:
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Larry H. Ebbers, Co-major Professor
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Ames, Iowa

2012

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This dissertation is dedicated to my husband and best friend, Mike, who has always supported my professional goals and educational aspirations, and to our children – Sarah, Adam, Nicholas and Benjamin, and grandchildren – Addison, Mya, and Cainan, may you always pursue your goals.

This dissertation is also dedicated in memory of my parents, Adam and Dee Hergenreter, who instilled in me the values of hard work and discipline; they would be especially proud.

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ABSTRACT

The purpose of this study was to examine the pathway model of a nursing curriculum and evaluate the relationship and predictive ability of demographic and academic variables on the success or failure of those taking the National Council Licensure Examination for Registered Nurses (NCLEX-RN®) and to determine the impact of noncognitive role variables to student outcomes. A retrospective exploratory study was conducted using a purposive sample of 225 students admitted between 2007 and 2009 to an associate degree nursing program at a large Midwestern community college. Demographic and academic variables of age, prior degrees, Test of Essential Academic Skills (TEAS®) nursing entrance assessment score, science and nursing course grades, ATI RN Comprehensive Predictor Assessment exit score and cumulative grade point averages were analyzed for predictive value of first-attempt pass on the NCLEX-RN. In a separate analysis, the program database was explored to determine the impact of the noncognitive role variables of employment, and caregiving responsibilities on student academic outcomes in the first year of the program.

Descriptive analyses supported the relationship of the TEAS entrance assessment with early nursing program success. Students with prior degrees were more likely to persist in the program and graduate. Descriptive analysis of the cumulative grade point average showed implications for transfer and completion of a 4-year degree. The results of the chi-square analysis revealed statistical significance in associations between passing or failing the NCLEX-RN in the cumulative GPA and the RN Comprehensive Assessment score and first nursing course in the first and second years of the program: PNN139 and ADN577, respectively. The independent t test determined there were no significant differences in academic outcomes related to students’ noncognitive roles. An exploratory forward stepwise
regression was employed to test the theoretical pathway model that examines the factors that predict the results of NCLEX-RN exam. The pathway model was not significant due to the limited variability number of observations in the dependent variable. Implications for nursing education and recommendations for further study are addressed.
CHAPTER 1. INTRODUCTION

National Nursing Shortage

According to the Bureau of Labor Statistics (2010), employment opportunities in nursing will grow much faster than all other occupations through 2018. A more recent report released by the Bureau of Labor Statistics (2012a), *Employment Projections: 2010–2020*, cites that an additional 26% of nursing positions will be required to meet the needs of the healthcare sector on a national level.

Recent studies have found the effects of the recession have altered the projected nursing shortage. According to lead author and economist Auerbauch, the impact of the recession and its effect on the nursing shortage has resulted in a surge of student interest in the nursing profession; many students view nursing to be a safe-haven occupation (Auerbach, Buerhaus, & Staiger, 2011). Auerbach et al. (2011) projected the number of nurses will grow in proportion with the population through 2030, yet this projection may be complicated by bottlenecks common to nursing programs, including nursing faculty shortages, program waiting lists, and limited availability of clinical teaching sites. Auerbach et al. noted that many institutions of higher education offer unique or accelerated formats for program delivery that have attracted and may account for the increased interest of younger and second-career/degree students.

In the 2010 publication *The State of Nursing Education Capacity: 2007–2008*, the National League for Nursing (NLN) highlighted the role the recession has had on the nursing workforce and the historical implications for prelicensure nursing programs. According to the NLN (2010), trends in nursing program enrollment in associate degree nursing programs show expansion during periods of recession, yet many students interested in nursing remain...
unprepared for the academic rigors of nursing education. The NLN cited that approximately 35% of students pursuing nursing education are not qualified for admission, 26% are qualified and not accepted, and 26% of students are admitted. Obstacles for admission to nursing programs include the limited program seats available; the lack of qualified faculty, available clinical sites, classroom space and clinical preceptors; and budget constraints, all prompting the turning away of qualified students (American Association of Colleges of Nursing [AACN], 2012).

Record enrollments have been noted in community colleges, largely due to the impact of the economy. Those who are unemployed are returning to school to obtain degrees in the hopes of becoming more marketable for employment. According to the National Center of Education Statistics ([NCES], 2012b), between 1999 and 2009 community college enrollment of full-time students rose 45%, whereas the growth of part-time students rose 28% during the same time period, crediting enrollment growth to both rising unemployment rates and/or growth in population. The NCES (2012b) reported community college enrollment increases of 9% for students under the age of 25 and a 23% increase in enrollment of students over the age of 25 years. More recent reports have provided a current picture for enrollment in higher education. Lederman (2012) identified a 2.3% decline in enrollment at 2-year public institutions, noting an increase of those enrolling in college as part-time students.

Many students who enroll in community colleges are nontraditional learners who have responsibilities outside of higher education, including raising/caring for a family and employment, both may inhibit these students’ success and/or delay graduation. This study made use of a database of associate degree nursing (ADN) students from a large Midwestern
community college serving a rural community in Iowa (Carnegie Foundation, 2012) to
examine the relationship between selected academic and demographic variables related to the
program prediction model and success on the NCLEX-RN® licensure exam on first attempt.
Additionally, the noncognitive variable of student roles (i.e., employment, caregiver and/or
housekeeping) were explored to determine if there is a relationship with student academic
performance. A review of the students’ cumulative GPA provided insight into the ability for
transfer to and degree completion at a 4-year university. In light of the nursing shortage and
limited nursing program seats available, the ability to identify variables that have the most
significance in predicting students at high risk for program attrition and high probability of
success on the nursing licensure exam ensures that an adequate nursing workforce is
available.

In response to the recommendations in the Institute of Medicine’s (2011) report, The
Future of Nursing: Focus on Education, to increase the proportion of nurses with
baccalaureate degrees to 80% by 2020, academic and clinical practice leaders in nursing have
been prompted to examine nursing education and begin a dialogue on degree progression
models and practice requirements within their states. The Institute of Medicine’s (2011)
recommendation for a progressive nursing education model is a call to action for community
college nursing programs to ensure students are prepared for transfer and higher degrees in
nursing.

Many hospitals aspire to Magnet status, a credential offered by the American Nurses
Credentialing Center (ANCC) on an international level that recognizes high quality patient
care in health care organizations (ANCC, 2012). Magnet certification is a credential many
hospitals covet; having the certification is an indicator of quality patient care, nursing
excellence, and innovations in professional nursing practices. The certification requires hospitals to employ a nursing staff with specific educational credentials. A percentage of at least 80% of registered nurses with baccalaureate degrees is a criterion added to the 2012 guidelines and pertains to nurses providing direct patient care (ANCC, 2012).

The community college system serves as an entry to higher education for many students who already aspire to bachelor and graduate degrees. Lanaan (2003) found that more than 25% of students entering a 2-year college planned to attain at least a bachelor’s or master’s degree and that younger students are pursuing higher degrees and “achieving upward mobility in terms of income and occupational status” (p. 512).

Nursing students enrolled in the community college are unique; many are nontraditional students who have degrees in other areas and are balancing academics with employment and roles as caregivers. In contrast, there are students in the community college system lacking the academic skills to persist in postsecondary education.

**Problem**

There is a national nursing shortage, and students are vying for limited seats in nursing programs. Ashford (2012), citing a need for 26% more nurses to address a shortfall of 800,000 in nursing positions, noted that the need for healthcare workers will grow faster than any other field, excluding STEM (science, technology, engineering, and mathematics).

Although several studies have been conducted to determine variables and predictors of nursing student success on the NCLEX-RN exam, the majority of that research has been conducted in baccalaureate nursing programs. There is a need for research of the unique student population enrolled in community college nursing programs, where the majority of students interested in nursing are seeking admission. This study adds to the body of literature
by exploring variables associated with student progression and completion of a nursing program and by including the impact of nonacademic student roles on student success. Further, the study addressed transfer readiness of community college nursing students. The goal of this dissertation is to offer new approaches to understanding program persistence and transfer readiness of the community college nursing student.

**Purpose of the Study**

The purpose of this study was to examine the pathway model of nursing curriculum by exploring the relationship and predictability of demographic and academic variables to first pass attempt on the NCLEX-RN, and to investigate the impact of noncognitive role variables of ADN students from a large Midwestern community college serving a rural population in the state of Iowa. The study included the exploratory analysis of predictors for NCLEX-RN licensure success on first attempt and was intended to assist in the development of policies that will increase student success and nursing program completion at a time of a national nursing shortage.

In this study, variables that contribute to program progression and completion as well as student success on the NCLEX-RN licensure exam were analyzed utilizing the selected demographic and academic variables. In addition, a correlation of scores from the Assessment Technologies Institute (ATI) RN Comprehensive Predictor Assessment, an assessment taken by students at the end of the final term in their nursing program were examined as a proxy measure for student program persistence. The study employed descriptive statistics, correlation analysis, chi-square analysis and inferential statistics to identify the variables influencing program completion and first-attempt passage of the NCLEX-RN licensure exam.
Significance

The significance of this exploratory study lies in the testing of a theoretically grounded hypothetical pathway model and confirming the curriculum of the nursing program as a rigorous program of study. The rationale behind the model is based on the prediction pathway model hypothesizing that the persistence in the program is imbedded in the curriculum and the gateway courses as critical courses for student progression in the program. This analysis is intended to test the criteria and will provide the college with a model of prediction that can be used for further testing and evaluation of student outcomes.

Research Questions

The following questions guided this study:

1. What are the demographics and program precollege assessment scores in math and reading of the Midwestern community college associate degree nursing students?

2. What are the prior college degrees and cumulative GPAs of the Midwestern community college associate degree nursing students?

3. Is there a relationship between course grades, nursing entrance and exit assessment scores, prior degrees, and cumulative GPA?

4. To what extent do prior degrees, cumulative GPA, science and nursing course grades, and the TEAS and RN Comprehensive Predictor Assessment scores predict student success on the NCLEX-RN licensure exam?

5. Are there differences in the academic performance of students based on the level of noncognitive factors, such as responsibilities of employment, childcare, and/or housework compared to those who do not have similar responsibilities?
Definitions of Terms

*American College Test® (ACT®):* a national college entrance exam comprising separate examinations in four subject areas: English, science, math and reading (American College Testing, 2012).

*Assessment Technologies Institute (ATI):* a source for preparatory materials and assessments designed to measure a student’s knowledge related to subject areas on the NCLEX-RN exam as well as curricular support materials to augment curriculum, revamping of courses, faculty development, and improvement of student tests outcomes and attrition rates (ATI, 2012).

*Associate degree nurse:* a nurse with a degree from a program that has “at least a two-academic-year course of study or its equivalent in theory and practice as described by the Iowa Board of Nursing that leads to a degree in nursing and to eligibility to apply for registered nurse licensure by examination” (State of Iowa, n.d., Chapter 3, p. 1).

*Attrition:* an “indicator of] a decrease in student enrollment at the individual, institution, or system level” (Hisrshey, Bremer, & Castellano, p. 301).

*Community College Survey of Student Engagement (CCSSE):* a survey that provides information on student engagement, a key indicator of learning and, therefore, of the quality of community colleges; administered to community college students, it asks questions that assess institutional practices and student behaviors that are correlated highly with student learning and student retention (CCSSE, 2011).

*COMPASS®:* a measurement used to assess a student’s skill level in reading, writing and math; used by colleges to determine student course placement and may indicate the need for additional assistance (COMPASS, 2012).
Iowa Board of Nursing: legal body responsible for regulating and enforcing regulations for nursing education, nursing practice, and continuing education for nurses in Iowa (Iowa Board of Nursing, 2011a).

National Council of State Boards of Nursing (NCSBN): a not-for-profit organization whose stated mission is to “provide leadership to advance regulatory excellence for public protection” to its member state nursing boards (National Council of State Boards of Nursing [NCSBN], n.d.a).

NCLEX-RN® (National Council Licensure Examination for Registered Nurses): the examination currently used for initial licensure as a registered nurse or licensed practical nurse (State of Iowa, n.d., Chapter 2, p. 1); a comprehensive computerized exam used by the Boards of Nursing that measures entry-level nursing competencies required to perform safely and effectively as an entry-level nurse (NCSBN, n.d.b).

NCLEX pass rate: the percentage of candidates who pass the NCLEX-RN on their first attempt (NCSBN, n.d.b).

Nontraditional learners: students who delay enrollment in a program, evidenced by being 25 years of age or older when entering the program (Jinkens, 2009).

Nursing undergraduate retention and success (NURS) model: a model describing student retention as being based on the interaction of profile characteristics; affective and academic factors; and environmental, psychological, and outside surrounding factors; “professional integration factors at the center of the model because they are at the crossroads of the decision to persist, drop out, or stopout” (Jeffreys, 2012, para. 1).

Program: “The course of study by any method of instruction or delivery that leads to a nursing diploma, degree or certificate. Multiple-site programs offered by one
controlling institution shall be considered one program if the philosophy and curriculum of all sites are the same” (State of Iowa, n.d., Chapter 2, p. 2).

*Program persistence:* successful completion of developmental education and college-level course success; percentage of students completing certificates and degrees (American Association of Community Colleges [AACC], 2012).

*Qualified nursing faculty:* an individual who possesses “current licensure as a registered nurse in Iowa prior to teaching . . . has two years experience in clinical practice” and the academic qualifications of “at least a baccalaureate degree with a major in nursing or an applicable field at the time of hire. This person shall make annual progress toward the attainment of a master’s or doctoral degree with a major in nursing or an applicable field” (State of Iowa, n.d., Chapter 2, p. 8).

*RN Comprehensive Predictor Assessment:* a proprietary assessment used at the end of a nursing program to measure a student’s preparedness for the NCLEX-RN (ATI, 2012).

*Student success:* achieving an educational goal (Braxton, 2003).

*Test of Essential Academic Skills (TEAS®):* a proprietary, prenursing program assessment used to predict early nursing school success (ATI, 2012), comprising assessments in four areas: English and language usage, reading, science and math.

*Traditional learners:* Students who are younger than 24 years of age who enroll in institutions of higher education (Jinkens, 2009).

*Transfer readiness:* the completion of the nursing program, allowing for graduation and passage of the NCLEX-RN licensure exam, with a minimal cumulative GPA as required by the 4-year institutions.
Theoretical Framework/Theoretical Perspective

The conceptual model and theoretical framework for this study are tri-fold. This exploratory study used Jeffreys’s (2004) nursing undergraduate retention and success (NURS) model as the primary theoretical framework. Jeffreys’s (2004, 2007) theoretical framework is based on the interactions of academic, demographic, and student characteristic variables used to examine student retention of nontraditional students and success on the NCLEX-RN licensure exam. Jeffreys's NURS model was used to examine retention of nontraditional nursing students in studies by Jeffreys (2004, 2007) and in dissertation research studies conducted by Horton (2006) and Alden (2008), who utilized the theoretical framework in their research of baccalaureate students.

The NURS model developed by Jeffreys (2004) is based on the student retention theory first put forth by Bean and Metzner (1985) and provides a framework to examine the factors affecting the retention of undergraduate nursing students according to their interactions and effect on program completion. The model employs multiple factors including: cognitive or academic; affective; environmental (employment, finances, childcare, etc.); and integration and socialization variables in the profession of nursing. In addition, Jeffreys (2004) asserted the outcome measures of academic and psychological (stress) affect the retention of undergraduate nursing students.

A second framework incorporated in the study is the pathway map of student progress used by Hagedorn, Moon, Cypers, Maxwell, and Lester (2006) and Hagedorn and Lester (2006) to visualize student progression and completion in program gateway courses according to barriers and successes in their research studies. Within the context of this study, the pathway model depicts the relationship of academic and demographic variables to
advancing to each semester with the end-point of program completion and first-attempt passage of the NCLEX-RN exam. The model incorporates many of the challenges students in the community college face and can be used to identify students at risk for attrition, transfer readiness, and subsequent failure on the NCLEX-RN exam (see Figure 1.1).

Figure 1.1. Midwestern community college nursing persistence pathway model.

A third theoretical framework includes the research of Bean and Metzner (1985, 1987) whose conceptual model of nontraditional student’s decision to leave college is due to the influence of external factors, rather than academic and social integration.

A myriad of research relating variables in predicting NCLEX-RN success in nursing programs already exists, this study utilized selected variables from the NURS model (Jeffreys, 2004) that illustrate a prediction of retention and student persistence in an ADN program, expanded the existing body of knowledge regarding admission criteria and retention, and offers opportunities for guidance related to program attrition appropriate to the unique population of students enrolled today in the community college setting.
The dependent variable selected for this study is student success on the NCLEX-RN on first attempt. For the purpose of the study, this measurement also implies student persistence in the nursing program; in order for students to be eligible to sit for the NCLEX-RN licensure exam, graduation from an approved nursing program is required. The independent variables selected for this study were organized into three major categories: (a) demographics, including age, gender, and prior degree; (b) academic, including nursing preadmission assessment (TEAS) score, nursing course grades, science grades, cumulative GPA, precollege reading and math assessment scores from American College Test (ACT and COMPASS); and (c) noncognitive role variables representing the number of hours the student devoted to employment, childcare, and/or housework each week.
CHAPTER 2. LITERATURE REVIEW

Overview

In 2011, the Institute of Medicine released the report, “The Future of Nursing: Focus on Education,” which called for nurses be prepared at the baccalaureate level for entry into professional nursing practice. The report promoted the requirement of a 4-year degree as the basic level of education needed to meet the challenges of today’s complex health care environment, calling for an 80% nursing workforce of baccalaureate-prepared nurses by 2020. Since the release of this report, a national nursing coalition, called “The Future of Nursing: Campaign for Action,” has formed; and local, state, and regional coalitions have developed individual groups to promote the movement on regional levels. As of August 2012, 48 of the 50 states had developed coalitions and had begun regional discussions to implement the recommendations put forth by the national coalition (The Future of Nursing: Campaign for Action [FNCA], 2012). One of the recommendations is to strengthen education and training for nurses through progressive models in nursing education and advance nursing degrees at all educational levels.

Nursing education and practice leaders in Iowa are engaged in conversations in determining an educational progression model for nursing students in the state. The majority of Iowa students preparing for nursing careers are educated in community colleges. In 2011, according to the Iowa Board of Nursing (2012), 58% of nursing students graduated from ADN programs as compared to 42% from prelicensure baccalaureate programs.

Pérez-Peña (2012) reported that hospitals prefer to hire registered nurses with a baccalaureate degree, an emerging trend for the past 5 years that has resulted in a surge of enrollment in RN-BSN nursing programs. The Institute of Medicine’s (2011)
recommendation for progressive nursing degrees, coupled with the current hiring trends in nursing, makes it essential for community college nursing programs to prepare associate’s degree students for transfer and degree completion.

The concept of transfer and degree completion has long been a part of the mission of the community college. As described by Hagedorn, Cypers, & Lester (2008), a major function of the community college mission is the transfer of students to 4-year institutions and greater access to higher education.

Nursing programs are held by their accrediting bodies to the standards and definitions of student success through the pass rate of the NCLEX-RN licensure exam on first attempt and to the degree of student attrition and program completion. This literature review highlights research predicting student persistence and graduation in nursing and the passing of the licensure exam on the first attempt for students enrolled in associate’s degree programs. There is a need for additional research regarding nursing student retention and success for community college programs to determine the most appropriate criteria for this unique student population and to validate the more recent studies. This review provides insight to student success by exploring demographic and academic characteristics as well as the impact of student roles on degree completion and eligibility to transfer to 4-year institutions.

**Student Engagement**

One of the most widely researched areas of higher education is student involvement. Studies have identified engagement to be closely associated with student success and academic achievement. Theories supporting student success through engagement and retention have been put forth by Tinto (1975), Astin (1993, 1985), Bean (1980), and Bean
and Metzner, 1987). The Community College Survey of Student Engagement ([CCSSE], 2011) provides community colleges with analyses of student data and characteristics and offers insights into effective educational practices unique to an institution.

There is a plethora of research on student engagement and the important implications on student outcomes: intellectual development, student adjustment, and academic achievement. Tinto (1975, 1993) is one of the earliest scholars who related the number of student with faculty interactions to academic achievement. Pascarella and Terenzini (1979, 1991) studied student–faculty interaction, student integration into college, and the indirect effects the college had on student engagement. Astin, (1984, 1993), also one of the early scholars of student engagement, related student involvement in college to academic achievement. According to Pike and Kuh (2005), “the influence of institutional characteristics on student engagement extends well beyond global characteristics such as size and institutional mission” (p. 187) and requires the investment of both student and faculty.

Bean’s (1980, 1983) work on student retention examined the “organizational attributes and reward structures affecting student satisfaction and persistence” (as cited in Center for the Study of College Student Retention, 2012, item 2). Bean and Metzner’s (1985) research found “environmental factors have a greater impact on departure decisions of adult students than academic variables” (as cited in Center for the Study of College Student Retention, 2012, item 4).

Stahl and Pavel’s 1992 study analyzed community college student persistence using Bean and Metzner’s (1987) nontraditional undergraduate student attrition model to determine how fitting this model was for community college students. In the study, survey data from a sample of 597 students was examined using inferential analyses to determine the most
significant variables. The researchers found that enrollment status, educational goals, high school performance, study habits, major certainty, finances, hours of employment, family responsibilities, opportunity to transfer, and student satisfaction aligned with the Bean and Metzner (1987) model. They also found a second construct that differed “from the Bean and Metzner (1987) model: academic advisement, absenteeism, course availability, outside encouragement, utility goal, goal commitment, and stress” (Stahl & Pavel, 1992, p. 29).

More recent studies relating engagement to student outcomes have focused on nonacademic student support methods to enhance or create social relationships among students in higher education (Bensimon, 2007; Crisp, 2010; Engstrom & Tinto, 2008; Karp, Hughes, & O’Gara, 2010; Lichenstein, 2005; Rendón, 1994; Scrivener et al., 2008; Tinto, 1975, 1993).

One of the most important ways to gauge student engagement in community colleges is through the surveys issued by the CCSSE (2011). Saenz et al. (2011) described the “five benchmarks used by CCSSE: active and collaborative learning, student effort, academic challenge, student–faculty interaction, academic challenge, and support for learners” (p. 238). They also indicated that “as far as the critical outcome of student engagement, findings from the most recent CCSSE study (CCSSE, 2010) indicate that students who show the least amount of engagement are at greater risk of dropping out” (p. 236).

According to Maxwell (2000), community college students are more likely to engage in academic forms of involvement, including class-related activities and meeting with faculty, rather than social involvement within the college. Hagedorn, Maxwell, Rodriquez, Hocevar, and Filpot (2000) found community college students to be motivated by curriculum and academic issues.
In 2012, the CCCSE released the first series of a report titled, *A Matter of Degrees: Promising Practices for Community College Student Success (A First Look)*. The report presented effective educational practices used by participating community colleges, with input from students, faculty and college leaders, to close achievement gaps and improve completion rates. The report identified “critical” principles for student success: (a) a strong start that promotes personal connections of students; (b) clear pathways that help students move within a college system and eliminate confusion; (c) providing integrated support that transcends across departments and moves skill development into coursework; (d) promoting high expectations and providing necessary support for academic planning and financial aid; (e) intensive student engagement through program design; (f) “design for scale” across the college, meaning adequate political and financial support, faculty involvement, and allowance of sufficient time for endeavors to be effective; and (g) providing professional development of staff, faculty, administrators and members of the governing board to work differently and re-evaluate their roles to promote student engagement and success (CCSSE, 2012).

**Traditional and Nontraditional Adult Learners**

For the purpose of this study, traditional students were classified as those students whose age was 24 years or younger (Jinkens, 2009). These students tend to enter college immediately following high school, remain financially dependent on their parents, and live on college campuses. The NCES (2012b) reported community college enrollment increases of 34% for students under the age of 25 and 42% for students over the age of 25 years between 2000 and 2010.
Haley (2012) defined nontraditional learners as adult students “over 25 years of age . . . financially dependent, returning to college after time away, or not starting college directly after high school,” adding that “the traditional student no longer make[s] up the majority of students in U.S. higher education” (para. 6). In a 2004 study, Kim, Sax, Lee, and Hagedorn (2010) looked beyond the demographic definition of age of the nontraditional student in an attempt to provide a “more holistic picture” (p. 403) of this population and described the multiple roles commonly held by the adult learner in their research.

The majority of students enrolled in the community college are nontraditional students (NCES, 2012b) who have responsibilities outside of the classroom and are increasingly balancing priorities. Recent findings from CCSSE (2012) show that 19% of students work full time and 42% work part time and that 29% of full-time students and 37% of part-time students care for dependents at least 11 hours per week. Further, 59% of community college students are enrolled part time and less than 45% meet their goal of earning a degree in six years (CCSSE, 2012). Hagedorn’s 2010 analysis supports that enrollment as a part-time student, financial independence from parents, and having sole responsibility for dependents present obstacles for the nontraditional students’ pathway toward degree completion and transfer to 4-year institutions.

In the executive summary for the Council for Adult & Experiential Learning’s (CAEL, 2012) report, Fueling the Race to Postsecondary Success: A 48-Institution Study of Prior Learning Assessment and Adult Student Outcomes, findings from a large, multi-institutional study of 62,475 students at 48 colleges and universities showed that adult students with prior learning experience had better academic outcomes and shortened time to degree attainment as compared to other adult students.
Ely (1997) acknowledged the socialization of nontraditional students and the importance of faculty interaction as critical factors to academic success for these students. Rendón’s 1994 study expanded the definition of nontraditional students by including income, generational, and employment status.

**Trends in Higher Education**

Increasing numbers of students enrolled in higher education are combining their academics with paid employment. This is in response to the increase in the cost of attending college. A review by the *The Chronicle of Higher Education* showed that tuition increases continue to outpace the inflation index, with annual tuition rate increases ranging from 2.9% to 30%, depending on the institution and state ("Tuition over Time," 2010). With this trend and the reduction in financial aid, the number of hours students are working while in college continues to increase each year.

In addition to increased employment, the amount of student debt for college students has grown exponentially. A recent article in *The Chronicle of Higher Education* stated that two thirds of first-year college students took out student loans of more than $25,000 in their freshman year (Lipka, 2012).

**Employment and Student Achievement**

Working while attending college has become the norm according to King and Bannon (2002), who found that one in five full-time students worked 35 hours or more per week. A study completed by Miller, Danner, and Staten (2008) demonstrated that 57% of all college students work part or full time while in college. Kulm and Kramer (2006) attributed these numbers to the increasing costs of higher education.
The detrimental effects of working while attending college have been cited by several studies; some studies showed a clear relationship with undesirable influences on academic success and health. Miller et al. (2008) found that students who worked more than 20 hours per week were more likely to engage in binge drinking, to sleep less, and to have a lower academic performance. Callender’s (2008) study found that, the more hours a student worked, the greater the negative effect the student experienced; students working 15 hours per week were 33% “less likely to get a good degree than an identical non-working student” (p. 373). The findings of Kulm and Kramer’s (2006) study were consistent with other studies, showing that working had negative correlations with employment, student study time, and GPA.

Bradley (2006) found that “most students, whether working or not, report high levels of commitment to their studies and a strong desire to do well academically” (p. 483). Bradley’s study presented evidence of a clear relationship between working while in college and GPAs, finding that the highest GPAs were held by those students who did not work and by those who worked more than 20 hours per week. This finding suggests that these students have developed time management and organizational skills associated with balancing work and academics. Kulm and Kramer (2006) found employed students were more likely to attend classes and were just as likely to have better skills managing their time and coordinating schedules. Additionally, Kulm and Kramer noted that students working a limited number of hours each week, (i.e., 10 or fewer) had a positive impact on academic performance.

Community college students struggle to maintain balance with the challenges of work, family, and school. Nonacademic supports for students who work and have
responsibilities beyond academics can make college feasible (Karp, 2011). Karp (2011) posited that “services that aid students in overcoming these challenges help ensure that students’ educational pursuits are not compromised” (p. 2). Further, Karp suggests providing students with options such as transportation assistance, and “offering on-site daycare would help minimize the conflict between family and school; offering courses at a variety of times and providing on-campus work opportunities may improve retention” (p. 3). According to Karp, providing these types of services will aid students in overcoming challenges and help ensure that students’ educational pursuits are not compromised. Community college students struggle to maintain balance with the challenges of work, family, and school. Karp posited, “Services that aid students in overcoming these challenges help ensure that students’ educational pursuits are not compromised” (p.2). Helping students to balance their work and school responsibilities is essential.

**The Community College Today**

Boggs (2001) maintained that “community colleges have always defined themselves by the core values of open access” (p. 14). As early as 2004, Levine noted that increased enrollment trends, as qualified students sought access to 2-year colleges, coupled with limited and/or shrinking resources, was one of the greatest challenges facing community colleges. In times with reduced government funding sources, community colleges are striving to keep up with providing services needed for students with reduced fiscal resources from the state and federal government. These trends continue to be one of the greatest challenges facing community colleges.

One of the most important ways to gauge student readiness for postsecondary education is through the assessments completed by students in primary and secondary
education. In the *Condition of Education Report*, published by the U.S. Department of Education (NCES, 2012a), the 2011 national assessment scores of 12th grade students show that 36% of students were below the basic level in math achievement and 26% were below the basic achievement level in reading. Recent findings released by the College Board indicate 2012 high school graduates who completed the SAT and ACT do not have the foundational skills needed to succeed in college, citing writing and reading skills have declined (Marklein, 2012). According to Giodarno (2012), a major part of the mission of community colleges “is providing remedial education to high school graduates whom experts say are not ready for college work” (para. 16).

Student success in college is measured using graduation rates. Kuh, Kinzie, Schuh, and Whitt (2005) posited, “The best predictors of whether a student will graduate or not are academic preparation and motivation” (p. 7). According to Sheppard (2010), community college students are entering with excessive work and family responsibilities. These factors have contributed to retention rates of only 50% and an increased number of students being placed on academic probation. In addition to academic unpreparedness, community college students face other challenges inhibiting their success: 25% of students come from families earning 125% or less than the federal poverty level and many are the first in their family to attend college (Sheppard, 2010).

**Nursing Program Retention and Student Success on the NCLEX-RN Licensure Exam**

Nursing programs have conducted research over the past four decades to predict student success on the NCLEX-RN licensure exam, with early studies investigating predictors of student success using test scores, theory course grades, and GPAs (Schwirian,
Baer, Basta, & Larabee, 1978). The majority of the studies employed descriptive, correlative, and/or quantitative analyses in studying attrition/retention in nursing programs, graduation rates, and NCLEX-RN success; the majority of the research has been conducted in baccalaureate nursing programs.

According to Liu (2007), “community colleges enroll the largest number of nursing students each year” (p. 753). Ashford (2012) reported that associate’s degree programs graduate more RNs as compared to baccalaureate programs, but added that “the gap between RNs with an initial nursing education of associate degree and RNs with initial nursing education of bachelor degree is narrowing” (para. 11). Ashford attributed this trend to practicing RNs advancing their education and completing baccalaureate degrees. This literature review includes relevant studies and dissertations related to retention and NCLEX-RN success of nursing students in ADN programs that have been published in the past 10 years.

**Nursing Student Attrition and Retention**

Many of the concerns over access and student outcomes for ADN programs were found to have been addressed in the literature. Researchers have analyzed various factors such as student academic readiness, GPA, high school course grades and rank, college science and English grades, and precollege math and reading assessment scores. The debate over student access and attrition has been the impetus for much of the research found in the literature for ADN programs, with more recent research illuminating student situational factors related to roles, caring for dependents, hours spent working, and financial aid awards.

Windham’s (1995) research investigated a set of environmental and student characteristics that contributed to student attrition at a Florida community college over a
period of 2 years. Windham explored demographic, enrollment, and financial aid status; college preparatory course participation; college placement scores; high school certification type; GPA; employment; and ethnicity. Through logistic regression, Windham found that GPA in the first nursing semester and math placement scores were the most statistically significant throughout the entire study ($p < .001$); the writing placement score was also determined to be significant ($p < .10$). Additionally, the study’s findings showed that students working full time were two to three times more likely to drop out ($p < .001$) as compared to students not employed full time. Half of the sample were enrolled in college preparatory courses, and they were nearly twice as likely to drop out as compared to those not taking the college preparatory course ($p < .05$). Windham found that students most likely to remain enrolled in the nursing program “were those who fit the profile of the traditional student” (p. 15).

In one of the initial studies conducted by Jeffreys (1998), she explored the challenges of nontraditional nursing students using the theory of nontraditional student attrition (Bean & Metner, 1985, 1987). In investigating the relationship of self-efficacy and academic and environmental variables to nursing program performance, Jeffreys (1998) analyzed student study skills, gender, ethnicity, student role as parent and worker, level of support, transfer options, study skills, academic advising, and course availability. The study included a student survey administered to 151 students in a university setting. Jeffreys (1998) found academic variables to be highly correlated with student retention and academic success ($r = 34; p < .01$); student study skills and faculty interaction also were found to promote retention. Jeffreys (1998) concluded a student’s perception of environmental factors, such as student roles and support, to be a higher predictor of academic achievement and program retention.
Jeffreys (2001) conducted a subsequent descriptive exploratory study examining academic and psychological outcomes of nontraditional nursing students participating in a peer tutor program. The study utilized a sample of 257 students over a period of 4 semesters. The students completed two surveys: a student perception survey and a student satisfaction survey. Jeffreys (2001) found that students involved in peer tutoring had higher pass rates and reduced attrition as compared to those who were not. Further, students reported greater satisfaction with the nursing program of study when they were involved in peer tutoring. The study found family responsibilities, finances, and employment to be barriers to retention.

In their study, Manifold and Rambur (2001) investigated predictors of student retention in a sample of 157 Native American students and found language scores and older students correlated strongly to retention and program completion.

The purpose of a 2002 report provided for the Center for Student Success in California was to determine a student selection model to improve nursing program completion rates in that state (Phillips, Spurling, & Armstrong, 2002). Phillips et al. (2002) employed a longitudinal study over a period of 5 years and used a convenience sample of 5,007 students comprising students from 20 ADN programs in the California community college system. The researchers classified selection variables according to two dimensions: institutional and dispositional. Using logistic regression, four factors were determined to be statistically significant to predicting program completion. Further exploration and analysis determined GPA, core Biology course GPA and core Biology course repetitions to be predictive of program completion.

Jeffreys (2002) investigated student perceptions of program supports through a pretest/posttest survey, which included ratings of student perceptions of faculty advising,
study groups, study time, class friends and perception of the program enrichment group. The sample consisted of 80 students who participated in the enrichment group. Jeffreys (2002) compared pretest survey ratings to posttest ratings and found student perceptions were most positive for student retention for those who participated in the enrichment program; findings considered most restrictive for retention were related to family and financial barriers.

In a study conducted by Sandiford and Jackson (2003), discriminate analysis was used to examine first semester nursing course pass or failure from a sample of 190 students enrolled in a Texas community college nursing program. The researchers examined the relationship of academic, socioeconomic and motivational variables to attrition. The findings of the study suggested students who were determined to be “at college level” (Sandiford & Jackson, 2003, p. 2) had lower attrition rates than did students who were not ($p < .001$). Students with preprogram GPAs of 2.5 or above had lower attrition as compared to students with GPAs of 2.0–2.49, ($p < .001$). The noncognitive variables of the study (hours worked weekly, financial difficulty, attending college and achievement) were found not to be statistically significant in predicting first semester nursing attrition.

In a report for the California Postsecondary Education Commission, in response to the critical nursing shortage of registered nurses in the state, Seago and Spetz (2003) reported on an exploration of nursing program admission policies and attrition rates in California community college nursing programs. The report found that nursing programs with selective admission requirements did not correlate with higher success rates for on-time program completion or NCLEX-RN first-time pass rates. The researchers attributed this finding to the variability in programs across the state and recommended programs standardize admission policies and prerequisite courses to create a state-wide admission standard for selecting
students who were most likely to succeed. The report highlighted state-wide recommendations including: (a) same number of program credits to encourage program completion within 2 years, (b) program transparency to promote student decision making, (c) offering of remedial and tutoring programs, (d) faculty training, (e) increasing state-wide financial aid to nursing students, (f) increasing governmental funds to programs with high completion and first-pass NCLEX-RN rates, and (g) increasing the amount of need-based funds to students so their need for employment would be reduced (Seago & Spetz, 2003).

In 2004, Jeffreys published the NURS model, a theoretical framework built upon the nontraditional student retention theories of Bean and Metzner (1985). Jeffreys (2007) tested this model in a multisite study comprising 1,156 nontraditional students using the Student Perception Appraisal survey to determine factors supporting student retention. Jeffreys (2007) employed logistic regression to determine the five most significant factors supporting student retention; the factors included: environmental (financial status, family financial support, family and/or friend support, family and childcare responsibilities, family crisis, employment, transportation, etc.); institutional (facilities) and integrative (enculturation) factors; personal academic factors; and support from friends. Jeffreys (2004) found no statistical significance of demographic variables that supported retention.

Rudel’s (2005) dissertation described a qualitative study that explored retention and empowerment of nontraditional nursing students. The study used phenomenological methods through interviews, classroom observation, student reflective journals, and faculty–student interviews. Themes gleaned from the study and students’ experiences included: retention as a factor related to issues outside of the institution (i.e., family, peer, and social
support); faculty characteristics; and learning challenges students attributed to faculty who lacked knowledge of adult learning theory.

In Horton’s (2006) dissertation study, the NURS model was used to predict graduation and NCLEX-RN success in a Midwestern baccalaureate program, using a sample of 351 students. The independent variables selected by the researcher included prenursing science course grades, nursing course grades in the junior and senior years, and GPAs; the dependent variables were student graduation and success on the NCLEX-RN. Horton used logistic regression and differing models in examining the predictions of the dependent variables and found grades from the following nursing courses to be statistically significant ($p < .001$): Mental Health ($p < .001$), Research in Nursing ($p < .05$), and Pathopharmacology ($p < .01$). The model predicting graduation was statistically significant ($p < .001$) with the junior year GPA as statistically significant ($p < .001$). The third model also was statistically significant ($p < .001$); the independent variables found to be statistically significant were admission GPA ($p < .001$) and nursing GPA ($p < .001$). In predicting NCLEX-RN success, the first model included senior nursing grades and combined scores of the entrance exam, Mosby Assess, and the RN Comprehensive Predictor Assessment. Horton found this model to be statistically significant ($p < .001$); the statistically significant variables were the RN Comprehensive Predictor Assessment ($p < .05$) and course grades in Therapeutic Interventions ($p < .05$), Adult Health Care ($p < .01$), and Pediatrics ($p < .001$). The second model predicting NCLEX-RN success was also significant ($p < .001$); statistically significant independent variables were the RN Comprehensive Predictor Assessment ($p < .001$), junior level GPA ($p < .05$), and senior level GPA ($p < .01$). The final model predicting NCLEX-RN
success also was significant \((p < .001)\); the independent variables determined to be significant predictors were admission GPA \((p < .001)\) and nursing program GPA \((p < .001)\).

Perin’s (2006) research examined key variables and outcomes for a nursing community college cohort group of 130 students compared with other students enrolled in alternate majors at a Hispanic-serving university in the northeast United States. The variables used in the study were demographic (ethnicity, gender and age), enrollment status (full time), academic preparedness (ACT assessments from the ACT), and developmental education course work and grade. Retention was measured by the number of students who remained in the college system at the end of a 3-year period and the number who graduated. Perin found nursing students to have a higher attrition rate as compared to students enrolled in other majors and the developmental course-taking patterns of completion between the successful and unsuccessful students to be different. Perin recommended careful monitoring of all nursing students throughout a program and providing nursing-specific tutoring, advisement, and counseling to students.

In a longitudinal study, McLaughlin, Moutray, and Muldoon (2008) examined the role of personality and self-efficacy in the retention of nursing students in a sample of 350 students from a U.K. university diploma school of nursing. The outcomes of the study were occupational and academic self-efficacy, or confidence. The researchers employed a personality questionnaire and explored demographic and academic variables. They found that students who were more extroverted received lower grades. In contrast, students who scored higher on occupational self-efficacy received higher grades (McLaughlin, Moutray, & Muldoon, 2008).
Dearnley and Matthew (2007) sought to review the Open Learning Enrolled Nurse Conversion Course, a professional development course designed as a prerequisite course for first-level nursing students. The authors concluded that finding appropriate levels of support for students and using this knowledge ultimately promotes student success and program completion.

In her dissertation study, Alden (2008) used the NURS model to predict early academic success and program completion in a baccalaureate program at the University of North Carolina. Using a sample comprising 350 students, she conducted an analysis using logistic regression of demographic, academic, assessments and stress as variables in her study. Two models were used in the study and found to be statistically significant. The first model, predicting early academic success, was found to be statistically significant, $\chi^2 = 57.76$, $p < .001$, with a significant independent variable to be science GPA ($p < .003$). The second model, predicting program completion, also was statistically significant, $\chi^2 = 55.1$, $p < .0001$; the significant independent variables were reading comprehension ($p < .0001$), math skills ($p = .04$), and previous degree ($p < .01$).

In a dissertation study conducted by Rogers (2009), logistic regression was used to predict program completion and NCLEX-RN success for a sample of 294 nursing students in an associate’s degree program. Rogers found the TEAS preadmission exam to be predictive of program completion and first-attempt passage on the NCLEX-RN exam. She included subscore measures of the TEAS exam and determined the reading scores to be predictive of NCLEX-RN success but not statistically significant for predicting program completion. Science GPA was found to be statistically significant in predicting program completion; health-related coursework and GPA were predictive of NCLEX-RN success. The study
found students of nontraditional age were more likely to succeed as compared to traditional-age students (Rogers, 2009).

Grounded theory provided the theoretical framework in the dissertation study completed by Cook (2010), who investigated first semester attrition of students who left a community college nursing program. In this qualitative study, Cook found that those students who entered nursing, entered with varying levels of psychic strength. She asserted that students who adapt to the rigors of nursing education regain homeostasis. Students were more likely to leave a program if they were unable to adapt (Cook, 2010).

Using Jeffreys’s (2004) NURS model, Pence (2011) explored the relationship between intelligence, motivation, demographic variables, and retention. This researcher conducted a quantitative, descriptive, nonexperimental study using a sample of 397 students in nine associate’s degree programs in Illinois. Pence used two surveys, the Assessment Emotions Scale and the Motivated Strategies for Learning Questionnaire, and demographic data in her study. Using inferential analyses, she found age to be statistically significant ($p = .039$), with older students having less retention following the first nursing course. Additionally, this study found that race, ethnicity, and ADN (campus environment) affected student persistence; motivation and emotional intelligence were not found to be statistically significant (Pence, 2011).

Shelton’s (2012), using a model of nursing student retention, examined student supports in predicting retention and academic success in a sample of 458 nontraditional students enrolled in an ADN program. In the study, three groups of students were examined: those who voluntarily withdrew, those who withdrew due to academic failure, and those who persisted. Shelton employed a survey instrument to determine student demographic
characteristics, academic self-efficacy, and perceived faculty support. The study’s findings showed that students who persisted in the program scored high in the category of academic efficacy expectations ($M = 58.35$, $SD = 9.01$), academic outcome expectations ($M = 52.07$, $SD = 5.98$), and perceived faculty support ($M = 83.80$, $SD = 16.74$). One-way analysis of variances were computed to compare the three variables; there were no significant differences among the groups. Shelton found that students who persisted had higher academic aspirations ($p = .051$) as compared to students who withdrew voluntarily. Statistical significance was found in the difference of student perception of faculty support for those who persisted as compared to those who failed academically (Shelton, 2012).

**Associate Degree Nursing Student Success on the NCLEX-RN Licensure Exam**

Studies predicting associate degree student success on the NCLEX-RN began to emerge in the late 1990s and mirrored research conducted for baccalaureate programs. Many of the early studies examined cognitive variables including: GPA; standardized (ACT or SAT) exam subscores, such as reading or math; demographics; standardized proprietary assessments specific to nursing programs; parental characteristics, such as age, educational level, and socioeconomic status; and academic variables, including high school ranking, prerequisite and course grades in liberal arts curriculum (science, English, math, psychology) and nursing courses. In more recent research, exploration of noncognitive variables, such as test anxiety, student stress and roles, and program-specific interventions such as tutoring and remediation, have emerged.

Albert (1988) examined differences in organizational variables and their influence in determining student success. This study explored attrition and achievement on the NCLEX-
RN exam in associate’s degree programs in California. Using systems theory, Albert analyzed programs according to the effect of whether the program was a loosely coupled versus tightly coupled system, student and instructor abilities, administrator ability, and the size of the college and resource allocation. Using multiple regression, the researcher found that, the more tightly coupled the program, the higher the passage rate on the NCLEX-RN. Albert concluded that having prerequisite courses, a minimum GPA for admission, and hiring qualified faculty would improve attrition and program licensure pass rates and recommended that programs review curriculum for rigor and the faculty’s ability to motivate and care about students.

Forsythe’s (1997) study examined the predictors of success on the NCLEX-RN and the development of an early assistance intervention for at-risk transfer students. The study’s findings suggested utilizing early intervention and remedial programs for at-risk students and to follow these students closely during enrollment.

Rubino (1998) used a correlational design in her dissertation study to explore the relationship of 109 student scores on the computerized Nurse Entrance Test (NET) and success on the NCLEX-RN examination in a Delaware ADN program. The study examined the relationship between first semester GPA and composite math and reading subscores on the NET assessment. The math subscore was positively related to student persistence and program completion in the second year of the program, whereas the average stress score was negatively correlated. The NET reading subscore showed the strongest prediction of student performance.

According to Gallagher, Bomba, and Crane (2001), “students admitted to nursing programs which have limited enrollments must be carefully selected to identify those who
are most likely to be successful in completing the nursing curriculum and passing the NLCEX-RN examination” (p. 132). Gallagher et al. conducted a descriptive study to explore the predictive validity of the NET as compared to the Registered Nurse Entrance Exam (RNEE) tool used to rank program applicants prior to program admission in this ADN program. Using logistic regression, they found reading comprehension of the RNEE tool to be statistically significant \( r = .23; p < .05 \) with first semester nursing course passage and a course grade of B. They concluded that preadmission scores were not good predictors of program success as they relate to passing the NCLEX-RN licensure exam.

In her dissertation study, DePew (2001) explored the differences between associate degree and baccalaureate nursing programs’ use of multiple-choice tests in nursing courses and the extent of nursing faculty engagement in validity and reliability activities for multiple-choice tests and NCLEX-RN student success. The sample of the study included 1,086 undergraduate nursing faculty from 329 nursing programs across the United States who taught the theory component of practicum clinical course. The researcher utilized a self-developed 62-item survey administered via the Internet, using components of program evaluation and Bloom’s (1956) taxonomy of educational, measurement, and classical test theory to determine faculty use and review of program exams. The findings revealed that ADN faculty had a significant higher validity score as compared to baccalaureate faculty; bachelor of science in nursing (BSN) faculty were found to have a significantly higher use of reliability in analyzing exams as compared to associate’s degree faculty. The findings of the study revealed no relationship between high and low factors in predicting NCLEX-RN success. DePew found small significant relationships between NCLEX-RN success and test
evaluation activities and attributed these to available computer resources on college campuses.

The purpose of the dissertation study by Engelmann (2002) was to explore preadmission and postadmission variables that identify students at risk for failing the NCLEX-RN exam. Two populations were studied: Associate Degree Nursing Council members of the state of Illinois and a subset of the respondents from schools who had high NCLEX-RN pass scores. Using logistic regression, Engelmann found admission GPA to have a significant relationship ($r = .282; p = .06$). The postadmission variables found to be significant included low test scores ($r = .343; p < .05$). Engelmann also found the availability and amount of student support services to be statistically significant ($r = .279; p < .05$).

In her dissertation study, Collins (2002) used an ex-post facto design to determine the predictability of preprogram science grades, cumulative GPA, and grades in select nursing courses in determining NCLEX-RN success. Collins utilized a convenience sample of 159 graduates from a small, rural community college in western Michigan. Using Pearson product correlation and logistic regression, she found weak correlations between preprogram science grades (Anatomy & Physiology I & II, Chemistry, and Microbiology) and NCLEX-RN success. The preprogram GPA and the second semester Drug Therapy course had the strongest correlations and significance ($p < .01$).

Sayles, Shelton, and Powell (2003) explored successful completion of the associate’s degree program and success on the NCLEX-RN in a correlational study of scores on the NET and other pre-RN proprietary assessments. The researchers used a convenience sample of 68 graduates of the 2001 class. The six variables—NET family and social stress scores, NET visual learner score, ACT reading score and two nursing course grades—were found to be
statistically significant ($p < .05$). The researchers found that the NET and pre-RN program scores were statistically significant predictors for first-pass success on the NCLEX-RN ($r = .263$, $p = .03$).

Yin and Burger (2003) examined the relationship of admission variables in a retrospective study of 325 graduates of an ADN program at a Midwestern university. The independent variables of student age, gender, ethnicity, enrollment status, previous degrees, transfer status, and LPN status; cognitive variables included high school GPA and rank, ACT composite score, number of college credits prior to nursing admission, college GPA, and grades in liberal arts courses (English, psychology, and sciences). The researchers analyzed variables using $t$ tests and chi-square analysis to compare the attributes of students who passed the NCLEX-RN with those who did not. The findings of the study showed college GPA to be significantly correlated ($r = .15; p < .01$) with success on the NCLEX-RN exam.

Laird’s (2003) research was an investigation at John Tyler Community College, in the last nursing semester, using the Arnett Development Corporation’s Computer Adaptive Test, an exam that individualizes students’ exams based on their answers and abilities. The sample size of 137 students included 112 students who passed the NCLEX-RN exam and 25 students who failed. The findings showed a relationship between pass/fail scores, $\chi^2 = 4.6277$, $df = 1$, $p = -.0314$.

In his dissertation study, Sutton (2004) investigated predictor variables for 235 associate degree nursing graduates’ success on the NCLEX-RN exam at a large urban community college in Florida. Using logistic regression, Sutton found the RN assessment examination taken at the end of the nursing program to be the most significant predictor of NCLEX-RN success.
Canillas-Dufau (2005) explored 22 variables of demographic and academic factors predicting program completion and first-pass on the NCLEX-RN exam in an associate’s degree program. The student sample comprised a convenience sample of 107 nontraditional students enrolled in the evening/weekend program at Mount St. Mary’s College in California. The researcher used a retrospective descriptive correlational design and logistic regression to identify variables predicting program completion and NCLEX-RN success. The variables found to be the most predictive were exit GPA and students who were not on academic probation at the time of program admission. Additional variables found to predict student persistence and program completion included: higher levels of education prior to admission, a higher admission overall GPA, a higher admission science GPA, fewer years since having taken chemistry, a higher grade in science courses, higher assessment math and NLN test scores, not having had remedial math, having successfully passed the NCLEX-RN licensure examination, and fewer months between graduating and taking the NCLEX-RN exam.

Variables found to be predictive of passing the NCLEX-RN on first attempt included: not having been admitted to the program on probationary status, higher previous levels of education, higher overall GPA at the time of admission to the program, a higher science GPA at the time of admission to the program, having a higher chemistry grade prior to admission, a higher grade in anatomy, a higher grade in physiology, and a higher NLN test score (Canillas-Dufau, 2005).

Nibert, Young, and Adamson (2006) completed a fourth consecutive study on the predictive ability and accuracy of the Health Education Systems, Inc. (HESI) exit exam for NCLEX-RN success and failure. The researchers employed a descriptive comparative design using the HESI database and responses to a questionnaire from school administrators during
1999–2000. Data were obtained from registered nurse (RN) and practical nurse (PN) schools that comprised a sample of 6,800 nursing students. The findings revealed the predictive accuracy of the HESI exit exam to be 98.3% for RN students and 98.46% for PN students. The study further explored scoring intervals between high- and low-scoring students who failed the NCLEX exam and found that NCLEX failures increased as the scoring intervals decreased. No significant differences were found for student outcomes for differing programs (BSN, ADN, Diploma, and PN).

Gilmore’s 2008 study, involved an exploration of predictive factors to assist ADN programs in determining admission criteria. Using a retrospective correlational design and convenience sample of 218 individuals from two southeastern community colleges, Gilmore explored nursing course GPAs and first-pass success on the NCLEX-RN as the dependent variables; the independent variables of ACT composite scores and subscores (math, English, science and reading), anatomy and physiology grades, and preprogram GPAs were analyzed. Using analysis of variance and logistic regression, the findings of all combined variables were predictive of program completion; the ACT English subscore was statistically significant ($p < .05$) to program completion, and the nursing GPA was predictive of NCLEX-RN success.

In a dissertation study conducted by Rose (2010), a nonexperimental descriptive design was used to determine if associate degree and baccalaureate student nurse use of Evolve Apply case studies had an impact on the EVOLVE Exit (E2) scores to predict success on the NCLEX-RN. The findings revealed that the use of the EVOLVE case studies improved the students’ Exit (E2) scores, a finding suggestive of NCLEX-RN success.
Using an action research design, Lown (2010) examined GPA, NET scores as admission criteria, and Anatomy & Physiology course grades on student admission for their relationship to NCLEX-RN success in an ADN program for two successive cohorts representing before and after a change in the admission criteria was introduced. A survey of students was completed to obtain student perceptions of nursing department support and the number of times the students used support services. Using correlational analysis and logistic regression, Lown found admission GPA and Anatomy & Physiology II course grades to have a positive relationship with NCLEX-RN success.

In her dissertation research, Burds (2010) compared the relationship of demographic and academic characteristics of rural and urban campuses of an ADN program in the Midwest with predicting NCLEX-RN success in a sample of 398 graduates. Using logistic regression analysis, the researcher found first year nursing course GPA to be statistically significant ($p < .001$) and the first year nursing GPA to have an 84.7% prediction of first attempt NCLEX-RN passage.

Using a convenience sample of 245 students from two large community college nursing programs in California, Benefiel (2011) explored variables to predict success and failure on NCLEX-RN. Benefiel explored 11 preadmission and five nursing program variables using chi-square analysis and determined there was a significant relationship between preprogram GPA, student type (traditional, contract, LVN to RN, transfer), gender, age, ethnicity, TEAS preadmission assessment score, and TEAS subscores, number of attempts on TEAS, first semester GPA, nursing GPA, nursing program GPA, RN Comprehensive Predictor Assessment score, number of course repeats, and time from graduation to sitting for the NCLEX-RN. Benefiel developed four models to predict
NCLEX-RN pass and failure and found each model to be predictive: 92.3% of the time for model 1 and 91.7% of the time for Model 2. The analysis of the third model, which used all variables for the LVN to RN students, showed that Model 3 predicted NCLEX-RN pass and failure at 100%. With the TEAS assessment scores and first semester GPA variables removed, Model 4 was revealed as having the highest accuracy in predicting failures (Benefiel, 2011).

DeLima, London, and Manieri (2011) conducted a retrospective study comparing academic and demographic variables of students in an associate’s degree program who failed the NCLEX-RN with those of students who passed. Entering cumulative GPA, entering nursing curriculum GPA, preadmission exam score, five nursing course grades, NLN examination scores taken throughout the program, graduating GPA, and the HESI exit score taken at the end of the program were examined. The researchers found that females had a higher pass rate (54%) as compared to males (42%) and that White students had higher pass rates than did minority (Black, Hispanic, and Asian) students. The variables found to be statistically significant relative to NCLEX-RN passage were the NLN assessment (PAX-RN) score ($p < .05$); nursing course grades in the parent–child course ($p < .01$) and mental health course ($p < .02$); NLN scores in the fundamental ($p < .01$), parent–child ($p < .00$), and mental health ($p < .00$) courses; and the score on the HESI exit exam ($p < .00$).

**Iowa Nursing Trends and the NCLEX-RN**

Iowa’s nursing programs experienced a decline in NCLEX-RN pass rates in 2002, prompting the Iowa Board of Nursing to convene a task force to study the decline and provide recommendations to nursing education programs within the state. The task force presented several recommendations to nursing education programs: (a) use standardized and
computerized testing throughout the program to aid in advising and program evaluation and
to determine program policies for student progression; (b) incorporate NCLEX review
courses; (c) provide faculty development for those in the role of nursing educator; (d)
evaluate students deemed as at-risk upon admission or prior to program entry and implement
an advising and student success plan; (e) promote and affirm high academic standards to
administration; (f) evaluate and revise admission standards, course repeat, and progression
policies; (g) analyze faculty turnover and improve faculty mentoring, recruitment, and
retention; (h) evaluate adjunct and full-time faculty ratios; and (i) publicize scholarship
opportunities to facilitate and reduce employment of program students (Iowa Nursing Task
Force, 2006). In 2011, Iowa’s NCLEX-RN pass rates improved to 87% for associate’s
degree programs and 84% for baccalaureate degree programs (Iowa Board of Nursing, 2012).

Interest in pursuing nursing education degrees in the state of Iowa remains strong,
with enrollment trends reflecting a 233% increase in the number of associate’s degree
graduates enrolling in 4-year baccalaureate nursing programs from 2005 to 2011 (Iowa Board
of Nursing, 2012). The average annual tuition and fees is $7,157 at Iowa’s public 4-year
institutions and $3,769 at 2-year public institutions, compared to $16,041 at private 4-year

**NCLEX-RN Exam**

The NCLEX-RN licensure exam is a comprehensive computerized exam that
measures the competencies required to perform safely and effectively as an entry-level nurse
(NCSBN, n.d.b). The licensure exam utilizes a computerized adaptive testing method that
makes each candidate’s test unique, meaning the number of questions a candidate receives is
based on the individual’s answer to each question. The standard number of questions the
applicant receives ranges from 75 to 265 (NCSBN, n.d.b). The level of difficulty on the NCLEX exam has increased periodically since 2004; the most recent change occurred in 2008 (NCSBN, n.d.b). In a 2003 study, the NCSBN found students were more likely to pass the licensure exam if they sat for the examination as soon as they became eligible (NCSBN, n.d.b). The NCLEX pass rate is defined as the candidate’s first attempt on the licensure exam (NCSBN, n.d.b).

The 2010 demographic data for the national NCLEX-RN show an overwhelming majority (87.04%) of candidates were female and that Whites, at 68.10%, comprised the largest ethnic group (NCSBN, n.d.b). The national passage rates on the RN licensure exam for first-time candidates in 2010 and 2011 were 87.42% and 87.03%, respectively (Iowa Board of Nursing, 2010, 2011b).

Iowa’s Nursing Workforce

In response to the national nursing shortage, Iowa Governor Chet Culver appointed a nursing task force in 2006 to review the state of the nursing workforce in Iowa. The task force projected a 25% vacancy rate in nursing in the state of Iowa by 2020 and attributed the projection to the following factors: the aging population of the state, 50% of the current nursing workforce retiring, rural and urban health care disparity, and a shortage of qualified nursing faculty (Iowa Nursing Task Force, 2006).

The U.S. Census Bureau (2012) census data from the 2008 survey ranked Iowa fifth in the nation for the number of older adults 65 years of age or older. Older adults consume more health care resources due to chronic health conditions, further impacting the need for a sufficient workforce in nursing. Moreover, “the recent reforms in healthcare will give
millions of people access to the healthcare system” (American Nurses Association, 2012, para. 1), warranting the need for an adequate workforce in healthcare.

Iowa Workforce Development (2011) released a report of employment projections for the state of Iowa entitled *Iowa’s Hot 50 Jobs 2008–2018*, identifying high-demand, high-salary occupations. Postsecondary health specialties were ranked third, and according to this report, the projected need for nurses in Iowa will be evident through 2018.

The Iowa Organization of Nurse Leaders ([IONL], 2011), in its annual report of the healthcare workforce in Iowa, highlighted results of a 2010 survey requested from 166 hospitals with regard to nursing vacancies and projections at various-sized hospitals. According to the report, the survey was “intended to provide the healthcare industry leaders and policy makers with workforce data and analysis” (IONL, 2011, p. 2). The survey was sent to hospitals in both rural and urban regions; a 63% return rate was cited. The IONL report characterized the current state of the nursing workforce in Iowa as: (a) having a 3% vacancy rate for registered nurses and a 2% vacancy rate for licensed practical nurses; (b) having an annual turnover rate of 12% for registered nurses, and (c) reflecting the average age of a registered nurse in Iowa to be 43 years. Although 61% of the respondents preferred to hire registered nurses with a BSN, a breakdown of the educational preparation of current nursing staff responding to the survey revealed 46% were educated at the associate’s degree level, 13% at the diploma level, 33% at the BSN level, and 6% at the graduate level, as well as 5% masters prepared and 1% doctorate prepared (IONL, 2011).

The 2011 nursing program enrollment data provided by the Iowa Board of Nursing (2012) identified 79% of nursing students as being enrolled in associate’s degree programs, compared to 21% enrolled in baccalaureate degree programs. In 2012, the AACN reported
similar statistics at the national level. These trends indicate that the majority of nursing
students are educated in the community college setting (AACN, 2012). In response to the
on Education,” to increase the number of nurses with baccalaureate degrees in nursing to
80% by 2020, clinical practice and academic nursing leaders in Iowa have begun discussing
the nursing workforce and educational requirements of nurses in the state (FNCA, 2012).

**Assessment Technologies Institute**

Assessment Technology Institute provides curriculum support and assessment tools
used by many programs of nursing education. ATI provides preadmission assessments,
course and comprehensive predictor student assessments, online laboratory and remediation
modules for students, live NCLEX-RN review sessions for students nearing graduation,
curriculum mapping tools, and development education for nursing faculty (ATI, 2012). ATI
also provides a comprehensive package to supplement nursing program curriculum. All of
the ATI assessments are taken on the computer and are proctored and timed. The RN
Comprehensive Predictor Assessment simulates the NCLEX-RN exam. It is a
comprehensive assessment of entry-level nursing competencies formulated to the NCLEX
test plan; the assessment is timed and offers a similar number of questions as the NCLEX-
RN.

The ATI assessments provide student profiles for each assessment, which aid faculty
in determining student comprehension of course objectives and provide direction to students
for remediation of content. Additionally, the assessment profiles provide national mean
scores, program mean scores, and national percentile ranks for the program. The profiles
help to identify student knowledge, which aids in planning student remediation, and
curriculum gaps, which provide faculty with information on gaps in content to aid in program and curriculum revision.

**Summary**

Numerous research studies focusing on student retention in higher education and nursing student success on the NCLEX-RN exam were found in the literature for associate degree and baccalaureate nursing programs. The majority of the studies focused on academic predictors of program completion and cognitive variables related to first-attempt passage of the NCLEX-RN exam. In the past 5 to 10 years, the numbers of studies of ADN programs have increased. The majority of nursing students are educated in community colleges (AACN, 2012; Iowa Board of Nursing, 2012; Liu, 2007), and associate degree programs have responded by conducting research and implementing evidence-based strategies to help students improve their performance in a rigorous program of study, thereby promoting persistence and passage of the NCLEX-RN on the first attempt.

Many of the studies focused on a variety of cognitive variables (course grades, GPA, exit assessments, etc.) to predict NCLEX-RN success. Very few nursing studies have focused on the implications of nonacademic student roles and their relationship to persistence; and there were no community college nursing studies addressing student readiness to transfer for degree completion. There is an obvious gap in the literature for studies that have examined program completion and transfer.

Jeffreys (2004) provides the only model of nursing student retention found in the literature that explores a holistic and comprehensive examination of nontraditional community college nursing students. The theoretical framework of Jeffreys’s (2004) NURS model of student retention and progression explores cognitive, professional integration, and
noncognitive variables that have been further tested in research of baccalaureate nursing programs conducted by Alden (2008) and Horton (2006). Pence (2011) used Jeffreys’s (2004) NURS model in a study she conducted in an ADN program. Further testing of this model in the community college setting is needed.

Researchers have examined numerous variables in predicting nursing student retention and success on the NCLEX-RN: precollege assessment scores, GPA, nursing course grades; preadmission and exit exam scores, course grades, faculty advisement and interaction, employment, financial aid, motivation, ethnicity, and test anxiety. There is a lack of consensus related to effective predictors. “Developing predictive models is complex because of the number of demographic, academic, and psychosocial variables that interact and are beyond the scope of any one study” (Schmidt & MacWilliams, 2011, p. 173).

The needs of the nursing workforce and the limited seats available in nursing education programs are trends forcing nurse educators to re-evaluate admission criteria. In the mid-2000s, community colleges began to adopt competitive admission standards using proprietary nursing assessments. Several studies explored the predictive significance of these variables to identify students at risk for attrition and success and/or failure on the NCLEX-RN (Benefiel, 2011; Burds, 2010; Canillas-Dufau, 2005; DeLima et al., 2011; Gallagher et al., 2001; Horton, 2006; Lown, 2010; Nibert et al., 2006; Rogers, 2009; Rose, 2010; Rubino, 1998; Sayles et al., 2003; Sutton, 2004). The literature revealed the inconsistencies of research in nursing programs and attributed this to program and curricular differences; several studies were built upon, or replicated, past studies.

The present study was built upon the findings from previous nursing education research by examining the predictive variables of student academic and demographic
characteristics found to be significant in prior studies, and adding nonacademic student roles to the exploratory analysis. The independent variables selected for this research were chosen based on the reported significance found in recent studies of ADN programs. In addition, a limited number of noncognitive variables representing student roles used by Jeffreys (2004) were added and analyzed separately.

The variables selected for this research relate to the unique institutional curriculum and nursing program characteristics of the study sample and provided insight into the relevance of the nursing student population in a community college in Iowa. In addition, student GPA and the implications of transfer readiness and baccalaureate degree completion at a 4-year institution were explored in this study.
CHAPTER 3. METHODOLOGY

The purpose of this study was to investigate the prediction pathway model and relationship between demographic and academic variables to first attempt passage on the NCLEX-RN. A second purpose was to explore variables associated with student roles to determine if there are significant differences between students who are employed and/or provide childcare/ housework and those who do not, hypothesizing that student involvement in work and as a caregiver would negatively impact program progression and licensure pass rate.

Students’ cumulative GPA was examined to determine transfer readiness to a 4-year university considered to be a regional academic partner of the Midwestern community college. Transfer readiness is defined as meeting the academic partner’s admission requirements, which include graduating from an ADN program, meeting a minimum cumulative GPA, and passing the NCLEX-RN licensure exam.

This chapter provides a description of the (a) research design, (b) study sample and population, (c) procedures and data collection, (d) ethical considerations, and (e) methods of data analysis in relation to each of the research questions.

Research Design

In order to address the research questions, an exploratory, nonexperimental, retrospective, quantitative, correlational design was utilized. The purposeful sample was from an ADN program of students enrolled at a very large Midwestern community college that serves a rural community in the state of Iowa (Carnegie Foundation, 2012) and admitted to the nursing program between 2007 and 2009. The dependent variable for this study was first-attempt passage of the NCLEX-RN. The independent variables selected were
categorized according to (a) demographics (age and prior degree) and (b) academics (nursing preadmission and program exit assessment scores, nursing and science course grades, precollege assessment scores of reading and math from ACT and COMPASS, and cumulative GPA). The noncognitive variables measuring student roles were the number of hours involved with employment, childcare, and/or housework each week and were explored in a separate analysis to determine if differences existed between the student groups.

**Study Sample and Population**

A total of 644 participants were selected from a program database of a large Midwestern community college nursing program. Participants were representative of both day and evening/weekend program enrollees.

**Procedures and Data Collection**

Three data sources were merged to form the nursing program database. The variables drawn from each of the data sets are illustrated in Figure 3.1.

The first dataset (college records) was provided by the college’s Office of Institutional Effectiveness. This dataset included date of birth, precollege entrance assessment (ACT and COMPASS) scores in reading and math, prior degrees, cumulative GPAs, and course grades. Individual course grades were available for all students beginning in 2008. The second dataset (nursing program) was provided by the nursing program and included student gender, nursing program TEAS preadmission and RN Comprehensive Predictor Assessment scores, and NCLEX-RN licensure results. The third data set (Nursing Learning Management System Survey) was provided by a college representative and included fall 2011 program survey results of students’ self-reported hours devoted to employment, childcare, and/or housework each week. The data sets were combined
according to student college identification number and placed in an Excel file. Following the merging of the data sets, I imported the data from the nursing program database and placed the data into SPSS.

Sampling procedures restricted inclusion criteria to those students graduating from the nursing program in the fall 2009 through the fall 2011 semesters and to those who had completed the NLCEX-RN licensure exam. The number of students who had completed the program and had NCLEX-RN licensure results represents the sample utilized for inferential analysis numbered 225. Male students represented 8.4% of the sample, which is lower than the national trends of 14% of males enrolled in ADN programs (NLN, 2012). Females represented 91.6% of the sample.

This retrospective study included secondary analysis of the nursing database, utilizing select academic and demographic variables predicting NCLEX-RN success. The conceptual
model for this study was based on Jeffreys’s (2004) NURS model, a model predicting student retention and success through the interactions of cognitive (academic), demographic, and noncognitive variables, and according to the pathway model used in research by Hagedorn et al. (2006) and Hagedorn and Lester (2006) to visualize student progression and completion in program gateway courses according to barriers and successes. Thus, the select independent variables representing demographic and academic variables were chosen from the model. Depiction of the independent variables and coding can be found in Table 3.1.

In evaluating the impact of student roles (noncognitive variables), analysis of the third data set \((N = 244)\) was completed separately due to the limited number in the sample \((n = 30)\) who had NCLEX-RN exam results. The analysis explored the impact of student academic outcomes in the first year of the nursing program.

**Study Variables**

**Dependent Variable**

The dependent variable for the study was the NCLEX-RN results, an indicator of program completion. Student NCLEX-RN results are provided to Iowa nursing programs by the Iowa Board of Nursing. The NCLEX-RN results were operationalized as a dichotomous variable: 1 = pass; 0 = fail.

**Independent Variables**

**Demographic variables.** The demographic variable of age was operationalized for the descriptive analysis to distinguish the percentages of traditional and nontraditional students. Student age was determined by the date of birth listed in the students’ records. For the purpose of the study, traditional age was defined as 24 years of age or younger. Gender and age were explored for descriptive purposes only. Students were categorized by prior
Table 3.1

*Independent Variables*

<table>
<thead>
<tr>
<th>Category/variable</th>
<th>Coding/scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td>1 ≥ 25</td>
</tr>
<tr>
<td>Nontraditional</td>
<td>0 ≤ 24</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0 = male</td>
</tr>
<tr>
<td>Female</td>
<td>1 = female</td>
</tr>
<tr>
<td><strong>Academic/cognitive</strong></td>
<td></td>
</tr>
<tr>
<td>COMPASS</td>
<td></td>
</tr>
<tr>
<td>Math pre-algebra</td>
<td>0 ≤ 49; 1 ≥ 50</td>
</tr>
<tr>
<td>Reading</td>
<td>0 ≤ 81; 1 ≥ 82</td>
</tr>
<tr>
<td><strong>ACT</strong></td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>0 &lt; 18; 1 ≥ 18</td>
</tr>
<tr>
<td>Reading</td>
<td>0 &lt; 19; 1 ≥ 19</td>
</tr>
<tr>
<td><strong>Prior degree</strong></td>
<td>4-point scale:</td>
</tr>
<tr>
<td>High school or GED</td>
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<tr>
<td>Associate’s degree</td>
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<tr>
<td>Baccalaureate degree</td>
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<td>Master’s or higher</td>
<td>3 = MA or higher</td>
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<td><strong>Course grades</strong></td>
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</tr>
<tr>
<td>Science:</td>
<td></td>
</tr>
<tr>
<td>Anatomy &amp; Physiology I</td>
<td>0=F, 1=D, 2=C, 3=B, 4=A</td>
</tr>
<tr>
<td>Anatomy &amp; Physiology II</td>
<td>0=F, 1=D, 2=C, 3=B, 4=A</td>
</tr>
<tr>
<td>Microbiology</td>
<td>0=F, 1=D, 2=C, 3=B, 4=A</td>
</tr>
<tr>
<td><strong>Nursing course grades</strong></td>
<td>4-point scale:</td>
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<tr>
<td>Intro to Nursing</td>
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<tr>
<td>PNI</td>
<td>0=F, 1=D, 2=C, 3=B, 4=A</td>
</tr>
<tr>
<td>PNII</td>
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</tr>
<tr>
<td>Intro to AD</td>
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</tr>
<tr>
<td>ADI</td>
<td>0=F, 1=D, 2=C, 3=B, 4=A</td>
</tr>
<tr>
<td>ADII</td>
<td>0=F, 1=D, 2=C, 3=B, 4=A</td>
</tr>
<tr>
<td>ADIII</td>
<td>0=F, 1=D, 2=C, 3=B, 4=A</td>
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<td><strong>RN Comprehensive Predictor</strong></td>
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<tr>
<td><strong>Cumulative GPA</strong></td>
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<td><strong>Noncognitive/roles</strong></td>
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</tr>
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<td>Work</td>
<td>0 = 0–5, 1 = 6–10, 2 = 11–20, 3 = 21–30, 4 = 31 or more</td>
</tr>
<tr>
<td>Housework and/or childcare</td>
<td>0 = 0–5, 1 = 6–10, 2 = 11–20, 3 = 21–30, 4 = 31 or more</td>
</tr>
</tbody>
</table>
education, and the sample included students across these four categories: high school or GED (General Education Development), associate’s degree, bachelor’s degree, master’s degree or higher.

**Academic variables**

*Precollege assessments.* The ACT is a college entrance assessment measuring four subject areas: English, science, math and reading (American College Testing, 2012). The ACT English and math subscores were selected as independent variables and operationalized according to the Midwestern community college requirement scores for enrolling in college-level math and English courses at that institution (see Appendix A). The ACT math requirement is a score of 18, and a score of 19 in reading is required for enrolling in college-level English courses. The precollege assessment scores were recoded in order to examine distribution and descriptive statistics. In math, scores below 18 were coded as a 0, and those equal to or greater than 18 as 1. The ACT reading score was operationalized with a 0 for scores less than 19 and 1 for scores greater than or equal to 19.

The COMPASS test measures a student’s skill level in reading, writing, and math and is used by colleges to determine student course placement and the need for placement in remedial courses (COMPASS, 2012). COMPASS precollege assessment scores were operationalized according to the college requirement for enrolling in college level math and English courses (see Appendix A). The nursing program requires students to have a score of 50 in the pre-algebra math portion of the COMPASS assessment; scores below this level were coded as 0 and scores equal to or greater than 50 were coded as 1. The reading score was operationalized as 0 for scores below 82 and 1 for scores equal to or greater than 82.
Students had the option to enroll in college-designated math and/or liberal arts courses and obtain a grade of C– or above to waive precollege assessment requirements; this option was excluded from the analysis. Students also could transfer equivalent courses from other institutions to the nursing program of study, which also waived the required college placement assessments and was not explored in this study.

Descriptive statistics explored were the precollege assessment variables for the sample. The largest number of students with NCLEX-RN results had taken the COMPASS reading and math assessments. A new variable was computed combining COMPASS math and reading scores and recoding it according to the college’s enrollment requirements and benchmarks stated in an earlier section. The variable was operationalized as high COMPASS math and reading scores and low COMPASS math and reading scores. The mean of the variable was compared to NCLEX-RN success (see Chapter 4) to determine the percentage of students who passed and failed the licensure exam on first attempt.

Students with low COMPASS scores were exempt from the COMPASS requirement if they enrolled in recommended remedial math courses or Introduction to Psychology and received a grade of C– or higher. There were no additional COMPASS scores recorded for these students, and an assumption was made that they had received the course waiver for admission to the program. Precollege assessment scores were further explored for descriptive analysis and excluded from inferential analysis, as explained in Chapter 4.

*Preprogram requirements.* TEAS is a program requirement for admission and comprises four exams in reading, math, English and science. The assessment is a multiple choice exam measuring entry level skills standardized to nursing program applicants (ATI, 2012). In collaboration with ATI, the Midwestern community college nursing program
reviewed and analyzed, through an Anghoff study in 2008, their student population to determine an admission score that best fit their program. The program determined the composite score of 73.5 on the TEAS version IV as the required level for admission. “The Test of Essential Academic Skills, from ATI is proven to be a statistically significant predictor of early nursing school success” (ATI, 2012; Cooper, 2012). Students have up to three attempts to meet the required cut-off score of 73.5. If a student had multiple attempts on the TEAS assessment, the first score was placed into the database as a continuous variable.

The nursing program requires three science courses as part of the associate’s degree plan of study: Anatomy & Physiology I, Anatomy & Physiology II, and Microbiology. Students are required to complete the Anatomy & Physiology I and II courses prior to admission if they enroll in the day program. Evening/weekend students are required to also complete the Microbiology course prior to admission in addition to the Anatomy & Physiology I and II courses. Students enrolled in the day program may enroll and complete the Microbiology course prior to the last semester of the program. Many students who enroll in the day program complete Microbiology prior to admission to the program, as there is a 3- to 4-semester wait to enter the program.

The community college and nursing program require a grade of C– or higher in the science courses. Students who fail a science course may repeat the course an unlimited number of times. For the purpose of this study, the initial course grade awarded was used in the analysis.

*Nursing program courses.* There are five semesters of nursing courses in the ADN program plan of study. The first nursing courses, Introduction to Nursing and Practical
Nursing I (PN I), provide the foundation of theoretical concepts in nursing and include content on medical surgical nursing, nutrition, and pharmacology. The foundational content is threaded throughout the remaining four semesters of the program. The second nursing semester, PN II, provides students with basic content in maternal, child, and pediatric nursing as well as more advanced concepts in medical surgical nursing.

The associate’s degree level of the program encompasses three semesters, and the course outcomes align to the competencies and roles of the registered nurse; there is leveling of the medical surgical content. The first semester of the second year in the program is a transitional semester. Students are concurrently enrolled in two nursing courses: Introduction to AD Nursing and ADN I. For the fourth nursing semester, ADN II includes advanced medical surgical nursing and mental health content. The content of the final semester course, ADN III, includes leadership, community health, multisystem health, and advanced maternal and pediatric nursing content. Nursing students are allowed to repeat nursing courses one time at each level of the program. Nursing course grades were coded according to the grades the students received on first attempt. Analysis of grades for each nursing semester was conducted. The nursing program of study can be found in Appendix B, and nursing course descriptions are found in Appendix C.

The RN Comprehensive Predictor Assessment is an exit exam taken by students in ADN III, 2 to 4 weeks prior to graduating from the program. The computerized assessment is timed, and the exam content covers the registered nurse categories of the NCLEX-RN test plan. The assessment score is a continuous variable. In a 2012 report by Cooper, analysis of the RN Comprehensive Predictor Assessment score was determined to be statistically significant in predicting NCLEX-RN success ($r = .416, p < .01$); student mean scores of 74.8
on the RN Comprehensive Predictor Assessment predicted NCLEX-RN success at 100%.
The frequency distribution of the RN Comprehensive Assessment score was evaluated and
operationalized with a 0 for scores less than or equal to 75 and 1 for scores greater than or
equal to 75.1; exploration was conducted using cross-tabulation and chi-square analyses.

The cumulative GPA reflects the students’ end of program GPA and was coded after
reviewing and according to the admission requirements of regional academic partners for
transfer to 4-year baccalaureate nursing programs. The most stringent requirement is a GPA
of 3.0 from the public university partner. The remaining partners are private, not-for-profit
institutions that require GPAs of 2.5 or 2.6 for admission. Cumulative GPA was coded
according to the 4-year institution requirements for admission to the baccalaureate nursing
program.

**Ethical Considerations**

I obtained prior approval from the community college’s Department of Institutional
Effectiveness and from the Iowa State University Institutional Review Board (see Appendix
D). The study (#11-226) was modified and approved in May 2012 and declared exempt from
the requirements of the Human Subject Protections Regulations as there were no risks for the
students. Student files were retrieved by program and community college personnel. I
removed information that could be linked to the student prior to the combining of files and
the analyses. The student files were combined and stored on a secure BlackBoard website
housed at Iowa State University. The database was maintained in a secure location
throughout the study.
Methods of Data Analysis

Descriptive Statistics

Descriptive statistics was generated to provide a profile of students in the sample and included frequencies, means, and standard deviations from answers pertaining to the first two research questions: What are the demographics and program precollege assessment scores in math and reading of the Midwestern community college associate degree nursing students? and what are the prior college degrees and cumulative GPAs of the Midwestern community college associate degree nursing students? I examined all of the independent variables—age, prior degree, precollege assessment scores, nursing program assessments (TEAS and RN Comprehensive Predictor Assessment) scores, nursing and science course grades, and cumulative GPA—for normal distribution. Data that are normally distributed are symmetrical with skewness near 0 and kurtosis of 3. “Screening continuous variables for normality is an important early step in almost every multivariate analysis, particularly when inference is a goal” (Tabachnick & Fidell, 2007, p. 79). The distribution of the scores for the independent variable, PNN138 Introduction to Nursing course grade, was negatively skewed and was excluded from analysis. Statistical Package for the Social Sciences (SPSS) Version 19.0 was utilized for data storage and analyses.

Using the Pearson product-moment correlation coefficient, the independent variables were examined for strength and direction of relationships among the variables pertaining to Research Question 3: Is there a relationship between course grades, nursing entrance and exit assessment scores, prior degrees, and cumulative GPA? The correlations also were examined for strong linear relationships. According to Urdan (2010), examining the correlation is indicated when exploring more advanced statistics such as regression.
When variables are highly correlated, such as with a correlation of .90 and above, they can produce issues of multicollinearity when they are combined in a regression to predict an outcome (Tabachnick & Fidell, 2007). If two variables are highly correlated, using one, not both, is more appropriate for future analyses. The grades from the science courses Anatomy & Physiology I and II and the nursing courses were highly correlated. There were strong correlations between the independent variables of individual nursing course grades, cumulative GPA, and prior degrees.

Cross-tabulation and chi-square analysis was conducted to further evaluate and define the pathway model and to provide a focused approach for examining the independent variables for relationship. “Chi-square or phi/Cramer’s V are good choices for statistics when analyzing two nominal variables” and “are used to test statistical significance and also provide information about the strength of the association between two categorical values” (Morgan, Leech, Gloeckner, & Barrett, p. 109). Cross-tabulation was conducted to determine the association of students passing or failing the NCLEX-RN with the independent variables of age, prior degree, TEAS assessment, science course grade of Anatomy & Physiology II, and nursing course grades PNN 139, ADN105, and ADN577, RN Comprehensive Assessment, and cumulative GPA. Gender was excluded due to the limited number of male participants.

I examined the relationship of the independent variables, using chi-square tests and cross-tabulation, with the dependent variable NCLEX-RN passage on first attempt. The Phi and Cramer’s V tested the statistical significance and the strength of the association between the variables. The results of this analysis showed that age and prior degree were not
significantly related to the dependent variable. I examined the odds ratio for the independent variables PNN139 course grade and RN Comprehensive Predictor exit assessment score.

The chi-square and cross-tabulation analysis provided further evaluation and definition in selecting the four independent variables to be used in the development of the regression model. The independent variables selected for exploration in the stepwise regression analysis, which included the course grades from Anatomy & Physiology II, PNN139, ADN105, and ADN577, were statistically significant according to Phi and Cramer V. The courses selected represent the pathway model of a course taken prior to program entry and the gateway courses in the first and second years of the nursing program.

Due to the significant relationship observed between the independent variables and the dependent variable, a multiphase examination of the assumption to employ the forward stepwise logistic regression model to test the hypothetical pathway model was conducted. There were several phases to examining assumptions for executing the regression analysis. Assumptions were evaluated for each of the independent variables: age, prior degree, TEAS assessment score, science and nursing course grades, RN Comprehensive Predictor assessment score and cumulative GPA. The first phase was to investigate whether the independent variables differ on whether the participants passed or failed the NCLEX-RN by utilizing a chi-square statistics. The second phase of examining the assumptions was based on the correlation matrix among all variables that were observed in this study. The nursing course grades identified as gateway courses were selected for the exploratory regression model.
Inferential Statistics

An exploratory forward stepwise regression was employed to further examine the relationship between the independent variables, Anatomy & Physiology II, PNN139, ADN105, ADN577 course grades and the dependent variable, NCLEX-RN pass or fail in answering Research Question 4: To what extent do prior degrees, cumulative GPA, science and nursing course grades, the TEAS and RN Comprehensive Predictor Assessment scores predict student success on the NCLEX-RN licensure exam? The logistic model was examined for goodness-of-fit using the Hosmer and Lemeshow test, “where a good model produces a nonsignificant chi-square” (Tabachnick & Fidell, 2007, p. 459) and a value that is not significant with $p > .05$. The Omnibus Tests of Model of Coefficients and chi-square tests the justification of the step and adding a variable if the significance is less than .05.

This type of analysis is appropriate for categorical outcome variables—in this study, whether students passed or failed the NCLEX-RN exam. Logistic regression has the ability to analyze continuous, discrete, and dichotomous variables concurrently, without assuming a linear relationship between the variables (Tabachnick & Fidell, 2007).

Missing data were observed for the independent variables and were attributed to students transferring courses and missing course grades; entering the second year of the program as a transfer student, having completed the first year of nursing requirements at another college; or entering the second year of the program as a practical nurse. To best address the missing data, variables were added individually in building the model to look at the added value of including additional variables and to assess for suppression or arbitrary variables.
In a separate analysis, an independent $t$ test was conducted using the third data set and to answer Research Question 5: Are there differences in the academic performance of students based on the level of noncognitive factors, such as responsibilities of employment, childcare, and/or housework compared to those who do not have similar responsibilities? There were 244 nursing students who completed the fall 2011 survey, representing all nursing levels. The survey was administered via the nursing course Learning Management System as an online survey. Student responses were retrieved by a college representative and delivered to me.

Three of the survey questions were developed and drafted after reviewing survey questions used in past research studies of community college students. The questions provided the data for the noncognitive role variables and were formulated from the Transfer and Retention of Urban Community College Students (TRUCCS) survey developed by Hagedorn (2004). Those three nursing survey questions were: (a) “In the past seven days, how many hours did you work at a job”; (b) “In the past 7 days, how many hours did you provide care to your children or do housework?; (c) “Please indicate the highest level of education achieved” (Hagedorn, 2004; see Appendix E).

Prior to analysis, the nursing database was filtered for students who had participated in the fall survey. The students self-identified the number of weekly hours they were involved in employment, childcare, and/or housework responsibilities. The noncognitive variables measuring student roles (i.e., employee, childcare provider, and housekeeping) were coded according to the number of hours of student involvement each week as depicted in Table 3.1. The variables were then recoded as 0 for $0 \leq 10$ hours and 1 for $\geq 11$ hours. The PN program GPA was selected for the mean comparison of the groups. An independent
A t test was conducted to examine the equality of means of academic performance between the student groups: those who were employed, provided childcare, or did housework for more than 10 hours per week versus those who worked, provided childcare and/or did housework for less than 10 hours per week. An independent t test is used to “compare the means of two independent samples on a given variable” (Urdan, 2010, p. 93).

Summary

The purpose of this study was to explore, understand and describe the variables affecting the persistence of nursing students in a rigorous academic program of study. The study tested the effects of Jeffreys’s (2004) NURS model using variables unique to the Midwestern community college’s nursing program of study and the pathway model of student progress through gateway courses used by Hagedorn et al. (2006) and Hagedorn and Lester (2006). Using inferential statistics, academic variables were explored for predicting the persistence pathway for nursing courses in the model to program completion, graduation and NCLEX-RN first-attempt passage. The operationalization of the study provides information for faculty and administration in identifying students at high risk for attrition and a unique approach in visualizing a pathway to degree completion. The study’s findings have implications in identifying students who are at high risk for attrition before they are admitted to a program and allowing them to be closely followed upon admission. Student outcomes may be changed if early advising occurs.

The community college nursing programs educate the majority of students in nursing. At a time of a national nursing shortage, the study’s findings expand the existing body of knowledge regarding student persistence and licensure success, as well as offer opportunities for guidance related to nursing program retention appropriate to the unique community
college population. In light of the movement toward baccalaureate-prepared nurses for entry into professional practice, this study explored student GPA and the need to identify and advise students who do not meet the requirements early in their course of study so they meet the requirements and are eligible to transfer to a 4-year program upon graduation.
CHAPTER 4. RESULTS

The purpose of this study was to explore and analyze the predictive relationship of academic and demographic variables for first-attempt pass on the NCLEX-RN licensure exam. A second purpose was to determine if there are differences in academic performance between students who had employment and/or childcare and housework responsibilities with those who did not. The cumulative GPAs of students who graduated were examined to determine eligibility to transfer.

This chapter presents the results of descriptive statistics in answering Research Questions 1 and 2. Descriptive statistics provide student profile, academic, and role characteristics. Correlational analyses, cross-tabulation, chi-square analysis, and odds ratios were performed to explore relationships among the independent variables to answer Research Question 3. Inferential statistical analyses were performed in determining the predictive value of the statistically significant independent variables to answer Research Question 4. An independent $t$ test was performed to determine differences in student outcomes according to student roles in answering Research Question 5.

Descriptive Analysis

Research Question 1

What are the demographics and program precollege assessment scores in math and reading of the Midwestern community college associate degree nursing students?

Descriptive statistics of the sample for four of the independent variables are displayed in Table 4.1. The majority of the students (81.3%) were older than 24 years of age. The youngest student was 20 years of age, and the oldest was 54 years.
Table 4.1

Demographic Characteristics of Midwestern Community College Nursing Students

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19</td>
<td>8.4</td>
</tr>
<tr>
<td>Female</td>
<td>206</td>
<td>91.6</td>
</tr>
<tr>
<td>Prior degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school or GED</td>
<td>143</td>
<td>56.2</td>
</tr>
<tr>
<td>Associate’s</td>
<td>41</td>
<td>18.2</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>38</td>
<td>16.9</td>
</tr>
<tr>
<td>Master’s or higher</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Grade point average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 ≥ 2.49</td>
<td>13</td>
<td>5.8</td>
</tr>
<tr>
<td>2.5–2.99</td>
<td>81</td>
<td>36</td>
</tr>
<tr>
<td>3.0–4.0</td>
<td>127</td>
<td>56.4</td>
</tr>
<tr>
<td>Missinga</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 24 years</td>
<td>42</td>
<td>18.7</td>
</tr>
<tr>
<td>25 year or older</td>
<td>183</td>
<td>81.3</td>
</tr>
</tbody>
</table>

aMissing grade point average due to incomplete student records.

Research Question 2

What are the prior college degrees and cumulative GPAs of the Midwestern community college associate degree nursing students?

Descriptive statistics of cumulative GPA show that 13 (5.8%) of the students would have been ineligible for transfer to complete a baccalaureate degree at a 4-year university, whereas 36% met the admission requirement for the private academic partners in the region and 56% met the requirement of the public partner. The mean GPA of the sample was 3.1; the lowest GPA was 1.98, and the highest was 3.92. Over one third (36%) of the sample had a prior degree beyond high school and/or GED, as illustrated in Table 4.1. Prior degree was
explored to determine if there was a relationship to student persistence and first-attempt passage of the NCLEX-RN exam.

The data for the academic variables representing students’ precollege admission assessments, the COMPASS and ACT assessment and the TEAS preprogram assessment scores, as well as the RN Comprehensive Predictor Assessment scores are displayed in Tables 4.2 and 4.3. The COMPASS and ACT standardized assessments measure students’ readiness for college coursework, whereas the TEAS assessment measures a student’s ability to persist early in the program. The RN Comprehensive Predictor Assessment is completed at the end of the program and measures student persistence. A goal of the study was to identify factors predicting students at risk for attrition.

The majority of the sample completed the COMPASS assessment. Of the 225 students completing the college’s required reading assessments, 73.1% met the ACT score requirement and 72.6% met the required COMPASS score. Analyzing the entrance math score, 69.1% of the students met the required ACT score and 82.4% met the required COMPASS score.

Among the 225 students were 70 students admitted to the nursing program without completing the required TEAS exam. These students had been on the program wait list prior to the TEAS requirement and were grandfathered into the program without having to meet this admission requirement. There were 223 students who completed the RN Comprehensive exit assessment; missing scores were observed for two of the participants.

Furthermore, the relationship between the COMPASS entrance requirements and the passage of the NCLEX-RN were examined. The students who met the required scores for college entry of 82 or higher in reading and 50 or higher in math comprised a sample size of
Table 4.2

*Preprogram and Exit Assessment Score Data*

<table>
<thead>
<tr>
<th>Assessments</th>
<th>$N$</th>
<th>$M$</th>
<th>$SD$</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEAS preadmission exam</td>
<td>155</td>
<td>80.42</td>
<td>5.31</td>
<td>69.4-92.9</td>
</tr>
<tr>
<td>COMPASS reading</td>
<td>113</td>
<td>85.11</td>
<td>13.62</td>
<td>41-99</td>
</tr>
<tr>
<td>COMPASS pre-algebra</td>
<td>119</td>
<td>63.20</td>
<td>20.10</td>
<td>17-95</td>
</tr>
<tr>
<td>ACT reading</td>
<td>67</td>
<td>21.10</td>
<td>4.16</td>
<td>13-31</td>
</tr>
<tr>
<td>ACT pre-algebra</td>
<td>68</td>
<td>19.32</td>
<td>3.49</td>
<td>13-27</td>
</tr>
<tr>
<td>RN Comprehensive Predictor</td>
<td>223</td>
<td>75.23</td>
<td>9.45</td>
<td>50-99</td>
</tr>
</tbody>
</table>

*a*Missing data due to waiving requirement for students on wait list.

*b*Missing data on student records.

Table 4.3

*Reading and Math Entrance Exam Scores*

<table>
<thead>
<tr>
<th>Assessment</th>
<th>$N$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT reading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College-ready</td>
<td>49</td>
<td>73.1</td>
</tr>
<tr>
<td>Below</td>
<td>18</td>
<td>26.9</td>
</tr>
<tr>
<td>Total testers</td>
<td>67</td>
<td>100.0</td>
</tr>
<tr>
<td>ACT math</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College-ready</td>
<td>47</td>
<td>69.1</td>
</tr>
<tr>
<td>Below</td>
<td>21</td>
<td>30.9</td>
</tr>
<tr>
<td>Total testers</td>
<td>68</td>
<td>100.0</td>
</tr>
<tr>
<td>COMPASS reading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College-ready</td>
<td>82</td>
<td>72.6</td>
</tr>
<tr>
<td>Below</td>
<td>31</td>
<td>27.4</td>
</tr>
<tr>
<td>Total testers</td>
<td>113</td>
<td>100.0</td>
</tr>
<tr>
<td>COMPASS math</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College-ready</td>
<td>98</td>
<td>82.3</td>
</tr>
<tr>
<td>Below</td>
<td>21</td>
<td>27.4</td>
</tr>
<tr>
<td>Total testers</td>
<td>119</td>
<td>100.0</td>
</tr>
</tbody>
</table>
96. Of the 96 students, 44% did not meet the COMPASS scores requirement and were admitted to the nursing program after enrolling in and receiving a C– or higher in courses that allowed them to waive this requirement. The descriptive statistics showed that students who scored at or above the college requirement scores passed the NCLEX-RN exam on first attempt at 88.5% compared to 70.5% of those whose scores were waived based on credit received for enrollment in courses exempting them from the requirement, as illustrated in Figure 4.1.

Further analysis of nursing course grades revealed that students received the lowest grades in the first nursing semester course, PNN 139, with 8.5% ($n = 17$) failing the course on first attempt, whereas students received the highest grades in the final semester course, ADN 654 (see Table 4.4). Missing data were observed for course grades that were attributed

Figure 4.1. Relationship between COMPASS reading and math scores and NCLEX pass rate.
Table 4.4

Nursing Course Grades

<table>
<thead>
<tr>
<th>Course</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNN 138</td>
<td>203</td>
<td>3.74</td>
<td>0.57</td>
</tr>
<tr>
<td>PNN 139</td>
<td>204</td>
<td>2.62</td>
<td>0.83</td>
</tr>
<tr>
<td>PNN 533</td>
<td>205</td>
<td>2.97</td>
<td>0.75</td>
</tr>
<tr>
<td>ADN105</td>
<td>222</td>
<td>3.27</td>
<td>0.59</td>
</tr>
<tr>
<td>ADN 577</td>
<td>218</td>
<td>2.90</td>
<td>0.74</td>
</tr>
<tr>
<td>ADN 653</td>
<td>221</td>
<td>2.90</td>
<td>0.58</td>
</tr>
<tr>
<td>ADN 654</td>
<td>221</td>
<td>3.05</td>
<td>0.66</td>
</tr>
</tbody>
</table>

*Missing grades.

to students transferring courses from other colleges and entering the second year of the program as a transfer student, having completed the first year of nursing requirements at another college or to entering the second year of the program as a practical nurse. There were 17 students in the sample admitted as transfer students to the ADN level of the program who had completed the PN program at another college.

Research Question 3

Is there a relationship between course grades, nursing entrance and exit assessment scores, prior degrees, and cumulative GPA?

Results of the correlational analysis among study variables showed a significant positive relationship between 12 of the 13 variables and the RN Comprehensive Predictor Assessment, the indicator of program completion (see Table 4.5). The strongest correlation
Table 4.5

Correlation Matrix of Independent Academic Variables

<table>
<thead>
<tr>
<th>Variablea</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prior degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Cumulative GPA</td>
<td>-.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. TEAS score</td>
<td>-.02</td>
<td>.31**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. A &amp; P I grade</td>
<td>.05</td>
<td>.57**</td>
<td>.21*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. A &amp; P II grade</td>
<td>.07</td>
<td>.49**</td>
<td>.23*</td>
<td>.53**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Microbiology grade</td>
<td>.06</td>
<td>.51**</td>
<td>.23*</td>
<td>.37**</td>
<td>.40**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. PNN 139 grade</td>
<td>.07</td>
<td>.45**</td>
<td>.18*</td>
<td>.39**</td>
<td>.25**</td>
<td>.35**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. PNN 533 grade</td>
<td>.01</td>
<td>.43**</td>
<td>.12</td>
<td>.30**</td>
<td>.19*</td>
<td>.45**</td>
<td>.47**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. ADN 105 grade</td>
<td>-.04</td>
<td>.39**</td>
<td>.02</td>
<td>.31**</td>
<td>.24**</td>
<td>.29**</td>
<td>.30**</td>
<td>.42**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. ADN 577 grade</td>
<td>.06</td>
<td>.43**</td>
<td>.08</td>
<td>.37**</td>
<td>.34**</td>
<td>.43**</td>
<td>.37**</td>
<td>.50**</td>
<td>.34**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. ADN 653 grade</td>
<td>.01</td>
<td>.41**</td>
<td>.07</td>
<td>.33**</td>
<td>.27**</td>
<td>.33**</td>
<td>.37**</td>
<td>.43**</td>
<td>.37**</td>
<td>.44**</td>
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<td></td>
</tr>
<tr>
<td>12. ADN 654 grade</td>
<td>.05</td>
<td>.44**</td>
<td>.07</td>
<td>.34**</td>
<td>.30**</td>
<td>.49**</td>
<td>.40**</td>
<td>.40**</td>
<td>.30**</td>
<td>.32**</td>
<td>.41**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. RN Comprehensive Pred. Assess. score</td>
<td>.21**</td>
<td>.34**</td>
<td>.12</td>
<td>.32**</td>
<td>.25**</td>
<td>.33**</td>
<td>.48**</td>
<td>.26**</td>
<td>.22**</td>
<td>.34**</td>
<td>.37**</td>
<td>.35**</td>
<td></td>
</tr>
</tbody>
</table>

aA & P = Anatomy & Physiology

*p < .05. **p < .01.
to the exit assessment was with the first nursing semester course PNN 139 grade \( r = .48, p < .01 \).

The strongest correlation among the variables was between the cumulative GPA and the grade for the first science course (Anatomy & Physiology I; \( r = .57, p < .01 \)). This means that the higher the grade was for the first prerequisite course the higher the GPA was at the end of the program. There were strong correlations between Anatomy & Physiology I and II course grades \( r = .53, p < .01 \) and between Anatomy & Physiology I and Microbiology course grades \( r = .51, p < .01 \).

The TEAS preadmission assessment had significant moderate positive correlations with course grades in Anatomy & Physiology I \( r = .21, p < .05 \), Anatomy & Physiology II \( r = .23, p < .05 \), and Microbiology \( r = .24, p < .05 \). Although there were 155 students in the sample who completed the TEAS assessment, there was a weak positive correlation between the TEAS assessment and the grade for the first nursing course (PNN 139; \( r = .18, p < .05 \)).

There were significant moderate positive correlations among the nursing course grades: between the first semester course, PNN 139, and the second semester course, PNN 533 \( r = .47, p < .01 \), and between PNN 533 and the first nursing courses in the second level, ADN 105 \( r = .42, p < .01 \) and ADN 577 \( r = .49, p < .01 \). This means that the better the grade was in the first nursing semester, the better the first semester course grades were in the ADN level in the program.

At the ADN level, there were significant moderate positive correlations among all of the course grade variables. The correlation between the third semester course, ADN 577, and the fourth semester course, ADN 653, was \( r = .44, p < .01 \).
There was a significant strong positive correlation between cumulative GPA and the Microbiology course grade \( (r = .51, p < .01) \). There were significant moderate positive correlations between the cumulative GPA and the preadmission exam and among all of the nursing course grades. There was a significant weak positive correlation between prior degree and the RN Comprehensive Predictor Assessment \( (r = .21, p < .01) \). This suggests that having a prior degree is associated with program completion.

**Research Question 4**

*To what extent do prior degrees, cumulative GPA, science and nursing course grades, the TEAS and RN Comprehensive Predictor Assessment scores predict student success on the NCLEX-RN licensure exam?*

To test the hypothetical pathway model, an exploratory forward stepwise regression was employed to further examine the relationship between the independent variables, Anatomy & Physiology II, PNN139, ADN105, ADN577 course grades, and the dependent variable, NCLEX-RN pass or fail. The four variables selected represent the pathway model of a course taken prior to program entry and the gateway courses in the first and second years of the nursing program; selection was also based on the chi-square, cross-tabulation, and correlation analyses. There were several phases to examining assumptions for executing the regression analysis. The first phase was to investigate whether the independent variables differed on whether the participants passed or failed the NCLEX-RN by utilizing chi-square statistics. Assumptions were evaluated for each of the independent variables: age, prior degree, TEAS assessment score, science and nursing course grades, RN Comprehensive Predictor assessment score, and cumulative GPA. The results indicate that the student’s cumulative GPA was statistically significant in passing or failing the NCLEX-RN exam, \( \chi^2 = \)
16.39, \( df = 2, N = 221, p < .01 \); students with higher GPAs are more likely than expected under the null hypothesis to pass the NCLEX-RN exam on first attempt. The results also indicate that the student’s RN Comprehensive Assessment score is statistically significant in passing or failing the NCLEX-RN, \( \chi^2 = 20.56, df = 1, N = 223, p < .01 \); students with higher RN Comprehensive Predictor assessment scores are more likely than expected under the null hypothesis to pass the NCLEX-RN exam on first attempt.

Using Fisher’s exact test, the chi-square result for students in the PNN139 course, \( \chi^2 = 25.46, df = 1, N = 204, p < .01 \), and in the ADN577 course, \( \chi^2 = 25.16, df = 1, N = 218, p < .01 \), indicate those with higher course grades are more likely than expected under the null hypothesis to pass the NCLEX-RN exam on first attempt.

The second phase of examining the assumptions for testing the regression analysis was based on the correlation matrix among all variables that were observed in this study. The cumulative GPA provides a global perspective of student evaluation at the end of the program. Although cumulative GPA was statistically significant, as discussed previously, this variable was excluded due to the relational observations found in prior analyses. Multicollinearity can potentiate problems in regression analysis because it can make it difficult to identify the relationship between predictors and the dependent variable (Urdan, 2010). Using highly correlated variables in regression reduces the significance and power of the predictors and restricts the degrees of freedom.

The science course grades for Anatomy & Physiology I and II were strongly correlated, as displayed in Table 4.5. Anatomy & Physiology I, Anatomy & Physiology II and Microbiology course grades all had significant moderate positive correlations \( (r = .53, r = .40, r = .37, \text{respectively}) \), resulting in the decision to remove the Anatomy & Physiology I
and Microbiology course grades from the logistic regression in order to improve the predictive validity of the other variables in explaining NCLEX-RN first-attempt passage.

The nursing course grades identified as gateway courses were selected for the exploratory regression model in order to test the pathway model and based on the statistical significance from the chi-square analyses.

The logistic model was examined for goodness-of-fit using Hosmer and Lemeshow test, “where a good model produces a nonsignificant chi-square” (Tabachnick & Fidell, 2007, p.459), and a value that is not significant with $p > .05$. The Omnibus Tests of Model of Coefficients and chi-square tests the justification of the step and adding a variable if the significance is less than .05. Regarding the sample size, of the data from the 225 students in the sample, there were 148 participants available for the stepwise regression analysis. According to Urdan (2010), one need[s] 30 cases for the first observed variable and 10 cases each for each additional variable” (p. 169). The sample of 148 meets this guideline. Despite the multi-phase examination of the assumption to employ the forward stepwise logistic regression model to test the hypothetical pathway model, the findings of the results were not statistically significant due to the limited number of observations in the dependent variable.

**Research Question 5**

*Are there differences in the academic performance of students based on the level of noncognitive factors, such as responsibilities of employment, childcare, and/or housework compared to those who do not have similar responsibilities?*

As illustrated in Table 4.6, 68% of the students reported working 11 hours or more each week, and 49.2% had childcare and/or housework responsibilities of 11 hours or more per week. I performed an independent $t$ test to compare the PN GPA of students who
worked, provided childcare and/or did housework for more than 10 hours each week with those whose responsibilities in these areas were 10 hours or less per week. The Levene test for equality of variances was not significant; the absolute value of $t$ indicates the groups were statistically not different (see Table 4.7). The lack of significance in this analysis suggests the academic performance of students who had role responsibilities of 11 hours or more hours per week did as well in the first year of the nursing program as those who had responsibilities of 10 hours or less per week.

Table 4.6

*Role Characteristics of Fall 2011 Nursing Students*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$N$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of hours employed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–5</td>
<td>62</td>
<td>25.4</td>
</tr>
<tr>
<td>6–10</td>
<td>16</td>
<td>6.6</td>
</tr>
<tr>
<td>11–20</td>
<td>51</td>
<td>20.9</td>
</tr>
<tr>
<td>21–30</td>
<td>55</td>
<td>22.5</td>
</tr>
<tr>
<td>31 or more</td>
<td>60</td>
<td>24.6</td>
</tr>
<tr>
<td>Total</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>Number of hours providing childcare/housework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–5</td>
<td>65</td>
<td>26.6</td>
</tr>
<tr>
<td>6–10</td>
<td>59</td>
<td>24.2</td>
</tr>
<tr>
<td>11–20</td>
<td>23</td>
<td>9.4</td>
</tr>
<tr>
<td>21–30</td>
<td>26</td>
<td>10.6</td>
</tr>
<tr>
<td>31 or more</td>
<td>71</td>
<td>29.1</td>
</tr>
<tr>
<td>Total</td>
<td>244</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.7  
*Comparison of Means Between Student Role Characteristics and Practical Nursing Level Grade Point Average*  

<table>
<thead>
<tr>
<th></th>
<th>Levene’s test for equality of variances</th>
<th>$t$ test for equality of means</th>
<th>95% CI of the difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$F$</td>
<td>Sig.</td>
<td>$t$</td>
</tr>
<tr>
<td>Hours worked</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>.082</td>
<td>.775</td>
<td>.325</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>.315</td>
<td></td>
<td>123.52</td>
</tr>
<tr>
<td>Hours providing childcare/housework</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>2.324</td>
<td>.129</td>
<td>−.711</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>−.793</td>
<td>40.447</td>
<td>.433</td>
</tr>
</tbody>
</table>

**Group statistics**

<table>
<thead>
<tr>
<th></th>
<th>HoursHiLo = .00</th>
<th>HoursHiLo = 1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$N$</td>
<td>$M$</td>
</tr>
<tr>
<td>Hours worked</td>
<td>70</td>
<td>2.80</td>
</tr>
<tr>
<td>Hours providing childcare/housework</td>
<td>128</td>
<td>2.89</td>
</tr>
</tbody>
</table>
Summary

Descriptive analyses were used to describe the demographic characteristics of the sample of a selected Midwestern community college ADN students admitted to the program between 2007 and 2009. Of the 225 students, the majority of participants were nontraditional, female students; one third of the sample had degrees beyond a high school diploma or GED.

The academic variables of precollege entrance assessments for reading and math were excluded from inferential analysis; 44% of the sample were exempt from this requirement due to the transfer of courses or enrolling in a college-approved course, which waived this requirement. Descriptive statistics of COMPASS assessment scores showed a higher percentage (88.46%) of students with high scores in math and reading passed the NCLEX-RN exam as compared to the students with lower scores (70.45%).

The academic variables were analyzed to determine the relationships among the variables and for potential use in the regression analysis. The correlation analyses explored the variables according to the continuum pathway in the nursing program using Pearson product-moment correlation, cross-tabulation, and chi-square analysis. The nursing preadmission exam was found to have a weak positive relationship with the first semester nursing course grade, and each of the science and nursing course scores and the RN Comprehensive Predictor assessment scores were found to have strong positive relationships. The relationships between variables were examined for multicollinearity, which “can cause problems in multiple regression analysis because it makes it difficult to identify unique relation between predictor variable and the dependent variable” (Urdan, 2010, p. 154). The chi-square and cross-tabulation analyses provided further evaluation and definition in
selecting the four independent variables to be used in the development of the regression model. The independent variables selected for exploration in the stepwise regression analysis were statistically significant according to Phi and Cramer V and include students’ grades from the following courses: Anatomy & Physiology II, PNN139, ADN105, and ADN577. The courses selected represent the pathway model of a course taken prior to program entry and the gateway courses in the first and second year of the nursing program.

A forward logistic stepwise regression analysis was conducted to explore the predictive value of the academic variables for NCLEX-RN first-attempt passage among a sample of 148 students. The model was not significant due to the limited number of observations in the dependent variable, supporting the need for further evaluation of the variables and continued research using a larger sample.

Additionally, descriptive statistics of the noncognitive role variables of employment and providing childcare and housework hours was completed. The independent significance means t test of the PN level GPA determined there were no statistically significant differences between students with responsibilities requiring many hours per week and those with minimal weekly responsibilities. The lack of significance may indicate the need to explore a longitudinal survey of cohort students at various points in the program.
CHAPTER 5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter comprises a discussion of findings related to nursing student success and first-attempt pass on the NCLEX-RN licensure exam. In the explorative study the predictive relationship of academic and demographic variables for students in a very large community college in Iowa was investigated. The discussion summarizes the academic variables found to have strong relationships to NCLEX-RN passage. Subsequently, the results of the separate analysis comparing academic outcomes of the non-cognitive role variable between student groups are discussed and implications for future research of student roles are presented. The delimitations and limitations, implications for practice and recommendations for future research also are described.

Summary

This retrospective, exploratory study examined a cohort of 225 students enrolled in a large Midwestern community college from 2008 through 2011. Demographic, academic, and student role data were collected to investigate the predictive relationship of the variables to first-attempt passing of the NCLEX-RN. The demographic variables included student age, gender, and prior degree. The academic variables included: TEAS preadmission and precollege entrance assessment scores, science and nursing course grades, RN Comprehensive Predictor Assessment scores, and cumulative GPA. The noncognitive student role variables included the number of hours devoted to employment and providing childcare/housework each week. The student’s first-attempt pass of the NCLEX-RN was the dependent variable in the study. In 2011, 84% of the participants passed the licensure exam on first attempt, leaving 16% who did not; the national pass rate on the NCLEX-RN licensure exam in 2011 was 87.03% (Iowa Board of Nursing, 2011b).
The independent variables representing demographic characteristics were examined using descriptive statistics and included frequency counts and percentages. Academic and student role variables were explored using means, standard deviations, and correlational analyses to determine relationships among the variables. The independent variables selected for inferential analysis were examined for relationships using Pearson product-moment correlation, cross-tabulation, and chi-square analysis prior to regression. The four independent variables selected for the exploratory regression model were: Anatomy & Physiology II course grade, and nursing course grades of PNN139, ADN105 and ADN577. The forward stepwise logistic regression analysis was employed to further examine the relationship between the selected independent variables and the dependent variable, NCLEX-RN pass or fail on first attempt.

Further, student role variables were examined for participants enrolled in the fall 2011 semester. An independent means t test was conducted to compare academic differences between student groups according to the number of hours involved in working and providing care to dependents each week.

Delimitations

In order to increase the validity of the study, the participant cohorts selected for the study were limited to those enrolled at the large Midwestern community college during 2009 through 2011, a period of time when there were no major curriculum changes.

Limitations

The limitations of the study include:

1. Student attrition and dropping out prior to program completion prevented the outcomes for some students from being known.
2. The participants’ self-preparation and individual decision to immediately schedule and sit for the NCLEX-RN licensure exam following graduation may have affected the outcome.

3. There were a limited number of students who failed the NCLEX-RN in the sample, resulting in low variability of the dependent variable. This study predicted those who passed, but did not predict those who failed.

4. The comparison of academic outcomes between student groups from survey findings represents one point in time during the participants’ program of study.

Findings and Conclusions

Demographic Characteristics

The results of the descriptive statistics of age and gender of the participants were consistent with demographic characteristics and national trends in nursing programs with a female-dominanted group (90.6%; NCSBN, 2012; National League for Nursing, 2012). The majority of the sample were nontraditional students, which reflects current demographics at community colleges (NCES, 2012b). The number of students with prior degrees beyond high school comprised 43.8% of the participants in the study. An analysis of the relationship between prior degrees and the program exit assessment suggested that having a prior degree is associated with reduced attrition and increased program completion, a finding congruent with prior research (Canillas-Dufau, 2005).

Data from the entire database (N = 644) was examined separately to determine the total number of participants with prior degrees enrolled in the nursing program between 2008 and 2011. The enrollment time frame coincides with the onset and period of time during an economic recession. During times of recession students return to college (NCES, 2012b),
and many select community colleges to acquire skills for gainful employment. The number of students with prior degrees enrolling in nursing programs was not a surprise. It has been predicted that the nursing profession will have a shortage for several years. Despite the recession, nursing as a career is projected to have strong job growth through 2020 (Ashford, 2012; Bureau of Labor Statistics, 2012a; Iowa Board of Nursing, 2012; Iowa Workforce Development, 2011). Within the larger nursing database, 20.3% of the participants had associate’s degrees, 21.7% had bachelor’s degrees, and 1.7% had master’s degrees or higher.

Academic Measures

The precollege placement scores of the participants in reading comprehension and math skills varied; 52% of the sample completed the COMPASS assessment. One fourth of the students were admitted to the program having met the precollege placement assessment requirement by passing approved courses or transferring credits. Therefore, it was difficult to determine if a student was prepared to enter the nursing program. After further exploration, it was determined that the students who attained COMPASS scores meeting the college-entry requirement had an 18% higher pass rate on the NCLEX-RN exam, as compared to students whose scores were waived.

Nursing requires students to be competent in math in order to calculate drug dosages and safely administer medications to patients. Although the precollege entrance assessments were excluded from analysis in the study, in the literature math and reading scores were found to be important predictors of nursing student outcomes (Alden, 2008; Canillas-Dufau, 2005; Gilmore, 2008; Rubino, 1998; Windham, 1995).

The TEAS preadmission assessment score had a significant relationship with student success in the first semester nursing course. Approximately two thirds (67%, n = 150) of the
225 students met the required TEAS admission score and received a passing course grade in the first semester nursing course; 75 (33%) of the students had received a waiver for this requirement. Findings from this study provide evidence that the TEAS preadmission assessment score has a significant and positive relationship with early program success. The relationship of the TEAS assessment score to early nursing program persistence also was demonstrated in prior studies (Cooper, 2012; Rogers, 2009). The Midwestern community college in this study allows a student three attempts to meet the required TEAS score for admission. The number of attempts on the TEAS assessment in relation to student persistence in the program was not evaluated in this study. Therefore, it is unknown if students taking the assessment more than one time are at greater risk of attrition. There is no evidence in the literature to support the practice of allowing multiple attempts. A newer version of the TEAS assessment has been released and was adopted by the program in the summer of 2011. The newer version of the TEAS has not been investigated.

The preprogram science course grades had strong positive correlations to each of the individual nursing course grades as well as to program completion. This finding is consistent with prior research (Alden, 2008; Canillas-Dufau, 2005; Collins, 2002; Lown, 2010; Phillips et al., 2002; Rogers, 2009).

Of the first year nursing courses, the first semester course PNN 139 appeared to be the “gatekeeper” course, as determined by the 8.3% attrition rate and a lower mean GPA ($M = 2.76$) as compared to the mean GPAs of the other nursing courses in the program. Additionally, the PNN 139 grade point had a strong positive relationship to the program’s exit assessment, the RN Comprehensive Predictor Assessment, suggesting that students who do well in the first nursing semester will persist in the program and graduate. Nursing course
GPAs were found in past studies to be predictors of student persistence (Gilmore, 2008; Windham, 1995) and of NCLEX-RN success (Burds, 2010).

There were 223 students who completed the nursing program exit assessment. The RN Comprehensive Predictor Assessment score had a significant positive relationship, $\chi^2 = 20.56$, $p < .01$, to passing and failing the NCLEX-RN exam. Prior research has demonstrated the significance of nursing program exit assessments as predictors of NCLEX-RN success (DeLima et al., 2007; Horton, 2006; Nibert et al., 2006; Sutton, 2004). This finding is not surprising, as nursing program exit assessments measure a student’s comprehensive knowledge of nursing theory and concepts at the end of the program.

The cumulative GPA ($n = 221$) had a positive relationship with passing and failing the NCLEX-RN in this study, $\chi^2 = 16.39$, $p < .01$. The cumulative GPA also determines the qualifications to transfer to another institution to complete a 4-year degree in nursing. In this study 5.8% ($n = 13$) of the participants would not have been eligible to transfer to any of the regional university partners. This Midwestern community college’s regional partnerships for RN-BSN nursing programs include three 4-year universities: one public and two private. The tuition and fees at the Iowa public university are significantly lower than at the private universities (“The States,” 2012). The RN-BSN program at the public university requires students to have at least a 3.0 GPA on admission, and 56.4% of the sample would have met this requirement. Prior studies have determined a student’s cumulative GPA to be a predictor of NCLEX-RN success (Canillas-Dufau, 2005; Horton, 2006; Yin & Burger, 2003).

**Prediction as Exploratory Analysis**

The pathway model was explored to determine if the courses selected were the most critical courses in the program curriculum. The courses selected represented the curriculum
prior to program entry (Anatomy & Physiology II) and the gateway courses in the first and second year of the nursing program (PNN139, ADN105, and ADN577). The result of the analysis was not significant due to the limited number of observations in the dependent variable of students who failed the NCLEX-RN \((n = 35)\). There were significant correlations found in the descriptive statistical analysis using Pearson correlation, cross tabulation and chi-square analyses in examining the relationship of the independent variables to the dependent variable. A multiphase examination of the assumptions for conducting the regression analysis was conducted with caution.

**Student Noncognitive Role Variables**

The number of hours students work and provide childcare/housework each week was not significantly related to student outcomes in the first year of the program, a finding suggestive of the importance of time management skills demonstrated in past studies (Bradley, 2006; Kulm & Kramer, 2006). Descriptive statistics for the students enrolled in the program during the Fall 2011 semester show that 69\% \((n = 244)\) were working and 49\% were involved in caregiving responsibilities more than 11 hours each week. It was difficult to determine if students modified their employment hours or secured additional assistance in caring for dependents after they began the nursing program. Students who are employed and/or have childcare/housework responsibilities while in college may take longer to complete a program of study. National studies of community college students have found fewer than half with responsibilities in addition to academics reach their educational goal in six years (CCSSE, 2012, p. 7).

Based on the study’s results, the conclusion is a preliminary discussion of the most critical courses in the program and the impact of noncognitive variables in determining
student persistence and NCLEX-RN success. The study’s results regarding the relationships found in the analyses could inform faculty. There is a need to add and combine multiple student cohorts to increase the sample size and complexity, and to explore additional variables in determining the impact of student persistence in the program and in determining predictors of NCLEX-RN success using a different conceptual model.

**Recommendations**

The following recommendations for practice, policy, and future research are made based on the findings and conclusions of the study.

**Practice**

1. Provide professional development and support for faculty learning through workshops on measures to improve student retention and promote persistence and success in the nursing program (CCSSE, 2012).

2. Provide academic planning sessions for students who attend orientation and discuss the impact of GPAs as it pertains to transfer and degree completion. There is a need to advise students prior to beginning prerequisite coursework about the importance of academic credentials.

3. Engage and work collaboratively with science faculty to develop an advising plan for nursing students while they are completing prerequisite science courses. The significant relationship of science grades to nursing course grades and to program completion supports the need to identify students at risk for attrition prior to entering the program. Having a higher grade in prerequisite courses also will improve the student’s cumulative GPA and eligibility to transfer.
4. Consider using the TEAS subscore in math as a requirement for admission as an alternative to the COMPASS pre-algebra or ACT math assessments. The TEAS assessment is an admission requirement for all students admitted to the program and will provide consistency for the continued evaluation of math and reading comprehension requirements.

5. Explore national models for progressive nursing degrees in response to the nursing shortage, national climate for educational requirements in nursing, and employer preference in hiring nurses with 4-year degrees (AACN, 2012; FNCA, 2012; Fulcher & Mullen, 2011; Institute of Medicine, 2011; IONL, 2011).

6. Explore RN to MSN degree partnerships, thereby securing a pipeline for future nurse educators for all program levels. Nursing faculty may consider the option of allowing students an opportunity to co-teach a clinical course with an experienced nursing faculty member as an internship instead of a one-on-one preceptorship in the final semester, thereby encouraging students to consider a future in nursing education.

7. Provide students with financial aid advising and information about work–study programs in new formats, and publicize available grants and employer incentives for tuition reimbursement on the program website and on the learning management system for each nursing course.

8. Provide students with academic advising at the conclusion of the first year of the program with focused attention on GPA and degree transfer information.
Policy

The following policy recommendations for the institution and state and national levels are provided.

**Institution.** As the cost of a college education continues to increase, community colleges are challenged with meeting the needs of students with reduced fiscal resources (Levine, 2004). The Midwestern community college state funding allocation has been reduced annually over the past several years (“The States,” 2012). As such, colleges should work with state and federal governments in expanding resources for their institutions and financial aid resources for students. The following recommendations are made:

1. Increase funding from state and federal governments for the institution and for student grants and other forms of financial aid.
2. Advocate for and increase funds for nursing faculty salaries.
3. Enhance community partnerships to increase student scholarships, coordinate social program information (childcare assistance, food stamps, etc.) and availability through the student life department, and provide access to resources in the nursing department.
4. Increase funding for the Institutional Effectiveness Department, and provide programmatic support for continued evaluation of the nursing program database.

**State.** Institutions in higher education are increasingly called upon to improve student outcomes such as retention, graduation rates, and placement in the workforce. Reform in higher education is requiring all institutions to adopt a culture of transparency where monitoring student outcomes is a necessity; many states are linking student outcomes to funding (Middle Class Task Force, 2011). The role of the Institutional Effectiveness
Department and use of decision support systems have become increasingly important for program policy development and evaluation.

Nursing academic and practice leaders are engaged in discussion of the level of education required for entry-level nurses on a national level as well as in the state of Iowa. Community colleges educate the majority of nursing students in the state of Iowa (Iowa Board of Nursing, 2012). A core function of community colleges is to meet the workforce needs of the region they serve. As the state is challenged with the nursing shortage and employer preference for hiring baccalaureate-prepared nurses, the following measures should be considered:

1. Increase funding for Iowa community college systems and research departments for the development of a centralized, state-wide repository for collection of ADN student data, and make the program costs and student outcome information (enrollment, graduation, employment rates, and licensure results) public.

2. Re-establish the state of Iowa chapter of the National Organization for Associate Degree Nursing to promote the value of the community college nursing graduate in a strong and unified voice.

3. Engage and dialogue with regional clinical partners to gain a better understanding of current nursing workforce needs through focus groups.

4. Consider offering the baccalaureate degree in nursing at the community college to ease career transition (Community College Baccalaureate Association, 2012).

**Future Research**

1. Continue to evaluate student outcomes using the established database, adding multiple cohorts to increase the sample and variables, and address other issues
related to student persistence using a different model. Continued evaluation will provide a greater understanding of factors associated with student retention and success on the NCLEX-RN; additionally, examine relevant variables for student sub-populations holding prior degrees.

2. Evaluate the impact of allowing multiple attempts on the TEAS assessment to student outcomes as related to persistence and early program success; and evaluate student outcomes for the newest version of the TEAS (Version V). Identifying factors related to students at-risk for attrition requires ongoing evaluation of students by faculty.

3. Evaluate the effectiveness of the nurse tutoring and remediation programs. Using sound research practices, the faculty can evaluate student outcomes related to student support programs and provide evidence for continuing these programs.

4. Measure student success in the milestone, critical courses using a course completion ratio proposed by Hagedorn et al. (2006).

5. The impact of student roles in relation to program persistence and student success warrants further evaluation. Longitudinal evaluation of student roles at various points during the nursing program may provide more accurate information in predicting the impact of employment and childcare/housework responsibilities on nursing student persistence in the program and on successful first-attempt passing of the NCLEX-RN. Additionally, relevant variables for student subpopulations who are employed in a health care setting should be examined.

The “Great Recession” of 2008 created an increased focus on community colleges, which are challenged to achieve the goals of the American Graduation Initiative (AACC,
To increase degrees and certificates awarded. In the report *Gateways to Gainful Employment and College Degrees* by Carmevelle, Rose, and Hanson (2012), career and technical education programs have gained new prominence for providing a pathway to employment in highly skilled professions such as nursing. Given the quality and affordable education and training provided, students in turn have come to the community college to “re-career,” and many have selected nursing. As such, the community college is positioned to assist students reach their educational and professional goals.

Community college students are increasingly working and thus enrolling part time (CCSSE, 2012; Lederman, 2012; NCES, 2012b). Understanding their unique needs has become even more important. Past studies on community college nursing programs have largely focused on academic predictors of student success regarding program persistence and NCLEX-RN success. Although there have been numerous studies on the community college student’s readiness to transfer, there were no studies found in the literature identifying the need for community colleges to advise and prepare nursing students to further their education in nursing. National discussion on nursing education is occurring, implicating the need for community colleges to prepare their students. Initiatives to aid students to persist in a rigorous program of study are taking on greater importance, particularly as they relate to ensuring an adequate workforce at a time of a national nursing shortage. Findings from this study, as well as future studies, can help them to do so.

Nurse educators play an important role in developing nurses for the workforce. In the community college they are challenged to prepare students whose cognitive abilities vary and whose time devoted to academics may be limited by employment or caring for family members at home. Nurse educators and administrators must strive to improve retention and
attainment of students with diverse learning needs seeking degrees in nursing. Colleges can meet this challenge by asking, “What makes a practice effective?” (CCSSE, 2012, p. 2). The answers for student pathways to degree attainment must be found by looking at historical works, identifying what works best for students and making decisions that are data-informed.

As proclaimed by President John F. Kennedy (1961) during National Education Week:

Let us think of education as the means of developing our greatest abilities, because in each of us there is a private hope and dream which, fulfilled, can be translated into benefit for everyone and greater strength of the nation.
REFERENCES


APPENDIX A. COMPASS COURSE RECOMMENDATIONS AND REQUIREMENTS

**WRITING PLACEMENT**

<table>
<thead>
<tr>
<th>COMPASS SCORE</th>
<th>Writing Placement</th>
<th>ACT SCORE</th>
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<tr>
<td>01-31</td>
<td>Basic Writing (ENG 013)</td>
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<td>32-69</td>
<td>Elements of Writing (ENG 101) Prerequisite for Comp I</td>
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<td>70-98</td>
<td>Composition I or College Writing (ENG 105, ENG 120)</td>
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<td>99-100</td>
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**READING PLACEMENT**

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<td>71-81</td>
<td>Effective Reading Strategies (RDG 130)</td>
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<td>82-100</td>
<td>No Reading course recommendation-Credit Courses</td>
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**MATHEMATICS PLACEMENT**

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<tr>
<td>Pre-Algebra 01-23</td>
<td>Basic Math (MAT-700)</td>
<td>01-17</td>
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<tr>
<td>24-50</td>
<td>Pre-Algebra (MAT-052) or Prep for College Math (MAT-076)</td>
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<td>51-100</td>
<td>Prep for College Math (MAT-076), Elementary Algebra (MAT-062) or Survey of Math (MAT-107)</td>
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<td>43-75</td>
<td>Prep for College Math (MAT-076), Intermediate Algebra (MAT-102) or Survey of Math (MAT-107)</td>
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<td>76-99</td>
<td>Math &amp; Society (MAT-115), Math for Elem. Teachers (MAT-117), College Algebra (MAT-120), College Algebra w/ Limits (MAT-138), Finite Math (MAT-140), Discrete Math (MAT-150), Statistical Ideas (MAT-155) or Statistics (MAT-157)</td>
<td>22-24</td>
</tr>
<tr>
<td>51-99</td>
<td>Trig &amp; Analytic Geometry (MAT-136), Business Statistics (MAT-162) or Business Calculus (MAT-165)</td>
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<td>51-99</td>
<td>Calculus I</td>
<td>30-36</td>
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## APPENDIX B. MIDWESTERN COMMUNITY COLLEGE
### NURSING PROGRAM PLAN OF STUDY

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<tr>
<th>Term</th>
<th>New Course #</th>
<th>Course Name</th>
<th>Lecture Hours</th>
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</tr>
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<td>Prereq</td>
<td>BIO-168</td>
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<td>Prereq</td>
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<td>Prereq</td>
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<td></td>
<td></td>
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<td>32</td>
<td>192</td>
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**PROGRAM TOTALS**

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<td>720</td>
<td>76.0</td>
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APPENDIX C. NURSING COURSE DESCRIPTIONS

PNN-138  2cr  Introduction to Nursing
Provides the basic concepts related to nursing, such as adaptation, basic nutrition, communication, nursing roles, teaching/learning and health. Students learn the nursing process and issues related to nursing practice on an introductory level. Credits: 2, Hours: (2/0/0/0), Prereq: BCA-189, BIO-168, BIO-173, HSC-107, HSC-135, HSC-210, HSC-211; Coreq: PNN-104, PNN-139, PNN-722; Arts & Sciences Elective Code: B; Comments: Lecture (32.00).

PNN-139  5cr  Practical Nursing I
Introduces the role of provider of care for the adult client with an emphasis on chronic illnesses, including gerontological issues. The areas of pathophysiology, nutrition and pharmacology are integrated relative to the client problems. Basic nursing skills are practiced in a supervised lab setting. Credits: 5, Hours: (4.5/1/0/0), Prereq: BCA-189, BIO-168, BIO-173, HSC-107, HSC-135, HSC-210, HSC-211; Coreq: PNN-104, PNN-138, PNN-722; Arts & Sciences Elective Code: B; Comments: Lecture (72.00), Lab (16.00).

PNN-533  6cr  Practical Nursing II
Presents concepts related to maternal/child health including pediatrics and obstetrics. Medical/surgical and mental health illnesses throughout the lifespan are studied. Principles of growth and development are applied. The areas of pathophysiology, pharmacology and nutrition are integrated relative to the client problems. Basic nursing skills are practiced in a supervised laboratory setting. Credits: 6, Hours: (4.5/3/0/0), Prereq: PNN-104, PNN-138, PNN-139, PNN-722; Coreq: PNN-732; Arts & Sciences Elective Code: B; Comments: Lecture (72.00), Lab (48.00).

ADN-105  1cr  Introduction to AD Nursing
Examines the role of the associate degree registered nurse. Concepts of nursing process, wellness, community and management are introduced. Credits: 1, Hours: (1/0/0/0), Prereq: PNN-533, PNN-732, PSY-111, PSY-121, SPC-101; Coreq: ADN-577, ADN-723; Arts & Sciences Elective Code: B; Comments: Lecture (16.00).

ADN-577  3.5cr  ADN I
Emphasizes the utilization of the nursing process to promote adaptation in clients with physiological problems. Concepts studied include acid/base balance, fluid and electrolytes, shock, and biological defenses. Selected disease states present in the adult population assist in the application of these concepts. The areas of pathophysiology, nutrition and pharmacology are integrated relative to the client problems. Advanced skills are practiced in a supervised lab setting. Credits: 3.5, Hours: (3/1/0/0), Prereq: PNN-533, PNN-732, PSY-111, PSY-121, SPC-101; Coreq: ADN-105, ADN-723; Arts & Sciences Elective Code: B; Comments: Lecture (48.00), Lab (16.00).
ADN-653  3cr    ADN II
Emphasizes the utilization of the nursing process to promote adaptation in adults, families and communities. Selected cardiovascular and neurological disease states are studied. Advanced psychosocial concepts and illnesses are studied in the context of the family and the community. The areas of pathophysiology, nutrition and pharmacology are integrated relative to the client problems. Credits: 3, Hours: (3/0/0/0), Prereq: ADN-105, ADN-577, ADN-723; Coreq: ADN-724; Arts & Sciences Elective Code: B; Comments: Lecture (48.00).

ADN-654  4cr    ADN III
Emphasizes the utilization of the nursing process to promote adaptation in adult, pediatric and obstetrical clients with acute multi-system problems. Registered nurse roles related to community and management are studied. The areas of pathophysiology, nutrition and pharmacology are integrated relative to the client problems. Credits: 4, Hours: (3/2/0/0), Prereq: ADN-653, ADN-724; Coreq: ADN-725; Arts & Sciences Elective Code: B; Comments: Lecture (48.00), Lab (32.00).
APPENDIX D. INSTITUTIONAL REVIEW BOARD APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
315-294-3276
FAX 315-294-4287

Date: 6/17/2011
To: Sandra E Cooper  CC: Dr. Larry Ebbers
800 Hodge St  N256 Lagomarcino Hall
North Liberty, IA 52317

From: Office for Responsible Research

Title: Development of a Data Analysis Framework for Analysis of Nursing Student Success: Kirkwood Community College

IRB Num: 11-226

Submission Type: New  Exemption Date: 6/16/2011

The project referenced above has undergone review by the Institutional Review Board (IRB) and has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b). The IRB determination of exemption means that:

• You do not need to submit an application for annual continuing review.

• You must carry out the research as proposed in the IRB application, including obtaining and documenting informed consent if you have stated in your application that you will do so or if required by the IRB.

• Any modification of this research should be submitted to the IRB on a Continuing Review and/or Modification form, prior to making any changes, to determine if the project still meets the federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.

Please be sure to use only the approved study materials in your research, including the recruitment materials and informed consent documents that have the IRB approval stamp.

Please note that you must submit all research involving human participants for review by the IRB. Only the IRB may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.
Date: 5/25/2012

To: Sandra E Cooper
800 Hodge St
North Liberty, IA 52317

CC: Dr. Larry Ebbers
N266 Lagomarcino Hall
Soko Starobin
N221A Lagomarcino

From: Office for Responsible Research

Title: Development of a Data Analysis Framework for Analysis of Nursing Student Success: Kirkwood Community College

IRB ID: 11-226

Study Review Date: 5/24/2012

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (1) Research conducted in established or commonly accepted education settings involving normal education practices, such as:
  - Research on regular and special education instructional strategies; or
  - Research on the effectiveness of, or the comparison among, instructional techniques, curricula, or classroom management methods.

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:
- You do not need to submit an application for annual continuing review.
- You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. Only the IRB or designees may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

Please be aware that approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires
permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.
APPENDIX E. FALL 2011 STUDENT SURVEY

1. In the past 7 days, how many hours did you work at a job?
   a. 0 to 5 hours
   b. 6-10 hours
   c. 11-20 hours
   d. 21-30 hours
   e. More than 31 hours

2. Please indicate the highest level of education achieved:
   a. High School diploma or GED
   b. Associate’s degree
   c. Baccalaureate degree
   d. Master’s degree or higher

3. In the past 7 days, how many hours did you provide care to your children or do housework?
   a. 0 to 5 hours
   b. 6-10 hours
   c. 11-20 hours
   d. 21-30 hours
   e. More than 31 hours

4. Rate how well are you able to do the following in English (1 – not able; 2 – not very well; 3 – I can do it; 4 – I can do it well; and 5 – I am proficient in English)
   a. Read 1 2 3 4 5
   b. Write 1 2 3 4 5
   c. Understand a college lecture 1 2 3 4 5
   d. Read a college textbook 1 2 3 4 5
   e. Write an essay 1 2 3 4 5
   f. Participate in class discussions 1 2 3 4 5
   g. Communicate with instructors 1 2 3 4 5

5. In the past 7 days, how often have you used technology such as laptops, smart phones or tablet PC’s?
   a. 0 to 5 hours
   b. 6-10 hours
   c. 11-15 hours
   d. 16-20 hours
   e. More than 21 hours
6. Rate how comfortable you consider yourself to be with the following technology (1 – not able; 2 – not very well; 3 – I can do it; 4 – I can do it well; and 5 – I am proficient with this technology)

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<th>2</th>
<th>3</th>
<th>4</th>
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<td>a. Angel</td>
<td></td>
<td></td>
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<tr>
<td>b. Educational products (e.g., ATI)</td>
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<tr>
<td>c. Productivity software (e.g., MS office)</td>
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<td>d. Social Networking</td>
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<td>e. Entertainment/ Gaming</td>
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