

READING COMPREHENSION AND NURSING EDUCATION:

A MISSING VARIABLE ASSOCIATED WITH

NURSING STUDENT ATTRITION?

by

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## **ABSTRACT**

### **READING COMPREHENSION AND NURSING EDUCATION: A MISSING VARIABLE ASSOCIATED WITH STUDENT ATTRITION?**

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The goals of nursing faculty and administrators are to select students most capable of completing the nursing program and to provide academic support needed for program completion. However, despite stronger entrance requirements, educators are still baffled by the persistent attrition from nursing education programs. The purpose of this study was to describe and compare the level of reading comprehension of two groups of students, a pre-nursing student group and a senior nursing student group, to begin to understand the level of reading comprehension found in the nursing student population. This could contribute to future research to determine whether reading ability might be an unexplored variable contributing to the persistent attrition of nursing students from baccalaureate programs at a time when resources in these programs are limited, and the demand for a competent and diverse workforce continues to increase. This study used a descriptive, quantitative, non-experimental design.

Reading comprehension was measured using the Nelson-Denny Reading Test (NDRT).

The findings of this study showed that both the pre-nursing and senior nursing students' levels of reading comprehension are low. The mean grade equivalent score for the pre-nursing student sample was 10.09, and 14.75 for the senior nursing student sample. Pre-

nursing and senior nursing students scored below the standardization norms for comparable college students, and senior nursing students also scored below the standardization values for other health profession students at a comparable level of education. Senior nursing students scored at a higher level than pre-nursing students, however, it is not known if this reflects growth in reading ability with exposure to higher levels of post-secondary education or student attrition.

Student perceptions of their college reading expectations or experiences were assessed using a five-point Likert scale. Pre-nursing students were extremely optimistic in their abilities to successfully complete their reading assignments, while the seniors were much more realistic and described challenges completing assigned readings.

Selected demographics variables were compared with reading scores using simultaneous multiple regression. Three demographic predictors collectively accounted for 51.9% of the variance: (1) group (pre-nursing or senior student), (2) self-reported hours spent working per week, and (3) number of hours spent reading per week. The number of self-reported hours spent working per week was not a significant predictor of the student's total reading score. Limitations of the study included the use of a nonrandomized sample which limits the ability to generalize the findings beyond the sample population, homogeneity of the sample, the use of self-reported measures, and time limitations, which included the age of the normative sample and test administration time limits. This study supports the need for further research in the areas of reading comprehension and student academic outcomes. This will contribute to the emerging body of research describing academic literacy, discipline-specific literacy, and the literacy needs of English language learners.

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## CHAPTER I

### Introduction

Understanding and addressing reading comprehension in nursing education may be the one of the keys to understanding and reducing attrition from nursing colleges and universities, and to increasing diversity in nursing education and the nursing workforce. Little is known about reading comprehension as a predictor of success for students in college and university pre-nursing and nursing programs. The ability to understand written material and to be able to "read to learn" (Carnegie Corporation of New York, 2010a, p. x) or "learning to read to learn" built on the work of Jeanne Chall (Snow & Biancarosa, 2003, p. 5) represents one dimension of the complex concept of reading comprehension and academic literacy.

It has been recognized that there is a critical link between literacy performance and postsecondary education and career success (Berman, 2009; Carnegie Corporation of New York, 2010a, 2010b). A growing body of literature describing the importance of adolescent literacy has identified a "challenging disconnect in our educational system" (Carnegie Corporation of New York, 2010a, p. vii). The landmark report, *Time to Act: An Agenda for Advancing Adolescent Literacy for College and Career Success*, described that the pace of literacy improvement has not kept up with the pace of the accelerating demands of the global, knowledge-based economy, leading to a failure of United States (U.S.) high schools to produce highly literate graduates ready for the demands of higher education, careers, and citizenship (Carnegie Corporation of New York, 2010a ; 2010b). Considerable research has been conducted to identify variables that contribute to academic success in nursing education (Campbell & Dickson, 1996;

Jeffreys, 2004). No studies could be found that capture the knowledge of reading ability as it relates to nursing education, yet literacy is associated with access to and success in postsecondary education (Berman & Biancarosa, 2005; Biancarosa & Snow, 2006; Carnegie Corporation, 2010a, 2010b; Flippo, 2011; Flippo & Caverly, 2009; Pawan & Honeyford, 2009; Rand Research Study Group [RRSG], 2002).

National reading scores have essentially remained flat since 1992 (National Center for Education Statistics [NCES], 2011, p. 9) with a persistent ethnic/racial gap (NCES, p. 11). The average reading score for the nation's twelfth-grade students, in 2009, was four points lower than in 1992, with only 5% of these students reading at an advanced level (NCES, 2009). Similar findings were also seen in the grade 4 and grade 8 student population tested in 2011 (NCES, 2011).

ACT testing data (ACT, 2011a, 2012), which measures student performance in terms of college readiness benchmarks, showed a trended increase in the percentage of high school students tested who did not meet all four college readiness benchmarks. Seventy-five percent of students did not meet all four benchmarks in 2011 and 2012. The ACT measures student performance in four areas: English, Math, Reading and Science, as well as creating a composite score (ACT, 2012).

Multiple research and policy papers have emerged suggesting that poor adolescent reading skills in secondary education may be associated with flat reading performance in high school and poor academic outcomes in postsecondary education as graduating students are not prepared for college level reading (ACHIEVE, Inc., 2005, 2009, 2010, 2011; ACT, 2005, 2009, 2011a, 2011b, 2011c, 2011d, 2012 ; Alliance for Excellent Education, 2011; Berman & Biancarosa, 2005; Biancarosa, 2012; Biancarosa &

Snow, 2006; Carnegie Corporation of New York, 2010a, 2010b; Fulks, 2010; Graham & Perin 2007a, 2007b; Grosso de León, 2005; Harvard University, 2008; Heller & Greenleaf, 2007; Hosch & Kiehne, 2011; Jacobs, 2008; Lee & Spratley, 2010; Lesaux & Kieffer, 2010; Levin, Caitlin & Elson, 2010; Moje et al., 2008; Moje & Tysvaer, 2010; Morsy, Kieffer & Snow, 2010; National Center for Education Statistics [NCES], 2009, 2011; National Governors' Association, 2005; Short & Fitzsimmons, 2007; Snow & Biancarosa, 2003; Snow, Foorman et al., 2004; Snow, Martin, & Berman, 2008; Southern Regional Education Board, 2009; Zucker & Carel, 2012). These studies report that students with poor academic literacy at a huge disadvantage for college and career success.

This study lays the foundation to explore the concept of reading comprehension and nursing education. Reading comprehension is a measurement of academic literacy. For the purpose of this study, reading comprehension was measured by the Nelson Denny Reading Test [NDRT] (Brown, Fishco, & Hanna, 1993a, 1993b, 1993c. The NDRT produces four measurements of reading ability: (1) a vocabulary score; (2) a reading comprehension score; (3) a total score which is obtained by adding the vocabulary score and a double weighted reading comprehension score; and (4) a self reported reading rate obtained during the first minute the students spend reading during the reading comprehension test section. While it is known that reading comprehension and reading ability is only one piece of the larger concept of academic literacy and discipline-specific literacy, nurse educators must first understand the reading abilities found in the nursing student population, before being able to understand and address the broader concept of academic literacy in nursing education. Academic literacy is "defined as the kind of

reading proficiency required to construct the meaning of content-area texts and literature encountered in school. It also encompasses the kind of reading proficiencies...such as the ability to make inferences from text, to learn new vocabulary from context, to link ideas across texts, and to identify and summarize the most important ideas or content within a text" (Torgesen, Houston, Rissman et al., 2007, p.3). It "includes not only the ability to read text for initial understanding but also the ability to think about its meaning in order to answer questions that may require the student to make inferences or draw conclusions" (Torgesen et al., 2007, p.3). The results of this study contribute to the development of standardization norms for reading comprehension specifically for nursing education, and indicate a need for future research to guide the development of remediation and retention programs, admission policy decisions, assessments tools, and evidence-based interventions which will add to emerging reading comprehension and academic literacy research.

A lack of conceptual clarity and frameworks for reading comprehension specific to nursing education may be why this concept has been overlooked as a possible variable associated with nursing student attrition. Previously, it was assumed that students came to college prepared for the academic rigor of their program, and that students who had "learned to read" and were meeting grade level benchmarks by grades 3 or 4, would continue to demonstrate growth in their literacy skills. The emerging body of adolescent literacy research has demonstrated that this is not true, leaving many students struggling in college with formal reading education that ended in grade 3 or 4. Reading experts agree that little is known about what it means to be literate in college today, suggesting the need for further research in this area (Berman & Biancarosa, 2005; Biancarosa, 2012;

Carnegie Corporation of New York, 2010a, 2010b; Flippo, 2011, Flippo & Caverly, 2009; Pawan & Honeyford, 2009; RRSF, 2002). It is also known that while students may have previously demonstrated the ability to memorize and recall information, a higher level of literacy is necessary for success in nursing education. Nursing students need to not only have a deep understanding of the subject matter, but must be able to analyze and synthesize this information. They must also be able to think critically, and quickly apply this knowledge, especially in a clinical area (Abdur-Rahman & Gaines, 1999; Pawan & Honeyford, 2009). While concern has been expressed by faculty regarding a lack of analytical reading skills in college students (White, 2004), there is no published research that describes the level of reading comprehension necessary for inferential reading for nursing education. The greatest growth in reading skills appears to occur during the first year of college (Falk-Ross, 2001), suggesting the need to identify both the level of reading comprehension necessary for success in nursing education, and to assess the student's level of reading comprehension as early as possible on admission to college so that students may be quickly referred for remediation and successfully complete college coursework (Carnegie Corporation, 2010a).

Literacy and reading comprehension test scores have essentially remained flat since 1992 (ACT, 2005, 2006, 2009, 2011a; NCES, 2009, 2011), at a time when educational standards are increasing, health care is becoming more complex, and the demand for a diverse, well-educated registered nurse (RN) workforce is imperative (AACN, 2007c, 2009, 2012c; IOM, 2011; NLN, 2012). Multiple variables, including changing workforce needs, diverse college enrollments, expanding literacy requirements, increased complexity of the healthcare environment, and an increased emphasis on

accountability have converged to form a “perfect storm” for nursing education (Hinshaw, 2008). Nursing's "perfect storm" has converged with "America's Perfect Storm" (Kirsch, Braun, Yamamoto & Sum, 2007) created by the combined impact of multiple variables of divergent skill distribution among U.S. population groups, a changing economy, and changing demographic trends, including a growing, more diverse population contributing to greater inequities in wages and wealth, and social and political polarization threatening the nation's economic and social fabric. These factors drive the need for further research into the emerging fields of reading comprehension and adolescent, academic and discipline specific literacy (Carnegie Corporation, 2010a; Flippo & Caverly, 2009; IOM, 2011).

This study described the level of reading comprehension found in the pre-nursing student population and the senior nursing student population, as a possible variable contributing to persistent attrition in nursing education. While no current literature could be found which described this concept, some early work (Bryan, 1971; Campbell & Dickson, 1996; Fearing, 1995) suggested that poor reading comprehension might contribute to academic difficulties in nursing programs. Research in this area is needed to explore reading comprehension and nursing student attrition. This research also adds to the development of normative standards for the pre-nursing and senior nursing student populations, and contributes to the development of evidence-based interventions which support successful, timely completion of college nursing programs, increases the diversity of the nursing profession, and leads to the development of a competent professional registered nurse (RN) workforce.

## **Statement of the Problem**

The demand for literacy is high and will continue to increase, however, college reading levels have been described as being “at its lowest place in more than a decade” (ACT, 2006, 2011a, 2011b; NCES 2009, 2011). Multiple variables have been studied that predict success in nursing programs, but despite twenty-plus years of research (Campbell & Dickson, 1996; Jeffreys, 2004), it appears as though there are variables that have not yet been identified. The purpose of this study was to describe the level of reading comprehension found in senior nursing students and in pre-nursing students enrolled in college and university nursing programs. As the mandates for accountability in education and return on investment increase, coupled with a persistent overwhelming shortage of RNs, limited diversity in the nursing workforce, and healthcare disparities associated with poor patient outcomes, it is important to look for new solutions to support students through the academic rigor of nursing programs.

Experts have identified that “the need for research in reading comprehension is critical and the possibilities for research topics in this area are nearly endless” (RRSG, 2002, p. xvi). Berman and Biancarosa (2005, p.4) describe that “literacy is a gateway to achievement and opportunity” and has been associated with access to college, and to higher levels of the college experiences. Poor literacy has been identified as having a “gate-keeper” role (Pawan & Honeyford, 2009). Educational investigators have indicated that research related to college academic literacy and reading comprehension is limited, and that evidence-based knowledge is needed (Carnegie Corporation, 2010a; Flippo, 2011; Flippo & Caverly, 2009). Concerns suggesting the need to study the impact of reading comprehension on academic success include a demand for higher literacy skills

required for advanced vocational or academic training, and a stagnant level of reading skills, demonstrated by longitudinal studies (Carnegie Corporation of New York, 2010; Grigg, Donahue, & Dion, 2007; NCES, 2009, 2011). Reading performance declines were described for all but the top reading performers (90<sup>th</sup> percentile), and a persistent achievement gap has been described between White students and Black students, and between White students and Hispanic students (NCES, 2009,2011). A persistent performance gap between different demographic groups is associated with different academic achievement levels, persistent high-school and college dropout rates, decreased college admission and graduation rates, and a poorer quality of life. These studies also indicated that the crisis in adolescent literacy contributes to poor postsecondary academic performance, with many students demonstrating reading difficulties at the postsecondary level when they begin discipline-specific coursework (Carnegie Corporation of New York, 2010a). As colleges struggle to balance equity in higher education and to meet the diverse goals of access, accountability and educational excellence, debate continues about the value of remedial education, perceived breaks in the educational pipeline, and supports the need for research to guide policy and practice (Carnegie Corporation, 2010a).

It is known that college student attrition persists and “almost one-half of the three million people who start their first year of college will drop out before they earn their degrees” (Bowler, 2009, p. 1). “Thirty percent of college and university students drop out after their first year”, and “college completion rates in the U.S. have been stalled for the past three decades” (Bowler, 2009, p. 1). About one-half of all college students attend two or more institutions and, on average, “nonselective colleges” graduate

approximately only 35% of their students, compared to the most competitive colleges that graduate approximately 88% of their students (Bowler, 2009, p. 1).

Hosche and Kiehne (2011) analyzed Connecticut's (CT) post-secondary enrollment and completion patterns, looking at the public high school Class of 2004, six years after graduation. They found that only two out of five (41%) completed a degree or certificate. At least another 33% enrolled in a college, but did not complete a credential. Approximately one-quarter (26%), did not enroll in a college institution during those six years (Hosche & Kiehne, 2011). Less than one-half of CT's 25-34 year old population have completed an associate degree or higher, ranking the state number seven out of the fifty states in this age group, yet the state is ranked thirty-four out of fifty on the rate of which educational attainment is increasing (Hosche & Kiehne, 2011).

Nationally, the lack of college preparedness has been estimated to cost the U.S. \$3.7 billion (Zucker & Carel, 2012). More than 10,000 CT students dropped out of high school in 2010, costing an estimated \$2.6 billion in lifetime earnings. Seventy-two percent of those students who did enter college needed remedial education. Taxpayers, nationally, provided over \$1.5 billion annually to finance remedial education instructional costs, provided as subsidies from state and local governments (Zucker & Carel, 2012). The cost associated with CT students who failed to return to college after their first year was estimated to be over \$9.3 million in federal grants they received, and as much as \$68 million in other state expenditures. CT high school students who attended remedial English and math classes cost over \$84 million during the 2007-2008 academic year (Zucker & Carel, 2012). Attrition and inadequate preparation leaves many students

windowed out of access to professional programs. To support all students through the academic process, early identification and remediation of barriers to success is essential.

### **Relevance to the Field/Significance of the Study**

The United States (U.S.) health care and education systems are facing a time of great opportunity and challenges. With the passage of the *American Patient Protection and Affordable Care Act (ACA)* in March, 2010, and the U.S. Supreme Court decision in 2012, affirmatively ruling on its constitutionality, it is anticipated that at least an additional 32 million people will seek access to healthcare through the provisions of basic health care insurance to all U.S. citizens and residents, and through enhanced consumer protection regulations (IOM, 2012). Nurses, as the largest section of the health care professions, are key players in the new reformed health care system. Nurses are filling many of the new and expanded roles associated with new health care delivery models which focus on access, quality, safety, patient-centered care, cost, evidence-based practice, care integration, and sustainability.

Despite the fact that nurses are well positioned to meet the needs of the U.S. population, nursing faces some challenges, including constraints in education, practice, policy, and diversity (IOM, 2011). The release of the Institute of Medicine report (2011) titled *The Future of Nursing: Leading Change, Advancing Health*, challenged all stakeholders to assess practice and education challenges and interventions that would support the development of a more highly qualified RN workforce. Four key messages emerged from this report, including the recommendations that nurses should be able to practice to the full extent of their education, and should be full partners with physicians and other health care professionals in redesigning the U.S. health care system. Higher

levels of education for practice and seamless academic progression, recommendations that 80 % of the U.S. RN workforce be prepared at the baccalaureate level by 2020, as well as workforce data collection for workforce planning and policy were identified as imperative to support the future of professional nursing (IOM, 2011).

Nurses practice in all healthcare settings across the country. Yet, the disparity between the supply and demand of RNs persists, leading to a potentially overwhelming shortage of nurses and a national healthcare crisis, which must be addressed through the education of a large number of registered nurses ready to enter professional practice (Buerhaus, 2008; Buerhaus, Auerbach, & Staiger, 2009; Buerhaus, Donelan et al., 2007; Health Resources and Services Administration [HRSA], 2002, 2004, 2010; IOM 2004a, 2004b, 2011; Juraschek, Zhang, Ranganathan, & Lin, 2012). While there had been some weakening of the nursing shortage due to economic conditions, large shortages are still expected in the future, unless the capacity of nursing colleges and universities can be increased (AACN, 2012a, 2012b; Buerhaus, 2008; Buerhaus, Staiger, & Auerbach, 2003, 2004; Juraschek et al., 2012).

The U.S. Registered Nurse Workforce Report Card and Shortage Forecast (Juraschek, et al., 2012) used projected changes in population size and age to forecast the nursing shortage by states, and assigned letter grades based on projected shortage ratios. By 2030, a projected national shortage of 918, 232 (725,619 to 1,112,112) RNs is anticipated (p.241). Additionally, it is predicted that the numbers of states who received a "D" or "F" healthcare designation based on the predicted shortage will increase from 5 in 2009 to 30 by 2030 (p.241). Projections by the Bureau of Labor Statistics (AACN, 2012b) indicated that the number of employed nurses will grow from 2.74 million in

2010 to 3.45 million in 2020, a 26% increase. Additionally, 495,500 replacements will be needed, bringing the total number of job openings to 1.2 million by 2020. Despite the identified need to increase the nursing workforce, the American Associate of Colleges of Nursing (AACN, 2012b) reported that in 2011, U.S. nursing schools again turned away 75,587 qualified applicants from baccalaureate and graduate nursing programs, citing the nursing faculty shortage as the primary reason. Total enrollment has increased slowly in baccalaureate nursing programs. For the 2011 academic year, 259,100 students were enrolled, an increase from 238,799 in 2010 (AACN, 2012b). Primary health care, which is essential to reforming the U.S. health care system under the ACA, is also threatened by a shortage of approximately 124,000-159,000 physicians by 2025 (Robert Wood Johnson Foundation [RWJF], 2012). Federal funding was approved in 2013 to produce an additional 600 Nurse Practitioners (NPs) to help meet this gap. It is anticipated that the primary care workforce must increase by 10-25% to meet projected demands for the infrastructure to prevent disease and manage chronic health conditions (Healthreform.gov, 2013). Attrition, delayed persistence and graduation, and limited diversity in nursing represent three key challenges faced by stakeholders.

While educators have sought to identify predictors of success in nursing education, it appears that a variable may have been missing from this body of literature. An emerging body of research, commissioned by the Carnegie Corporation of New York in 2004, and multiple stakeholder reports have identified a clear need to improve academic and adolescent literacy (ACHIEVE, Inc., 2005, 2009, 2010, 2011; ACT, 2005, 2009, 2011a, 2011b, 2011c, 2011d ; Alliance for Excellent Education, 2011; Berman & Biancarosa, 2005; Biancarosa, 2012; Biancarosa & Snow, 2006; Carnegie Corporation of

New York, 2010a, 2010b; Goldman, 2012; Graham & Perin, 2007a, 2007b; Greenleaf, Litman, Hanson, Rosen, Boscardin, Herman et al., 2011; Harvard University, 2008; Haynes, 2009, 2010; Heller & Greenleaf, 2007; Hosch & Kiehne, 2011; IOM, 2004b; Jacobs, 2008; Lee & Spratley, 2010; Levin, Caitlin & Elson, 2010; McNeil, 2011; Moje et al., 2008; Moje & Tysvaer, 2010; Morsy, Kieffer & Snow, 2010; National Center for Education Statistics [NCES], 2009, 2011; National Governors' Association, 2005; Short & Fitzsimmons, 2007; Snow & Biancarosa, 2003; Snow, Foorman, Kamil et al.(2004); Snow, Martin, & Berman, 2008; Southern Regional Education Board, 2009; Zucker & Carel, 2012). Literacy experts report that the pace of literacy improvement has not kept up with the accelerating demands of the global knowledge economy. The lack of on-going literacy education through grade 12 has been described as leaving many high school and post-secondary education students at risk for dropping out of high school and/or college, and graduating unprepared for the challenges of education, employment and citizenship. The concept of discipline specific literacy has also emerged from this research.

The final Carnegie Corporation report (2010a), *An Agenda for Advancing Adolescent Literacy for College and Career Success*, described this "challenging disconnect" in the educational system. While early reading assessment and interventions have been well researched, formal reading programs generally end between third and fourth grade. It had been assumed that reading skills would continue to develop through an "inoculation" approach to reading instruction, however it is now known that, by grade 10, most of the students have lost most of their early reading proficiency. The authors clearly described that "students who are not proficient at understanding what they read

and in communicating what they learned are also at a tremendous disadvantage when it comes to succeeding in college and in competing for success in what is becoming an increasing knowledge-based economy" (p. xviii). This is of concern to college faculty, who, essentially are teaching high-level, specialized college course content to a majority of students whose reading comprehension education ended at grades 3 or 4. Students from a language minority background or English language learners (ELLs) are at increased risk of failure (Batalova, Fix, & Murray, 2007; Deshler, Palincsar, Biancarosa, & Nair, 2007; Francis, Rivera, Lesaux, Kieffer, & Rivera, 2006; Lesaux & Kieffer, 2010; Short & Fitzsimmons, 2007; Tatum, 2008). It is also important to note that significant changes in the student population have occurred. In the last two decades, the population of ELLs has grown 169%, while the general population has grown only 12%, and was estimated at over 9 million students (Francis et al. 2006). Not only does this knowledge identify the importance of reading comprehension to diversity in nursing education, it also raises significant concerns related to poor health literacy in the general population. While this topic is not addressed in this study, it is such a significant public health problem, that it must be acknowledged, with the understanding that improving reading comprehension and academic literacy in colleges and nursing education will also benefit the general population.

Nationally, nursing student enrollment does not reflect a significant change in 10-year diversity demographics. In 2011, 72% of enrolled students were White, 11% Black/African American, 4% Hispanic, 4% Asian, and 1% American Indian or Alaskan Native (AACN, 2012a). However, the data demonstrated that increased minority recruitment does not mean increased minority student retention. The reported

race/ethnicity of the U.S. RN population, from 2000 to 2008, shows that the White, non-Hispanic RN population decreased slightly from 87.8% in 2000 to 83.2 in 2008, and the non-White or Hispanic U.S. RN population rose from 12.5% in 2000, to 16.8% in 2008 (HRSA, 2010). Nursing colleges are under considerable pressure to produce a steady supply of competent registered nurses whose preparation and capabilities reflect the needs of the population, and the expanded skill and knowledge level for today's complex healthcare environment, yet a persistent shortage of both nurses and faculty persists (AACN, 2002, 2003, 2004a, 2004b, 2005, 2007a, 2007b, 2008, 2010, 2012a, 2012, b; American Hospital Association [AHA], 2007).

The landmark IOM report (2011), *The Future of Nursing*, calls for increasing the number of baccalaureate prepared nurses from approximately 50% to 80% by 2020, and doubling the number of nurses with doctoral degrees. The literature suggests that average student attrition from college nursing programs varies anywhere from 30-50% (Seago, & Spetz, 2005). Enrollment in nursing schools has not grown fast enough to meet the projected demand for nurses. Buerhaus (2005) suggested that enrollment in nursing schools would have to increase by 40% annually to replace only those retiring nurses expected to leave the workforce. A national report (HRSA, 2004) suggested that the United States (U.S.) must graduate approximately 90% more nurses annually to meet projected healthcare growth. A student lost from a nursing program represents the loss of a registered nurse at the point of care, and poor utilization of scarce resources. A student who is not successful in a nursing course and must repeat that course, means that another qualified applicant is delayed or denied entry to a nursing program. Attrition impacts students, faculty, higher education institutions, society, and policy makers in many ways.

It is associated with poor resource utilization and an increased cost of education (AACN, 2002, 2003, 2004a 2004b, 2005, 2007a, 2007b, 2008, 2010, 2012a, 2012b; Barton et al., 2004; Bleich et al., 2002; Campbell & Dickson, 1996; Eddy & Epeneter, 2002; Norman, Buerhaus, Donelan, McCloskey, & Dittus, 2005; Tennessee Center for Nursing Education [TCN], 2005), an inadequate RN workforce (AACN, 2002; AACN 2004a; AACN 2004b; AACN,2007a, 2007b, 2008, 2010, 2012a, 2012b ; HRSA, 2002; HRSA, 2004), poor student self-esteem (Abbott, Schwartz, Hercinger, Miller, & Foyt, 2008), and a lack of a diversified healthcare workforce, associated with persistent healthcare disparities (Sullivan Commission, 2004).

In an era of equal access to post-secondary education, it is essential to identify barriers to success to ensure student retention and timely program completion. Nursing programs have become very competitive, have a limited numbers of seats, and generally through a specific admission process seek to identify the candidates who have the best chance of successfully completing the program and entering the nursing workforce. However, programs with selective admission requirements, or that require more prerequisites for program admission do not have better on-time completion, delay, attrition, or better first-pass rates on the national R.N. licensing (NCLEX-RN) examination (TCN, 2005). While preadmission testing to the nursing major is a useful tool to identify those students who have the best chance of successfully completing the nursing program and entering the workforce, attrition still persists and admission policies window out many students who have inadequate academic preparation, especially students historically under-represented in the sciences.

Early work (Bryan, 1971), indicated that while nursing students had met the college or university admission requirements, many were still impacted by poor reading ability and struggled academically, yet no further research was done. National studies (Baer, Cook, & Baldi, 2006; Fulks, 2010) indicated that the assessment of reading comprehension in college may be the key to understanding and improving academic success. These studies have described that more than 75% of students at two-year colleges, and more than 50% of students at four-year colleges do not score at a proficient level of literacy. Higher levels of literacy were associated with higher grade point averages (GPAs), were highest for students earning professional degrees, and in classes that required analytic thinking. Higher GPAs have been associated with academic success in nursing education, however, the contribution of reading comprehension to higher GPAs has not been studied. One study has suggested that healthcare professionals may need a higher level of reading comprehension to be successful in healthcare programs (Haught & Walls, 2002). All senior healthcare student groups in this study scored higher on a standardized reading test on vocabulary, comprehension, and total reading scores than other senior college students. While this study did not include nursing students, it supported the need to assess reading comprehension, as it may be an overlooked variable associated with attrition. Nursing is a professional program and students are expected to comprehend a large volume of information presented, and to move to higher level processing skills and the synthesis of information required for higher-order cognitive skills of critical thinking, problem solving, and decision making. Proficient levels of reading comprehension comparable to other professional healthcare groups is the expectation of nursing education, suggesting a need for a specific

assessment of reading comprehension, as standardized entrance examinations and course grades do not appear to provide an accurate assessment of reading ability necessary for courses specific to a healthcare major (Fulks, 2010).

The ability to read well has traditionally been considered a childhood acquired skill, however, the evidence suggests that reading is a complex, multidimensional skill that requires ongoing intervention (Carnegie Corporation, 2010a). Driven by a critical nursing and faculty shortage, limited resources, increasing healthcare disparity, persistent limited diversity in nursing, persistent attrition from pre-nursing and nursing programs, a large paradigm shift in the access to and delivery of health care, education costs, effective use of limited resources, the education of a competent RN workforce remains a concern for nursing education. It is essential to insure that all students who are offered a seat in a nursing program, will be retained, will graduate on time, and will pass the national RN licensing examination (NCLEX-RN) on the first attempt (Donnelly, 2005; Green, Masten, & Cherry, 2005; Redman, Bednash, & Amos, 1990). Evaluation of reading comprehension and nursing students could lead to differences in the student selection process for the nursing major, and criteria to guide early, intervention programs to strengthen students' reading abilities and insure that they will be prepared for rigorous nursing coursework and academic success.

### **Purpose of the Study**

This study described and compared the levels of reading comprehension of pre-nursing students and senior nursing students, as measured by the Nelson-Denny Reading Test (NDRT) to determine whether reading ability differences could play a role in explaining the attrition of nursing students. The NDRT has four measures of reading

comprehension: (1) vocabulary; (2) reading comprehension; (3) a total score (vocabulary and reading comprehension x2) and (4) reading rate. The pre-nursing and senior nursing students' reading scores were compared to national standardized reading scores, and the senior nursing student scores were also compared to healthcare professional students' reading scores. Selected demographic variables were compared with reading scores. A Likert scale was used to measure the students' perceptions of their reading expectations and experiences.

### **Research Questions**

This study examined the following research questions:

1. What is the level of reading comprehension of baccalaureate college/university students admitted to a pre-nursing program?
2. What is the level of reading comprehension of baccalaureate college/university senior nursing students?
3. Is there a difference in the level of reading comprehension found between the pre-nursing student group and the senior nursing student group?
- 4a. Is there a difference between pre-nursing and senior nursing students' reading comprehension scores, and existing norms for college/university students (Brown, Fishco, & Hanna, 1993c, p. 35-38)?
- 4b. Is there a difference between senior nursing students' reading comprehension scores and existing norms for healthcare professional students (Haight & Walls, 2002, p.228-238)?
5. Is there a relationship between demographic variables (age, sex, ethnicity, full-time or part-time student, primary language, working during academic year and number of hours

worked per week, hours spent reading for assigned courses, number of failures or withdrawals from nursing courses, type of high school attended) and the students' level of reading comprehension?

6. What are the pre-nursing and senior nursing students' perceptions of their reading skills?

### **Conceptual Framework**

Reading experts have described the need for a unified theory of reading comprehension for the secondary and post-secondary student populations, and adult learners. While many micro-theories exist (e.g. bottom-up models, top-down models, interactive models, learners' interest models), the Dual Coding Theory (Sadoski & Paivio, 2001, 2004, 2007) is representative of a more comprehensive theory of reading comprehension, built on previous smaller, fragmented reading theories. The Dual Coding Theory (DCT) is a "general theory of cognition", or a "general theory of the mind applied to literacy" (Sadoski & Paivio, 2007, p. 350). This theory includes the basic principles of decoding, comprehension, and response, and applies the basic building blocks of reading to a broader, unified theory of literacy. The basic principles of the theory include the description of two separate codes: the verbal code which is useful for "representing and processing language in all its forms, including speech and writing, whereas the nonverbal code deals with the representation and processing of nonverbal objects, events, and situations" (Sadoski & Paivio, 2007, p. 222). The authors describe that "all knowledge, meaning, and memory is explained by representation and processing within and between the two codes" (Sadoski & Paivio, 2007, p.222). Words are defined "as verbal labels for concepts" (Sadoski & Paivio, 2007, p.222). Dual coding theory also explains the reader's

ability to acquire sight vocabulary, develop meaningful vocabulary (Sadoski & Paivio, 2001, 2004, 2007), and the stages of spelling development (Sadoski, Willson, Holcomb & Boulware-Gooden, 2005).

In this theory, vocabulary is described as a central factor in reading ability, as well as decoding, comprehension, and reading rate. Decoding is "converting a written word to a spoken language or covertly to an inner language" (Sadoski & Paivio, 2007, p.341). Comprehension involves the "construct of meaningful interpretation as a mental modality of the text, and is typically seen as occurring at levels such as literal, inferential, and interpretive/critical" (Sadoski & Paivio, 2007, p.341). The concept of response is described as overlapping with comprehension. It involves "affect, appreciation, and/or application" (Sadoski & Paivio, 2007, p. 341). Connections between previously learned speech forms and new written forms allow the student to learn to read, and are associated with phonemic decoding. Meanings of words are determined by verbal and nonverbal representation and situational context.

This theory (Sadoski & Paivio, 2007), also incorporates the concepts of the learners' developmental and individual differences, including variations in reading skill and verbal thinking or imagery. Research from the neuropsychology domain, correlating brain areas and their activity in developing reading ability, suggests that the left brain hemisphere is more specialized for verbal tasks, while the right hemisphere is more associated with imagery tasks, and can affect the outcome of educational interventions. This theory allows understanding of the concept of reading comprehension as a interdisciplinary, life-long, multi-dimensional process.

### **Definition of Terms**

Academic Literacy: is "defined as the kind of reading proficiency required to construct the meaning of content-area texts and literature encountered in school. It also encompasses the kind of reading proficiencies...such as the ability to make inferences from text, to learn new vocabulary from context, to link ideas across texts, and to identify and summarize the most important ideas or content within a text" (Torgesen et al., 2007, p.3). . It "includes not only the ability to read text for initial understanding but also the ability to think about its meaning in order to answer questions that may require the student to make inferences or draw conclusions" (Torgesen et al.2007, p.3).

Reading comprehension: is a measurement of academic literacy. For the purpose of this study, reading comprehension was measured by the Nelson Denny Reading Test (NDRT). The NDRT produces four measurements of reading ability: (1) a vocabulary score; (2) a reading comprehension score; (3) a total score which is obtained by adding the vocabulary score and a double weighted reading comprehension score; and (4) a self-reported reading rate obtained during the first minute the students spend reading during the reading comprehension test section. The raw scores are then use to develop grade equivalent scores which are reported by the grade level and month of the grade level. An example would be that a grade equivalent level of 10.5 would indicate that the student was reading at the tenth grade, five month level (Brown et al., 1993c).

Pre-nursing student: For the purpose of this study, a pre-nursing student is an individual who is enrolled in classes to prepare for admission into a professional nursing program. This describes a baccalaureate college student enrolled in a college or university who has

declared nursing as a major, and is in the process of taking required courses to apply for a seat in the nursing major. Second degree students are excluded from this study.

Senior nursing student: for the purpose of this study, a senior nursing student is a student enrolled in a baccalaureate college or university nursing major, who is in their last semester of coursework or has graduated from the program no longer than six months prior to participating in the study. Second degree students are excluded from this study.

### **Assumptions**

The following assumptions were recognized for this study:

Undergraduate nursing student attrition and retention is a priority concern for nurse educators, educational institutions, the nursing profession, policymakers and society.

Undergraduate nursing student retention is a complex phenomenon affected by multiple variables (Campbell & Dickson, 1996; Jeffreys, 2004).

Nurse educators are in key positions to influence attrition, persistence and retention of nursing students (Dzurec, Allchin, & Engler, 2007; Jeffreys, 2004; Jeffreys, 2007b; Magnussen & Amundson, 2003; Norman et al., 2005; Poorman, Webb & Mastorvich, 2002; Sadler, 2003).

Students participating in a college or university nursing program desire to be successful in their nursing coursework, and to pass the NCLEX-RN on the first attempt (Dzurec et al., 2007; Jeffreys, 2004, 2007b; Magnussen & Amundson, 2003; Norman et al., 2005).

During the study time frame, there have not been any major curricular changes made at the college or university.

**Limitations**

This study was limited by the use of a convenience sample which limits the ability to generalize the results to the general population of nursing students. The study was also limited by the homogeneity of the students who participated in the study, the lack of standardized reading assessments tools that are available to measure the level of reading comprehension in the college population, and time constraints. The limitation of time was associated with the age of the normative NDRT standards, and the time allowed for the students to complete the NDRT.

**Summary**

This chapter introduced reading comprehension as a multidimensional concept, and potentially as an important variable capable of influencing nursing education outcomes, reducing attrition, increasing diversity, and a significant area of inquiry for nursing. The preparation of large numbers of competent registered nurses is a multidimensional issue. Further research is needed to guide the continuum of workforce development including educational preparation to be able to sustain change. A high level of student attrition and delayed persistence is not a cost effective use of educational resources, and must be minimized for optimal nursing workforce development. The purpose of the study and the rationale for studying academic literacy and nursing students was described. A theoretical framework, that identified a comprehensive approach to understanding the acquisition of reading comprehension skills, was presented. Research questions, study assumptions, and limitations were identified, and the potential contributions to nursing science were described.

## CHAPTER II

### Review of the Literature

#### Introduction

This chapter presents an integrated review of the literature related to the description, assessment, and research applications of variables associated with attrition and delayed persistence in nursing students, reading comprehension and nursing students, reading comprehension and college students, college reading and remedial education, diversity and nursing education, adolescent literacy, academic literacy, and the assessment of college reading comprehension and standardized tests. The literature review was conducted from an interdisciplinary perspective, as little evidence was found in the areas of nursing education and nursing research. A emerging understanding of the concept of reading comprehension and nursing education has been influenced by the theoretical perspectives of other disciplines including education, sociology and psychology.

The following databases were searched from 1999-2013, using the keywords reading comprehension, college reading, attrition, persistence, diversity, minority students, literacy, ELLs, reading comprehension assessment, remedial education and adolescent literacy, academic literacy and the Boolean operator AND nursing students, nursing education. Databases included: *Academic Search Premier, E-Journals, ERIC, MEDLINE, Mental Measurements Yearbook, PsycARTICLES, PsycINFO, SocINDEX with Full Text, Tests in Print, CINAHL with Full Text, Education Research Complete, HealthSource: Nursing Academic Edition, Health and Psychosocial Instruments, PubMed* and the internet search engine *Google*. Following this review, it was apparent

that the concept of reading comprehension and nursing students or nursing education had not been studied, supporting the need for expanded educational research.

### **Attrition, Persistence, and Nursing Education**

The concepts of attrition and delayed persistence have been well studied in the nursing literature, and are reviewed to describe variables associated with attrition and persistence in nursing education (Alden, 2008; Alexander & Brophy, 1997; Arathuzik & Aber, 1998; Barkley, Rhodes, and Dufour, 1998; Beeman and Waterhouse, 2001, 2003; Beeson & Kissling, 2001; Briscoe & Anema, 1999; Byrd, Garza, & Nieswiadomy, 1999; Campbell & Dickson, 1996; Childs, Jones, Nugent, & Cook, 2004; Crow, Handley, Morrisson, & Shelton, 2004; Czubytyj, 2010; Daley, Kirkpatrick, Frazier, Chung, & Moser, 2003; Ellis, 2006; Endres, 1997; Gallagher, Bomba, & Crane, 2001; Haas, Nugent, & Rule, 2004; Higgins, 2005; Hopkins, 2008; Jeffreys, 2004, 2007a; Jeffreys, 2007b; Kennedy, McIsaac, & Bailey, 2007; Newton, Smith, & Moore, 2007; Newton, Smith & Moore, 2007; Newton, Smith, Moore, & Magnan, 2007; Norman, Buerhaus, Donelan, McCloskey, & Dittus, 2005; Papes & Lopez, 2007; Poorman, Webb, & Mastorvich, 2002; Potolsky, Cohen, & Saylor, 2003; Sayles, Shelton, & Powell, 2003; Seldomridge & DiBartolo, 2004; Sifford & McDaniel, 2007; Stewart, 2005; Stuenkel, 2006; Tatem, & Payne, 2000; Vance & Davidhizar, 1997; Wells, 2007; Yellen & Geoffrion, 2001; Yin & Burger, 2003). Twenty years of research has identified common predictors of success in nursing programs (Campbell & Dickson, 1996) which included: nonacademic variables which contribute to success in nursing education described in qualitative literature; academic predictors of success in nursing education described in quantitative research; and very limited research describing retention strategies which support timely, program

completion. This work was synthesized in Jeffreys (2004) theoretical framework, the Nursing Student Retention Model (NURS model). Jeffreys (2004) has summarized significant student profile characteristics associated with attrition which included age, ethnicity or race, gender, language, prior educational experience, family's educational background, prior work experience, and enrollment status. Jeffreys also described that personal study skills, including reading and writing skills, were important to student retention and success, however, reading comprehension had not been studied.

Academic predictors of success in nursing programs include cumulative grade point average (GPA), science GPA, standardized test scores, the number of times students fail the prerequisite science courses, and grades in nursing coursework, especially the number of C or lower grades earned (Alexander & Brophy, 1997; Arathuzik & Aber, 1998; Barkley, Rhodes, and Dufour, 1998; Beeman and Waterhouse, 2003; Beeson & Kissling, 2001; Briscoe & Anema, 1999; Bryan, 1971; Byrd, Garza, & Nieswiadomy, 1999; Campbell & Dickson, 1996; Gallagher et al., 2000; Higgins, 2005; Jeffreys, 2004; Poorman, Webb, & Mastorvich, 2002; Potolsky, Cohen, & Saylor, 2003; Roncoli, Lisanti & Falcone, 2000; Sayles, Shelton, & Powell, 2003; Seldomridge & DiBartolo, 2004). Most of the studies that describe predictors of success and nursing education are small and cannot be generalized to other nursing student populations. Most are retrospective and examined predictors of success and NCLEX-RN pass rates after program completion. This means that the majority of the samples studied were senior nursing students who had completed nursing coursework and had taken the NCLEX-RN. These indicators of success describe the nursing students who were able to successfully

complete the nursing program, but does not provide any variables associated with students who were not academically successful and left the nursing program.

Early work by Bryan (1971) described the effectiveness of a developmental reading course for nursing students (N=28), at the University of Kentucky. Students were randomly assigned to two control and two experimental groups. The experimental groups participated in a ten-week developmental reading program. Changes in reading ability were measured using pre-tests and tests at week one, ten and after five months. Students met once a week for two hours per week. While the mean scores on the pre-tests showed no significant differences between the control and experimental groups, the final test showed significantly higher scores for the experimental group on reading rate and efficiency, but lower scores on the reading comprehension variable. Bryan's literature review described work done by Dearborn in 1941, which indicated that while admission requirements were met by students, many students demonstrated poor reading abilities and were unable to complete course reading assignments. This early work described the need for reading programs in college and suggested that reading deficiencies were found in an estimated 10-20% of students, with one-fifth reading at an 8th grade level. It appears that during the 1940s and 1950s, educators were concerned that ineffective reading abilities were associated with college academic failures.

Alexander and Brophy (1997) investigated the relationship between admission and curriculum variables and National League for Nursing (NLN) comprehensive achievement scores with NCLEX-RN pass rates (N=188). Using descriptive statistics and regression analysis, the strongest indicators of NCLEX-RN success were SAT-V, nursing GPA, and the comprehensive NLN scores. Arathuzik and Aber (1998) suggested

that cognitive abilities were important competences, however described that internal factors such as emotional distress, fatigue and multiple role strain, family demand, financial difficulties and work demands all contributed to academic success (n=79 senior nursing students). Barkley, Rhodes, and Dufour (1998) used regression analysis to describe that nursing theory course grades, nursing clinical course grades, and NLN achievement test scores best predicted academic success. A significant relationship was found between the number of C grades on nursing courses and NCLEX-RN success (N=81). Briscoe and Anema (1999) found that pre-admission GPA, failing a nursing course, and NLN achievement test scores best predicted NCLEX-RN success (N=38).

Using retrospective data analysis, age, science GPA, and pre-nursing GPA predicted 77% of graduation pass rates (N=287). Limitations of this study included that the data were collected in one school over a three year period, a predominately White student sample, and the students had unlimited attempts to pass the nursing courses (Byrd, Garza, & Nieswiadomy, 1999). Prerequisite science performance was also found to be a reliable indicator of academic performance (Potolsky, Cohen, & Saylor, 2003). This study (N=37) suggested setting a minimum GPA in the sciences to a B grade, and to consider denying admission to students who have failed and/or repeated science courses

Beeson and Kissling (2001) used a retrospective logistical regression model (N=505 over a 5 year period) to identify predictors of success associated with first attempt NCLEX-RN pass rates, and found that sophomore student grades in biology and GPA were associated with NCLEX-RN pass rates. The average GPA in the students who passed the NCLEX-RN was 3.41, compared to 2.88 in the failing group. Students who received one C grade in a nursing course by the end of sophomore year were more likely

to fail, with the number of C, D, and F grades identified as the most significant predictors of failure. Students who had no C or lower grades passed at a rate of 97%, while students with one or more C grade passed at an 84% rate. With three or more C, D, or F grades, the pass rate fell to 51%. Consistent with these results, Beeman and Waterhouse (2003) identified seven predictor variables (N=289). The total number of C+ or lower grades in nursing courses correctly classified 94% of the passing students and 92% of the students who failed. Siktberg and Dillard (2001) used a retrospective review of NCLEX-RN pass rates to develop interventions that would support student success. The study found that after raising the admission GPA from 2 to 2.75, not readmitting students to the program after an academic failure as the study found that 85% of third readmitted students failed the NCLEX-RN, and raising the passing rate for nursing courses to a 78% on both a test component and a project and/or paper component, the NCLEX-RN pass rate was above the national average for six years.

One small study (Roncoli, Lisanti, & Falcone, 2000) compared a random sample of students who passed the NCLEX-RN (N=19) to a sample of students who had no record of passing (N=19). The study found significant differences in the GPAs of students in both groups. Students with the grade of A or B in the science prerequisites and upper division nursing courses were significantly more likely to have evidence of an NCLEX-RN pass than students who achieved C grades.

Sayles, Shelton and Powell (2003) used a correlational, comparative study design (N=83) to describe the relationship between the NCLEX-RN pass rates and scores on the Educational Resources Institute (ERI) NET examinations. Factors identified as significant included ethnicity, NET math and reading scores, and nursing GPA. Their

recommendations included that standardized measures and educational records may be useful tools for advising students, developing action plans to prepare for the NCLEX-RN, and for developing support services.

Using a retrospective data analysis (N=186), Seldomridge and DiBartolo (2004) found that models could be created to predict success, however, it was more difficult to predict failure. The test average in an advanced "Med/Surg" course and the percentile score on the NLN exit exam predicted 94.7% of NCLEX-RN pass-rates, but only 33.3% of failures. The recommendations included that admission policies should be revised based on academic outcomes, and that patterns of withdrawal or failure in science courses be taken into consideration. Students with more than one D or F grade in a science course would not be admitted to the nursing major, and that students must have a C in nursing courses to pass the course. Higgins (2005), using retrospective nursing student records (N=213), found a relationship between the biology course, the science component of pre-admission testing, the HESI exit examination score, and the nursing skills class grade with NCLEX-RN pass rates. Campbell and Dickson (2006) found that a combination of GPA, the number of C grades in prerequisite courses and the pathophysiology course grade were the best pre-nursing variable combination, predicting 95% of NCLEX-RN pass, but only 42.9% of the failures. Final exam grades in nursing theory courses predicted 92.5% of the NCLEX-RN pass-rates, but only 50% of the failures. This was consistent with a previous study (Seldomridge & DiBartolo, 2004), reporting that while success can be predicted accurately, predicting failure remains difficult.

Jeffreys (2007a) tracked the entry, progression, graduation, and licensure characteristics of nursing students (N=112) and found that the variables that influenced first time NCLEX-RN pass rates were course grades in three nursing courses, the number of nursing course failures or withdrawals, and the nursing GPA.

Only one small study could be found in which reading comprehension and entrance examinations were analyzed. Scores on the Nurse Entrance Exam (NET) related to reading comprehension subtests were found to be significant in predicting program success (Gallagher, Bomba, & Crane, 2001). Gallagher, Bomba, and Crane (2001) found that NET reading comprehension subtests needed to be at a level of 32 for a 50% probability of passing the NCLEX-RN (N=195). The authors suggested that each program should examine their own criteria to see what determines success, however, recommended benchmarks for a prerequisite reading course or a reading skills intervention workshop.

Many colleges have used entrance and exit examinations to track student progress. Using retrospective data analysis of academically successful nursing students at program exit, the Health Education Systems, Inc. (HESI) exit examination has frequently been used to predict the probability of passing the NCLEX-RN (English & Gordon, 2004; Frith, Sewell & Clark, 2006; Lauchner, Newman, & Britt, 1999; Morris & Hancock, 2008; Morrison, Adamson, Nibert, & Hsia, 2004; Morton, 2006; Newman, Britt, & Lauchner, 2000; Nibert, Adamson, Young, Laucher, Britt & Hinds, 2006; Nibert & Young, 2008; Nibert, Young, & Adamson, 2008; Nibert, Young, & Britt, 2003). Annual studies have been done on the predictive validity of the HESI exit exam. It was found that most schools with progression policies had established a benchmark of 85 or

better based on results from a sample of 5903 RN students (Nibert, Young, & Adamson, 2008). The predictive accuracy of the HESI exit examination (N=3531) was found to be 98.27% (Newman et al., 2000). No studies, analyzing variables associated with attrition and persistence, could be found for the nursing student population that was not academically successful.

A large body of qualitative evidence describes the lived experience of nursing students. Themes that emerged included: feelings of being overwhelmed by the rigor of nursing programs and academic expectations, and feelings of being alone, socially isolated, stressed, and feeling inadequate. Students described not being prepared to handle the college experience, conflicting demands, and stressed the importance of the connection with faculty (Dzurec et al., 2007; Jeffreys, 2004, Magnussen & Amundson, 2003; Norman et al. 2005; Poorman et al., 2002). Students also described difficulty completing assigned readings, and processing the large amounts of information presented in class lectures (Norman et al., 2005). The authors suggest that institutional policies, as curricular overload, lack of financial support, and the failure to focus not only on the recruitment of students, but on their retention, may also contribute to the impact of academic and/or nonacademic barriers on nursing student success.

Barriers to retention for minority students included issues of academic and social adjustment, feelings of isolation and under-representation on campus, a lack of academic preparation for college, large numbers of unprepared first-generation college students, lower standardized test scores, financial problems, the need to cope with insensitivity and discrimination, and difficulty finding a balance between personal life and college requirements (Carter & Xu, 2007, Childs, Jones, Nugent, & Cook, 2004; Cunningham,

Stacciarini, & Towle, 2004; Gardner, 2005a, 2005b; Gilcrest & Rector, 2007; Sullivan Commission, 2004, Zuzelo, 2005). Barriers in the clinical areas included a lack of cultural sensitivity and ethnocentrism found in healthcare providers, and language and communication barriers associated with concern for patient safety (Carter & Xu, 2007). Preclinical strategies, which included the development of critical thinking, reading comprehension and stress management skills were suggested (Abdur-Rahman & Gaines, 1999).

While societal awareness of English language learners (ELL) difficulties has grown, barriers have emerged from the expanding body of U.S. adolescent literacy research related to the needs of ELLs and the failure to identify best practices to support this population. Students from a language minority background (ELLs) are at an increased risk of failure and racial/ethnic disparities persist. In the last two decades, the population of ELL has grown 169%, while the general population has grown only 12%, associated with the rising number of immigrants, demographic trends, and the increasingly global economy (Francis, Rivera et al., 2006). ELLs are at particular risk and face specific challenges including content area knowledge, and the importance of distinguishing conversational language proficiency from academic language proficiency. Previously, it was assumed that conversational language proficiency equaled academic language proficiency. This has been identified as a barrier for ELLs, as educators often overlook struggling ELLs because they can speak English well (Batalova et al., 2007; Carnegie Corporation, 2010; Deshler et al., 2007; Francis, Rivera et al., 2006; Lesaux & Kieffer, 2010; Short & Fitzsimmons, 2007; Tatum, 2008). Barriers for ELLs also included a lack of assessment tools in native languages, a lack of knowledge of English

language development and content knowledge teaching, as well as limited educator knowledge about second language literacy acquisition and reading across content areas (Short & Fitzsimmons, 2007). In 2007, nationally, over 6 million U.S. students were at risk for failure due to poor reading comprehension, with only about 30% of all secondary students reading proficiently, and 89% of Hispanic students and 86% of African American students reading below grade level. The data indicated that approximately 50% of minority students did not graduate with a high school diploma (Short & Fitzsimmons, 2007) and that pathways for success in college or a profession are blocked without highly developed academic literacy skills. Fifty-seven percent of adolescent ELLs were born in the U.S. and are second or third generation immigrants. Approximately 59% of ELLs live in families with incomes at 185% below the poverty line, compared with 28% of English speaking adolescents (Short & Fitzsimmons, 2007). Low levels of literacy have been associated with poorly educated adults who are less likely to be employed, gain higher incomes, have better health, and participate more in civic life (Short & Fitzsimmons, 2007).

Despite increased enrollments of diverse nursing students nationwide, the evidence does not reflect a significant change in 10-year diversity demographics of the RN population. In, 2011, 72% of enrolled students were White, 11% were Black/African American, 4% were Hispanic, 4% were Asian, and 1% were American Indian or Alaskan Native (AACN, 2012b). However, increased minority recruitment does not mean increased minority RN student retention. The reported race/ethnicity of U.S. RN population from 2000 to 2008 shows that the White, non-Hispanic RN population decreased slightly from 87.8% in 2000 to 83.2%, and in 2008, the non-White

or Hispanic U.S. RN population rose from 12.5% in 2000 to 16.8% in 2008 (HRSA, 2010).

No literature could be found that describes the point at which most nursing student attrition occurs. This is of concern, as clinical courses use more resources than early introductory and non-clinical courses. Cost and the return on investment must be considered when deciding how to best allocate scarce resources in nursing education (Aiken & Gwyther, 1995; Donnelly, 2005; Green et al., 2005; Redman et al., 1990). Nursing programs have become very competitive, have a limited numbers of seats, and generally through a specific admission process seek to identify the candidates who have the best chance of successfully completing the nursing program, and entering the nursing workforce. However, it was found that programs with selective admission criteria do not have better on-time completion, delay, attrition, or NCLEX-RN first-pass rates (TCN, 2005). Programs that require more prerequisites for admission also do not have better rates (TCN, 2005). This suggests that there may be a variable contributing to attrition in nursing education that has not been identified.

Following this review, it was apparent that the concept of reading comprehension had not been studied as a possible variable associated with nursing student attrition. Demographic variables associated with attrition were identified from the literature, and selected for study analysis.

### **Reading Comprehension and Nursing Education**

Little research was found that described reading comprehension or academic literacy, and nursing students or nursing education. A review of the literature, from 1979 to 2013, found only eight studies that addressed this concept (Bryan, 1971; Fearing, 1995;

Gallagher et al., 2001; Haught & Walls, 2002; Hopkins, 2008; Noone, Carmichael, Carmichael, & Chiba, 2007; White, 2004). Much of the literature related to reading comprehension, literacy, and nursing students described information literacy, and identified gaps in this area associated with the inability to find evidence from a variety of sources. Health literacy was also well described from a nursing education focus, and included areas such as the impact of poor literacy on healthcare outcomes, and assessing healthcare information for readability by patients and their families.

Early work in the 1970's and 1980's (Campbell & Dickson, 1996; Fearing, 1995) indicated that some consideration of reading comprehension as a possible attrition variable was identified, but was not studied. There appeared to be an interest in nursing education research at that time, in response to high levels of student attrition. Topics of interest included analysis of academic variables associated with program and NCLEX-RN success, identification of high-risk students, admission policies, evaluation methods, and predicting success in nursing programs. Little research has been done related to teaching strategies, student support, and academically disadvantaged students. Verbal portions of the SAT and ACT were found to be significant in predicting NCLEX-RN success, but none of the research used reading comprehension as a predictor variable. Preadmission criteria was useful for admission decisions and standards, but concern was expressed that it not be used to exclude at-risk students. The consensus at that time was that at-risk students should be identified early and given support to strengthen them academically. Bryan (1971) described literature as early as 1941 by Dearborn, indicating that even though students met admission requirements, many were still impacted by poor reading ability, and the inability to complete reading coursework assignments, and estimated that

approximately 10-20% of students had reading deficiencies. Bryan (1971) also described work in 1954 that suggested that the increasing enrollment of students in colleges, indicated a need to implement reading programs, and estimated that about one-fifth of freshman students were reading on an 8<sup>th</sup> grade level. No studies could be found that specifically assessed reading comprehension and academic literacy as a predictor for academic success in nursing. Further research into this area was suggested.

Bryan (1971) assessed the implementation of a pilot developmental reading course. Students (N = 84) were randomly assigned to two control and two experimental groups. The experimental groups participated in a ten week reading program. These students had already been admitted to the nursing program and were taking nursing coursework at the same time. Pre- and post-testing was done prior to the start of the course, during the first week of the course, at week ten, and after five months using the *Maintaining Reading Efficiency Test*. The students participating were all first semester freshman. On the final test, the experimental group scored significantly higher on reading rate and efficiency, but lower on comprehension, suggesting a need for further research.

Fearing (1995) looked at the impact of academic enrichment on the success of nursing students. Fearing's (1995) literature review described that, in response to high attrition rates in nursing education programs, an interest developed into identifying predictors of success for nursing students.

Two studies described support programs for nursing students. Hopkins (2008) described the need to identify nursing students who are at risk for academic failure early, and to provide support for retention and success in associate degree programs. The

investigator examined the effects of an early support program, including tools to strengthen reading comprehension, on the fundamentals of nursing course (N = 382; 62.1% White). Despite using this support program, 17% of the population were still unsuccessful in the course, receiving a grade below 80. Noone et al. (2007) assessed the outcome of a pilot support program for under-represented minority nursing students. The authors designed a two year program for associate degree students (N = 25), who had been placed by admission testing into the equivalent of a first year high school algebra course. In addition to developmental aspects of the program, students would complete 22 credits of nursing course work. While reading comprehension levels were not assessed, one of the major components of the program was reading comprehension. Other strategies of the program included successful learning habits, critical thinking skills, written communication skills, and technology. Forty-eight percent of the first cohort successfully completed the first semester. The course was then modified in response to this outcome, and 84% of the second cohort finished. Successful students received stipends at the end of the semester. Critical thinking scores were analyzed and indicated a 28% improvement at the end of the first semester. Students who were successful in the program and reached the benchmark GPA of 2.75 were admitted to the nursing program. The students were tested using the National League for Nursing (NLN) pre-admission exam for comparison only to other applicants to the nursing program, not as a requisite for acceptance. Eighty-five percent of the cohort passed the exam, compared to only 55% of the applicant pool. The investigator also polled current students who were not part of the project (n = 14) and found that they were in school an average of 2.5 years

before beginning the nursing program, so this program did not appear to increase degree completion time more than that of the general applicant pool.

White (2004) described faculty reports of reading difficulties in nursing students. Faculty perceived that students lacked basic reading skills. Identifying that nursing students must often read at least 300 pages per week of text for three academic courses, faculty were concerned about the burden this placed on students with poor reading skills. The author described that as formal reading classes in public schools often end by grades three and four, many students lacked college level reading skills, could not comprehend the large volume of information presented, or move to higher level processing skills, and the synthesis of information required for critical thinking, problem solving, and decision making. Critical reading and critical thinking skills are considered higher-order cognitive skills. Critical reading ability develops skills in independent thinking, analysis, and judgment, and allows the student to weigh evidence for reliability, accuracy, and representativeness (White, 2004, p.43 ). Critical thinking is defined as “a way of analyzing problems or phenomena” and “enables the nurse to examine the assumptions, beliefs, propositions, and the meanings and uses of words, statements, and arguments associated with a problem” (White, 2004, p.43 ).

Nursing faculty also expressed concerns that they were not reading experts, and lacked the theory and tools to evaluate and assist students, yet, were expected to identify students with reading problems for referral to specialists. Reading difficulties are often not identified until students are exposed to higher and more complex, cognitive tasks. This may explain why many students are successful in introductory courses, and later struggle with advanced discipline-specific coursework. Basic introductory texts are more

easily understood, and do not require the use of higher level critical thinking and processing skills, which requires the student to synthesize previous knowledge and construct new knowledge (Pawan & Honeyford, 2009).

No studies could be found that specifically assessed literacy as a predictor for academic success in nursing. Only one study could be found that described reading comprehension benchmarks for healthcare professional students (Haught & Walls, 2002). These investigators assessed whether the reading comprehension level of students graduating with a healthcare major of pre-medicine, pre-dentistry, physical therapy, or internal medicine residents (N = 1122), had comparable NDRT scores when compared to standardization norms for all students graduating from college with a different major. While senior nursing students and/or nursing students accepted to graduate school were not included in this study, nursing is a professional program, and the results are applicable to this population. When the professional healthcare groups were compared to the standardization norms for college graduates, all healthcare groups scored higher on vocabulary, reading comprehension, and the total reading score than did other college graduates. The authors suggested that further research was needed as existing norms for college graduates may not accurately evaluate healthcare professions students. New healthcare standardization norms could be beneficial for screening and prediction of academic success for nursing students. Limitations of this study included that the groups were not representative of diversity (90% white), and that no control was made for language ability (ELLs). This population was also already accepted into a graduate, healthcare professional program, and may be more representative of some of the strongest students, reading at a higher level than the average college graduate. Results

from the study also suggested that regardless of age, reading appears to improve with exposure to college coursework and with additional education. Students in this study had an average mean GPA of 3.66 and a mean science GPA of 3.61. While the study did not attempt to correlate GPA with levels of reading vocabulary and comprehension, it raises the question that reading comprehension may be the variable that contributes to higher GPAs, and may be one of the reasons that a high GPA has been correlated with academic success in nursing programs.

As the complexity of healthcare increases, it can be assumed that the need for higher levels of reading comprehension will continue to escalate, suggesting the need for further research. It is expected that nursing students must be able to comprehend the large volume of information presented in class and in required readings, and to be able to move to higher level processing skills and the synthesis of information required for critical thinking, problem solving, and decision making. A lack of studies that described the level of reading comprehension necessary for nursing student success was identified. This supported the need for a description of this concept and normative nursing student scores for comparison with reading scores of the college and healthcare student population. It appears that early discussion of the topic of reading comprehension and nursing education occurred in previous work from 1941 and 1954, yet this concept has not been explored in nursing education research.

### **Reading Comprehension and College Students**

While there is very little literature that describes reading comprehension and nursing students, a larger body of research has emerged from the disciplines of education and psychology, that describes the crisis in adolescent literacy and the impact this has on

college academic achievement (ACHIEVE, Inc., 2005, 2009, 2010, 2011; ACT, 2005, 2009, 2011a, 2011b, 2011c, 2011d; Alliance for Excellent Education, 2011; Berman & Biancarosa, 2005; Biancarosa, 2012; Biancarosa & Snow, 2006; Carnegie Corporation of New York, 2010a, 2010b; Goldman, 2012; Graham & Perin, 2007a, 2007b; Harvard University, 2008; Haynes, 2009,2010; Heller & Greenleaf, 2007; Hosch & Kiehne, 2011; IOM, 2004b; Jacobs, 2008; Lee & Spratley, 2010; Levin, Caitlin & Elson, 2010; McNeil, 2011; Moje et al., 2008; Moje & Tysvaer, 2010; Morsy, Kieffer & Snow, 2010; National Center for Education Statistics [NCES], 2009, 2011; National Governors' Association, 2005; Short & Fitzsimmons, 2007; Snow & Biancarosa, 2003; Snow, Foorman, Kamil et al.(2004); Snow, Martin, & Berman, 2008; Southern Regional Education Board, 2009; Zucker & Carel, 2012). Reading has been well researched in primary education, yet most formal reading programs end around the third and fourth grades (Carnegie Corporation of New York, 2010). Researchers (Flippo, 2011; Flippo & Caverly, 2009) suggested a need to understand academic literacy in college, and to develop and share best practices that contribute to academic success.

Research supporting the need for remedial education in response to the changing demographics of students and admission policies has been described in the literature (Boylan, & Bonham, 2007; Sullivan Commission, 2004). Factors that suggested the need for further study of college reading included predictions by the U.S. Bureau of Labor, that by 2014, new job growth will increase by 13%. Sixty percent of these jobs will require a minimum of an associate degree. Between 1996 and 2006, the average literacy requirements for new jobs increased by about 14%, with the fastest growing professions having far greater literacy demands (Biancarosa & Snow, 2006).

The clear need to improve adolescent literacy skills has been described in the context of rapidly accelerating challenges of modern society, expanded technological capabilities, and the knowledge-based global economy. Nationwide, it is estimated that U.S. business spends approximately \$3.1 billion to strengthen the writing skills of entry level workers. Research has also demonstrated that students' early reading achievement dissipates by grade 10, with U.S. students' scores among the lowest in the world (Carnegie Corporation, 2010a). The U.S. Census Bureau (NGA, 2005) indicated that while 54% of Americans over age 25 attended some college, only 37% attained a two- or four-year college degree. In 1999, the U.S. was tied first for global graduation rates, but by 2006, it was ranked 14<sup>th</sup> in the proportion of its population who are college graduates, and had lost its historic edge (Flippo & Caverly, 2009; NGA, 2005). By 2006, the U.S. had the second highest dropout rate of 27 industrialized countries (NGA, 2005). Nationally, it is known that at least 30% of freshman entering college must take at least one remedial course which is ineligible for credit toward a degree.

Nationally, the lack of college preparedness has been estimated to cost the U.S. \$3.7 billion (Zucker & Carel, 2012, p.5). More than 10,000 CT students dropped out of high school in 2010, costing an estimated \$2.6 billion in lifetime earnings (Zucker & Carel, 2012, p.3). Seventy-two percent of those students who did enter college needed remedial education (p.3). Taxpayers, nationally, funded over \$1.5 billion annually to finance remedial education instructional costs, provided as subsidies from state and local governments (p.5). The cost associated with CT students who failed to return to college after their first year was estimated to be over \$9.3 million in federal grants they received, and as much as \$68 million in other state expenditures (p.6). CT high school students

who attended remedial English and math classes cost over \$84 million during the 2007-2008 academic year (Zucker & Carel, 2012, p.6). It is also known that students who fail or under-perform academically suffer lifelong consequences of unemployment or significantly lower lifetime incomes (Biancarosa & Snow, 2006). Zucker and Carel's (2012) study was the only current study that could be found representing colleges in the Northeast, where this study took place.

Reports from ACT testing indicated that college level reading has been described as “being at its lowest place in more than a decade” (ACT, 2006, p. 2). The ACT measures student performance in terms of college readiness benchmarks and reports scores and benchmarks for English, mathematics, reading, science, and a composite score (ACT, 2012). ACT benchmarks represent the level of achievement students need to have either a 50% chance of obtaining a B or higher, or a 75% chance of obtaining a C or higher in a corresponding credit-bearing first year college course (ACT, 2011a). In 2009, national scores continued to be reported and voluntary state scores were reported for the first time. A comparison of CT and national scores is presented in Table 1. CT scored above the national scores in all areas. It is also important to note that the graduating class tests results are reported only for students tested under normal conditions, eliminating the population of students who require accommodations such as extended time (ACT, 2012).

Table 1 National 2012 ACT and CT ACT Scores

State	Average Composite Score	Average English Score	Average Math Score	Average Reading Score	Average Science Score
National	21.1	20.5	21.1	21.3	20.9
CT	23.8	23.9	23.8	23.9	23.2

(Source: ACT (2012): ACT Profile Report State: Graduating Class of 2012, p.7)

Nationally, 5 year scores described in Table 2, show a slight increase in tests results in some areas, however the students who met all four benchmarks remained approximately one in four (ACT, 2012). National science scores showed a slight upward trend, however, only 1 in 4 senior students met all four benchmarks.

Table 2 ACT Test Results: Five Year Trends: Percentage of Students Meeting College Readiness Benchmarks (National)

Year	Number of Students Tested	English	Mathematics	Reading	Science	Meeting All Four
2008	1,421,941	68	43	53	28	22
2009	1,480,469	67	42	53	28	23
2010	1,568,835	66	43	52	29	24
2011	1,623,112	66	45	52	30	25
2012	1,666,017	67	46	52	31	25

(Source: ACT, 2012: ACT Profile Report State: Graduating Class of 2012, p.7)

Five year trends (Tables 3 and 4) of national ACT graduating class tests scores remain essentially flat, however, the five-year comparison of the percentage of CT students meeting nations benchmarks appears to be trending very slowly upward.

Table 3: Five Year Trends National Average ACT Scores

Year	Number of Students Tested	English	Mathematics	Reading	Science	Composite
2008	1,421,941	20.6	21.0	21.4	20.8	21.1
2009	1,480,469	20.6	21.0	21.4	20.9	21.0
2010	1,568,835	20.5	21.0	21.3	20.9	21.0
2011	1,623,112	20.6	21.1	21.3	20.9	21.1
2012	1,666,017	20.5	21.1	21.3	20.9	21.1

(Source: ACT, (2012): ACT Profile Report State: Graduating Class of 2012, p.7)

Table 4: Five Year ACT Score Trends: Percentage of CT Students Meeting College Readiness Benchmarks

Year	Number of Students Tested	English	Mathematics	Reading	Science	Meeting All Four
2008	8,159	84	62	69	40	34
2009	9,240	85	63	71	41	37
2010	10,453	86	65	70	45	39
2011	10,809	86	68	72	46	42
2012	11,192	86	64	71	48	43

(Source: ACT(2012): ACT Profile Report State: Graduating Class of 2012, p.7.

A persistent racial/ethnicity gap exists both nationally and in CT. In 2011, nationally 66% of all ACT tested high school graduates met the English college readiness benchmark, 52% met the reading benchmark, 45% met the mathematics benchmark, and just under 1 in 3 (30%) met the science benchmark (ACT, 2011a). Recently released 2012 data (ACT, 2012), describing the percentage of ACT-tested high school graduates meeting the college readiness benchmarks by race/ethnicity, shows that just over 4 in 10 Asian graduates met all 4 benchmarks, 5% of African American graduates met all 4 benchmarks, and none of the benchmarks was met by at least 50% of the African American, American Indian, or Hispanic students (Table 5)

Table 5 Five Year Trends CT ACT Scores: Percent and Average Composite Score by Race and Ethnicity

Year	All Students	Black/African American	American Indian/Alaska Native	White	Hispanic/Latino	Asian
2008	23.3	18.4 (5%)	21.7 (0%)	23.4 (66%)	24.8 (3%)	24.8 (3%)
2009	23.5	18.4 (5%)	20.5 (0%)	23.8 (74%)	20.9 (4%)	25.1 (4%)
2010	23.7	18.8 (5%)	21.1 (0%)	24.0 (76%)	21.6 (5%)	25.7 (4%)
2011	23.9	18.7 (6%)	22.2 (0%)	24.4 (75%)	21.4 (6%)	25.4 (4%)
2012	23.8	18.8 (6%)	21.4 (0%)	24.2 (73%)	21.8 (7%)	25.5(5%)

(Source: ACT (2012): ACT Profile Report State: Graduating Class of 2012, p.8)

The *Nation's Report Card for Reading* reported that reading rates of 12<sup>th</sup> grade students in the U.S. have remained relatively flat since 1992, and a significant minority gap persists (NCES, 2009, 2012). Results of the 2009, 12th grade National Reading Tests found that the average reading score was 2 points higher than in 2005, but 4 points lower than in 1992. Only 5% of students scored at an Advanced level, which is necessary for critical thinking and college performance. Seventy-four percent score at or above Basic and 38% scored at the Proficient level (NCES,2009). Not only have national 12th grade reading scores remained essentially flat over time, a persistent score gap remains between White and Black students, and between White and Hispanic students.

It is known that college student attrition persists and “almost one-half of the three million people who start their first year of college will drop out before they earn their degrees” (Bowler, 2009, p. 1). “Thirty percent of college and university students drop

out after their first year”, and “college completion rates in the U.S. have been stalled for the past three decades” (Bowler, 2009, p. 1). Remedial students are also less likely to succeed (Bowler, 2009, p.1). About one-half of all college students attend two or more institutions and, on average, “nonselective colleges” graduate approximately only 35% of their students, compared to the most competitive colleges which graduate approximately 88% of their students (Bowler, 2009, p. 1).

Delayed persistence exists in colleges and universities, with many students requiring more time than anticipated to graduate. This area has not been well reported in the literature as there are no processes to track students between institutions, and internal tracking is generally proprietary data.

Attrition and inadequate preparation leaves many students windowed out of access to many professional programs. Academic literacy in college is associated with access to the higher levels of the college education, with poor literacy having a “gate-keeper” role. It has been suggested that “a great deal of the social and economic success of the U.S. depends on how well it is able to educate its academically under-prepared students” (Parker, 2009, p.47). More than 63 % of community college students need remedial coursework, and discussion continues to focus on the failure of the K-12 educational system to adequately prepare students for the rigors of college.

It is necessary to consider the changes found in today’s college environments, including newer technologies that have decreased the amount of time and nature of reading done by the students, poorly communicated standards and expectations for college admission and work, and the need for benchmarks that predict success, retention, and degree-attainment for college students. Remedial education should be viewed as a

tool to bridge gaps in the K-12 education pipeline, and to bridge the social inequities found in many school systems, so that students will successfully complete post secondary educational programs. Faculty may need to reconsider expectations of students entering colleges and universities, and realistically assess student skills on admission to accurately determine gaps in educational preparation (Parker, 2009). These discussions come at a time when policymakers and the public have called for increased access to higher education, greater accountability in higher education, and more effective use of resources (Academic Senate for CA Colleges, 2002; Parker, 2009, Spelling Commission, 2006).

Experts suggest that the concept of academic literacy must be broadened to understand that students do not come to college with a single literacy, but with "multiple literacies", reflecting their diverse backgrounds and learning styles. This may explain why many students will be successful in introductory courses, and later struggle with advanced courses specific to their major. Basic introductory texts are more easily understood, and do not require the use of higher level critical thinking and processing skills, which requires the student to synthesize previous knowledge and construct new knowledge (Pawan & Honeyford, 2009). Academic literacy has three different phases. The first is the initial or entry level literacy necessary for access into academia, followed by the development of platform literacy necessary for the student to participate and engage in the academic community, and advanced academic literacy which enables the student to legitimize their individual differences to affect curricular direction (Carnegie Corporation, 2010a). As students develop higher levels of academic literacy, they also begin to develop discipline-specific literacy, but need "scaffolded" support to master these concepts.

Research also suggests the need to understand the impact of changes in college admission policies in response to equal access to education. A higher proportion of students with weaker academic abilities are entering college in response to open access policies and the need for a well-educated workforce. College faculty often describe today's high school graduates as "illiterate", but national reports do not support this (Pawan & Honeyford, 2009). Trends in reading and writing have essentially remained flat over the past twenty years. National reading assessments showed no statistically significant differences between 1992 and 2011 (NCES, 2009, 2011). The data does indicate, that the proportion of students entering college within one year of graduation, has increased from one-half to two-thirds of this population since 1980, and that less than 40% of students have adequate reading skills for college work, and less than 30% have adequate writing skills (Jameson, 2007).

Changes in the scoring parameters of the Scholastic Achievement Test (SAT) may also be associated with the poor perception of college students' reading abilities. The SAT was re-centered in 1995, and the top score of 800 no longer meant that all questions were answered correctly. Test content was also changed giving students more time to answer fewer questions, providing context for vocabulary questions, and omitting the antonym questions and the subtest on standard written English. Over the next ten years, the average scores varied by only a few points, but may not have had the same meaning as previous scores. In 2005, the new SAT was used for the first time and included math, critical reading, and writing areas, and in both 2005 and 2006, the largest decline was seen on test scores. Possible causes suggested for the decline included fatigue due to length of the test, or that the student chose not to retake the test due to

increased costs, or actual decline in student performance (Jameson, 2007). Decline was also described in the amount of time students spend doing homework. However, a rise in grades was also seen, suggesting the possibility of grade inflation in high school. This, combined with a decrease in standardized test scores, suggests that the rise in grades does not reflect increased subject mastery (Jameson, 2007).

The amount of time a student spends reading may predict academic success, or may be a symptom of poor reading comprehension, as poor readers work harder and take more time to complete reading assignments. The amount of time a student spends reading may also be reduced by the impact of newer technologies, and must be considered when assessing why student reading comprehension rates are not improving (Clump, Bauer, and Bradley 2004; Collins, Onwuegbuzie, & Jiao, 2008; Emanuel et al. , 2008; Lord, 2008). The amount of time psychology students spent reading course textbooks was analyzed to understand the study strategies of students, which can predict class performance. Results indicated that students ( $n = 423$ ) read 27.45% of assigned readings before class, and 69.6% before an exam, consistent with previous research that described that the majority of college students spend less than three hours a week reading textbook material. Students instead felt that it was the instructor's responsibility for reviewing material during class time, and indicating what was important to read. This was inconsistent with faculty expectations that students should spend at least forty hours per week in class preparations (Clump et al., 2004; Lord, 2008).

As newer technologies become available, it appears that college students are communicating differently and reading less (Bromley, 2010; Emanuel et al, 2008; Fang, 2012; Fox, Rosen & Crawford, 2009; Lee, Lin, & Robertson, 2012. Researchers

(Emanuel et al., 2008) studied the amount of time college students spent reading. The length of an average communication day was 13.38 hrs. Reading accounted for 17.1% of the day, speaking for 16.1%, and writing for 11.4%. Students reported spending 63.4% of their reading time on school related materials, 36.6% on personal materials, and 37% of their time on internet reading. These findings suggested that college students would only have 2.26 hours available daily to read, and described that 63.4% of this time would be spent reading for college. This indicated that students spend less than 2 hours per day reading for college courses (Emanuel et al., 2008).

Students spend as much time listening to media as they do in interpersonal communications. Displacement theory was used by the authors (Emanuel et al., 2008) to explain how this impacts academic literacy. Displacement theory suggests that participating in one cognitive domain takes away from time and resources allocated to another cognitive domain. This concept should be considered when understanding the impact of new technologies in reducing the amount of time that students would have previously spent reading, and may contribute to the changes in reading ability and reading comprehension described in the college population. These findings also suggested a need for further research that could identify which of the newer technologies could contribute to improving reading comprehension.

Reading time and ability may also be associated with procrastination, and the student's underestimation of the amount of time required for reading. A student's perception about his/her ability to read and write has been associated with underestimation of the time necessary to complete assignments, and contributes to poor achievement, such as missed deadlines, low course grades, course withdrawal, and

academic anxiety. Higher reading ability scores were seen with lower levels of procrastination. Fear of failure explained 98% of the variance found in academic procrastination (Collins et al., 2008).

A lack of academic preparation, on admission to college, was described by faculty and students (Academic Senate for California Community Colleges, 2002; Bray, Pascarella, & Pierson, 2004; Byrd & MacDonald, 2005; Maaka, & Ward, 2000). Faculty expressed concerns that students were under-prepared in the areas of critical thinking, reading, and writing (Academic Senate for California Community Colleges, 2002). In one state college system, 83% of faculty described that a lack of analytical reading skills contributed to students not being successful in courses, and that approximately only one-third of students are sufficiently prepared for the two most frequently assigned writing tasks: analyzing information for arguments, and synthesizing information from multiple sources. Additionally, a lack of basic grammar skills was described, with more than 50% of students unable to produce papers that have no language errors. Forty percent of faculty indicated that the students' ability to tackle complex, analytical work had declined, and described student thought processes as "shallow, like sound bites" (Academic Senate California Community Colleges, 2002, p. 15). Reasons that students may be under-prepared for reading in college included that reading was not well supported in the culture, or formally taught after a certain point in the student's education. Faculty also estimated gaps in basic English coursework, and identified that only 48% of their students were able to spell accurately, and 41% were able to use grammar and punctuation accurately. Sixty-four per cent of faculty described difficulties seen in second language learners (ELLs), noting difficulty reading or writing at the

college level. ELLs were still expected to demonstrate the same competencies as other students in postsecondary education. Faculty described the belief that academic literacy was an institutional obligation and includes the concept of reading, writing, listening, speaking, critical thinking, use of technology, and habits which foster academic success (Academic Senate, 2002).

College reading was found to be an area where the students felt very under-prepared and believed that their weak areas included reading skills, vocabulary, and not being ready for the amount of reading required (Bray, Pascarella, & Pierson, 2004). Byrd and MacDonald (2005) found similar patterns when studying college readiness at a community college. Forty-one percent of incoming college freshman were under-prepared in at least one of the basic skills of reading, writing or mathematics. Using a qualitative interview (N=8), college students were asked to describe what they felt was important to be ready for college. Ten themes emerged as important and included: academic skills, reading, writing, math, technology, communication, and study skills, with reading and writing described more frequently.

The amount of postsecondary education a student receives also has a major impact on cognitive growth. The more the student is involved in coursework, use of library resources, and in reading and writing assignments, the greater the cognitive growth. For students, who entered college as average readers, significantly higher gains in reading achievement were seen than in those students who entered at below average levels (Bray et al., 2004). Bray, Pascarella, and Pierson (2004) used an exploratory study to examine factors related to the growth of students during the first three years of college (N=1054). Improvement in the ability to comprehend text, and attitude towards reading

were described as significant. Because the literature had indicated that many students, especially minority students, face barriers due to gaps between K-12 and postsecondary education, Bray et al. (2004) also looked at whether factors associated with literacy growth differed for White students and Minority students, and for students with better developed skills in comprehension and attitudes towards literacy.

Using a longitudinal study of the first three years of college at 18 different institutions ( $N = 1054$ ), linear regression was used to predict growth in outcomes. The major finding of the study was that the college experience factors associated with literacy growth varied depending on the student's race, sex, level of reading comprehension, and attitude toward literacy. These findings were found to be consistent with the long history of developmental reading programs, suggesting the need to provide different learning experiences based on different student needs, and that better literacy skills allows students to reach higher levels of education (Bray et al., 2004). The amount of time spent reading was a significant predictor on tests of vocabulary and cultural literacy. Data for this study were obtained through secondary analysis of the National Study of Student Learning (NSSL) from 1992-1995. A dropout rate of about 43% was found, consistent with previous reports of student attrition. Reading comprehension was assessed by the College Assessment of Academic Proficiency Reading Model. Inspection of the findings (Bray et al., 2004) indicated that the strongest predictor of reading comprehension was the level of reading comprehension on admission to college ( $b = -.046$ , effect size .052). A smaller, but statistically significant relationship (Bray et al., 2004) was found with the amount of postsecondary education/number of credits completed ( $b = .095$ , effect size = .052), the number of assigned books read ( $b = .132$ ,

effect size = .052), the extent to which the student perceived receiving effective instruction ( $b = .20$ , effect size = .046), and exposure to natural science and engineering courses ( $b = .044$ , effect size = .046). These gains were 3.8 times stronger for White students than for Minority students. For students who entered college as average readers, there were significantly higher gains in reading achievement, than in those students who entered at below average levels. Minority students were found to have started with a significantly lower level of reading comprehension than their White classmates, consistent with previous studies on literacy. Even after accounting for background differences and college experience, Minority students were found to be at a greater disadvantage in reading comprehension after three years of postsecondary education than they were when they entered college. The authors also found that African American students made smaller gains during college on measures of critical thinking, science reasoning, mathematics, and writing skills. For students with below average reading comprehension scores, extracurricular activity was negatively related to reading growth in college, suggesting that time away from reading may lead weak readers to fall further behind. The authors described that the findings may also be due to the Matthew effect, identified by Stanovich (1986), in which he refers, in reading, to the gap between good and poor readers. Good readers tend to read more, while poor readers tend to read less, so the good reader will become stronger and the poor reader, weaker. The good reader experiences success and is encouraged to read more, while the poor reader needs more time to complete assignments, and becomes fatigued or discouraged. While there has been considerable debate about the term "Matthew Effect" as it has been applied to education and reading growth, much of this stems from the verbatim application of the

biblical passage "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath. Gospel according to Matthew, XXV, 29"(Walberg & Shiow-Ling, 1983). The Matthew effect had been used by Walberg to explain different patterns of educational achievement and was adapted by Stanovich to explain the "rich-get-richer and poor-get-poorer patterns" of reading achievement. Stanovich (2010) described that the term was applied to model the effects that occurred in the reading process, and to describe the cumulative advantages and disadvantages that affects students in developmental reading. He described that students who gain good word recognition during the early reading experience, will be able to decode meaning more quickly, will enjoy reading more, will read more. and reading skills will continue to develop and allow the student to process and learn on a higher level. This helps educators to conceptualize the need for early remedial reading education and support, so that the student who has the advantage of access the post-secondary education, will be supported so that they do not become discouraged by poor reading, but are able to move to a higher level of reading comprehension, and the much higher level of academic and discipline specific literacy.

Spelling, also, was indicated as a quick screening for reading comprehension (Bennett-Kastor , 2004). The spelling abilities of students (n = 44) in developmental writing classes were assessed using a pseudo-word spelling test, and it was found that students in developmental writing classes misspelled more words and made more errors per word than students in college courses. The study indicated that more substitution errors using an inappropriate letter to represent a sound, especially in vowels, is a finding often seen in younger students with learning disabilities, and is consistent with the belief

that some language learning disabilities may not have been diagnosed in K-12. Pass rates in this class were low, with only 53% passing the first time, and 15% withdrawing by the end of the semester. The authors also recommend that spelling may be used as a quick screening for reading comprehension as they rely on similar mechanisms. Poor spellers, even without reading comprehension problems, may have difficulty keeping pace with reading assignments in college level courses and become discouraged. Poor spelling skills were also found in the general population, suggesting that this university's low admission standards may not be representative of other universities (Bennett-Kastor, 2004).

Studies have demonstrated, that even for students with very poor reading scores, developmental programs can improve reading comprehension and college success (Bennett-Kastor, 2004; Caverly, Nicholson, & Radcliffe, 2004; Falk-Ross, 2001). Falk-Ross (2001) followed students' progress through a series of reading and writing assignments designed to deliver relevant ways to connect marginalized students with literacy skills and strategies. Students enrolled in a developmental reading course (N=8) were reading at below 8<sup>th</sup> grade ability. After the assignments, students improved both in qualitative assessments of their written work, as well as gaining the equivalent of three grades in reading. Caverly, Nicholson, and Radcliffe (2004) conducted two studies to examine the effect of strategic reading courses on developmental readers, noting that success in college depends to a considerable degree upon the student's ability to strategically read academic texts. Lower division college students have extensive reading to do, often as much as 150-200 pages per week. The results indicated that the first group had significant post-test growth after the course. The second group, after four years,

outperformed the control group on standardized testing and the average grade in a reading intensive history course.

It is important to understand the relationship of academic literacy to the science of nursing, as well as pre-requisite science courses. Science coursework requires conceptual change, and strong academic literacy skills are necessary for conceptual change. At risk readers, who have difficulty in science coursework, will often memorize the information rather than focusing on the higher level skills of learning and understanding.

Memorization of isolated facts or concepts was found to impair the student's ability to interrelate scientific concepts. Learning science, in addition to conceptual change, was associated with persistence and effort, emerging from motivation. Failure experienced by students leads to reduced motivation to learn (Hynd, Holschuh, & Nist, 2000).

Maaka, and Ward (2004) conducted two surveys, one for instructors and one for students, to assess for agreement and discrepancies of the students' perceptions of themselves as readers, compared with faculty perceptions. These patterns were to be used to design effective classroom programs. Fifty-nine percent of students felt they were effective readers (N=236), but when rated by their instructor only 39% fell into this category. Sixty-six percent said they completed the required reading assignments, with 43% reporting one hour or less per week reading per class. Students described that a lack of time, lack of motivation to read, lack of interest in the type of reading especially textbooks, lack of background information to make connections in the reading, and difficulty reading in the language of instruction (English) were all barriers to reading.

The area of reading comprehension and college students was reviewed and described. The research described stagnant reading comprehension scores, as well as

faculty and student reports of poor reading comprehension, and inadequate preparation for the volume and complexity of reading required at the college level. The most recent national research and policy papers support the need for further research into this area (ACHIEVE, Inc., 2005, 2009, 2010, 2011; ACT, 2005, 2009, 2011a, 2011b, 2011c, 2011d ; Alliance for Excellent Education, 2011; Berman & Biancarosa, 2005; Biancarosa & Snow, 2006; Carnegie Corporation of New York, 2010a, 2010b; Fulks, 2010; Graham & Perin 2007a, 2007b; Grosso de Leon, 2005; Harvard University, 2008; Heller & Greenleaf, 2007; Hosch & Kiehne, 2011; Jacobs, 2008; Lee & Spratley, 2010; Levin, Caitlin & Elson, 2010; Moje et al., 2008; Moje & Tysvaer, 2010; Morsy, Kieffer & Snow, 2010; National Center for Education Statistics [NCES], 2009, 2011; National Governors' Association, 2005; Short & Fitzsimmons, 2007; Snow & Biancarosa, 2003; Snow, Foorman et al., 2004; Snow, Martin, & Berman, 2008; Southern Regional Education Board, 2009; Zucker & Carel, 2012). These findings may also be associated with changes in admission policies, changes in standardized testing such as the SAT, changes in the population of students being admitted to college, and multiple "literacies" that students bring to college. The research also suggested that while many students are prepared to comprehend basic introductory texts, they lack higher level critical thinking and processing skills, which involves the synthesis of previous knowledge and the construction of new knowledge necessary for the higher level of academic literacy expected in nursing education (Pawan & Honeyford, 2009). This may explain why many students are successful in introductory coursework and have a high GPA on admission to the nursing major, but subsequently experience academic failures in nursing coursework. Variables associated with student perceptions of their reading abilities were used to

develop a student questionnaire to assess students' perceptions of their college reading experiences, and barriers to reading comprehension in nursing education.

### **Reading Theory**

“Reading proficiency is a long term developmental process” (RRSG, 2002, p.9). Generally, reading theory and literacy education begin as reading instruction in public schools in the primary grades, where children "learn to read". A myth which has been identified as a barrier to the development of proficient college-level academic literacy, was the belief that if students could read well by the third grade, these skills would continue to develop through grades 4-12 (Carnegie Corporation of New York, 2010a; Snow & Moje, 2010). It has been identified that students lose gains made in early reading proficiency by grade 10 and are not prepared to do college level work.

A large body of research of early academic literacy and reading has provided a strong understanding of the prerequisites associated with successful reading education. Successful initial reading instruction, with the ability to read words accurately, provides the foundation for strong reading comprehension ability. Good oral language skills, including a large vocabulary and good listening comprehension, well developed prior world knowledge, interaction on a large socio-cultural context both in the classroom, home and community, and good exposure to literary experiences are associated with strong reading comprehension. Gaps in this literature included understanding the best approaches to remedial education for many different demographic groups including socially, economically, and educationally disadvantaged students (Carnegie Corporation, 2010; Flippo, 2011; Short & Fitzsimmons, 2007; RRSG, 2002).

In the 1970's, reading theories emerged with the brain being viewed as a self-monitoring system, necessary for the development of good reading comprehension. In Gough's 1972 theory, he viewed reading as a "linear hierarchal process from the smallest units of analysis (letters) to the largest (text meaning) and that each level of analysis triggers the next higher level, eventually leading to understanding the meaning of the text" (Lipson &Wixson, 2003, p.2). Sub-processes embedded in this theory included that the initial formation of a visual image which moves to letter identification, and then to the assessment of memory for identification (Lipson &Wixson, 2003). In LaBerge and Samuel's 1974 theory, they viewed reading in terms of component processes related to different levels of memory and their functions depending on the task. The authors describe that this is not a linear process as different memories may be used in different patterns (Lipson &Wixson, 2003, p. 2).

Interactive models such as Rumelhart's (1977) model describe that "readers process text in a flexible manner, using different information sources available at that time, and that analysis is a mixture of both higher and lower levels of processing" (Lipson &Wixson, 2003, p. 6). Capacity processing models suggest that people have a limited processing capacity, often juggling multiple sub-processes at one time. Reading does not represent a single skill, but involves multiple competencies developed over a long period of time. Reading requires a higher level of processing and memory, which can slow reading comprehension. Based on the difficulty and complexity of the text, and the need to integrate information from multiple sources, the slow reader may become more frustrated when trying to complete large, complex reading assignments, and may experience poor academic outcomes.

The concept of automaticity was also used to describe that as the reader develops proficiency in lower level sub-processes, they become automatic. This allows the reader to be able to move to and manage the higher level cognitive processes of critical reading and critical thinking. Information processing theories described how the reader uses multiple sub-processes to understand text, but limitations can include social and cultural factors which impact reading comprehension (Lipson & Wixson, 2003). Failure to consider socio-cultural factors may be a barrier for the minority student, both in the classroom and with the use of standardized college admission tests.

Different competencies, associated with strong reading proficiency, have been identified and include: cognitive capacities of attention, memory, and critical analytic ability; inferencing; visualization ability; motivation; reader self-efficacy; and different types of knowledge which can include vocabulary, domain, and topic knowledge, linguistic and discourse knowledge, and knowledge of reading comprehension strategies. Motivation and self-efficacy changes over time, depending on the reader's positive or negative reading experiences. Fluency, or quick and efficient word recognition, was associated with strong reading comprehension skills, and appeared to continue to develop with additional reading assignments (Hannon, 2012; RRSg, 2002).

Social theories interact with cognitive models, and explained the impact of culture on language development and thought processing. Underpinnings of social theories of language and learning are framed by the concepts "that meaning is not an individual construction, but a social negotiation that depends on supportive interaction and shared use of language" and that "knowledge is constructed through an individual's interaction with their environment" (Lipson & Wixson, 2003, p.7). Learning to read occurs in many areas outside of the classroom. This many explain why significant

reading gaps persist for many different demographic student groups. Economic disparities, neighborhood and school culture, social practices, poor school funding and resources, less experienced teachers, and less and later exposure to reading opportunities are seen as contributing to persistent, minority student gaps in reading proficiency (RRSG,2002).

National reading tests indicated that minority students scored below the normative standards for grades 4, 8, and 12 (NCES, 2009, 2011). This was also seen in much earlier research done by Jimenez, Garcia, & Pearson (1996), identifying that research on cultural aspects of literacy, related to differences in academic achievement, was extremely limited. This research indicated that students who demonstrate good reading comprehension are able to draw upon a large body of prior knowledge, utilize reading strategies effectively, and because of this are able to devote a large amount of their cognitive resources to the reading assignment. Less successful Hispanic students frequently encountered difficulty with vocabulary, used fewer strategies, and were less able to resolve difficulties in either English or their primary language. The authors suggested that “native-like literacy proficiency” (p. 93) was often difficult for ELL students to achieve. Bilingual adults, with proficiency in both languages, tended to read slower in both languages, yet appeared to be more proficient in reading when it was done in their primary language (Jimenez et al., 1996). Adult English language learners, (ELLs) with strong oral skills, may still lack skill in written language, and have difficulty interpreting and applying printed materials to learning. Two of the more influential components for English language learning included vocabulary and syntactic proficiency, with experts suggesting a minimum 3000 word vocabulary to be able to read independently in a second language (Burt, Payton, & Adams, 2003).

Vocabulary development was significant to reading comprehension (Flippo & Caverly, 2000; Jimenez et al., 1996; Lipson & Wixson, 2003; RRSB, 2002). Beginning early in childhood, a preschooler's vocabulary grows by about seven words per day, or 2,500 to 3,000 words per year. Adequate vocabulary development allows the student to infer and learn the meaning of new words and concepts, as well as rapid word identification. This is barrier for students who have not acquired these skills in early grades or for ESL/ELL students (Short & Fitzsimmons, 2007). Readers need to be able to immediately recognize "high-potency words" including their own or family member's names, and high-frequency words as *the, but, as, where, there, when, then*. It was assumed that readers would develop these skills early, but research demonstrates that many have not acquired this skill by 7<sup>th</sup> or 8<sup>th</sup> grade. Students who have not had adequate early reading exposure may not have acquired these basic words, and continued to struggle with reading comprehension (Lipson & Wixson, 2003).

At the college level, vocabulary acquisition was impacted by the student's active involvement in applying processing strategies. Different levels of processing are associated with advanced vocabulary acquisition, to not only quickly recognize and understand the meaning of the word, but to apply it on a contextual level (Francis & Simpson, 2009). Vocabulary recognition is an underpinning of reading rate and fluency, and students who struggle to read at an adequate rate use resources needed for comprehension. Fluent readers are described as being able to "read text with speed, accuracy, and proper precision" (Lipson & Wixson, 2003, p. 31).

Metacognition describes the "student's knowledge of and control over their own learning activities" (Lipson & Wixson, 2003, p. 35), and was associated with the

philosophy that students are responsible for and need to be self-directed in their learning. Students with this ability are able to identify difficulty with the written material, and quickly use the appropriate strategies to solve the problem.

Other factors associated with poor reading skills included students' social and emotional development. Poor concentration, poor social interaction with peers, difficulty concentrating, and any physiological or psychological problems are additional barriers to reading comprehension and learning. Two areas of physical development, hearing and vision were significant, as the areas of perception, attention and memory are associated with development of reading and writing comprehension (Lipson & Wixson, 2003, p.33-49).

Multiple fragmented theories of reading exist, and reading experts describe a need for a unified theory of reading to improve outcomes. Most important for student success is the ability to construct meaning from text, which relies on critical theory and metacognitive processes and awareness (Sadoski & Paivio, 2007). Sadoski & Paivio, (2007) described "the relative youth of reading as a science" to explain the development of scientific theories of reading. Multiple early theories looked at reading from multiple perspectives. Bottom-up models described how readers extracted information from texts and viewed reading as the "process of gathering visual information from the text and synthesizing the information through different systems in the brain that identify letters, map them onto words (word recognition), and analyze words in clauses and sentences (syntactic parsing)" (Burt et al., 2003, p. 24). Readers progressed from learning letters to words to phrases or sentences, and finally to developing meaning from reading. Top-down models evolved from this concept, with the underlying philosophy that readers are

actively involved in the reading process, and acquire meaning from the text (inferencing) and through the use of previously acquired knowledge. Interactive models such as Learners' internal models describe that as learners are exposed to literacy, the development of individualized models of reading occur. If the student relies too much on certain processes, such as decoding, this may affect reading comprehension. Key skills identified as necessary for successful reading included phonological processing, vocabulary recognition, syntactic processing, and schema activating (Burt et al., 2003).

Reading experts described the need for a unified theory of reading comprehension for the secondary and post-secondary student populations and adult learners. While many micro-theories exist (e.g. bottom-up models, top-down models, interactive models, learners' interest models), the Dual Coding Theory (Paivio, 2007; Sadoski & Paivio, 2001, 2004, 2007) is representative of a comprehensive theory of reading comprehension, building on previous smaller, fragmented reading theories. The Dual Coding Theory (DCT) is a "general theory of cognition", or a "general theory of the mind applied to literacy" (Sadoski & Paivio, 2007, p. 350). This theory includes the basic principles of decoding, comprehension, and response, and applies the basic building blocks of reading to a broader, unified theory of literacy. The basic principles of the theory include the description of two separate codes: the verbal code which is useful for "representing and processing language in all its forms, including speech and writing, whereas the nonverbal code deals with the representation and processing of nonverbal objects, events, and situations" (Sadoski & Paivio, 2007, p. 222). The authors described that "all knowledge, meaning, and memory is explained by representation and processing within and between the two codes" (Sadoski & Paivio, 2007, p. 222). Words are defined "as verbal labels for

concepts" (Sadoski & Paivio, 2007, p.222). Dual coding theory explains the reader's ability to acquire sight vocabulary and develop meaningful vocabulary as well as the stages of spelling development (Sadoski, Willson, Holcomb, & Boulware-Gooden, 2005). In this theory, vocabulary is described as a central factor in reading ability, as well as for decoding, comprehension, and reading rate. Decoding involves "converting a written word to a spoken language or covertly to an inner language" (Sadoski & Paivio, 2007, p.341). Comprehension involves the "construct of meaningful interpretation as a mental modality of the text , and is typically seen as occurring at levels such as literal, inferential, and interpretive/critical" (Sadoski & Paivio, 2007, p.341). The concept of response overlaps with comprehension, and involves "affect, appreciation, and/or application" (Sadoski & Paivio, 2007, p. 341). Connections between previously learned speech forms and new written forms, associated with phonemic decoding, allows the student to learn to read. Meanings of words are determined by verbal and nonverbal representation, and situational context.

This theory described the learners' developmental and individual differences, including variations in reading skill and imagery. Physiological variables also affect the outcome of educational interventions and must be considered in the understanding of a student's ability to process written information. Research from the neuropsychology domain, correlating brain areas and their activity in developing reading ability, suggests that the left brain hemisphere is more specialized for verbal tasks, while the right hemisphere is more associated with imagery tasks (Sadoski & Paivio, 2001, 2004, 2007).

Reading is viewed as a long-term, interdisciplinary, developmental process. Multiple, fragmented theories of reading exist. These theories describe similar variables

which contribute to the ability to be able to read, and to progress to proficient academic literacy, and the higher levels of critical reading and critical thinking. These include: successful initial reading instruction; sight recognition of letters; word spelling development; a large vocabulary for fluency and quick word recognition; a well developed prior knowledge from a large socio-cultural context and memory; physical characteristics such as hearing and vision; psychosocial and emotional development associated with self-efficacy, motivation, and metacognitive strategies. These skills contribute to the ability to decode and comprehend written materials, to reading rate, and to the response to written materials. Previous beliefs, including the assumption that a child who demonstrated the ability read well during elementary school years would continue to develop these skills in middle and high school education, are barriers to the development of strong academic literacy skills. Limited research associated with social theories of reading exists to describe barriers to academic literacy for ELL learners, even for those who received most of their education in U.S. school systems. Different variables contributing to reading difficulties for ELL learners include: limited letter recognition associated with initial learning done with a different alphabet, different symbols, or limited exposure to written work; a limited English vocabulary, despite a proficient vocabulary in a native language; and different socio-cultural exposures. Experts have suggested that a minimum 3000 word vocabulary is necessary to read in a second language. This is a topic of concern as equal access to college/ university education policies have not included a understanding of the level of reading comprehension necessary for students' academic success.

The U.S. school systems are seeing a significant increase in the numbers of ELLs associated with rising numbers of immigrants, demographic trends, and demands of the global economy. Fifty-seven percent of ELLs were born in the U.S., and are 2nd or 3rd generation immigrants, but large numbers struggle with reading proficiency in the secondary schools. Experts have described the population of ELLs as doing "double the work", learning a second language while developing their proficiency in academic English, while also studying core content areas (Short & Fitzsimmons, 2007).

A newer area of academic literacy has emerged in the literature, "disciplinary literature" (Carnegie Corporation, 2010a). It is now known that each content specific area has its own content literacy. Reading experts suggest that the discipline-specific faculty should know how to teach the basic approach to academic literacy within that discipline, and that all educators need to have a strong understanding of their discipline-specific challenges (Carnegie Corporation, 2010a).

While a strong body of research and interventions exists for the early reading population until about grade 4, there is a critical need for research into the fields of adolescent literacy, ELL literacy, and postsecondary academic literacy. Early literacy education has been described as "learning to read", but a lack of research into the concept of adolescent literacy and disciplinary literacy, or "reading to learn" has been associated with a large population of high school students graduating without the tools needed for college and career success. There is also an identified need not only to understand the gaps in minority literacy, but gaps in evidence-based knowledge and best practices to support the successful transition from high school to college and career readiness. As experts have recommended the need for more comprehensive theories of reading to meet

the needs of adult language learners, the Dual Coding Theory (Sadoski & Paivio, 2001, 2004, 2007) that builds on previous fragmented reading theories, was selected to guide this research.

### **Other Factors Affecting Nursing Student Attrition**

While reading comprehension and nursing student attrition has not been researched, other factors have been identified that may also impact nursing student attrition. Although, this study does address the impact of these other factors on attrition, they will need to be considered in future research investigating this concept.

Multidimensional factors affect undergraduate nursing student retention and success. Significant student profile characteristics identified by Jeffrey's NURS model (2004) included age, ethnicity, gender, language, prior educational experience, family's educational background, prior work experience, and enrollment status. More older students have returned to college, especially with the current economic changes, and myths associated with this population can be barriers to retention and timely program completion. Additional role responsibilities were described for this population, and studies have suggested that older students, when in the minority, often experience feelings of differential treatment, uncertainty, powerlessness, and low confidence.

Studies also suggested that for traditional students, social integration and college adjustment are important retention predictors (Jeffrey, 2004; Tinto, 1993). Study results looking at age as an academic predictor of retention and success are varied. Longer persistence times, a higher risk of attrition, and being less academically prepared are some of the themes found in the research. However, Jeffrey (2004) also described studies that suggested that older students have developed better study habits, more goal

commitment, greater motivation, better time management, more self-direction, and a preference for adult learning strategies.

Gender barriers to retention in nursing education should be considered, as men remain an under-represented minority in this profession. Covert and overt biases have been described as well as unequal opportunities in the clinical setting, feelings of loneliness, isolation, self-doubt, as well as lack of role modeling and professional socialization (Jeffreys, 2004).

Prior educational experiences must also be assessed when considering attrition and nursing students. Pre-college variables representing high school performance are appropriate for the traditional student, but are not as useful for the nontraditional student. For diverse student populations, it was recommended that standardized tests such as the SAT or ACT, and GPA should not be the only admission predictors considered. Other variables to consider included the type of secondary school programs (college preparatory, honors, advanced placement, vocational, technical, or general), gaps in educational experiences, the location and language of previous education. Gaps in education may indicate the need for refresher or remedial courses. Prior educational experiences may also help to evaluate whether the student understands the rigor of nursing coursework and time demands. It is also important to consider where students have done prerequisite coursework, especially science courses, as transferred science courses may not reflect grades earned in the nursing college's institution (Jeffreys, 2004). Students educated outside of the U.S. present different concerns. Difficulty in evaluating previous coursework, different standards and grading, and faculty expectations may be barriers to retention. When assessing prior educational experiences, Jeffreys suggested

using the following variables: “number of course withdrawals, repeats and failures; overall GPA; science course grades; and transfer history” (2004, p. 24).

Family educational background must also be considered, as first-generation college students are at greater risk for attrition. The parent’s level of formal education has been highly correlated with a student’s success in college. This is significant, as nursing education has seen larger numbers of first-generation college students. Prior work experience should be examined, especially in today’s economic climate, as more people are returning to work, and/or seeking second careers. Prior work experience was associated with a commitment to task, time management, meeting responsibilities, and familiarity with the work environment needs. Prior work experience can be a barrier to retention as students may have difficulties adjusting to the new role, critical thinking, and decision making associated with difficulties changing previous patterns of behaviors and worldview. Students may also demonstrate overconfidence in their performance, associated with inadequate preparation for coursework (Jeffreys, 2004).

Other areas to assess when considering retention are the affective factors of cultural values and beliefs, self-efficacy, and motivation. Jeffreys included cultural values and beliefs in the NURS model as they “consciously or unconsciously guide thinking, decisions, and actions that ultimately affect retention” (2004, p. 43). Cultural congruence is “the degree of fit between the student’s values and beliefs and the values and beliefs of the surrounding environment” and that “a high level of cultural congruence is associated with positive academic and psychological outcomes and persistence and retention” (Jeffreys, 2004, p. 43). These factors include “individual and group orientation, time perception, verbal communication, nonverbal communication, household responsibilities,

health, education, teacher, work habits, help- seeking behaviors, and persistence” (Jeffreys, 2004, p. 45).

Academic factors which also affect retention included personal study skills, study hours, attendance, class schedule, and general academic services. Included in personal study skills are high levels of ability in reading, writing, studying, listening, note taking, and paper presentation. Behaviors that supported good personal study skills are self-direction, detailed planning, and task focused goals. Behaviors which were barriers to strong study skills included self-handicapping, learned helplessness, procrastination, defeatist attitudes, task avoidance, and task irrelevant behaviors. Time management, organization, and planning skills were better predictors than the number of hours the student spent studying. The number of study hours was associated with retention, however, there was no specific number of hours identified (Jeffreys, 2004).

Environmental factors, external to the academic process included financial status, family financial support, family emotional support, family responsibilities including childcare arrangements, family crisis, employment hours and responsibilities, encouragement by outside friends, living arrangements, and transportation (Jeffreys, 2004).

One study was found in which the authors described the impact of work hours on academic performance (Reyes, Hartin, Loftin, Davenport, & Carter, 2012). The authors found a statistically significant negative relationship between students who worked at least 16 hours per week and academic performance, especially in high-attrition courses.

Professional integration appeared to be significant for the student when they must make a decision to withdraw or continue. Faculty advisement was associated with

promoting feelings of self-worth, providing assistance and presence. The most significant times that faculty advisement and support appeared to occur was outside of the classroom, and was seen as an informal professional socialization experience for the student, promoting professional growth, development, and integration (Jeffreys, 2004).

Three academic outcomes were significant for nursing student retention; learning, personal growth, and satisfaction, which in-turn impacts self-efficacy, motivation, persistence, and retention. Strong academic performance coupled with positive psychological outcomes resulted in persistence. Students make persistence and attrition decisions during and after each nursing course, so course grades help students to determine those decisions. Jeffreys suggests that nursing course grades, nursing GPA, and total GPA allow for identification of at-risk students and earlier interventions (2004).

Psychological outcomes for the nursing student are satisfaction or dissatisfaction and stress. Dissatisfaction was defined as the “emotional disconnect that arises from the discrepancy between expected academic, developmental, personal, and/or professional outcomes from the nursing educational process, and what actually occurs” (Jeffreys, 2004, p.127). Overall, these outcomes were found to be more significant for females than males. In high achieving minority students, low levels of satisfaction were associated with a greater risk for attrition (Jeffreys, 2004). A mild degree of stress (positive stress) was described as stimulating and increased attention and preparation, however unmanageable (negative) stress negatively affects academic outcomes. In addition to rigorous academic expectations, nursing programs have different stressors than other college programs, especially the clinical experience (Jeffreys, 2004, p. 132).

Ethnicity and race were described as significant predictors of attrition. Most minority groups continue to be underrepresented in higher education and nursing education. Research has shown that minority students have high attrition rates in nursing education. Barriers associated with the lack of diversity in nursing include “real or perceived stereotyping, prejudice, discrimination, and racism, as well as lack of role models, peer solidarity, and social integration” (Jeffreys, 2004, p.16-17). “Motivation, achievement, and retention can be impacted by prior experiences with stereotyping, prejudice, discrimination, and racism as students fear repeating these experiences” (Jeffries, 2004, p. 17). The belief that these issues are not found on college campuses can be a barrier to retention, creates feelings of isolation, stress, and cultural pain, and blocks the development of culturally sensitive campuses (Jeffreys, 2004).

The NURS theory of nursing student retention created two categories of nursing students, traditional and non-traditional. Traditional nursing students were defined as a “nursing student who is enrolled in an entry level undergraduate nursing program” and who “meets all of the following criteria: (1) age 24 or younger, (2) resides in campus housing or off-campus housing, (3) enrolled full-time, (4) female, (5) White and not a member of an ethnic and/or racial minority group, (6) speaks English as a first language, (7) has no dependent children, (8) has a U.S. high school diploma, and (9) requires no remedial classes” (Jeffreys, 2004, p.7). Based on the literature review, it appears that few students may fit this profile of the “traditional” nursing student. Therefore, it may no longer be appropriate to describe students as traditional or nontraditional, and further research is indicated to understand who the current nursing student population is and their learning needs.

An emerging body of research (Seaton, Marsh & Craven, 2010; Marsh, Trautwein, Ludtke, Baumert & Koller, 2007) described the effects of the little-fish-big-pond theory on students' academic self-concept. While previous literature reported poor student academic achievement as a result of attending lower performing school systems, this research demonstrated that attending high-ability schools also had a negative effect on students' academic self-concept. Students who attended high-ability schools were found to have a lower academic self-concept than those educated in a low- or average-ability environment. This phenomenon was found to be substantial at the end of high school and two to four years later.

Reading achievement gaps still exist between minority and white students. The ACT reported that approximately 53% of students tested in 2009 met the college readiness benchmark in reading (ACT, 2009). Just one in four students met all four college readiness benchmarks in English, reading, math and science. Sixteen percent met one benchmark, 18% met two benchmarks, 15% met three, and 23% met all four benchmarks. Twenty-eight percent met no benchmarks. The ACT (2009) also reports that, in the past, students who took the minimum recommended college preparation curriculum in high school were more prepared to enter college. In recent years, their data indicated that even students, who take a number of additional high-level courses beyond the minimum core curriculum, were not always ready to enter college.

College readiness benchmarks for the high school graduates have not improved (ACT, 2009, 2012). The percentage of students meeting all four benchmarks was 23% in 2009 and 25% in 2010. When the data were broken down to compare different student populations, two populations scored above 23%. For Caucasian American/white

students, the score for all four benchmarks was 28%. Thirty-six percent of all Asian American/Pacific Islander students met all four benchmarks. Only 4% of African American/Black students, 10 % of Hispanic students, and 11% of American Indian/Alaskan Native students met all four benchmarks (ACT, 2009; 2011a).

Data suggest that the healthcare professions have not kept pace with the national demographic trends and changing health care needs, evidenced by the persistence of healthcare disparities and poor healthcare outcomes for certain population groups (Sullivan Commission, 2004). Today's healthcare professions, including nursing, "do not resemble the diversity of the populations they care for, leaving many Americans excluded by a system they feel is distant and uncaring" (Sullivan Commission, 2004, p.1).

Arguments related to access and opportunity in postsecondary education included the discussion that remedial education opens the door to a more diverse student population, and provides students with necessary tools for college success. Although, there has been an increase in the recruitment of larger numbers of students from different racial and ethnic groups entering baccalaureate nursing programs, similar trends are not seen in the workforce. An insufficient number of minority students graduate, limiting the development of a diverse registered nurse workforce (Childs, Jones, Nugent, & Cook, 2004). Additionally, 20,000 more minority nurses are needed if the proportion of minority nurses is to increase by just 1.0% (HRSA, 2002). Minority nursing students are less likely to graduate from nursing programs. Baccalaureate degree completion data for 1995 indicates that 83.1 % of white students graduated from nursing programs compared with a graduation rate of 7.9 % for African American student and 4.4% for Hispanic students. In 2011, the percentage of minority students enrolled in baccalaureate

degree programs was 12% African American, 8% Asian/Pacific Islander, 1% American Indian/Alaskan Native, 6% Hispanic, and 6% other (NLN, 2012).

The Sullivan Commission (2004) described that barriers in the nursing education pipeline begin early in the primary and secondary schools, where minority students often receive a lower quality K-12 education, score lower on standardized testing, and are less likely to complete high school. Minority students also faced barriers to gain admission to a health professions school. This included an “over-reliance on standardized tests in the admission process, unsupportive institutional cultures, insufficient funding sources, and leadership not committed to diversity” ( Sullivan Commission, 2004, p.6).

As more colleges of nursing use standardized entrance examinations to best identify students with the probability of program success, standardized tests may be “windowing students out” by identifying areas of academic deficiencies too late in the college program sequence. Currently, many colleges require institution specific exams for writing and math, yet no literature could be found which described the minimum level of academic literacy expected for the pre-nursing student, or for successful program completion. A lack of diversity among health care professionals (HCPs) continues to receive considerable attention. Historically, white women continue to dominate the nursing profession. Although there has been an increase in the numbers of students from different racial and ethnic groups entering nursing programs, the number who graduated has not been comparable. Without established retention initiatives in place, the attrition rates for students from diverse backgrounds exceeds the recruitment rates, and the nursing workforce does not reflect the changing demographics of the U.S. population (Childs et al., 2004). One of the factors contributing to the low number of minority

nurses was the high attrition rate of foreign-born/minority nursing students from schools of nursing. Exact numbers are not available, but it was estimated that the attrition rate of foreign-born/minority nursing students may be as high as 85% in some schools of nursing (Stewart, 2005). Minority students were less likely to graduate from a four-year college than White students. Approximately 30 % of White students graduate with a four-year degree, compared with 17 % of African American students, and 11 % of Hispanic students.

Multiple factors have been identified that appear to play a part in academic difficulties in college, and to persistent attrition from nursing education programs. Some research has begun to suggest that poor academic literacy plays a role in persistent attrition, but this concept has not been clearly described in the literature suggesting a missing variable for academic success of all students. This study described the concept of reading comprehension as measured by the Nelson Denny Reading Test and nursing education attrition.

### **Standardized Reading Tests**

Published research from 1999-2013 did not reveal any studies related to standardized reading tests and nursing students. Two types of standardized reading tests are available. Screening tests are used to quickly evaluate large populations to determine if a reading deficiency does exist, and diagnostic tests are used for a more comprehensive student assessment that is necessary to create an individual program of remediation (Flippo & Schumm, 2009). Normative referencing of standardized tests should reflect the population being tested. The norm group should be described in terms of age, sex, educational level, socioeconomic status, race, geographical status, and size. Reliability

coefficients of .90 or higher are recommended to make informed decisions about individual students, but the authors suggests that a reliability coefficient of .80 or higher was highly correlated. Local norms repeated over time should be done to ensure adequate representation of all populations (Flippo & Schumm, 2009).

The following tests are appropriate for testing reading comprehension in the college population: *the California Achievement Test, Fifth Edition (CAT/5), Levels 20, 21/22, 1992 edition; Terranova Performance assessments, the 2<sup>nd</sup> edition (CAT/6), 2005; Degrees of Reading Power (DRP), standard and advanced forms, 1995 edition; Gates-Macginite Reading Tests, Forms and T 4<sup>th</sup> edition, 2006; Nelson-Denny Reading Test (NDRT), Forms G and H, 1993; ACT Asset Student Success System, 1993; Computerized Adaptive Placement Assessment and Support System (COMPASS), 2006 (Flippo & Schumm, 2009).*

Multiple tools for structured reading comprehension are available. Informal reading inventories (IRIs) are “individually administered reading tests composed of a series of graded word lists and graded passages that the student reads aloud to the examiner” (Lipson & Wixson, 2003, p. 313). This category of testing allows the student's reading level to be identified. Limitations of IRIs are that they must be done individually, take 30-90 minutes to administer, and are done orally with both the examiner and student. IRIs are considered to be an informal assessment tool for the class instructor and are viewed as having limited use, as there is no evidence that reading levels established are consistent with classroom performance (Lipson & Wixson, 2003, p. 328). Other tests for informal reading assessment included the *Shipman Assessment of Work-Study Skills (SAWS)* (1984); the *Content Reading Inventories: English, Social Studies,*

*Science* (1979); or the *Group Reading Inventory* (2001) (Lipson & Wixson, 2003, p. 330-337). Other informal assessments included words lists, spelling inventories and evaluation of writing samples (Lipson & Wixson, 2003).

Formal reading comprehension assessment allows for standardized administration, scoring and interpretation. Concern for validity was important when evaluating standardized tests and for reading comprehension testing. Validity is the “degree to which evidence and theory support the interpretation of test scores entailed by proposed use of tests” (Lipson & Wixson, p. 380). Grade norms are widely used and are based on average scores earned by students in a series of grades. Scores are reported in years and months (e.g. 5.7 represents grade 5, 7<sup>th</sup> month) (Lipson & Wixson, 2003). Limitations of grade scores included that different scales are used for different tests, and grade norms may not reflect performance standards. In the past, standardized tests have been described as not representative of the diverse populations being tested, and that poor test performance may be more representative of less familiarity with the topic, rather than reading comprehension. New versions had been revised to reduce this bias, and include a more culturally competent approach to testing reading comprehension (Lipson & Wixson, 2003).

Another consideration when selecting a standardized test instrument is the methodology that will be used for test administration. Three types of test administration are described: live performance testing: traditional pencil and paper (PPT, PNP, or P&P); and computer-based testing (CBT). Different formats of computer based testing continue to emerge including sequential testing (CCT, CMT,) and computer adaptive testing (CAT). If cost is a consideration, performance testing is the most costly. Computerized

testing is also more expensive than the traditional paper and pencil format. While paper and pencil testing was described as the least sophisticated method, it is the lowest cost method, and offers the greatest control over security. Paper and pencil testing is also limited to administration in small, specific periods of time. Computerized testing allows scoring the time of administration, and continuous administration at multiple sites, but has higher security risks associated with increased accessibility.

A variety of standardized tests exist and faculty must consider both use of outcomes and the population. Test takers must be viewed as stakeholders in the process and need to understand the testing process. Survey tests are used to compare the performance of students or groups of students for norm-referenced achievements in multiple academic areas. Advantages include the ability to screen large numbers of students in specific areas, ease of administration and scoring, and to be able to identify students with serious problems (Flipppo & Schumm, 2009). It was described that there is no perfect test available at present and that all available tests are lacking in some way. While the overall conclusion was that better tests are needed, the NDRT was best suited to meet this study's needs.

The research was used to guide the selection of the Nelson Denny Reading Test (NDRT) for this study. The NDRT predicts success in college courses, diagnoses strengths and weakness in vocabulary, comprehension, and reading rate. It is also used as an initial screening tool to identify students who need special help in reading, or who could benefit from advanced placement (Brown et al., 1993a).

The NDRT is norm-referenced for high school and community college students, as well as four-year college students. An extended time version is available to assess

reading comprehension in student populations with identified needs. Attention has been paid to cultural diversity, and normative samples include both genders, and a wide range of ethnic backgrounds. The test can be administered in a typical college period and is described as appropriate for pre-professional and pre-graduate students (Brown et al., 1993a). Normative data for graduate healthcare professions students is also available for comparison (Haught & Walls, 2002).

The current literature summarizes that new reading assessments are needed to address the current diverse student populations and the adolescent literacy crisis. Nationwide, many high school districts are working to develop standardized senior exit reading assessments and common core standards, but it is not anticipated that this process will be available until, at the earliest, sometime in the 2014 academic year (ACHIEVE, 2010; Common Core State Standards, 2011; Porter, McMaken, Hwang, & Yang, 2011). Until newer tests are available, it remains necessary to select the best existing test for the required purpose. While the NDRT and many of the "older" reading tests were benchmarked during the early 1990s, national reading scores have remained essentially unchanged for several decades (NCES, 2009, 2011) and a lack of adequate standardized reading assessments was identified as contributing to a poor understanding of adolescent literacy (Carnegie Corporation, 2010a).

An overview of the different types and indications for administration of standardized reading tests was described and used to guide the selection of the NDRT for this study (Brown et al., 1993a, 1993b; 1993c).

**Summary**

This chapter presented an integrated review of the literature related to academic literacy, reading comprehension and nursing education. The literature was presented in a sequence that was illustrative of the construct of reading comprehension. No research could be found which describes the level of academic literacy necessary for successful completion of nursing programs, or normative standards for the nursing student population. Evidence, from the disciplines of education, neurology, and psychology, related to academic literacy was presented. Theories of reading comprehension and nursing student attrition are presented. A review of current reading assessment examinations was presented and used to guide selection of the best instrument for measuring reading comprehension in the nursing student population.

## **CHAPTER III**

### **Methods and Procedures**

#### **Introduction**

The purpose of this chapter was to present a detailed outline of the methods and procedures used in this study. Specifically, procedures included the study design, sample description and selection, institutional approval, instrumentation, data collection and analysis. Research in this area is useful to describe the concept of reading comprehension as a possible missing variable contributing to nursing student attrition

#### **Design**

A descriptive, exploratory, quantitative, non-experimental design was used as the project was focused on describing the level of reading ability of pre-nursing and senior nursing students (Polit & Beck,2012). Utilizing a non-experimental (observational) design, the designated independent variable “group” was not experimentally manipulated, yet the researcher wanted to compare the pre-nursing and senior nursing students (Polit & Beck,2012). Because the researcher was comparing two non-experimentally manipulated groups of students, it is possible that the pre-nursing and senior nursing students differed in many respects that could affect the outcome of interest, performance on the Nelson Denny Reading Test (NDRT). Thus, the design utilized does not provide information regarding the equivalence of the two groups of students before their reading performance was evaluated.

The following research questions were addressed:

1. What is the level of reading comprehension of baccalaureate college/university students admitted to a pre-nursing program?

2. What is the level of reading comprehension of baccalaureate college/university senior nursing students?
3. Is there a difference in the level of reading comprehension found between the pre-nursing student group and the senior nursing student group?
- 4a. Is there a difference between pre-nursing and senior nursing students' reading comprehension scores and existing norms for college/university students (Brown et al., 1993c, p. 35-38)?
- 4b. Is there a difference between senior nursing students' reading comprehension scores and existing norms for healthcare professional students (Haight & Walls, 2002, p.228-238)?
5. Is there a relationship between demographic variables (age, sex, ethnicity, full-time or part-time student, primary language, working during academic year and number of hours worked per week, hours spent reading for assigned courses, number of failures or withdrawals from nursing courses, type of high school) and the students' reading comprehension scores?
6. What are the pre-nursing/senior nursing students' perceptions of their reading ability?

### **Description of the Study Sample**

The study setting was a public, four year university in a major city in the Northeast. The university was classified as a Carnegie public masters I institution and an balanced arts and sciences/professions undergraduate instructional program. The institutional size classification was 5000-9999 students. The university was accredited by the Commission on Collegiate Nursing Education (CCNE), and approved by the National

Council of the State Board of Nurse Examiners. The students in the study were enrolled in a plan of study leading to a baccalaureate of science degree in nursing.

The university census, completed in 2011, identified that 73% of the student population were White-non Hispanic, 8% were Black-non Hispanic, 12% were Hispanic and 3% were Asian. The six-year graduation rate by race/ ethnicity for students completing baccalaureate degrees was described as: White 45%; Black 45%; Hispanic 45%; Asian 41% (NCES, 2012).

Two sample groups of students were recruited: pre-nursing and senior nursing students. A convenience sample was used. Students included were at least eighteen years of age and able to read and write English. The students gave their voluntary consent to participate in the study. During the study time frame, there were no major curricular changes made at this institution.

A pre-nursing student was an individual who was enrolled in classes to prepare for admission into a professional nursing program. For the purpose of this study, this describes a baccalaureate college student who had declared nursing as their major, and was in the process of taking required courses to apply for a seat in the nursing major. Second degree students were excluded from this study. A senior nursing student was a student enrolled in a baccalaureate college nursing major, who was in their last semester of coursework or had graduated from the program no longer than six months prior to participating in the study. Second degree students were excluded from this study.

No prior studies describing academic literacy and nursing students were found. Therefore, the current study was identified as a preliminary study, which Beck (2012) describes as a needs assessment for the purpose of "assessing the need for special

services" (p.267). A minimum sample size of 44 students in each group was identified after a power analysis was completed. Selecting the level of significance was described by Cohen (1998) as setting the research policy and represents the maximum risk that the researcher is willing to take. The standard for alpha is .05 (Cohen, 1998; Polit & Beck, 2012). This reflects the level of risk of committing a Type I error, or rejecting the null hypothesis when it should have been accepted, five times out of one hundred. Beta reflects the conventional power standard of .80, leaving a 20% risk of committing a Type II error, and concluding that no difference between two groups exists (Cohen, 1998; Polit & Beck, 2012). Beta should be no more than four times the alpha standard ( $1 - 0.20 = .80$ ). The effect size (ES), while never known, is estimated using existing evidence. When no existing evidence is available, it is suggested that the researcher use a calculated effect size based on expectations of a small, medium, or large effect. Cohen (1998, p. 99) suggests parameters of .10-.20 for a small ES, .30-.50 for a medium effect, and .50-.80 for a large effect. "Most nursing research studies use a medium effect" (Polit & Beck, 2012, p.496). Cohen (1998) also suggests the use of a standardized table to identify parameters. This was a needs assessment study, as no previous studies are available for comparison. Polit and Beck's (2012) tables suggest that for a test of the difference of two means, an alpha of .05, power of .80, and an estimated effect size of .50, a sample size (N) of at least 44 subjects would be necessary.

Frequency and descriptive statistics were used to create a demographic profile of the study participants.

### **Institutional Approval**

The research protocol was submitted to University of Wisconsin-Milwaukee (UWM) Institutional Review Board for the Protection of Human Subjects (IRB), and to the participating organization for secondary human subjects review. Approval to conduct this study was gained prior to data collection (Appendix A). This study met the criteria for exempt status, as it involved no more than "minimal risk" (UWM IRB, 2012). The study was voluntary, involved adults over age 18, dealt with non-sensitive materials, and was anonymous. No private, identifiable information was recorded by the investigator. The study posed no risk of physical, psychological, or social harm to human subjects. The study met the criteria described in exempt category # 2 for research involving the use of educational tests when no private identifying information will be recorded (UWM IRB,2012). All data was reported in aggregate. The study was fully explained to participants both verbally and in writing (Appendix B) and NDRT directions were provided (Appendix G).

### **Data Collection Procedure**

Data collection began after Institutional Review Board (IRB) approval was obtained, and continued until the needed sample was recruited. English speaking, adult baccalaureate pre-nursing and nursing students over the age of 18 years were initially made aware of the study by a faculty member from the participating institution. The study was presented to the pre-nursing population by a faculty member at a meeting to describe the process for application to the nursing major. The faculty member introduced the study and introduced the researcher. After the faculty member left the meeting, the students were asked to participate in the study and told that dates would be posted for

those interested in participating. Four small group testing dates were scheduled in December 2011, in a classroom at the university. Testing sessions were held during the first two weeks of December on December 1 (n=12), December 2 (n= 12), December 6 (n=12) and December 8 (n=8). All students participating in the study identified themselves as pre-nursing students who were completing their first semester coursework. The study was presented to the senior students by a faculty member. The study was then described by the researcher and a testing session was scheduled after their last class on December 7, 2011 (n=38) for students who chose to participate. Six students who graduated in May, 2011 were recruited through a snowball technique, agreed to participate and took the NDRT on October 7, 2011, five months after graduation. To maintain anonymity of the participants, each test was coded with a numeric code. All data were collected by the researcher. The data were stored by the investigator in a locked cabinet, and will be kept up to for a period of three years after study completion. The data was coded and entered using the statistical software package SPSS 18.

Data collection was conducted according to established research protocol and the following outline:

- (1) Researcher introduces self
- (2) Explanation of the purpose and rationale of the study (Appendix B)
- (3) Study instructions reviewed with participants and Nelson-Denny Reading Test instructions read to participants (Appendix G)
- (4) Test administration following NDRT guidelines
- (5) Demographics questionnaire (Appendix C or D) and nursing student reading survey (Appendix E or F) administered.

(6) Collection of all testing materials.

### **Instrumentation**

**Nelson Denny Reading Test.** The Nelson Denny Reading Test (NDRT), Form G was used to measure the level of reading comprehension found in the nursing student populations. The NDRT is a statistically valid and reliable instrument which provides an assessment of student ability in three areas: vocabulary, comprehension, and reading rate. The NDRT is a formal, standardized, norm-referenced test (Brown et al., 1993a, 1993b, 1993c; Flippo & Caverly, 2009). The primary use for the test is as an initial screening to identify students who need additional help in reading, and to identify students who could benefit from placement in advanced courses. Secondary uses of the test include predicting success in college courses, and identifying strengths and weakness in the areas of vocabulary, reading rate, and reading comprehension (Brown et al., 1993a, 1993b, 1993c; Flippo & Caverly, 2009). The NDRT is appropriate for student populations entering college, and pre-professional and pre-graduate students. Eighty items comprise the vocabulary subsection. There are five answer choices for each vocabulary item, and there is a time limit of fifteen minutes for this section. Seven passages comprise the comprehension section with a total of thirty-eight questions, again with five answer choices. The total time limit for this section is twenty minutes. Reading rate is calculated during the first minute of the comprehension section. The total time for test administration, including preparation of the answer sheet is approximately 45 minutes (Brown et al., 1993a, 1993b, 1993c ). Each question is scored as correct or incorrect and a point is totaled for each correct answer.

Validity refers to the ability to generalize research finding to other settings and samples (Polit & Beck, 2012). Potential threats to validity are addressed through an adequate sample size, and the appropriate psychometric testing of the selected instrument.

The Nelson Denny Reading Test was first developed in 1929 and content and statistical data had been frequently revised to reflect current high school, two-year community college, and four-year university student populations. The current version of this test are forms G and H, which was revised in response to expert opinion suggesting a need to reduce time pressures, and to address bias for certain population groups. Revisions to the test included shortening the vocabulary portion of the test, creating a balance in weighing the vocabulary and comprehension subsets, and developing extended time norms for the test use with select populations including those with identified learning disabilities, English as a second language or foreign language learners, and returning adults (Brown et al., 1993c). Three phases of test development were used including informal item tryouts, national item tryouts, and national standardization (Brown et al., 1993c).

The average difficulty (*p*-values) of vocabulary items for grade 13 is 0.59 (Form G) and 0.58 (Form H), with a range of difficulty up to 1.00. For grade 15, the average was 0.81 (Form G) and 0.80 (Form H) up to 1.00 (Brown et al., 1993c, p.3). The authors (Brown et al., 1993c) described a balance between sufficiently difficult items to challenge the stronger student and to discriminate among students, with “easier items” to minimize stress associated with overly difficult first items.

The comprehension subtest was developed to accommodate for a wide range of reading ability found in students. The authors suggested that the typical incoming reading range found for freshman at most statewide universities ranges from Grade 5 to beyond the university senior range (Brown et al., 1993a, p. 4). Passages were drawn from current high school and college textbooks. Concern was also addressed to ensure balanced treatment of minorities and gender, using the Mantel-Haenszel Measure of Differential Item Functioning, to eliminate potentially biased items. The opening passage was described as of a sufficient length to accommodate measuring the reading rate. The average difficulty of items for the national tryouts ranged from 0.66-0.68 for grade 13, and 0.82-0.85 for grade 15. BIS  $r$  for grade 13 ranged from 0.60-0.64 and from 0.63-0.68 for grade 15 (Brown et al., 1993c). Reliability of items was confirmed after the national testing was completed. Readability of the seven passages on the current version was confirmed through the use of three measures: the Dall-Chall Grade Level, the Fry formula, and the Fleash Reading Ease Score (Brown et al., 1993c).

The validity of the Reading Rate portion of the test looks at two specific measures of reading rate, amount-limit and time-limit. When amount-limit scores are calculated, the test taker reads a specific amount of material and the time taken to read the material is recorded. Time-limited evaluation of reading rate calculates how many words the test taker can read in a period of time. Items were reviewed by a representative panel of experts to select those items which provided both best representation of ethnic and gender groups, while retaining acceptable psychometric properties (Brown et al., 1993c).

National standardization samples were completed using three different groups: students in grades 9-12; students from the two-year college population; and students from

the four-year college or university population. A sampling matrix was constructed for each group to identify a balanced sample representative of the population when compared with national census data. Criteria for the two- and four- college and university populations included geographical region, school size, and type of institution. The sample for four-year institutions was 38 institutions and over 5,000 students (Brown et al., 1993c).

Reliability statistics for test scores were calculated to produce the error variance of the test and total test reliability (Brown et al., 1993c, p. 11). Descriptive data for the university population was provided. For grade 13, the vocabulary subtest (Form G) reports a mean of 49.40 ( $SD = 15.18$ ,  $KR-20 = 0.94$ ,  $SEM = 3.57$ ). For grade 16 (Form G), the mean is reported as 62.72 ( $SD = 11.55$ ,  $KR-20 = 0.92$ ,  $SEM = 3.25$ ) (Brown et al., 1993b, p. 11). The Comprehension subtest (Form G) for grade 13 reported a mean of 48.50 ( $SD = 15.27$ ,  $KR-20 = 0.88$ ,  $SEM = 2.63$ ). For grade 16 (Form G), the mean was reported as 59.07 ( $SD = 12.29$ ,  $KR-20 = 0.86$ ,  $SEM = 2.32$ ). Total scores reported for Form G for grade 13 ( $N=1043$ ) are a mean of 97.61, ( $SD = 28.94$ ,  $REL = 0.95$ ,  $SEM = 6.44$ ). Total scores for grade 16 (Form G) were reported as 121.96 ( $SD = 22.02$ ,  $REL = 0.93$ ,  $SEM = 5.66$ ) ( $N=558$ ) (Brown et al., 1993c, p.11). Forms G and H were equated with previous versions of the test to determine alternate-forms reliability. Using an equi-percentile method, this allows comparison with scores on earlier versions. Summary statistics are provided. Extended time administration was equated with Form G only (Brown et al., 1993c).

Reliability was also measured through alternate form administration to the same student within a three week period. The authors suggested that this was a better measure

of reliability than that obtained through internal consistency procedures as the KR-20 and accounts for four main sources of error including “variations arising from the measurement procedure, changes in the specific sample of tasks, changes in the individual from day to day, and changes in the individual’s speed of work” (Brown et al., 1993c, p. 13).

Reliability coefficients for reading rate during the tool revision range from 0.73 for the first minute, 0.67 for the second minute, 0.72 for the fourth minute, and 0.72 for the eighth (Brown et al., 1993c, p.6).

**Demographic questionnaire.** Self-reported demographic variables were collected using a demographic collection tool, completed by the participants after the NDRT was administered. Significant demographic variables were selected from the literature and Jeffreys' (2004) NURS model. Jeffreys has summarized significant student profile characteristics associated with attrition which included: age, ethnicity, gender, language, prior work experience, enrollment status, type of high school attended, and self-reported hours working during the academic year, and self-reported hours spent reading for courses.

Students were asked to complete a demographic questionnaire (Appendix B or C). Descriptive and frequency statistics were used to identify those variables that had restricted variability in responses for one group of students or both groups. These items were not considered feasible demographic predictors of total reading performance as the presence of a restricted range of values on one or more of the variables lowers the correlation coefficient (Polit & Beck, 2012). After these variables were removed, the following variables were used for analyses: (1) group (pre-nursing or seniors), (2) self-

reported work hours per week, and (3) self-reported hours spent reading for courses per week. Variables and their measurement for this study are outlined in Table 6.

Table 6 Demographic Variables

Variable Name	Description of Variable	Type	Coding
age	student's chronological age in years	metric (I/R)	Numerical
ethnicity	student's ethnic group identification	nominal	(1) White (2) African American (3) Hispanic (4) Asian- Pacific Islander
gender	Self-reported: male or Female	nominal	(1) Male (2) Female
enrollment status	Self-reported full or Part-time student	nominal	(1) Full time (2) Part time
English primary language	Self-reported	nominal	(1) Yes (2) No
Work status	Self-reported work during academic year	nominal	(1) Yes (2) No
Hours	Self-reported # of hours worked per week	metric(I/R)	numerical
Reading Hours	Self reported # of hours spent reading per week for nursing courses	metric(I/R)	numerical
Failure/ Withdrawal	Self-reported Failure or withdrawal from a nursing course	nominal	(1) Yes (2) No
# of Failures/ withdrawals	Self-reported # of times student has failed or withdrawn from a nursing course	metric(I/R)	numerical
Reason	Self-reported reason that student failed/withdrew	nominal	(1) Academic/Involuntary (2) Personal/Voluntary

**Nursing student reading survey.** The Nursing Student Reading Survey, a researcher developed, 5-point, 5- question Likert scale was used to describe pre-nursing students' perceptions of their reading abilities to compare with senior nursing students reading experiences. No existing scales could be found in the literature. This tool was developed from themes which emerged from a comprehensive review of the literature describing college students and reading comprehension. Variables associated with the development of strong reading comprehension skills in college included the amount of time that a student spends reading and preparing for class, note taking during the reading process (Clump et al., 2004; Collins et al., 2008; Emanuel et al., 2008; Jameson, 2007; Lord, 2008; Parker, 2009), and whether the student read before attending classes or did most of assigned reading only before exams (Clump et al., 2004; Lord, 2008). College reading was an area where the students felt very under-prepared and believed that their weak areas included reading skills, vocabulary, and not being ready for the amount of reading required (Bray et al., 2004).

Validity of the Likert scale was approached in three ways: content validity, face validity, and criterion-referenced validity. Content validity describes that the instrument reflects the full range of attributes of the concept being measured. This was accomplished by a comprehensive review of the literature. Face validity was accomplished through expert review of the items and represents that on inspection or face value, the instrument appears to be a good indicator of the concept being measured. Content validity was accomplished through scale review by two experts, one who was a PhD prepared nursing faculty, and another who was a EdD prepared education faculty with a specialization in reading.

Student responses to the open ended question could not be assessed through qualitative analysis as the students did not respond to the open-ended question comments about their experiences. Self-reported reading hours and work hours are reported using descriptive statistics.

### **Data Analysis**

**Research questions.** Each student's responses on the NDRT were evaluated according to the directions contained in the NDRT, then, data were subjected to various descriptive and inferential statistical procedures to address the posed research questions.

**Research Question 1.** What is the level of reading comprehension of baccalaureate college/university students admitted to a pre-nursing program?

Prior to addressing the research question, the reliability of the NDRT was confirmed using computed Kuder-Richardson values (Polit & Beck, 2012). The reading performance of the pre-nursing students ( $n = 44$ ) was described using raw scores on the NDRT for vocabulary, reading comprehension, total scores and reading rate. Raw scores were converted to scale scores to obtain grade equivalent scores using the NDRT Manual for Scoring and Interpretation Form G & H (Brown et al., 1993c). The total score was calculated by adding the vocabulary raw score and the reading comprehension raw score ( $\times 2$ ). The reading comprehension score was double weighted to accommodate for a shorter test. Descriptive and frequency statistics were used to report the findings. The range of scores, mean scores and standard deviation were reported.

**Research Question 2.** What is the level of reading comprehension of baccalaureate college/university senior nursing students?

Prior to addressing the research question, the reliability of the NDRT was confirmed using computed Kuder-Richardson values (Polit & Beck, 2012). The reading performance of the senior nursing students ( $n = 44$ ) was described using scores on the NDRT for vocabulary, reading comprehension, total scores, and reading rate. Raw scores were converted to scale scores, grade equivalent scores, and percentiles using the NDRT Manual for Scoring and Interpretation Form G & H. The total score was calculated by adding the vocabulary raw score and the reading comprehension raw score ( $\times 2$ ). The reading comprehension score was double weighted to accommodate for a shorter test. Descriptive and frequency statistics were used report the findings. The range of scores, mean scores and standard deviation were reported.

**Research Question 3.** Is there a difference in the level of reading comprehension found between the pre-nursing student group and the senior nursing student group?

The pre-nursing and senior nursing students were compared on vocabulary, reading comprehension, total scores, and reading rate. To compare the reading performance of the pre-nursing and senior nursing students, a series of independent group  $t$ - tests were executed. As the significance under Levene's test was .05 or lower, the researcher did not assume that the variances were equal and reported the observed  $t$ ,  $df$  and  $p$  values for unequal variances.

**Research Question 4a.** Is there a difference between pre-nursing and senior nursing students' reading abilities, and existing norms for college/university students (Brown et al., 1993c, p. 35-38)?

**Research Question 4b.** Is there a difference between senior nursing students' reading abilities and existing norms for healthcare professional students (Haught & Walls, 2002, p.228-238)?

These research questions were evaluated by a series of one-sample t tests. The pre-nursing NDRT mean raw scores were compared with the Grade 13 NDRT standardization norms for vocabulary, comprehension, total scores, and reading rate. The performance of the senior nursing students was compared to both Grade 16 NDRT standardization norms and the standardization norms for post-baccalaureate health professions for vocabulary, comprehension, total scores and reading rate.

**Research Question 5.** Is there a relationship between demographic variables (age, sex, ethnicity, full-time or part-time student, primary language, working during academic year and number of hours worked per week, hours spent reading for assigned courses, number of failures or withdrawals from nursing courses, type of high school attended) and the students' level of reading comprehension?

To evaluate the relationship between various demographic measures and the total NDRT score, a simultaneous multiple regression was executed (Polit & Beck, 2012). This regression was appropriate for two reasons. First, the criterion or dependent variable was the student's total reading score, a metric variable. Second, the researcher wanted to evaluate the effect of several demographic predictors on reading performance.

Additionally, the data do not violate the assumptions of multiple regression (linearity, normal distribution, etc.), nor the requirement that the predictor variables did not substantially overlap (multicollinearity) (Polit & Beck, 2012).

**Research Question 6.** What are the pre-nursing and senior nursing students'

perceptions of their reading ability?

Prior to forming a total perception score, the 5 Likert items were evaluated for internal consistency and reliability using Cronbach's alpha. As the data supported the fact that the 5 perception items measured the same dimension, a total perception score was formed for each student by summing the point value assigned to each question. Then the correlation between the student's total perception score and their total reading score was determined separately for the pre-nursing and senior nursing students.

### **Summary of Methodology**

This chapter reviewed the plans for this study. The study design, sample selection, study procedures and descriptions of the study instruments were presented. The protection of human subjects in this study was described along with the data collection procedure, and the planned statistical analyses were detailed.

## **CHAPTER IV**

### **DATA ANALYSIS**

#### **Purpose of the Project**

This project was designed to describe and compare the reading abilities of two groups of nursing students, a pre-nursing college student group and a senior nursing group. Pre-nursing and senior nursing students were asked to respond to three types of questions: a demographic survey (Appendix C or D), a series of seven questions regarding the student's expectations or performance in college (Appendix E or F), and the Nelson Denny Reading Test (NDRT). The demographic information was used to create a describe the typical respondent in this study, identifying significant differences between pre-nursing and senior nursing students. These descriptions will be followed by the participants' responses to their college reading expectations or performance. Finally, the results of the Nelson Denny Reading Test (NDRT) will be presented. The reading skills assessed by the NDRT will be described using the framework of the six research questions addressed by this project. Reading comprehension, as measured by the NDRT, may be an unexplored factor contributing to persistent attrition in nursing education.

#### **Demographic Profile**

Descriptive statistics were computed to create a demographic profile of the study participants. A summary of the pre-nursing sample demographics is presented in Table 7. The pre-nursing sample was predominately female (97.7%), White (72.7%), and reported that English was their primary language (100%). The age range of the sample was between 19-52 years, with 49.9% of pre-nursing students age 20-29 years. The

majority of students reported that they were full-time students (97.7%) carrying a credit load of at least 12 semester hours (SH). A large portion (70.4%) reported working during the academic year. The largest number of self-reported hours reading per week (38.7%) was between 21-30 hours. The pre-nursing students' total (vocabulary and composition x 2) grade equivalent scores, as measured by the NDRT, ranged from grades 5.80 to 14.40, with a mean score of 10.09 (SD = 2.03), and a median score of 10.30.

Table 7 Background Characteristics of the Pre-nursing Study Participants

Variable	Range	N	Percentage
Age	19-52 years	17	Less than 20 yrs: 38.6%
		22	20-29 yrs: 49.9%
		3	30-39 yrs: 6.8%
		1	40-49 yrs : 2.3%
		1	50-59 yrs: 2.3%
Sex		12	Male: 27.3%
		32	Female: 72.7%
Ethnicity		39	White: 88.6 %
		1	African American: 2.3%
		4	Hispanic: 9.1%
Full- or Part-time Student		43	Full-time Student: 97.7%
		1	Part-time Student: 2.3%
English Reported as Primary Language		44	English: 100 %
		0	Other: 0 %
Worked During Academic Year		31	Yes: 70.4%
		13	No: 29.5%
Self-reported Number of Hours Worked per Week		17	0 38.6%
		2	1-10 4.5%
		10	11-20 22.7%
		15	21-30 34.1%
		0	31-40 0%
Self-Reported Number of Hours Reading for Courses per Week		7	1-10 15.8%
		12	11-20: 27.3%
		17	21-30: 38.7%
		7	31-40: 15.9%
		1	41-50: 2.3%

A summary of senior nursing student sample demographics is presented (Table 8). The senior nursing student sample was predominately female (84.1%), White (86.4%), and the majority reported that English was their primary language (93.2%). Participants in the sample were representative of a wide age range from 20-52 years, with the majority of the sample between the ages of 21-29 (88.7%). Many of students reported that they were full-time students (59.1%) carrying a credit load of at least 12 semester hours (SH). However, academic policy assumes that all students in the senior year of the nursing program are considered full-time. Therefore, it must be assumed that the 40.9% reporting part-time status, were enrolled only in 9 SH of nursing courses and had completed all elective and liberal arts requirements. A large portion (84.1%) reported that they worked during the academic year, with 47.8% working between 11 to 20 hours per week. Four point five percent reported not reading any assigned reading, while the largest percentage of students (44.2%) reported reading between 11 to 20 hours per week. Fifteen point nine percent of seniors reported experiencing at least one academic failure in nursing coursework. Total grade equivalent scores for the senior population, as measured by the NDRT, ranged from grades 4.5 to 18.90, with a mean score of 14.75, (  $SD = 2.72$ ), and a median score of 15.05.

Table 8 Background Characteristics of the Senior Nursing Student Study Participants

Variable	Range	N	Percentage
Age	21-52 years	0	Less than 20 yrs: 0%
		39	20-29 yrs: 88.7%
		4	30-39 yrs: 9.2%
		0	40-49 yrs : 0%
		1	50-59 yrs: 2.3%
Sex		7	Male: 15.9%
		37	Female: 84.1%
Ethnicity		38	White: 86.4%
		3	African American: 6.8%
		3	Hispanic: 6.8%
Full- or Part-time Student		26	Full-time Student: 59.1%
		18	Part-time Student: 40.9%
English Reported as Primary Language		41	English: 93.2%
		3	Other: 6.8%
Worked During Academic Year		37	Yes: 84.1%
		7	No: 15.9%
Self-reported Number of Hours Worked per Week		7	0: 15.9 %
		2	1-10: 4.5%
		21	11-20: 47.8%
		10	21-30: 22.8%
		4	31-40: 9.1%
Self-Reported Number of Hours Reading for Courses per Week		2	0 4.5%
		18	1-10: 42.0%
		19	11-20: 44.2%
		1	21-30: 2.3%
		3	31-40: 4.7%
Self reported Nursing Course Failure		7	Yes: 15.9%
		37	No: 84.1%
Self-reported Reason for Failure		7	Academic: 15.9%
		37	Did Not describe: 84.1%
Type of High School		41	Majority/Majority: 93.2%
		3	Minority/Majority: 6.8%

## Expectations Regarding College Reading

Both the pre-nursing and senior nursing students were asked to evaluate their college level reading abilities/behaviors. The questions were modified for the different groups (Table 9). The only difference between the questions posed to the group was whether the student was describing their expectations (pre-nursing students) of college reading or their performance of college reading (senior nursing students).

Table 9 Self-Reported Evaluation Questions of Reading Skills/Behaviors

	Pre-nursing questions	Senior-nursing questions
1.	I believe I will be able to complete assigned all assigned college readings prior to attending class.	I was able to complete all assigned readings prior to attending class.
2.	I believe that I am academically prepared for the amount of college course reading assignments.	I believe that I was academically prepared for the amount of nursing course Reading assignments.
3.	I believe that I am academically prepared for the difficulty of nursing reading assignments.	I believe that I was academically prepared for the difficulty of nursing course reading assignments.
4.	I believe my reading ability is good.	I believe my reading ability is very very good.
5.	I plan to take notes when I am for college courses.	I was able to take notes when reading I was reading for nursing courses.
6.	I plan to complete ___% of assigned readings before attending class.	I was able to complete ___% of assigned readings before attending class.
7.	I plan to complete ___% of assigned readings shortly examinations.	I was able to complete ___% of assigned readings shortly before examinations.

Questions 1 through 5 were evaluated on a five-point scale, with higher scores indicative of more agreement with the statement. For each of these questions, the 44 pre-nursing students, on average, “strongly agreed” with each statement with small differences in their reported expectations (Table 10). In contrast to each of these expectations, the 44 senior-nursing students either “disagreed” or reported that they were “undecided” about the statement. As documented in this table, not only did the seniors evaluate each question, on average, significantly less positively, they were also more variable in terms of their responses.

Table 10 Mean, Standard Deviation, and t-Test Results for Self-Report Responses to the Reading Skills/Behavior Questions

Quest	Pre-nursing students		Senior-nursing students		t	p	d
	M	SD	M	SD			
1	4.95	.21	2.59	.95	16.15	.0001	3.39
2	4.59	.50	2.86	1.03	10.06	.0001	2.11
3	4.50	.51	3.09	1.07	7.87	.0001	1.65
4	4.73	.45	3.50	1.07	7.03	.0001	1.4
5	4.59	.50	3.89	.92	4.47	.0001	.94
6	97.84	5.54	61.48	21.66	10.79	.0001	2.34
7	98.18	12.06	89.55	16.42	2.81	.006	.60

The responses to questions 6 and 7 were similar to the difference in responses between the pre-nursing and senior nursing students from questions 1 to 5. Again, the pre-nursing students, on average, evaluated these two questions significantly higher than

the seniors. The pre-nursing students reported that they planned to complete an average of 97.84% ( $SD = 5.54$ ) of the assigned readings before attending class. This expectation was significantly higher than the seniors who acknowledged that they actually completed substantially less of the assigned readings prior to class ( $M = 61.48\%$ ;  $SD = 21.66$ ),  $t(48.60) = 10.79$ ,  $p = .0001$ ,  $d = 2.34$ . The results were similar for question 7. The pre-nursing students reported that they anticipated completing 98.18% ( $SD = 12.06$ ) of the reading before the exam but the seniors reported they actually completed 89.55% ( $SD = 16.42$ ) of the assigned readings prior to the exam,  $t(78.94) = 2.81$ ,  $p = .006$ ,  $d = .60$ .

### **Nelson Denny Reading Test Results**

As described in Chapter 3, the Nelson Denny Reading Test (NDRT) provides its assessment of student ability in three areas: vocabulary, reading comprehension and reading rate. Further, the level of skill in each of these areas can be reported in terms of raw scores, scaled scores, percentiles and grade equivalents. Each research question was addressed by examining the raw score data from the vocabulary, reading comprehension and reading rate sections of the NDRT.

Prior to addressing the research questions, the vocabulary, comprehension and reading rate scores were summarized using various descriptive procedures and examined both graphically and numerically. These procedures confirmed that there were no missing data on vocabulary or reading rate, but several comprehension questions were not completed. This type of omission was dominant in the pre-nursing group. As each NDRT question is scored as correct or incorrect, and each correctly answered question receives one point, this was not considered a sufficient reason for eliminating participants

given that the primary emphasis of this study was on the differences in reading skills between senior nursing students and pre-nursing college students.

The data were then examined for existing patterns that would reveal major anomalies (scores or means outside their anticipated range of values suggesting an error in data entry or if outliers were present) and if the data supported the three general assumptions (normality, linearity and homogeneity) of parametric inferential tests, the analyses were used in evaluating the posed research questions. If these assumptions were violated, the results of the analyses may be biased (Polit & Beck, 2012). Fortunately, this was not the case as the most commonly used analysis in this study was the independent groups t test that includes the appropriate observed and df values when the data does not support the assumption of homogeneity of variance (simply known as equality of variances).

Finally, before the research questions were addressed, the reliability of the Nelson Denny Reading Test was calculated. Polit and Beck (2012) maintain “an instrument’s reliability is not a fixed entity ... as it is a property not of the instrument but rather of the instrument when it is administered to certain people under certain conditions” (p 335). The data confirmed the reliability of the NDRT, with computed Kuder-Richardson 20 values between .72 and .74. This formula was used as each question in the vocabulary and comprehension sections was evaluated dichotomously- it was either correct or incorrect.

Table 11 Reliability of the NDRT

Skill	Kuder-Richardson
Vocabulary	.74
Comprehension	.72

### Research Questions

**Research Question 1.** What is the level of reading comprehension of baccalaureate college/university students admitted to a pre-nursing program?

Descriptive statistics were used to summarize the raw scores from the vocabulary, reading comprehension, total reading and reading rate sections of the NDRT for the 44 pre-nursing college students. Although the possible range of the vocabulary raw scores was from 0 to 80, the pre-nursing students vocabulary scores ranged from a low of 20 to a high of 51, with a mean of 38.61 ( $SD = 7.76$ ).

The picture was similar for the reading comprehension raw scores. The pre-nursing students ranged from a low of 24 to a high of 60 when the possible range of values in comprehension was from 0 to 76 (comprehension x2). The mean comprehension score for these students was 37.29 ( $SD = 8.21$ ).

The same picture was reflected in the vocabulary and comprehension totals for these students as the observed range of the total scores was between a low of 46 and a high of 111, yielding a mean of 75.68 ( $SD = 15.53$ ). Total scores were calculated by adding the vocabulary score and a double weighted comprehension score.

In contrast to the poorer performance on the vocabulary, comprehension and combined vocabulary and comprehension sections, the reading rates from these 44 pre-college students ranged from 69 to 490, with a mean of 282.4 ( $SD = 94$ ).

The pre-nursing students' total (vocabulary and composition x 2) grade equivalent scores, as measured by the NDRT, ranged from grades 5.80 to 14.40, with a mean score of 10.09 ( $SD = 2.03$ ), and a median score of 10.30.

**Research Question 2.** What is the level of reading comprehension of baccalaureate college/university senior nursing students?

As with the precollege nursing data, descriptive statistics were used to summarize the raw scores from the vocabulary, reading comprehension, total reading and reading rate sections of the NDRT for the 44 senior nursing students. Although the possible range of the vocabulary raw scores was from 0 to 80, the vocabulary scores of the seniors ranged from a low of 28 to a high of 78, with a mean of 61.38 ( $SD = 10.61$ ).

Comprehension raw scores for the senior sample ranged from 10 to 76, with a mean of 53.18 ( $SD = 13.64$ ) in comparison with the possible range of scores in comprehension was from 0 to 76 (comprehension x2).

Of these nursing students, the total raw scores, a combination of vocabulary and comprehension, ranged from 38 to 154, with a mean of 114.52 ( $SD = 22.36$ ).

Raw score reading rates for the sample of senior nursing students ranged from 56 to 473, with a mean of 296.86 ( $SD = 85.05$ ).

Total grade equivalent scores for the senior student population, as measured by the NDRT, ranged from grades 4.5 to 18.90, with a mean score of 14.75, ( $SD = 2.72$ ), and a median score of 15.05.

**Research Question 3.** Is there a difference in the level of reading comprehension found between the pre-nursing student group and the senior nursing student group?

The pre-nursing and senior nursing students were compared on vocabulary, comprehension and reading rate using independent group *t* tests. These analyses identified two significant differences between these groups of students. The senior nursing students had significantly higher average reading comprehension scores than the pre-nursing college students,  $t(70.54) = 6.62, p = .0001, d = 1.41$  (see Table 12). Likewise, the seniors earned significantly higher vocabulary scores than the pre-nursing students.  $t(86) = 5.78, p = .04, d = .90$ . Despite significant differences in vocabulary and reading comprehension, the reading rates of the pre-nursing and senior nursing students did not differ significantly,  $t(86) = 1.1, p = .06$ .

Table 12 Senior Nursing and Pre-nursing Student NDRT Raw Scores

Reading Skill	Group	Mean	SD	<i>t</i>	<i>p</i>	<i>d</i>
Vocabulary	Seniors	61.38	10.61	5.78	.04	.90
	Pre-nursing	38.61	7.78			
Comprehension	Seniors	53.18	13.64	6.62	.0001	1.41
	Pre-nursing	37.30	8.21			
Total (V + Cx2)	Seniors	114.52	22.36			
	Pre-nursing	75.68	15.53			
Reading Rate	Seniors	296.86	85.05	1.1	.06	
	Pre-nursing	282.40	94.18			

**Research Question 4a:** Is there a difference between pre-nursing and senior nursing students' reading scores, and existing norms for college/university students (Brown et al., 1993c, p. 35-38)?

**Research Question 4b:** Is there a difference between senior nursing students' reading scores and existing norms for healthcare professional students (Haught & Walls, 2002, p.228-238)?

A one-sample t test was used to compare the average reading ability of either the pre-nursing college students or the senior nursing students to the appropriate grade NDRT norm for the designated group. For the 44 pre-nursing college students, the norm was Grade 13. As shown in Table 13, the pre-nursing students scored significantly below the Grade 13 norms reported in the Nelson Denny Manual on the vocabulary subtest, the reading comprehension section and the total reading score. However, the average reading rate of the pre-nursing groups was significantly higher than the Grade 13 standardization norm.

Table 13 Pre-Nursing Students NDRT Subscales Compared to Grade 13 NDRT Norms

Reading Skill	Mean of Pre-nursing	SD	Grade 13 Mean	t	p	d
Vocabulary	38.61	7.78	52.43	-11.81	.001	1.78
Comprehension	37.29	8.21	51.73	-11.66	.0001	1.76
Total	75.68	15.53	103.45	-11.85	.0001	1.79
Reading Rate	282.40	94.18	238.46	3.09	.02	.47

Similar comparisons were made for the reading abilities of the 44 senior nursing students. The senior nursing scores for the subtests of the NDRT were compared to the standardization values reported for Grade 16. As evidenced in Table 14, the senior nursing students did not differ significantly on Vocabulary from the Grade 16 standardization norm. In other words, this group of 44 seniors performed at Grade 16 norms on the vocabulary section of the NDRT. However, the senior nursing students scored significantly below the Grade 16 norms for reading comprehension and the total scores. Finally, the senior nursing reading rate was significantly higher than that reported for Grade 16.

Table 14 Senior Nursing Students NDRT Subscale Raw Scores Compared to Grade 16 NDRT Norms

Reading Skill	Mean of		Grade 16			
	Seniors	SD	Mean	t	p	d
Vocabulary	61.38	10.61	64.52	-1.95	.06	----
Comprehension	53.18	13.64	61.60	-4.09	.03	1.05
Total (Vocab + Comp)	114.52	22.37	126.56	-3.57	.04	1.04
Reading Rate	296.86	85.05	257.65	3.06	.05	.60

Research question 4b made further comparisons between the scores of senior nursing students and the standardization values reported for 542 students enrolled in post-baccalaureate health profession programs (Haight & Walls, 2002). As shown in Table 15, the senior nursing students scored significantly below the standardization values reported for the health profession programs on vocabulary, comprehension and total reading scores. The only subtest of the NDRT in which the senior nursing students

scored significantly higher than the standardization values for the health profession programs was reading rate.

Table 15 Senior Nursing Students NDRT Subscales Compared to Post-Baccalaureate Health Professions Programs

Reading Skill	Mean of Seniors	SD	Health Professions Mean	t	p	d
Vocabulary	61.38	10.61	70.29	-5.56	.01	.84
Comprehension	53.18	13.64	67.46	-6.94	.0001	1.05
Total (Vocab + Comp)	114.52	22.37	137.75	-6.88	.001	1.04
Reading Rate	296.86	85.05	245.75	3.98	.03	.60

**Research Question 5.** Is there a relationship between demographic variables (age, sex, ethnicity, full-time or part-time student, primary language, working during academic year and number of hours worked per week, hours spent reading for assigned courses, number of failures or withdrawals from nursing courses, type of high school attended) and the students' reading comprehension scores?

Although several demographic questions were included in the questionnaire, many of these questions had restricted variability in the responses for one group of students or both groups. Such items were not considered feasible demographic predictors of total reading performance as the presence of a restricted range of values on one or both variables lowers the correlation coefficient (Polit & Beck, 2012). Additionally, all the demographic questions were examined for outliers as these extreme scores can suggest a relationship between variables when one does not exist (Polit & Beck, 2012). If an

outlier was identified, the analysis first included the outlier and then was executed a second time without the outlier. As both analyses identified the same predictors as significant, the outliers were not removed.

A simultaneous multiple regression was used to examine the contribution of three demographic characteristics on the total reading score: (1) group (pre-nursing versus seniors), (2) reported number of hours worked per week and (3) number of hours spent reading per week. Thus, the regression examined how well these variables taken together predicted the student's total reading score (vocabulary + comprehension). As justified in Chapter 3, this regression was deemed appropriate as the criterion, the total reading score, reflected metric data and there were several predictors. Although this statistical analysis has the same three assumptions as required by parametric tests, the use of this statistical procedure also requires that the predictor variables are not highly intercorrelated, an assumption referred to as multicollinearity (Polit & Beck, 2012). As this assumption was verified in the regression analysis, the evidence that the data did not violate this assumption will be presented later as it appears in the SPSS output.

Guided by the fact that there is “no standard format for the tabular presentation of regression results,” (Polit & Beck, 2012, p. 253) and “given that the guiding principle in laying out a regression table is to be parsimonious while conveying critical pieces of information about the analysis” (p 253), the results are presented in Table 4.10. The three demographic predictors collectively accounted for 51.9% of the variance in total reading scores (vocabulary and comprehension).

Having established that the demographic characteristics collectively explain a significant amount of the variance in the total reading scores, the next question was

which of these predictors is significant? To answer this question, the weighted coefficients (unstandardized and standardized Beta values) and corresponding t and p values were summarized in Table 16. The unstandardized coefficient weight is the raw score weight assigned to a predictor variable in the regression analysis. Consequently, these values cannot be directly compared as each variable is based on a different unit of measurement and accordingly will have a different mean and standard deviation. The standardized regression weights under the “ $\beta$ ” (Beta column) represent the regression weight when the variable has been converted to a z score with a mean of 0 and a standard deviation of 1 (Polit & Beck, 2012). As suggested by the significance values (p) in Table 16, there were two significant demographic predictors: (1) “group” (whether the student was pre-nursing or a senior) and (2) the reported “hours read” each week. Surprisingly, the number of hours worked each week was not a significant predictor of the student’s total reading score (Vocabulary and Comprehension). As suggested by the sign attached to the Beta coefficients, whether the student belonged to the pre-nursing or senior nursing group was positively correlated with their total reading scores. In other words, Senior nursing students (dummy coded as 1) had significantly higher total reading scores than the pre-nursing students (dummy coded as 0). The reported number of hours the student spent reading each week was negatively correlated with their total reading score, suggesting that students who spent large amounts of time reading each week, earned lower total reading scores. Likewise, senior nursing students who reported that they spent fewer hours reading each week earned higher total vocabulary and comprehension scores on the NDRT.

Table 16 Model Summary Table and Weighted Coefficient Values

## Model Summary Table

R	R Square	Adjusted R square	F	p
.732	.536	.519	31.98	.0001

## Weighted coefficient values

Predictors	Unstandardized Coefficient Weight	Std Error	$\beta$	t	p
Group (pre-nursing VS seniors)	35.91	4.62	.657	7.78	.0001
Hours worked/week	-.11	.199	-.043	-.56	.57
Hours read/week	-.38	.199	-.16	-1.92	.05

Finally, of the significant predictors of total reading, which predictor accounted for the largest amount of variance in the combined vocabulary and comprehension score? Numerous indices have been employed in evaluating the relative importance of significant predictor variables to the regression analysis. Polit & Beck (2012) state it is not appropriate to compare the importance of the significant predictors by examining their zero-order correlations with the criterion variable (combined vocabulary and reading comprehension). Zero-order correlations are another name for bivariate correlations and consequently only reflect the degree and direction of the linear relationship between a predictor and the criterion, without considering the other predictors in the regression. Second, Polit & Beck (2012) cautions against comparing the Betas as these values can change with the addition or removal of one of the predictors. Instead, Polit and Beck

(2012) suggest comparing the squared semi-partial correlations associated with the significant predictors.

The semi-partial correlations are useful because they indicate a predictor's unique contribution to the criterion when the other predictors are in the equation, that is, the contribution after the effect of the other predictors has been taken into account. SPSS version 18 reports both the zero-order and semi-partial correlation values included in Table 17. As documented in this table, the predictor variable of "Group," with the largest semi-partial correlation, was designated as the best predictor of total reading, accounting for 43% of the variance in the criterion. Next, the demographic predictor of reported hours read per week was the second largest relatively important predictor of the combined vocabulary and comprehension score accounting for approximately 5% of the variance.

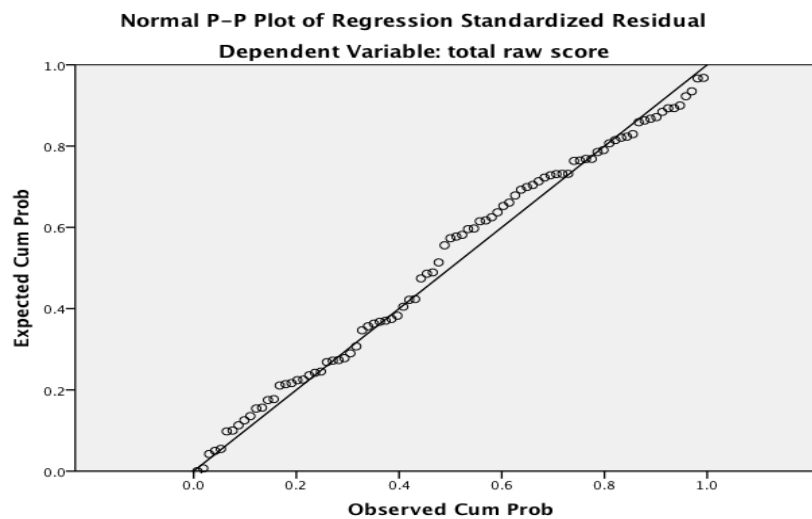
The evidence that multicollinearity was not an issue is also included in this table. Tolerance values are one way of assessing the amount of overlap among the predictors (Polit & Beck, 2012). For multicollinearity to be problematic in a multiple regression analysis, the tolerance values need to be about .10. As the tolerance values reported in this table are .78 and above, the predictor variables do not overlap extensively and hence reflect different contributions in the regression equation.

Table 17 Zero-order and Semi-partial Correlations for Each Predictor

Predictor Variables	Zero-order Correlations	Semi-partial Correlations	Tolerance
Group (Prenursing = 0; Senior nursing = 1)	.715	.649	.784
Reported hours worked weekly	.071	-.061	.946
Reported hours read weekly	-.435	-.207	.810

Finally, how well does the model predict the total reading score (combined vocabulary and comprehension)? Perhaps the best way to judge the fit of the model view is to the plot of the standardized residuals.

**Figure 1 Normal P-P Plot of Regression Standardized Residual dependent Variable: Total Raw Score**



As illustrated by this plot, the expected and observed raw score values for total vocabulary and comprehension combined are very close to the predicted values, suggesting that the amount of error in the regression has been minimized.

**Research Question 6.** What are the pre-nursing and senior nursing students' perceptions of their reading ability?

Before a total perception score was calculated, the internal consistency of questions 1 through 5 was determined using Cronbach's Alpha. This measure documented that the five items were internally consistent as they yielded an alpha value of .89. This value was used as the basis for forming a total perception score. For each participant in the study, a total perception measure was calculated by summing the points assigned by the student to each of the 5 perception questions. The average total perception score for the entire sample of students and separately for the pre-nursing and senior nursing students is presented in Table 18.

Table 18 Total Perception Scores of Reading Ability for Pre-nursing and Senior Nursing Students

Group	N	M	SD	Min	Max
Total sample	88	19.65	4.62	9	25
Pre-Nursing	44	23.36	1.45	20	25
Senior Nursing	44	15.93	3.58	9	24

As suggested by these data, the pre-nursing students were significantly more optimistic regarding their expected performance than the senior nursing students,  $t(56.71) = 12.77$ ,  $p = .0001$ ,  $d = 2.77$ . Further, notice that responses for the pre-nursing students were

between a range of 20 and 25 points in comparison to the range of values for the senior nursing students.

Bivariate correlations between the perception and total raw scores on the NDRT revealed non-significant relationships for both the pre-nursing college students and the senior nursing students. Whereas high perception scores tended to be associated with low NDRT total scores ( $r = -.01, p = .93$ ) for the pre-nursing students, the correlation between these two measures was positive for the senior nursing students ( $r = .07, p = .66$ ). Unfortunately, both relationships were not significant. Thus, the perception of one's expectations and/or performance was not related to the student's actual total reading score.

### **Summary**

The findings of this descriptive study designed to evaluate reading comprehension, as measured by the NDRT, are presented in this chapter. The results of three primary methods of statistical analyses are presented: descriptive, t-tests and a correlation/regression analysis. A demographic profile of the study participants was presented. Results associated with the six research questions are described.

The study sample consisted of 88 pre-nursing and senior nursing students. Demographic similarities were seen between both group. The majority of both the pre-nursing student sample ( $n = 44$ ) and the senior nursing student sample ( $n = 44$ ) were female, White, and reported English as their primary language. The sample was not representative of both genders, or different races. A majority of both samples reported working during the academic year. Differences were seen in the mean grade equivalent

total reading scores between groups. The mean total grade equivalent score for the pre-nursing group was 10.09 and 14.75 for the seniors.

Expectations and perceptions of college reading were compared between the groups. Pre-nursing students were found to be far more optimistic, and had very high expectations of their ability to handle the amount and difficulty of college reading assignments, while the seniors reported their perceptions much more realistically. The scores of the pre-nursing students may reflect pre-nursing students' limited exposure to the rigor of college-level coursework, a ceiling effect and/or may reflect social desirability. Social desirability is the tendency to give overly positive self-descriptions. Polit and Beck (2012) describe this as a "rather charming, but problematic quality of people" (p. 211) who want things to turn out well and to be helpful and present themselves in the best possible light. A ceiling effect, seen in the pre-nursing group indicates that they scored as high as was possible on their responses. If this had been a longitudinal study, results for this group as seniors might have demonstrated a decrease in their responses. However, despite the differences found between both groups, perceptions or expectations of reading skill was not related to the actual reading score.

The NDRT was used to measure the level of reading ability. After preliminary data analysis was completed, reliability of the NDRT was calculated. Research question one described the level of reading skills found in the pre-nursing group. Low to moderate performance was found in measures of vocabulary, reading comprehension and total score, in contrast to the reading rate. Research question two described the level of reading skill for the senior nursing student population. Data from questions one and two was used in question three to compare the differences in reading skills between the pre-

nursing and senior nursing group. The seniors scored much higher on measures of vocabulary, comprehension and total scores when compared to the pre-nursing group. Both groups scored high on reading rate which may be reflective of the students' ability to recognize and read words, without comprehending the material read. This has been described as the challenge students' with poor reading comprehension face. They have "learned to read" but do not know how to "read to learn". This will be further discussed in chapter five.

The NDRT scores for both groups were then compared with the standardized norms for the NDRT using one-sample t-tests (research question four). The pre-nursing students scored significantly below the Grade 13 norms for the NDRT on the vocabulary, reading comprehension and total scores. Reading rates again were higher than the standardization norms. When the comparisons were made for the senior nursing student group with the NDRT Grade 16 standardization norms, the seniors did not differ significantly from the Grade 16 norms in vocabulary, but reading comprehension and total scores were significantly below the norms.

Senior nursing student scores were then compared to scores of baccalaureate healthcare profession students, who were graduating and entering graduate programs the following year. The senior students' scores were significantly lower than this population.

Simultaneous multiple regression analyses were then used to determine the relationship among demographic variables and reading abilities (research question 5). The demographic variables of age, sex, race, type of high school, and primary language were not included in the regression due to restricted variability in response, which could lead to an artificial lowering of the correlation coefficient. Three demographic variables

accounted for 51.9% of the variance: (1) group (pre-nursing versus seniors), (2) reported number of hours worked per week and (3) number of hours spent reading per week. The significance of the predictor variables was evaluated using the weighted coefficients (unstandardized and standardized Beta values) and corresponding t and p values. Two significant demographic predictors were identified: (1) “group” (whether the student was pre-nursing or a senior) and (2) the reported “hours read” each week. The number of hours worked each week was not a significant predictor of the student’s total reading score (Vocabulary and Comprehension). The significance of these findings is discussed in Chapter Five, however, it may be that students tend to under-report the number of hours they work per week in response to faculty expectations and communication that academic performance is correlated with number of hours worked per week. The findings of the inverse relationship between self-reported hours spent reading and NDRT scores may be explained by the Matthew effect, and reading comprehension research which indicated that poor reading comprehension skills and poor reading metacognition skills were associated with students who become fatigued and frustrated when trying to read complex content areas. Consequently, it requires more time to read and to try understand the content, and was associated with academic difficulties and failure.

The results of the study provided evidence that poor reading abilities were found in both the pre-nursing and the senior nursing student populations. The implications of the data and recommendation are reported in Chapter Five.

## **CHAPTER V**

### **Discussion**

#### **Introduction**

The purpose of this project was to describe and compare the reading abilities of two groups of students, a pre-nursing group and a senior nursing group, to describe the level of reading comprehension found in this population, and to determine whether reading comprehension differences could play a role in explaining the attrition of nursing students from baccalaureate programs at a time when resources in these programs are limited and the demand for a competent and diverse workforce continues to increase.

#### **Summary of the Study**

Despite stronger entrance requirements such as higher overall GPA and science GPAs (Alexander & Brophy, 1997; Arathuzik & Aber, 1998; Barkley et al., 1998; Beeman and Waterhouse, 2003; Beeson & Kissling, 2001; Briscoe & Anema, 1999; Bryan, 1971; Byrd et al., 1999; Campbell & Dickson, 1996; Gallagher et al., 2001; Higgins, 2005; Jeffreys, 2004; Poorman et al., 2002; Potolsky et al., 2003; Roncoli et al., 2000; Sayles et al., 2003; Seldomridge & DiBartolo, 2004; Siktberg & Dillard, 2001), educators are still baffled by the persistent attrition from nursing education programs. In response to this continued loss of students, educators are again examining various academic skills (other than GPAs), that may play a bigger role in explaining this loss. One such variable being considered is the nursing students' reading comprehension ability.

One of the first steps in considering the role of reading ability was to gather some descriptive data about the participants and their reading performance. With this aim in

mind, a convenience sample of pre-nursing (n = 44) and senior nursing students (n= 44) from one university was asked to respond to three types of questionnaires: (1) a demographic survey (Appendix C or D), (2) a series of seven questions asking the student to describe their expectations or performance about reading assignments in college (Appendix E or F), and (3) the Nelson Denny Reading Test (NDRT).

The participants responses to these three instruments provided descriptive and comparative data regarding the pre-nursing and senior nursing students. The pre-nursing students scored significantly lower in vocabulary and reading comprehension than the senior nursing students. Likewise, when compared to grade appropriate norms, each of these groups performed below the norms. When submitted to a regression, the reading performance of these participants was predicted by their group (pre-nursing vs. seniors), and their reported hours spent reading. Finally, both groups demonstrated higher than anticipated reading rates when compared to NDRT standardization norms.

### **Limitations**

There are four sets of limitations of this study that have been identified. The first pertains to the use of a nonrandomized sample. The use of a convenience sample at one institution, limits the ability to generalize the sample beyond the population from which the data was drawn (Polit & Beck, 2012). The homogeneity of the sample also does not reflect the diversity of the nursing student population and prevents generalizing these conclusions to other nursing student samples.

The second limitation was associated with the use of self-reported measures, specifically self-reported hours spent reading and working. Both measures may reflect social desirability, or the students' attempts to provide the answer they believe faculty

expect to hear (Polit & Beck, 2012). Anecdotally, it is known that faculty generally advise students to work as little as possible or not at all during the academic year, as it is believed that this time away from their studies is associated with poor academic performance. Likewise, students are advised that they should spend at least 3 hours/semester hour/week reading and preparing for courses, or approximately a minimum of 36 to 45 hours per week. These thoughts may have been prominent in the students' minds and may not reflect their actual behaviors.

The third limitation is associated with issues of time. This study used a cross sectional design which limits the ability to compare the pre-nursing students' growth in reading abilities over their 4 years in college, and to begin to identify patterns of attrition. When comparing the pre-nursing group and the senior group, the senior group may have more of a selection bias. This group represents the students who have successfully navigated the rigors of the nursing program, and represents the strongest students who have "survived" and identified how to successfully navigate a professional healthcare program. The pre-nursing group represents students who are hoping to obtain a seat in the nursing major, however, the assumption is that many of these students will not be offered a seat, or will not be academically successful in the major. Utilization of a longitudinal design would allow the researcher to address the questions more directly and without competing hypotheses.

The other concerns relate to the age of the NDRT and the lack of available reading tests that measure academic literacy. Until newer tests become available, the NDRT is a respected, reliable and valid standardized test which measures reading abilities, but was not designed to be a measure of academic literacy. The first concern

relates to the age of the standardization norms. These benchmarks were last updated in the early 1990's, and may not be reflective of the current populations entering college. The second concern relates to the time allocated for completing the test. The form used was timed, and as the population's academic characteristics were not known, the extended time option was not used. Therefore, the researcher could not know if the poor performance was associated with the time limitations and if the participants would have done better if they were allowed additional time to complete the test.

### **Research Questions**

**Research question 1.** What is the level of reading comprehension of baccalaureate college/university students admitted to a pre-nursing program?

The first analysis revealed that pre-nursing students scored in the low to moderate range on measures of vocabulary, reading comprehension and total score. This was in contrast to reading rates, which were higher than anticipated. When the total raw scores were translated to grade equivalent scores, the pre-nursing students ranged from grades 5.8 to 14.4 with a mean grade equivalent of 10.09. This was consistent with the NDRT description that the typical incoming reading range found for freshman at most statewide universities ranges from Grade 5 to beyond the university senior range (Brown et al., 1993a, p. 4). High reading rates were found suggesting that while students may be able to identify and read words quickly, they have "learned to read" but have not learned how to "read to learn", as evidenced by lower comprehension scores. As the NDRT has not been updated since 1993, the measurement of reading rate may need to be revisited as there is no measure of reading comprehension associated with the reading rate.

This is a concern to educators as this group was enrolled in grade 13 coursework, and the assumption was that students would be reading at or above this level of

comprehension. It is known that larger numbers of students are seeking a college education. It is also known that the diversity of the population has changed and that students are coming to college without the reading abilities to support success in postsecondary education. The combination of these three factors may explain the poor level of reading comprehension found in the pre-nursing students.

As the level of reading comprehension for success in nursing education is not known, the concern is that the pre-nursing students may not be successful in pre-nursing coursework. If faculty were to assign 100 pages of reading per course, this would mean that students carrying 4-5 courses would be expected to read approximately 400-500 pages per week. The NDRT performance raises strong concerns not only about how these students will handle the demands placed on the typical college freshman, but if pre-nursing students should be able to read at a higher level than students in other majors. Typically, pre-nursing students carry not only introductory level courses, but also discipline specific science courses such as Chemistry and Anatomy and Physiology. If an institution admits based on ACT or SAT scores and GPA, some of the students may be successful in the introductory coursework, but anecdotally, it is known that many students struggle with the more complex, science courses which require a higher level of academic literacy. Course grades in the sciences have been associated with success in nursing programs. There is no evidence which describes the level of reading ability necessary for pre-nursing students, however, research has shown (Haught & Walls, 2002) that healthcare professional students had higher levels of reading ability than other college majors.

As more information has become available describing the challenges college students will face associated with the poor adolescent literacy skills they bring from high school, consideration must be given to assessing discipline specific programs of study. There is a need to understand how reading comprehension impacts pre-nursing student academic success and to describe standardization benchmarks for this population of students. Reading comprehension has not been measured for this population. This information could help educators to identify remedial support necessary for academic success and to assess the best sequence of nursing courses, so that students are given time to develop the literacy skills necessary to be successful in a professional program. This could also contribute to the best use of limited resources. One study (Zucker & Carel, 2012) has described the significant economic burden for one state, CT, associated with students who fail to return after the first year. This study only addresses the economic burden associated with grants provided to these students and the cost of remedial education. It does not describe the financial losses incurred by the institution associated with the failure to retain these students.

**Research question 2.** What is the level of reading comprehension of baccalaureate college/university senior nursing students, within 6 months of graduation?

Similar to the pre-nursing group, senior nursing students scored in the low to moderate range on measures of vocabulary, reading comprehension and total score. When the total raw scores were translated to grade equivalent scores, the senior nursing students ranged from grades 4.5 to 18.9 with a mean of 14.75. This is a concern to educators as these students were enrolled in grade 16 coursework, and were expected to be able to pass the NCLEX-RN on the first attempt, and enter professional practice after

completion of this coursework. High levels of academic literacy are necessary to produce students with strong critical reading and critical thinking skills, which is the foundation for the nursing education and practice, the nursing process, and the ability to pass the NCLEX-RN examination (Fulks, 2010). Again, high reading rates were found suggesting that while students may be able to identify and read words quickly, they have "learned to read" but have not learned how to "read to learn", as evidenced by lower comprehension scores.

Low scores on measure of reading ability also suggested that the nursing students who had successfully navigated and completed a baccalaureate nursing program, may not have a comparable level of academic literacy as other baccalaureate graduates, which may limit their ability to seamlessly transition to higher levels of education.

**Research question 3.** Is there a difference in the level of reading comprehension found between the pre-nursing student group and the senior nursing student group?

Pre-nursing and senior nursing students scores were compared on vocabulary, comprehension and reading rate. The senior nursing students scored significantly higher than the pre-nursing students on measures of vocabulary, comprehension and total reading score. Both groups scored high on the measure of reading rate.

Because this was a cross-sectional study and not a longitudinal study, and the composition of both groups on admission to the college was not known, it cannot be assumed that both groups were equal on admission. Therefore, the growth in reading ability that may have developed over time in the senior nursing student population cannot be described. It is known that attrition occurs over time, and the senior group may represent the students with a higher level of reading ability, which may have facilitated

their academic success in the program. It is also not known if the reason for these differences reflect strong readings skills on admission to the program which contributed to senior nursing student academic success and program completion, or the development of strong reading skills as students were exposed to higher levels of post-secondary coursework. It could also be suggested that many of the students with weaker reading skills were not successful in introductory coursework, were not offered seats in the nursing major, and that this attrition contributed to the stronger reading skills of the remaining senior students. Anecdotally, it is known that attrition occurs at various times during the four-year college experience, with many students lost during the period where they begin to experience higher level coursework such as the science courses and/or discipline-specific literacy challenges. The loss of this group of students would also contribute to the strongest students remaining as seniors. This would support the need for longitudinal studies to evaluate students' reading skills on admission to college, on admission to the nursing major, and immediately prior to graduation. This would also contribute to the body of knowledge identifying the key points in the nursing program where attrition tends to occur.

**Research question 4a.** Is there a difference between pre-nursing and senior nursing students' reading comprehension scores, as measured by the Nelson Denny Reading Test, and existing norms for college/university students (Brown et al., 1993c, p. 35-38)?

**Research question 4b:**Is there a difference between senior nursing students' reading comprehension scores and existing norms for healthcare professional students (Haught & Walls, 2002, p.228-238)?

The pre-nursing student group was compared to the NDRT standardization norms for Grade 13. The pre-nursing group scored significantly below the standardization group in the areas of vocabulary, comprehension and total score, but scored above the standardization norms for reading rate.

This performance, when evaluated according to grade appropriate norms, raises strong concerns about ability of pre-nursing students to handle the demands placed on the typical college freshman. As reading abilities and academic literacy have not been typically measured in the college population, this performance also raises concerns about the availability of appropriate resources needed to support all pre-nursing students, not just those who are found to be struggling academically. It is known that the expectations of nursing education and academic literacy have continued to increase, yet the population of students graduating from the nation's high school entering college either as traditional students directly from high school, or non-traditional students entering as adult learners, do not appear to have the basic literacy skills to be able to do college level work (Carnegie Corporation of New York, 2010a). The NDRT standardization norms were last updated in the early 1990's. It is not known if they are still applicable to the current college population. It is known that access to college has expanded, with a greater number of diverse students seeking a college education than in the past. It may be that these students have a lower level of reading ability than those admitted in the past, and/or that the reading demands of college education have increased, supporting the need for longitudinal studies, and universal measures of reading comprehension and literacy.

The senior nursing scores for the subtests of the NDRT were also compared to the NDRT standardization values reported for Grade 16. The senior nursing students did not

differ significantly on vocabulary from the Grade 16 standardization norm, but scored significantly below the standardization norms for vocabulary and total score. Finally, the senior nursing reading rate was significantly higher than that reported for Grade 16.

These results raise many concerns. It is anticipated that at the end of this coursework, the senior nursing students will pass the NCLEX-RN on their first attempt, and will enter professional practice. One of the expectations of professional practice is that the nurse will be able to quickly review a variety of written information describing the patient's healthcare encounter and will be able to quickly synthesize that information into an individualized plan of care. Students with reading abilities may have difficulty managing this process, especially when caring for multiple, complex patients. Another of the expectations of professional practice is lifelong learning. Nurses often must complete a mandatory number of continuing education courses for ongoing licensure or for professional employment evaluations and opportunities. Nurses with poor reading abilities may struggle to meet the minimum benchmarks and to maintain knowledge of best-practices and to be able to integrate evidence-based practice at the point of care.

In addition to concerns that the senior students are not reading at or above the NDRT standardization benchmarks, the senior nursing students also did not read at standardization norms for other healthcare professionals at a comparable level of education. The scores of senior nursing students were compared to the NDRT standardization values reported for 542 students enrolled in post-baccalaureate health profession programs (Haught & Walls, 2002). The senior nursing students scored significantly below the standardization values reported for other health profession programs on vocabulary, comprehension and total reading scores. The only subtest of the

NDRT in which the senior nursing students scored significantly higher than the standardization values for the health profession programs was reading rate.

Two areas of concern emerge from these findings. The first is related to the student's ability to be successful and pass the NCLEX-RN on the first attempt. NCLEX-RN first pass rates, not only allow the student entry into professional practice, but are also a measure of the organizations' academic outcomes, and are reviewed nationally for accreditation standards and by the State Boards of Nursing. Students who struggle with reading comprehension, may not be successful on the NCLEX-RN, as slow reading associated with poor comprehension may prevent the student from answering the questions within the time constraints. The second concern is related to the seamless transition of baccalaureate nurses to higher levels of education and practice. The recommendations of the landmark IOM report (2011), *The Future of Nursing*, calls for increasing the number of baccalaureate prepared nurses from the approximately 50% to 80% by 2020 and doubling the number of nurses with doctoral degree, as well as improving the ability for nurses to practice to the full extent of their education, and to be full partners with physicians and other healthcare professionals. Nurses must be on a similar level of academic literacy achievement to meet these recommendations, and to ensure that a seamless transition to higher levels of education is possible. For nurses to meet these goals, baccalaureate nurses should demonstrate a level of reading ability and academic literacy comparable to other healthcare professional students planning to enter advanced levels of professional education. Anecdotally, faculty have expressed concerns that nursing majors might not be as academically prepared as other healthcare professionals and ready for the challenges of graduate education, however, this has not

been studied. For nursing to have a seat "at the table", and be full partners in redesigning the healthcare systems, this is a topic of concern. Further research is needed to understand if this is a universal phenomenon, and to identify best practices to support the professional development of a highly educated workforce.

**Research question 5.** Is there a relationship between demographic variables (age, sex, ethnicity, full-time or part-time student, primary language, working during academic year and number of hours worked per week, hours spent reading for assigned courses, number of failures or withdrawals from nursing courses, type of high school attended ) and the students' level of reading ability?

Although several demographic questions were included in the questionnaire, many of these questions had restricted variability in the responses for one group of students or both groups. Such items were not considered feasible demographic predictors of total reading performance as the presence of a restricted range of values on one or both variables lowers the correlation coefficient (Polit & Beck, 2012). Due to the restricted range of values and concerns regarding power if too many predictors were used, the following items were not included in the analysis: ethnicity, sex, gender, English as a primary language, and type of high school program attended. Of the remaining demographic variables, two significant predictors were identified: (1) "group" (whether the student was pre-nursing or a senior) and (2) the reported "hours read" each week. The number of hours worked each week was not a significant predictor of the student's total reading score (Vocabulary and Comprehension). While the self-reported hours spent reading and working may be impacted by the concept of social desirability, the results suggested that the stronger reader requires less time to read and to be academically

successful, than the poor reader. This also raises a concern that the poor reader may not have the metacognitive strategies to help him/her be aware that a problem exists, and to be able to take steps to address the difficulty (Carnegie Corporation of New York, 2010) .

The results suggested reading ability grows as students progress through a program has been described in previous questions. However, the variables which correlated with reading scores, self-reported hours spent reading and scores on the NDRT may be explained by research from other disciplines. Previous research identified that the amount of time a student spends reading may predict academic success, or may be a symptom of poor reading comprehension, as poor readers work harder and take more time to complete reading assignments. The amount of time a student spends reading may also be reduced by the impact of newer technologies, and must be considered when assessing why student reading comprehension rates are not improving (Clump et al., 2004; Collins et al., 2008; Emanuel et al., 2008; Lord, 2008). Previous research has also found students spend less than three hours a week reading textbook material. Students instead felt that it was the instructor's responsibility for reviewing material during class time, and to describe important areas read (Clump et al., 2004; Lord, 2008). This was inconsistent with faculty expectations that students should spend at least forty hours per week in class preparations, suggesting the need for a process to clearly communicate and sustain expectations of college and discipline-specific academic outcomes (Clump et al., 2004; Lord, 2008). Again as newer technologies become available, it appears that college students are communicating differently and reading less, with findings suggesting that college students only have 2.26 hours available daily for academic reading, and described that only 63.4% of this time would be spent reading for college. This would

suggest that students spend less than 2 hours per day reading for college courses (Emanuel et al., 2008). The authors suggest that displacement theory explains how this impacts reading comprehension, suggesting that participating in one cognitive domain takes away from time and resources allocated to another cognitive domain. This concept should be considered when understanding the impact of new technologies in reducing the amount of time that students would have previously spent reading, and may explain the changes in reading ability and reading comprehension described in the college population (Emanuel et al., 2008). Newer technologies, such as online textbooks, are changing how students read for courses. If students use this type of technology, it often requires navigation to other links for access to other information that support the written text. It is not known if this disrupts the reading process, or the ability to synthesize across multiple sources, but must be considered when faculty select course materials. It is important to also begin to understand the academic challenges presented by different textbooks. Textbook publishers are beginning to identify the reading level of various texts, however, it is not known what level is appropriate for each level of nursing coursework. While many describe a grade-equivalent level, selection of a lower grade equivalent level may not be the best practice and may impeded the development of higher levels of academic literacy.

Reading time and ability may also be associated with procrastination, /or the student's underestimation of the amount of time required for reading. A student's perceptions about their ability to read and write has been correlated with underestimation of the time necessary to complete assignments, and contributed to poor achievement, such as missed deadlines, low course grades, course withdrawal, and academic anxiety

(Collins et al., 2008). The Matthew effect, identified by Stanovich (1986), which refers, in reading, to the gap between good and poor readers has been used to understand this finding. The good reader experiences success and is encouraged to read more, while the poor reader needs more time to complete assignments, and becomes fatigued or discouraged, and has poorer academic outcomes.

An emerging body of research (Seaton, Marsh & Craven, 2010; Marsh et al., 2007) described the effects of the little-fish-big-pond theory on students' academic self-concept. While previous literature reported that students often struggled academically as a result of attending lower-performing school systems, this research demonstrated that attending high-ability schools also had a negative effect on students' academic self-concept. Students attending high ability schools were found to have a lower academic self-concept than those educated in a low- or average-ability environment. This phenomenon was found to be substantial at the end of high school and two to four years later. This concept could not be evaluated in this study due to the homogeneity of high schools attended. Future research is needed to describe and understand this phenomenon.

As there was not enough variability in the range of responses to the demographic variable of minority status and second language learners (ELLs), this could not be analyzed in this study. However, future research is needed as there is extremely limited research on ELL learners and reading ability and academic literacy. English language learners have reported difficulty completing assigned readings using English language textbooks. It has been described that ELLs do "double the work", as the student translates materials between two languages. There is no evidence describing best practices and evidence-based interventions to assess, support and retain this population of

students. Emerging literature has also suggested that it is not only students with very little English language abilities who struggle academically. It appears that ELLs who have strong verbal abilities often struggle with reading comprehension and academic literacy, and that this phenomenon is seen not only in first generation immigrants, but also second and third generation immigrants.

Not only is this a critical topic related to academic literacy and nursing education, it raises significant concerns related to the poor health literacy found in the general population and represents a critical public health concern. While health literacy is not addressed in this study, improving reading comprehension and academic literacy in the college population will also benefit the general population and provide evidence to support health teaching.

**Research question 6.** What are the pre-nursing and senior nursing students' perceptions of their reading ability?

Both the pre-nursing and senior nursing students were asked to evaluate their college level reading ability. The pre-nursing students responded based on their expectations of reading ability in college, and senior student responses reflected their perceived experiences of reading within the nursing major. Questions 1-5 were evaluated using a five-point Likert scale. The pre-nursing students, on average strongly agreed with each statement and showed small differences in their expected performances. Pre-nursing students described the belief that their reading ability was very good and that they would be able to manage their reading assignments in college courses. They believed they were academically prepared for the amount and difficulty of assigned readings, believed they could complete all assigned readings before attending classes and take

notes on assigned readings. The scores of the pre-nursing students may reflect a ceiling effect and/or may reflect social desirability. Social desirability is the tendency to give overly positive self-descriptions. Individuals who present in a socially desirable manner attempt to appear overly moral, honorable and virtuous by denying common, yet undesirable traits and/or exaggerating uncommon yet desirable traits (Crowne & Marlowe, 1960). Polit and Beck (2012) describe this as a "rather charming, but problematic quality of people" (p. 211) who want things to turn out well and to be helpful and present themselves in the best possible light. These tendencies can affect what the participant does or says when they self-report and can result in biases, which can impact the validity of information obtained. A ceiling effect indicates that the students have responded with the highest possible scores allowed, and the only possible direction for change, especially with a longitudinal design, would be down. The responses of the pre-nursing students may also reflect the naivety of this group who may not have a basis for assessing their performance, as high school academic assignments are considerably less challenging than most college reading assignments.

In contrast, senior nursing students tended to be more realistic in their self-reported reading beliefs and experiences. Senior students tended to disagree with the statement that they were able to complete all assigned reading prior to attending class and felt that they were academically unprepared for the amount of reading assigned. The senior students reported that they were not able to complete most of their assigned readings before attending class. Qualitative themes were not able to be analyzed as the students did not respond to the open-ended question. Further research is indicated.

The finding of the senior group are consistent with previous literature in which college students identified that they were under-prepared in college level reading skills or for the amount of reading required (Bray et al., 2011) and that students underestimated the amount of time necessary to complete assignments, leading to poor academic outcomes (Collins et al., 2008). The only study which could be found that indicated the amount of reading that students completed before class or examinations described psychology students' self-reported measures of assigned reading before class and exams (Clump et al., 2004 ). When the psychology students' responses were compared to the nursing students' self- reported hours reading before class or exams, the nursing students reported that they were able to complete substantially more of the assigned reading before class and examinations. These results suggest that the senior nursing students understood the importance of completing reading assignments as the foundation on which to integrate, critically synthesize, and apply nursing science to clinical theory and practice.

### **Conclusions**

The findings of this study show that pre-nursing and nursing students levels of academic literacy are low and may be contributing to the persistent academic failure and attrition found in nursing education. The following conclusions emerged from this study:

(1) Pre-nursing students scored in the low to moderate range on the NDRT measures of vocabulary, reading comprehension and total score. This was in contrast to reading rates, which were higher than anticipated. When the total raw scores were translated to grade

equivalent scores, the pre-nursing students ranged from grades 5.8 to 14.4 with a mean grade equivalent of 10.09.

(2) Senior nursing students scored in the low to moderate range on the NDRT measures of vocabulary, reading comprehension and total score. When the total raw scores were translated to grade equivalent scores, the senior nursing students ranged from grades 4.5 to 18.9 with a mean of 14.75.

(3) The senior nursing students scored significantly higher than the pre-nursing students on measures of vocabulary, comprehension and total reading score. Both groups scored high on the measure of reading rate.

(4a) The pre-nursing students scored significantly below the Grade 13 NDRT standardization group in the areas of vocabulary, comprehension and total score, but scored above the standardization norms for reading rate.

The senior nursing students scored significantly below the Grade 16 NDRT standardization group in the areas of comprehension and total score. The senior nursing students did not differ significantly on vocabulary from the Grade 16 standardization norm, but scored significantly below the standardization norms for vocabulary and total score. The senior nursing student reading rate was significantly higher than that reported for Grade 16.

(4b) The senior nursing students scored significantly below the standardization values reported for other health profession programs (N=542) on vocabulary, comprehension and total reading scores (Haught & Walls, 2002). The senior nursing students scored significantly higher on reading rate than the standardization values for the health profession programs.

(5) Two significant demographic predictors were identified: (1) “group” (whether the student was pre-nursing or a senior) and (2) the reported “hours read” each week. The number of hours worked each week was not a significant predictor of the student’s total reading score (Vocabulary and Comprehension). Due to the restricted range of values and concerns regarding power if too many predictors were used, the following items were not included in the analysis: ethnicity, sex, gender, English as a primary language, and type of high school program attended.

(6) Pre-nursing students described the belief that their reading ability was very good and that they would be able to manage their reading assignments in college courses. They believed they were academically prepared for the amount and difficulty of assigned readings, believed they could complete all assigned readings before attending classes and take notes on assigned readings. The scores of the pre-nursing students may reflect a ceiling effect and/or may reflect social desirability. The responses of the pre-nursing students may also reflect the naivety of this group who may not have a basis for assessing their performance, as high school academic assignments are considerably less challenging than most college reading assignments.

Senior nursing students tended to be more realistic in their self-reported reading beliefs and experiences. Senior students tended to disagree with the statement that they were able to complete all assigned reading prior to attending class and felt that they were academically unprepared for the amount of reading assigned. The senior students reported that they were not able to complete most of their assigned readings before attending class

## **Implications**

There is very limited research which describes the concepts of reading comprehension, academic literacy, and discipline specific literacy in postsecondary education and nursing education, and until work begins in this area, the recommendations of the Carnegie Corporation study (2010a) describing the emerging body of research related to adolescent literacy can serve as a framework to guide action. The improvement of reading comprehension and academic literacy in the college and nursing student population "will take a village". It will require the partnership of multiple stakeholders and disciplines to develop a strong, cohesive, evidence-based approach to understanding and addressing this crisis.

The results of this study are consistent with the theoretical framework used to understand the complex process of reading comprehension, the Dual Coding Theory (Paivo, 2007; Sadoski & Paivio, 2001, 2004, 2007). This theory views reading as a complex process which builds on the basic reading of letter and word recognition. As the reader moves to higher levels of reading comprehension and academic literacy, the reader integrates both a "verbal code" and a "nonverbal code" and incorporates not only basic reading skills, but personal knowledge, memory, personal meaning, and individual developmental differences to understand written text. The Dual Coding Theory (Paivo, 2007; Sadoski & Paivio, 2001, 2004, 2007) describes several essential components for the reader to move to higher levels of critical reading and academic literacy:

(1) Successful initial reading instruction, (2) sight recognition of letters, (3) spelling development, (4) a large vocabulary for fluency and word recognition, (5) a well developed prior knowledge from a large sociocultural context and memory, (6) physical

characteristics such as hearing and vision, (7) psychological and emotional development associated with self-efficacy, motivation, and metacognitive strategies.

The implications from the data obtained in this study suggest that we are "losing our future", as we lose diverse students through attrition. The implications for nursing administrators and faculty include the application of the study's finding to decisions regarding early identification of students with academic literacy difficulties and to the development of policies regarding academic support necessary for students admitted to baccalaureate nursing programs. The status quo will be maintained if existing policies were to continue without regard to understanding and addressing the challenges of academic literacy and the implications of the crisis in adolescent literacy in our nation's high schools and its relationship to post-secondary education. Students with poor reading abilities and poor academic literacy skills are the students entering our colleges, either directly out of high school, or as adult learners. Recommendations for education, administration, practice and future research will be described.

The concept of "failure to rescue" has been well described in the acute care literature, and is offered here for application to the crisis in academic and adolescent literacy this nation faces educating the college nursing student population. Failure to rescue is a concept which was first introduced in the early 1990's by Dr. Jeffrey H. Silber, at the Center for Health Outcomes and Policy Research (CHOPR), to describe how the matrix of institutional and individual errors contributed to a patient's death, and in response to the growing awareness of healthcare quality improvement focusing on the prevention and early management of patient complications (Berwick, Calkins, McCannon & Hackbarth, 2006; Clarke & Aiken, 2003; Friese & Aiken, 2008; Leape et al, 1991;

Silber, Williams, Krakauer & Schwartz, 1992; Silber, Romano, Rosen, Wang, Even-Shoshaw & Volpp, 2007). Failure to rescue occurs when early signs and symptoms fail to be recognized and acted upon, and/or are recognized and interventions start too late or not at all, or are recognized and treatment is initiated without patient response because the condition has progressed to a point where it cannot be reversed. The basic premise is that problems must be recognized early before they are not reversible and result in poor outcomes. Mobilization of appropriate resources immediately when a deteriorating condition is identified has been associated with improved outcomes. This concept is frequently used to measure the quality of care in hospitalized patients, however, in recent years, the concept has expanded to other events such as Hurricane Katrina, other natural disasters, and terrorism (Morse, 2006).

Failure to rescue has been strongly linked to nursing care, as nurses are the first line of intervention to "rescue the patient". It is known that early recognition of complications and timely interventions reduce morbidity, mortality and costs. Nurse educators and administrators are the first line of intervention to rescue the nursing student. Academic literacy has three different phases. The first is the initial or entry level literacy necessary for access into academia, followed by the development of platform literacy necessary for the student to participate and engage in the academic community, and advanced academic literacy which enables the student to legitimize their individual differences to affect curricular direction (Carnegie Corporation, 2010a). As students develop higher levels of academic literacy, they also begin to develop discipline-specific literacy, but need "scaffolded" support to master these concepts.

Recognition of complications associated with poor reading comprehension and academic literacy at an early stage and evidence-based management could improve student academic rescue and ultimately improve the quality of nursing education, reduce attrition and increase timely completion of nursing coursework, improve first pass NCLEX-RN rates, and increase diversity of the nursing workforce while contributing to improvements in healthcare disparities, and health literacy. Early intervention would also assure the best use of limited educational resources and reduce costs.

Professional vigilance, based on nursing knowledge, has been described as a key role for nurses in the healthcare system and as "a state of watchful attention, of maximum physiological and psychological readiness to act and of having the ability to detect and react to danger" (Meyer & Lavin, 2005). It is grounded in the scientific, intellectual and experiential foundations of nursing practice, and is associated with early clinically significant observations, knowledge of the inherent risk in nursing practice, and early and appropriate responses to minimize risks and improve outcomes (Meyer & Lavin, 2005).

In an era of patient-centered care and transparency, hospitals and providers, in response to consumer demands, are publishing their outcomes. Initially, failure to rescue, focused on the failure to recognize and respond to changes in the patient's condition, however, this researcher suggests that the expanded understanding of this concept is applicable to nursing education. Barriers to early interventions addressing reading comprehension and adolescent and academic literacy have been described in the growing body of adolescent literacy research, are complex, and involve multiple system and process issues. They are complicated by a poor understanding of best-practices to improve educational outcomes. Resources are limited and nursing education and

healthcare grows more complex each day. Just as rapid response teams in acute care bring clinical expertise immediately to the point of care, the concept of rapid response teams for nursing education should be considered. The goal of nursing education and evidence-based intervention is to improve student academic outcomes through programs of support and remediation. An approach of true prevention, a proactive approach of intervening before a problem has occurred should be used.

### **Recommendations for Future Research**

The results of this study leave the researcher with more questions than answers, and clearly support the need for future research. While the study indicated that levels of reading comprehension are low, as measured by the NDRT, this study is limited in the ability to generalize the findings to other populations due to the use of a convenience sample, and the homogeneity of the sample. This study was a needs assessment study, to describe the level of reading comprehension found in pre-nursing and senior nursing students, and to explore whether poor reading was found in nursing students and whether there could be a need for further research in this area. This includes the possibility that poor reading comprehension could be a variable contributing to persistent attrition from nursing programs. Low total reading scores (Vocabulary and Comprehension) were found. This was in contrast to high reading rate scores, suggesting that many of the students had successfully "learned to read" in early reading coursework, but had not learned how to "read to learn". They are able to identify the words and read at a rapid rate, but they are not able to comprehend, synthesize and apply this information, which requires a higher level of academic literacy. The findings suggest that the use of standardized tests during the college admission process, does not identify the academic

literacy challenges that nursing students may face. High ACT or SAT scores, and high school GPA may best identify the students who will be successful in introductory level courses, but may not identify students who will struggle in the sciences and nursing courses. This suggests the need to explore different assessment methodologies to understand the student's level of literacy. While it is known that there is no perfect test to measure reading abilities, nationally, high schools are working to develop common core standards with international benchmarks, to assure that students leaving high schools, are prepared for the rigor of college and employment. However, until this is the population of students who enter college, research is needed to understand college academic literacy requirements, discipline-specific literacy requirements, and evidence-based interventions to improve academic outcomes.

Additionally, the evidence clearly describes that very little is known about the literacy challenges faced by English language learners. What is known describes that that this population struggles to read and to be able to comprehend written materials in English. It is also known that the diversity of the RN workforce has not changed consistent with the changes seen in the general population, and that this contributes to health disparities and poor outcomes. Originally, it was thought that when an ELL gained conversational proficiency, they gained adequate reading comprehension and academic literacy. It now appears that many students, even second and third generation immigrants, struggle, despite strong verbal English skills. Unless steps are taken to understand this phenomenon, and to change the system, persistent attrition will continue at a time when resources are limited and the demand for a diverse, well-educated nursing workforce continues to grow.

The following recommendations are made for further research:

- (1) Longitudinal quantitative research of students' academic literacy measures is needed including correlation of standardized reading test scores with GPA, standardized admission test scores such as the SAT or ACT and points in the nursing program where attrition occurs. Reading ability should be measured on admission to college, and annually, to understand the growth that occurs during exposure to college coursework.
- (2) Research is needed to identify or develop new assessment tools which will measure reading ability and academic literacy in the college population. This in turn, will guide the development of experimental research design to test interventions and outcomes leading to the identification and dissemination of best practices and sustainability of change.
- (3) Descriptive and experimental research are needed to understand the academic literacy challenges faced by ELLs, and to describe and test best practice interventions to support this population of students leading to increased retention, improved academic outcomes and increased professional diversity.

### **Recommendations for Nursing Education**

Nursing education faces the challenges of educating large numbers of competent, diverse RNs to meet the nation's healthcare needs. This study has identified gaps in the knowledge of reading comprehension, academic literacy, discipline specific literacy and evidence-based interventions to support students through the college nursing education process, while assuring timely completion and entry into professional practice. Areas identified that should be addressed include the admission process and admission criteria, both to college and to the nursing major, and identifying and applying evidence-based interventions to support the continued development of reading comprehension and

academic literacy in the nursing student population, so that nurses can truly practice to the full extent of their education, and on a level with their peers in other healthcare professions. Partnerships must be established with experts in other disciplines, such as education and reading, to best support sustained change. Anecdotally, nursing faculty suggest that the concept of nursing discipline-specific literacy is poorly understood, and evidence-based practice is needed. Data must be readily available to drive decisions. While nurse educators have struggled to identify factors associated with attrition, the outcomes have not changed.

Another challenge is to reassess how nurse educators describe their students. Previous models of nursing student retention (Jeffreys, 2004) had been built on the assumption that there are two types of nursing students, traditional and non-traditional. However, this study suggest that this may no longer be applicable. Most nursing students have demographic characteristics which overlap both categories, and many of the new education delivery models, which use interventions such as on-line learning and distance education, challenging this concept further.

The following recommendations are made for nurse educators.

(1) Establish interdisciplinary committees to assess barriers to academic success related to reading comprehension and academic literacy for all nursing students. Areas to be addressed include identification of a standardized tool to assess reading comprehension and academic literacy. Collect institution specific data to develop standardization norms for the institution and discipline. A process must be created to conduct ongoing formative and summative assessments as practices and interventions need to be empirically validated, by showing outcomes and successful replication in multiple areas. Students' reading skills should be screened prior to the start of each academic school

year.

(2) Use current data to assess and redefine admission and progression criteria based on the evidence. All decisions must be evidence driven.

(3) Establish a process for partnerships between content specific faculty and reading specialists to embed literacy instruction in specific subject areas and/or reading experts to learn to contextualize literacy instruction in the same discipline. This will allow faculty to systematically link instruction to the growing knowledge base of academic literacy and inform it with up to date data related to outcomes and best practices. This will also guide faculty decisions about the type of course materials, and the delivery methodologies most appropriate for nursing student learning.

(4.) Establish an early referral process of students who are not meeting academic goals to the appropriate literacy experts for assessment, and creation of an individualized, scaffolded approach to literacy support. Literacy support be given to all students, not just to those who are struggling academically at the moment.

(5) Use evidence-based practice to integrate newer technologies into the classroom. Select textbooks for courses using the principles of academic literacy and understand the impact of those texts on reading comprehension and discipline specific literacy and student performance.

### **Recommendations for Nursing Education Administration**

Some of the key challenges that will be faced by nursing education administration are associated with implementing and sustaining the change process and demonstrating the economic benefits of change. Nursing education administrators must be transformational leaders, who can facilitate change. A top down approach will not produce sustained change. Input must come from the "point of care" in the classrooms, labs and clinical settings, and must include input from all stakeholders. Rapid process

improvement methodologies should be utilized to best understand interventions which are successful, sustainable and control costs.

The following recommendations are made:

(1) College administrators must identify that academic literacy is a priority for all of its students, and support faculty to address this issue. College nursing administrators, using principles of transformational leadership, work in partnership with subject area specialists, literacy coaches, and other skilled experts to ensure testing and implementation of critical programs.

(2) Increase human capacity through appropriate professional development. Find and support good faculty with the right professional development opportunities. Professional development must be on-going, connected and job embedded.

(3) Increased and ongoing funding will be necessary to implement sustainable programs. Develop and utilize cost benefits and economic analyses to demonstrate cost savings from improved literacy, student retention, and program completion.

(4) Improve policies for the revision of standards, develop and revise assessments, instructional alignment, faculty preparation, professional development and accountability and institutionalization.

(5) Create common planning periods for grade level and content-area specific team meetings that are focused on raising student achievement and assure that current, data is readily available.

(6) Create positions for literacy coaches who serve as site-based professional development resources for all faculty. This role should include coordinating assessments, placement of students into intervention classes, professional development and mentoring of faculty, and content-specific training. They must be able to devote 100% of their time to literacy tasks-no administrative tasks.

## Summary

The goals of nursing faculty and administrators are to select those students who are most capable of completing the nursing program and to provide academic support needed for program completion. To meet these goals, evidence based interventions must be identified to develop strong academic literacy skills in the nursing student population. Attrition from college and nursing programs has high socioeconomic costs to all stakeholders. These challenges come at a time when the demand for a diverse, competent RN workforce to meet the needs of diverse populations, rapidly aging populations, and the paradigm shift from acute hospital care to a focus on population health continues to grow. The U.S. also faces a large projected shortage of RNs. Registered nurses must be able to practice to the full extent of their education and to progress seamlessly to higher levels of education to improve patient outcomes. This study supports the consideration of reading comprehension, academic literacy, discipline-specific literacy, and literacy needs of English language learners as overlooked variables which could play a role in the attrition of nursing students from education programs and persistent limited diversity of the nursing workforce. Vartan Gregorian, President of the Carnegie Corporation of New York, best expresses the significance of the emerging knowledge of academic and adolescent literacy which is applicable to nursing, healthcare, nursing students, stakeholders and the patients that we care for. He tells us that reading is "one of the great democratizing forces because it is a great equalizer". The ability to read provides knowledge and opportunities to all and is associated with the power people have to control their lives, and the quality of their lives (Carnegie Corporation of New York, 2010b, p. i).

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## Appendix A: Institutional Approval



Department of University Safety & Assurances

*Benjamin J. Kennedy, MA  
IRB Manager  
Institutional Review Board  
Engelmann 270  
P. O. Box 413  
Milwaukee, WI  
53201-0413  
(414) 229-3182 phone  
(414) 229-6729 fax  
<http://www.irb.uwm.edu>  
[kennedbj@uwm.edu](mailto:kennedbj@uwm.edu)*

### New Study - Notice of IRB Exempt Status

**Date:** May 31, 2011

**To:** Susan Dean-Baar, PhD, RN, FAAN

**Dept:** Nursing

**Cc:** Debra Lajoie, MSN, RN

**IRB#:** 11.372

**Title:** Reading Comprehension and Nursing Education: A Missing Variable Associated with Student Attrition?

After review of your research protocol by the University of Wisconsin – Milwaukee Institutional Review Board, your protocol has been granted Exempt Status under **Category 2** as governed by 45 CFR 46.101 subpart b.

Unless specifically where the change is necessary to eliminate apparent immediate hazards to the subjects, any proposed changes to the protocol must be reviewed by the IRB before implementation. It is the principal investigator's responsibility to adhere to the policies and guidelines set forth by the UWM IRB and maintain proper documentation of its records and promptly report to the IRB any adverse events which require reporting.

It is the principal investigator's responsibility to adhere to UWM and UW System Policies, and any applicable state and federal laws governing activities the principal investigator may seek to employ (e.g., [FERPA](#), [Radiation Safety](#), [UWM Data Security](#), [UW System policy on Prizes, Awards and Gifts](#), State gaming laws, etc.) which are independent of IRB review/approval.

Contact the IRB office if you have any further questions. Thank you for your cooperation and best wishes for a successful project.

Respectfully,

A handwritten signature in black ink, appearing to read "Benjamin J. Kennedy".

Benjamin J. Kennedy

IRB Manager

CC: Study File

**Appendix B: UW-Milwaukee IRB Information Sheet****University of Wisconsin – Milwaukee  
Research Information Sheet**

**Study Title:** IS READING COMPREHENSION A MISSING  
VARIABLE ASSOCIATED WITH STUDENT ATTRITION AND PERSISTENCE IN  
NURSING EDUCATION?

**Person Responsible for Research:** Debra Lajoie, RN, MSN

**Study Description:** The purpose of this study is to describe reading comprehension levels of pre-nursing students and the reading comprehension levels of senior nursing students. Approximately 60 subjects will participate in this study. If you agree to participate, you will be asked to complete a reading test, a demographic form, and a survey describing your reading experiences in nursing education. This will take approximately 45 minutes to complete.

**Risks / Benefits:** Risks to participants are considered minimal. There will be no costs for participating, nor will you benefit from participating other than to further research. This study will be anonymous. No personal identifying information will be collected. Data from this study will be reported anonymously. Results from this study will be presented at professional conferences and in professional literature.

**Voluntary Participation:** Your participation in this study is voluntary. You may choose to not answer any of the questions or withdraw from this study at any time without penalty. Your decision will not change any present or future relationship with the University of Wisconsin Milwaukee.

**Who do I contact for questions about the study:** For more information about the study or study procedures, contact Debra Lajoie at [dllajoie@uwm.edu](mailto:dllajoie@uwm.edu).

**Who do I contact for questions about my rights or complaints towards my treatment as a research subject?** Contact the UWM IRB at 414-229-3173 or [irbinfo@uwm.edu](mailto:irbinfo@uwm.edu)

**Research Subject's Consent to Participate in Research:**

By completing and submitting the attached surveys and reading test, you are voluntarily agreeing to take part in this study. Completing the reading test and surveys indicates that you have read this research information sheet and have had all of your questions answered, and that you are 18 years of age or older.

Thank you!

## Appendix C: Demographic Collection Tool: Pre-nursing

### Research Subject's Consent to Participate in Research:

By completing and submitting the attached survey, you are voluntarily agreeing to take part in this study. Completing the survey indicates that you have read the information sheet and have had all of your questions answered, and that you are 18 years of age or older.

Please mark the answer which best describes you.

1. What is your sex?      Male\_\_\_\_\_      Female\_\_\_\_\_
  2. What is your age?      \_\_\_\_\_
  3. What is your ethnicity?    White\_\_\_\_    African-American\_\_\_\_    Hispanic\_\_\_\_  
    Asian-Pacific Islander\_\_\_\_    Native American\_\_\_\_
  4. Are you a full-time (12 credits or more) or a part-time (less than 12 credits) student?  
    Full-time\_\_\_\_\_      Part-time\_\_\_\_\_
  5. Is English your primary language?  
    Yes\_\_\_\_\_      No\_\_\_\_\_
  6. Do you work during the academic year?      Yes\_\_\_\_\_      No\_\_\_\_\_
- How many hours do you work in a job per week? \_\_\_\_\_
7. How many hours per week do you plan spend reading for nursing course assignments  
    \_\_\_\_\_?



### Appendix E: Nursing Student Reading Survey (Pre-nursing)

**Research Subject's Consent to Participate in Research:** By completing and submitting the attached survey, you are voluntarily agreeing to take part in this study. Completing the survey indicates that you have read the study information sheet and have had all of your questions answered, and that you are 18 years of age or older.

**INSTRUCTIONS:** Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box.

	5	4	3	2	1
	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1. I believe I will be able to complete all assigned college course readings prior to attending class.					
2. I feel that I am academically prepared for the amount of college course reading assignments.					
3. I feel that I am academically prepared for the difficulty of college course reading assignments.					
4. I believe my reading ability is very good.					
5. I plan to take notes when I am reading for college courses.					

Please complete the following statements:

6. I plan to complete \_\_\_\_% of assigned readings before attending class.

7. I plan to complete \_\_\_\_% of assigned readings shortly before examinations

Please add any comments or experiences that you may have about reading and college courses:

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Thank you for your participation in this survey.

## Appendix F: Nursing Student Reading Survey (Senior students)

**Research Subject's Consent to Participate in Research:** By completing and submitting the attached survey, you are voluntarily agreeing to take part in this study. Completing the survey indicates that you have read the study information sheet and have had all of your questions answered, and that you are 18 years of age or older.

**INSTRUCTIONS:** Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box.

	5	4	3	2	1
	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1. I was able to complete all assigned nursing course readings prior to attending class.					
2. I feel that I was academically prepared for the amount of nursing course reading assignments.					
3. I feel that I was academically prepared for the difficulty of nursing course reading assignments.					
4. I believe my reading ability is very good.					
5. I was able to take notes when I was reading for nursing courses.					

Please complete the following statements:

6. I was able to complete \_\_\_\_% of assigned readings before attending class.

7. I was able to complete \_\_\_\_% of assigned readings shortly before examinations.

Please add any comments or experiences that you may have about reading and nursing education:

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Thank you for your participation in this survey.

**Appendix G: Directions for NDRT Standard Test Administration** (Brown et al. 1993, pp.9-10)

“Say: This test is divided into two parts: Part I is a vocabulary test containing 80 items, and Part II is a reading comprehension test containing 38 items. Your score is based on the number of correct responses. Since there is no penalty for incorrect answers, it is to your advantage to mark every question you read. But so not spend too much time on any one question.

Notice that the text booklet is bound at the top. The pages turn from bottom to top rather than from left to right. (Demonstrate.) The first part of the test, Vocabulary, is on the pages that face you. To take the second part of the test, Comprehension, you will turn the booklet over. (Demonstrate.) Now open your test booklets to page 2, Part 1, Vocabulary Test. Read the instructions up to letter D.

(When students are reading, write “Begin” and “End” on the board). When they have finished reading the directions, say:

On your answer sheet find the heading-Part 1 Vocabulary. Locate the boxed section titled-Vocabulary. Locate the boxed section titles Practice Exercises. When answering the three practice items, be sure that the item numbers on the answer sheet correspond to the practice item numbers you have just read in the test booklet. To make sure that you know how to take the test, complete the three practice exercises.

Read these practices exercises aloud and make sure each student understands the procedure.

Practice Exercises:

P1. A chef works with A. bricks B. music C. clothes D. food E. statues

Which word best completes the opening statement? Yes, *food*, is the best answer. Look at the first practice exercise answer row on the answer sheet to see how you are to mark your answer.

P2. To *repair* is to: F. destroy G. finish H. fix I. work J. show

Mark the space for the answer you think is correct. You should have marked space H, since *fix* is the correct answer.

P3. *Mathematics* refers to: A. letters B. numbers C. machines D. plants E. stars

What is the letter of the best answer? Mark the space lettered the same as the answer you think is correct. You should have marked space B; *numbers* is the correct answer.

When students have completed the exercise, say:

Part I and Part II are timed separately. You will have 15 minutes to complete Part I, the Vocabulary Test. If you finish before the 15 minutes are up, check your answers, then close your test booklet and wait quietly.

When I tell you, turn back this page. First be sure that you have properly located the Figure 1, under the Heading Part I-Vocabulary on your answer sheet. Now turn the page back and begin.

(Record starting time \_\_\_\_\_.)

Write the starting time on the board after “Begin”, add 15 minutes to this starting time, and write the time the test will end after the word “End”.

When the students have been working exactly 15 minutes, say:

Stop. Put your pencil down and close your booklet. (Pause.)

Now turn the test booklet to the back cover, which is marked Part II, Comprehension Test. Read the instructions through letter E.

(Erase the starting and ending times from the board when the students read the direction.)

Then say:

Look at the answer sheet and locate the section marked Part II-Comprehension at the bottom of the sheet. You will have 20 minutes to work on Part II of the test. The first minute will be used to determine your reading rate. Note the section marked Reading

Rate. When I tell you to begin, turn the page of the test booklet and start immediately to read the passage on page 8. read st your normal rate-neither faster or slower than usual.

At the end of one minute, I will call “Mark”. When you hear that signal, stop on the line you are reading. Note the number at the right of the line. Write that number in the row of three boxes under the heading Reading Rate.

(Show where the number is to be written).

If your reading rate consists of two digits, write 0 (zero) in the first of the three boxes provided. Write the first digit in the middle box and the second digit in the right-hand box. Then go on immediately with your reading. Before you begin, locate the answer circles for the section marked Part II-Comprehension on your answer sheet. This is where you will mark your answers to questions in the comprehension test. You will have 20 minutes to complete Part II. Begin.

(Record exact starting time\_\_\_\_\_). (Write the exact starting time on the board after the word “Begin”, add 20 minutes to that figure, and write the result after the word “End”.

Remember you are to call time after one minute for the Reading Rate).

(Exactly one minute after the signal to begin, say: MARK.)

(Then proceed as follows):

Stop on the line you are reading. Note the number printed at the right of that line. On your answer sheet, write the number as you were directed to do in the three boxes in the section marked Reading Rate. Then go on immediately with your reading.

(Exactly 20 minutes after the signal to begin, say:)

Stop! Close your test booklets.

NOTE: If students are using machine scorable booklets, continue:

Now look again at the reading rate section of your answer sheet. Fill in the appropriate circle below each digit of the number representing your reading rate.

Collect all test materials, the answer sheets first, followed by test booklets.

## CURRICULUM VITAE

Debra L. Lajoie MSN, RN

### Licensure: CT E37628

PhD	2013	University of Wisconsin Milwaukee Research
M.S.	1999	Western Connecticut State University Nursing: Clinical Specialist
B.S.N.	1985	Western Connecticut State University Nursing: Clinical Specialist
Diploma:	1975	Meriden-Wallingford Hospital School of Nursing

### Professional Experience

Donahue, Durham & Noonan P.C. Northern Westchester Hospital	7/08/13-present 12/20/11-01/20/13	Legal Nurse Consultant Asst. Director Research, EBP & Special Projects Asst. Clinical Professor
Western Connecticut State University	9/2002- 12/2012 9/2007- 9/2009	Asst. Professor Undergraduate Coordinator
Danbury Hospital	1975-2000	Radiology Clinical Specialist Instructor-School of Radiologic Technology Registered Nurse Surgical Services Surgical Clinical Specialist:OR & Surgical Tech Program: Clinical instructor/preceptor: Surgical Services Immunization Action Plan Coordinator/Director Clinical Specialist-Optifast: Phase II Clinical Research

Corporate Health Care:  
 Clinical Specialist  
 Renal Dialysis: Staff Nurse,  
 Charge Nurse  
 Critical care: Charge Nurse

Med Center Home Care  
 Mediplex Rehab, River Glen Continuing Care

#### Grants Projects and Research

Co-Director Federal Nursing Initiative Grant. CSUS Initiative to Improve the Capacity and Preparation of the Nursing Workforce. \$250,000. Funded 2008 (\$500,000 for Academic System-\$130,000 allotted for WCSU. . Funding renewed at same level 2<sup>nd</sup> yr 2009

Lajoie, D.& Daley, K. (2010). An analysis of variables associated with baccalaureate nursing students who were not successful in nursing coursework.

Daley, K., & Lajoie, D. (April 4<sup>th</sup>, 2008). Predictors of NCLEX Success: Results of a Four-Year Study. Presented at the 16<sup>th</sup> Annual Connecticut Collaborative Research Day Celebrating Nursing scholarship in Nursing Education, Practice, and Research: A Global Perspective..

Daley, K., & Lajoie, D. (March 29, 2008). Linking Research: A Capstone Course and Research: Formula for Success in Nursing Education. Presentation for the 11<sup>th</sup> Annual Faculty Research Conference at Eastern Connecticut State University.

Daley, K., & Lajoie, D. NUR 375: Predictors of NCLEX Success". Class assessment of program predictors of NCLEX Success In". analysis of 5 years of data on graduating seniors from the BS nursing program. 2002-2007. Funded by CSU Research Grant

#### Professional Membership

AACN: Colleges of Nursing

AACN: Critical Care

ANA

AALNC

ERNS