

Nursing Student Preferred Learning Styles and Predicted NCLEX[®] Success

A Dissertation submitted

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Abstract

Most state boards of nursing and other accrediting bodies use the NCLEX[®] passing rate as the major indicator whether a nursing program maintains its approval status and remains operational. Learning styles have become an important consideration for students' learning in the classroom. This quantitative non-experimental study was designed to investigate whether a difference exists between the identification of students' preferred learning styles as defined by visual, aural, read/write, kinesthetic assessment (VARK[®]) and predicted National Council Licensure Examination (NCLEX[®]) success as defined by the Assessment Technologies Institute (ATI) Comprehensive Predictor[®]. The study was conducted in one large proprietary education system with campuses located across the United States. The convenience sample consisted of 113 PN and RN students returning completed data packets including the VARK[®] assessment and taking the ATI Comprehensive Predictor[®] between March 1, 2014 and June 30, 2014. Ancillary demographic data was also reviewed. Study findings indicate that there is no difference between students' preferred learning styles and the predicted success on the NCLEX[®]. Learning styles for this study were identified using the VARK[®] assessment and include visual, aural, read/write and kinesthetic. Learning-style identification would allow students to adjust their learning strategies and encourage faculty to develop multiple teaching strategies to accommodate all learning-style preferences and therefore improve students' readiness for the NCLEX[®] examination.

Dedication Page

I dedicate this dissertation to my father, Ray Hartbarger, BA, M.Div. My dad encouraged me throughout this process and always believed that I was capable of finishing my degree even when at times I was not sure myself. My dad was the first in his family to graduate from college and to receive a master's degree. He taught me that education is important. Without his encouragement and belief that education is important, I would not have completed this program.

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Completing a doctoral degree has been a long arduous journey for me. It began in 1983 when I earned my first associate degree in nursing at the University of Evansville and began practicing as a registered nurse. I fell in love with the art and science of nursing. It continued over the years with completing a Bachelor of Arts degree in Music at Oakland City University in 1984, a Bachelor of Science degree in nursing at Southeast Missouri State University in 1999, and then a Master of Science degree in nursing at Regis University in Denver, Colorado in 2007. The journey will finally be completed when I receive my Doctor of Education degree from The College of Saint Mary this year, 2015.

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Nursing Student Preferred Learning Styles and Predicted NCLEX[®] Success**CHAPTER I: INTRODUCTION**

Nursing students bring a variety of experiences and learning styles into the classroom (Meehan-Andrews, 2009). According to Frankel (2009), applying knowledge to practice is important in developing highly skilled and competent practitioners. Education organizations must seek ways to address students' individual learning styles in the classroom in order to prepare students to become safe and competent practicing nurses (Frankel, 2009).

This research study was designed to investigate whether a difference exists between the identified student preferred learning styles as defined by visual, aural, read/write, kinesthetic assessment (VARK[®]) and predicted National Council Licensure Examination (NCLEX[®]) success as defined by the Assessment Technologies Institute (ATI) Comprehensive Predictor[®]. This study used the operational definition and conceptual formation of learning styles as defined by Neil Fleming, the author of the VARK[®] assessment. These definitions are identified in the definition section of this chapter. Leite, Svinicki, and Shi (2009) found the VARK[®] to be valuable in predicting student learning styles. Leite, Svinicki, and Shi stated that those using the VARK[®] to delineate students' preferred learning styles could do so with confidence. AlKhasawneh (2013) found the VARK[®] to be reliable and valid in a pilot test that included a control group of 10 nursing students.

Purpose of the Study

The primary purpose of this quantitative non-experimental, retrospective study was to identify the preferred learning style for associate degree (ADN) RN and PN students as determined by the VARK[®] assessment. The secondary purpose of this study was to determine if a difference existed between associate degree RN and PN students' preferred learning style, as determined by the VARK[®] assessment, and predicted success on the NCLEX-PN[®] and the

NCLEX-RN[®], as determined by the corresponding ATI Comprehensive Predictor[®]. The researcher conducted this study using ADN students and practical nursing (PN) students in a large proprietary education system with campuses located across the United States. The study entailed using the VARK[®] assessment to determine preferred learning styles (Fleming & Mills, 1992). The ATI RN Comprehensive Predictor[®] and the ATI PN Comprehensive Predictor[®] were used to predict NCLEX[®] success.

Problem Statement

In some cases, it is intuitive for students to know how best that they learn, but in most cases, a formal assessment of the latter would glean new information that has the potential for improving student-learning efficacy. The literature is permeated with studies about learning styles in various disciplines (Barclay, Jeffres, & Bhadta, 2011; French, Cosgriff, & Brown, 2007; Felder & Silverman, 1988). Barclay et al used pre and post assessments to ascertain if student learning improved. They used the VARK[®] assessment to determine preferred learning styles of pharmacy students and used educational games to supplement lecture. The study showed that students did learn from participating in the educational games. However, the study did not show a consistent and direct correlation between students' VARK[®] scores and improvement in assessment scores (Barclay, Jeffres, & Bhakta, 2011). French et al. conducted a study of Australian occupational therapy students and preferred learning styles as identified by the VARK[®] and by the Kolb Learning Style Inventory. This study confirmed that a range of teaching methods should be used to reach all types of learners. In addition, the study showed that students need to strengthen their capabilities to use a variety of learning styles (French, Cosgriff, & Brown, 2007).

Very little information has been published specifically concerning the preferred-learning styles of nursing students. However, the information from other disciplines may be pertinent to

the study of nursing student preferred learning styles. Correlational studies of student learning styles and success on the NCLEX-RN[®] or the NCLEX-PN[®] are not well documented. In addition, definitions of student preferred learning styles are fragmented. The literature has a plethora of various learning-style theories, resulting in considerable variation of definitions describing learning styles (AlKhasawneh, 2013; Curry, 1998; Cuthbert, 2005; Felder, 1993; Fleming & Mills, 1992; Fountain & Alfred, 2009; Frankel, 2009; Keene, 1993; Meehan-Andrews, 2009; Molsbee, 2011).

Background and Rationale

Most state boards of nursing and other accreditors use the NCLEX[®] passing rate as the major indicator for a nursing program to maintain its approval status and remain operational. Carrick (2011) wrote that a minimum number of graduates annually must pass the NCLEX-RN[®] exam, and that each individual state determines that benchmark. Harding (2010) concurred that the performance of graduates on the NCLEX-RN[®] is considered the key indicator of the quality of a nursing education program. Studies focusing on PN programs are not as frequently documented but performance of graduates on the NCLEX-PN[®] is also considered the key indicator of the quality of a PN program. Success rates for the NCLEX[®] indicate that candidates pass the NCLEX[®] on their first attempt (Davenport, 2007). Higgins (2005) noted that candidates' successful completion of the NCLEX[®] is necessary to protect the public, the education institutions' reputation in the community, accreditation, and finally to help to decrease the nursing shortage. Higgins suggested that the number of at-risk students is increasing and that predicting successful completion of the NCLEX[®] is critical to conserving faculty manpower and admitting applicants. In 2012, the Accrediting Council for Independent Colleges and Schools (ACICS) raised its expectations for persistence, placement, and licensure requirements for institutional and programmatic accreditation (ACICS, 2012). Poor success on the NCLEX[®],

high attrition rates, and failure to place graduates can now cause an institution or a program to lose its accreditation.

Identifying student preferred learning styles and their predicted success in passing the NCLEX[®] benefits both students and faculty. Identification of student preferred learning styles might allow schools to predict which learning style is most closely associated with successfully passing the NCLEX[®]. Faculty can assist students in learning with economy and efficacy once students' individual learning styles are identified. Identifying students' preferred learning styles would enable faculty to develop and individualize success plans for students early in the program therefore improving the chance of student success and student retention. Learning-style identification would allow students to adjust their learning strategies and encourage faculty to develop multiple teaching strategies to accommodate all learning-style preferences and therefore improve students' readiness for the NCLEX[®] examination.

Learning Styles

Learning styles have become an important consideration for students' learning in the classroom. Understanding their own preferred learning style may empower students to enhance their classroom learning experiences. The nursing profession is continually growing and changing. Nurses must remain current with standards and practices, such as leadership, health policy, system improvement, research and evidence based practice, teamwork and collaboration (Institute of Medicine, 2011). Today's nurses must also be proficient in care coordination and transitions. Adapting their learning style in diverse situations is especially important for nurses who must apply learned concepts quickly in a variety of settings.

McClanaghan (2000) wrote about the importance of teachers being aware that learning using many modalities enhances the potential of student learning. Cuthbert (2005) discussed the importance of instructors possessing knowledge of student learning styles in order to adjust

pedagogic strategies. Faculty competence in presenting content to students whose learning styles vary is essential for strategic lesson planning in nursing education programs. If a relationship between a student's preferred learning style and success on the NCLEX[®] is determined, faculty and students may be willing to adjust their pedagogical practices. Faculty may be able to focus each learner toward passing the NCLEX[®] on the first attempt with additional alternative pedagogical strategies. Students may be able to learn how to adjust their learning styles in order to retain the needed information to be successful on the NCLEX[®]. These adjustments could be applied to nursing educational programs resulting in improved teaching, student learning, and higher NCLEX[®] scores.

One of the most noted ways of defining learning styles began with the published works of Dr. Carl Jung, a Swiss psychologist. Jung (1916) acknowledges that people learn through the embodiment of experiences and judgments. According to Jung, an individual must use his or her own thoughts, previously established knowledge, and grounded judgments to learn new concepts. Jung's writings were the first effort to define how a person learns and are considered the beginning for modern-day learning-style theories. Jung noted that a person's attitude or readiness to act is determined by a preference for either extraversion, which focuses on the external world, or introversion, which focuses on the internal world. Jung identified four behavioral functions. These functions are *sensing*, *intuition*, *thinking*, and *feeling* and are connected to personality types.

There are different approaches used to ascertain student preferred-learning styles. These approaches have evolved throughout the last 20 to 30 years (Gardner, 1983; Gardner, 2011; Knowles, 2005; Kolb, 1984). In addition, multiple ways of classifying learning style characteristics exist. Historically, the classification of learning styles has grown and changed. Identification of learning styles continues to be an ongoing research and academic endeavor, and

researchers have conducted several studies during the last several years that attempt to identify one system of labeling the learning styles of students (Felder & Spurlin, 2005; Fleming, 1992; Gardner, 1983; Kolb, 1984; Myers-Briggs, 1993). No matter what terms were used to describe a person's learning style, all seem to emerge from Jung's studies.

Determining whether differences exists between the identification of student preferred learning styles and predicted success on the NCLEX[®] has the potential to positively affect the NCLEX[®] passing rate. Faculty identification of student preferred learning styles and implementation of strategies to maximize student learning might increase the NCLEX[®] success rate. Improving the NCLEX[®] rate and sustaining it is a necessity in order to demonstrate that an institution offers a quality-nursing program.

Exit Examination

A common practice of most nursing programs is to supplement learning by using nationally normed assessment tests (Spector & Alexander, 2006). The ATI Comprehensive Predictor[®] is one such test. Researchers have found the ATI Comprehensive Predictor[®] examination to be reliable in predicting NCLEX[®] success, especially when used in conjunction with the ATI Comprehensive Assessment and Review Program[®] (CARP). The ATI Comprehensive Predictor[®] correctly predicts NCLEX[®] outcomes 87.5% of the time for RNs (Assessment Technologies Institute, 2010, p. 1) and 86.7% of the time for PNs (Assessment Technologies Institute, 2011, p. 1). The programs that participated in this study all use the CARP[®] package along with the ATI Comprehensive Predictor[®]. The ATI CARP[®] package allows for focused remediation of students throughout their nursing programs. In addition to containing various comprehensive proctored examinations, the CARP[®] also contains remediation pieces that are linked directly back to the NCLEX[®]. ATI also stated that the CARP[®] package

can be used as an “academic measuring tool and a time saver for faculty”; packages are available for both RN and PN programs (Assessment Technologies Institute, 2012b).

Theoretical Framework

This study was based in cognitive learning theory. Schunk’s (2008) definition of cognitive learning was “theory that views learning as the acquisition of knowledge and cognitive structures due to information processing” (p. 518) or in the way a person learns. Schunk suggested that cognitive theories emphasize the role of learner’s thoughts, beliefs, attitudes, and values. Thoughts, beliefs, attitudes, and values are linked to cognitive learning processes and are a part of the student’s learning process. According to Schunk, the terms *cognitive styles*, *learning styles*, and *intellectual styles* were used synonymously.

Students’ thought processes are clearly reflected in their preferred learning styles. Information-processing theories and learning styles are associated with cognitive learning. The objective of cognitive theorists was to determine how learning occurs, as well as the mental processes that happen during learning. Preferred ways of learning have been instilled into students during their primary school years. This can be an advantage for students if they know what their learning styles are and how they can benefit from them. According to key cognitive learning theorists, preferred styles of learning resulted from information processing that has occurred over time (Wertheimer, 1959; Piaget, 1952; Vygotsky, 1978; Knowles, 2005).

Research Questions

The researcher posed two primary and two secondary research questions for this study. The following primary research questions were included:

1. Which learning styles, as determined by the VARK[®] assessment, do associate degree nursing students prefer in a large proprietary education system with campuses located across the United States?

2. Which learning styles, as determined by the VARK[®] assessment, do practical nursing students prefer in a large proprietary education system with campuses located across the United States?

The following secondary research questions were posed for this study:

3. Is there a difference between associate degree nursing students' preferred learning styles, as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the RN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States?

H₀3: There is not a difference between associate degree nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the RN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

H_a3: There is a difference between associate degree nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the RN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

4. Is there a difference between practical nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-PN[®] as determined by the PN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States?

H₀4: There is not a difference between practical nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX[®] styles as defined by the VARK[®] assessment and predicted success on the NCLEX-

PN[®] as determined by the PN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

H_a4: There is a difference between practical nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-PN[®] as determined by the PN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

Definition of Terms

The following operational and conceptual definitions applied to the terms used in this study:

- **Visual learners** learn by seeing things such as charts and graphs or pictures (VARK-Learn Website, 2011).
- **Aural learners** learn by hearing (VARK-Learn Website, 2011).
- **Read/write learners** learn by reading, writing, and seeing the printed word (VARK-Learn Website, 2011).
- **Kinesthetic learners** learn by doing things to understand them (VARK-Learn Website, 2011).
- **Learning styles** are different approaches or ways of receiving information for learning as determined by the VARK[®] assessment.
- **Student preferred learning styles** are the ways a student prefers to receive the information to be learned.
- **The ATI Comprehensive Predictor[®]** is a 180-item test proctored examination that offers an assessment of the student's comprehension and mastery of basic principles and contains questions from all NCLEX[®] client needs categories. There is a predictor for the NCLEX-RN[®] and NCLEX-PN[®], and both are aligned with their respective NCLEX[®] blueprint (Assessment Technologies Institute, LLC, 2012a).

- **NCLEX[®] success** equates to passing the NCLEX[®] on the first attempt.
- **The NCLEX-RN[®]** is a computerized adaptive test developed by the National Council of State Boards of Nursing that is administered to graduates of registered nursing programs and measures entry-level competency. Passing of this exam is necessary to become a licensed registered nurse (National Council of State Boards of Nursing, 2013).
- **The NCLEX-PN[®]** is a computerized adaptive test developed by the National Council of State Boards of Nursing that is administered to graduates of practical nursing programs and measures entry-level competence. Passing of this exam is necessary to become a licensed practical nurse (National Council of State Boards of Nursing, 2013).
- **Practical nursing programs** in this study include students from a large proprietary educational system with campuses located across the United States, are 15 months long, and prepare graduates to sit for the NCLEX-PN[®] to become licensed practical nurses. Graduates earn a diploma or certificate in practical nursing.
- **Associate degree nursing programs** in this study include students from a large proprietary educational system with campuses located across the United States, are 24 months long, and prepare graduates to sit for the NCLEX-RN[®] to become registered nurses. Graduates earn an associate's degree in nursing.

Limitations

This study had limitations. One limitation was that the students' interest level or distraction level could not be predicted on the day that the VARK[®] or the ATI Comprehensive Predictor[®] was administered. Another limitation was that eight students returned incomplete surveys or did not take the ATI Comprehensive Predictor[®] resulting in the researcher not being able to use the data. Fewer surveys were returned than originally anticipated due to declining enrollments of nursing students.

Summary

The researcher conducted this study to investigate whether differences existed between student identification of preferred learning styles as defined in the VARK[®] assessment and predicted success on the NCLEX-RN[®] or the NCLEX-PN[®] as determined by the ATI Comprehensive Predictor[®]. The VARK[®] learning assessment was taken prior to the student completing the ATI Comprehensive Predictor[®]. This study had the potential to assist in determining whether students' preferred learning styles differed from predicted success on the NCLEX-PN[®] or the NCLEX-RN[®].

CHAPTER II: REVIEW OF LITERATURE

Introduction

The researcher conducted a literature review related to nursing students' preferred learning styles and comprehensive predictor examinations. Preferred learning styles can be associated with cognitive learning. According to DeYoung (2009), research into learning styles or cognitive styles has been conducted for decades. Today, the term *learning style* is preferred to *cognitive style* because scholars believe more is involved in learning than just cognition.

Learning styles encompass cognitive, affective, and psychomotor domains of learning.

DeYoung defined learning style as “the habitual manner in which learners receive and perceive new information, process it, understand it, value it, store it, and recall it” (p. 30). More research is needed in the field of learning styles because of the lack of clarity in and commonality of the terms used to define learning styles. The researcher reviewed the literature about learning styles and their history, cognitive learning theories, studies conducted using student learning styles, the use of NCLEX[®] predictors, and learning-style inventories including the VARK[®] assessment.

This study was based in cognitive learning theory (cognitive styles) and focused on the variations in perceiving, organizing, processing, and remembering information processes necessary for the brain to learn (Schunk, 2008, p. 305). Cognitive learning theory focuses on the learning itself, whereas learning style focuses on the way a person prefers to learn, so the terms are closely related. DeYoung (2009) wrote that cognitive psychology has been under development since 1960. Ausubel (2000) developed his first cognitive learning theories in 1963. Ausubel discussed the various cognitive-structure variables that influence the acquisition and retention of subject matter and reasoned that anchoring concept variables and general background data must be present for learning. The concepts included in his theory are the availability of anchoring concepts, which is based on whether the background data is available,

has clarity and stability within the cognitive structure and centers on whether the data is relevant and has discriminability with the new concepts to be learned (Ausubel, 2000).

Students bring a wide range of diversity, learning needs, and expectations into today's classroom (Meehan-Andrews, 2009). Because of this, learning styles have become an important consideration for instructors. It is imperative that effective teaching practices are used in the classroom to reach all types of learners. Knowles, Holton III, and Swanson (2005) examined the uniqueness of adult learning in the classroom. Adult learners bring a wide variety of experiences and life situations into the classroom, which can enhance or detract from their learning. Mestre (2006) wrote about students' cultures in relationship to their effect on learning styles and concludes that no one preferred learning style exists that works for all students or even for any one particular ethnic or cultural group because not all students from any particular group learn in the same way.

According to Keefe and Ferrell (1990), style assessment can provide the basis for a more personalized approach to student advisement and placement as well as instructional strategy, and evaluation of learning providing the assessment is based on a defensible theoretical framework. Learning styles are intimately interwoven with the human personality. Keefe and Ferrell noted that most learning style instruments based on personality traits only indirectly assess learning styles.

History of Learning Styles

Teaching to a specific learning style represented a major philosophical change in educational practice during the 1980s (Marshall, 1990). Since that time, many educators have sought to define learning styles. McClanaghan (2000) remarked that learning how to learn in different ways would assist student in becoming life-long learners who are capable of learning in various settings and situations. This is an important concept for nursing practice, as nursing

takes place in various settings and with various patient situations. It is important to note that faculty should be flexible in their delivery methods in order to reach students of all learning styles. Some of the most noted pioneers in learning-style theories are Richard Felder and Linda Silverman (1988), David Kolb (1984), Howard Gardener (1983), Katherine Cook Briggs and Isabella Briggs Myers (1993), and Neil Fleming (1992). These pioneering works are discussed in the following paragraphs.

Felder and Silverman. Felder and Silverman (1988) began writing about learning styles of engineering students in the 1980s and continue their research today. Felder and Silverman described the learning process as a two-step process involving receiving and processing information. They also wrote, “A learning-style model classifies students according to where they fit on a number of scales pertaining to the ways they receive and process information” (Felder & Silverman, 1988, p.1). Felder and Silverman based their theory on parts of Jung’s (1916) and Kolb’s (1984) theories and added the sensing and intuitive components from the Myer’s-Briggs Type Indicator (MBTI). Using the MBTI and parts of Kolb’s and Jung’s learning theories, Felder and Silverman developed their own survey for assessing learning styles in 1987 and named it the Index of Learning Styles (Litzinger, Lee, Wise, & Felder, 2007). Felder and Soloman reformulated the ILS in 1991 from the ILS tool Felder and Silverman developed earlier (Felder & Spurlin, 2005). These authors also discussed how student learning styles and instructor pedagogical strategies do not always mesh well. Felder and Silverman also spent time contemplating how to get instructors to offer lessons for all types of learners.

David Kolb. David Kolb (1984) based his learning-style models on perception and processing dimensions that lead to four different learning styles. These learning styles are *diverger* (feel and watch), *converger* (think and do), *assimilating* (think and watch), and *accommodating* (feel and do). Kolb also maintained that a person could only have one learning

style or be in one learning stage at a time. He conceived learning as a four-stage cycle and maintained that learning is cyclical with learners going through a cycle one-step at a time.

Howard Gardner. Howard Gardner (1983) authored another learning-style theory. Gardner's theory of multiple intelligences contains nine elements of learning. These elements include *linguistic, logical-mathematical, spatial, musical, body-kinesthetic, intrapersonal* and *interpersonal, naturalistic* and *existential intelligence*. Most of the time, intelligence is measured with psychometric tests and is defined as an Intelligence Quotient (IQ). Gardner looked at intelligence as something that is ingrained in people, and learning occurs from the way a person views the world. In addition, Gardner maintained that no single approach exists to solving problems and no one way exists to measure a person's intelligence.

Myers-Briggs. According to Isabel Briggs-Myers (1993), the MBTI assesses a person's preference on four scales and was designed to make Jung's (1916) theories applicable to everyday life. The scales used in the MBTI are *extraversion* and *introversion*; *sensing* and *intuitive*; *thinking* and *feeling*; and *judging* and *perceiving*. This inventory indicates how people prefer to take in information and then draw conclusions from the information taken in. In itself, the MBTI identifies some ways that people prefer to learn. Katherine C. Briggs and her daughter, Isabel Briggs-Myers, created the MBTI. Both women studied the psychological theories of C. G. Jung for 20 years and integrated his theories with theirs to create the MBTI. The MBTI is one of the most widely used instruments for assessing normal personality functioning with more than 2 million people taking the inventory each year (Briggs-Myers, 1993).

Neil Fleming. Neil Fleming, creator of the VARK[®] assessment, defined learning styles as *visual, aural, read/write, and kinesthetic* (Leite, Svinicki, & Shi, 2009). These classifications were used for this research study. The original VARK[®] assessment contained 13 questions

(Fleming & Mills, 1992), whereas today the VARK[®] assessment has 16 questions. Although learning styles can have 18 or more dimensions, the VARK[®] is one dimension and focuses on how a person takes in information and puts out information during the learning process (Fleming & Mills, 1992). The VARK[®] assessment contains elements from the MBTI personality inventory, as well as elements of Kolb and Gardener's learning-style theories (Gardner, 2011; Kolb, 1984; Quenk, 2009). Sometimes the similarities between these learning-style indicators were apparent and sometimes not. The VARK[®] had its own focus, rationale and strategies, which is to simply identify a student's preferred learning style.

Learning Styles Today

Richard Felder continued his research in 2005 by collaborating with Joni Spurlin to study the reliability and validity of the Index of Learning Styles (ILS) further. Felder and Spurlin (2005) maintained that "students have different strengths and preferences in the ways they take in and process information—which is to say, they have different learning styles" (p. 1). In addition, these authors wanted to clarify the intended uses of the instrument. Felder and Silverman (1988) felt a need existed to guard against misusing the instrument. The following offers an understanding of Felder and Silverman's view of learning styles:

- Learning style dimensions, such as the four dimensions of the Felder-Silverman model are continual, not either/or categories.
- Learning style profiles suggest behavioral tendencies rather than being infallible predictors of behavior.
- Learning style preferences are not reliable indicators of learning strengths and weaknesses.
- Learning style preferences can be affected by a student's educational experiences.

- The point of identifying learning styles is not to label individual students and modify instruction to fit their labels (Felder & Spurlin, 2005, pp. 104-105).

The authors maintain that the most appropriate use of the knowledge of student learning styles is to design effective instruction. Felder and Spurlin (2005) also concluded that the ILS has two valuable applications. The ILS should be used to provide guidance to instructors when they prepare their lesson plans, and it offers students insight into possible learning strengths and weaknesses. Figure 1 illustrates this conclusion.

Dimensions of Learning and Teaching Styles

<i>Preferred Learning Style</i>		<i>Corresponding Teaching Style</i>	
sensory } intuitive }	perception	concrete } abstract }	content
visual } auditory }	input	visual } verbal }	presentation
inductive } deductive }	organization	inductive } deductive }	organization
active } reflective }	processing	active } passive }	student participation
sequential } global }	understanding	sequential } global }	perspective

Figure 1. Dimensions of Learning and Teaching Styles from "Learning and teaching styles in engineering education" by R.M. Felder and L.K. Silverman, Engineering Education. Copyright 1988 by Richard M. Felder. Reprinted with permission. (See Appendix A for permissions).

The study of learning styles has not only resulted in the development of valuable educational theory, but has also generated practical implications that can inform classroom teaching on a daily basis according to Burris, Kitchel, Molina, Vincent, and Warner (2008). Because of the changing health-care environment, nursing students need to be able to learn and function in various settings and situations. Faculty need to be flexible in their delivery methods in order to reach students of all learning styles.

Jones, Reichard, and Mokhtari (2003) studied the extent to which community college students' learning style preferences vary as a function of a discipline. Jones, Reichard, and Mokhtari derived their study using the Kolb Learning Style Inventory to ascertain students' preferred styles of learning and based the study on the premise that community-college student demographics are changing. More women are now enrolling in college than before, and student populations include nontraditional, minority, immigrant, low income, and high-school dropouts. These groups are entering community colleges through new entrance policies that make education accessible to all. The purpose of their study was to ascertain whether students' learning styles were based on the subject matter studied. It showed that "students perceive that different learning strategies are required for various learning situations" (Jones, Reichard, & Mokhtari, 2003, p. 371).

Barclay, Jeffres, and Bhakta (2011) studied pharmacy students' learning styles using the VARK[®] assessment and used games to incorporate several learning preferences into the selected learning experience. A pre-test was given prior to playing the game. A post-test was given after completing the game. They determined that learning occurred regardless of the students' preferred learning style. There was no direct correlation between students' preferred learning styles and improvement in assessment scores (Barclay et al., 2011).

French, Cosgriff and Brown studied Australian occupational therapy students. They used the Kolb LSI (version3) and the VARK[®] assessment to determine student learning styles. The study concluded that the kinesthetic learning style was most preferred by first year occupational students. French et al. maintained that "identifying students' learning styles enables educators to strengthen non-preferred learning styles and provide effective learning experiences based on preferred learning styles" (French et al., 2007, p. 60).

Today's students may not readily know their learning style. Yannibelli, Godoy, and Amandi (2006) contended, "Each individual has his/her unique way of learning, which affects the learning process and, therefore, its outcome" (p. 55). The effect may become visible to the student when the teacher uses knowledge of student preferred learning styles to encourage the learner to consider the nature of learning, understanding, and how he or she personally deals with the process. Knowledge of the students' preferred learning styles could be important to the teacher because it allows him or her to adjust his or her pedagogic strategies. According to Burris, Kitchel, Molina, Vincent and Warner (2008), the study of learning styles has not only resulted in the development of valuable educational theory, but has also generated practical implications that can inform classroom teaching on a daily basis.

Rassool and Rawaf (2008) noted that a paradigm shift is occurring in education today and that the focus is on learning activities rather than teaching activities. It is important for students to know what their learning style is because of this shift. Instructors must also know what learning style a particular student has in order to evaluate effectively student learning (Rassool & Rawaf, 2008). Other authors concur that learning styles should be considered when teaching students in order to maximize retention of concepts (Keene, 1993; Amerson, 2006; Khanal, Shah, & Koirala, 2014).

Horowitz (2008) agreed that student' learning styles are important and used three main categories for defining learning styles: auditory, visual, and kinesthetic. In the visual category, he included words, maps, charts, and environmental cues unlike Fleming (1987), who split the visual category into *read/write* and *visual*. Horowitz confirmed that teachers "can modify instruction to ensure the needs of students with highly stylized learning preferences are met" (Horowitz, 2008, p. 22).

Romanelli, Bird, and Ryan (2009) discussed the importance of students knowing their own learning styles in order to empower themselves to take charge of their own learning. They went on to say this is helpful to students when a particular teaching style does not match their own learning style. This empowerment can lead to overall student satisfaction (Romanelli, Bird, & Ryan, 2009). In addition, this belief closely related to Richard Felder's philosophy of building self-efficacy in the classroom and embracing a teaching paradigm that accommodates multiple dimensions of learning (Felder, 1993).

The literature clearly showed that commonalities exist in thoughts about student learning and preferred learning styles. Teaching to all types of learners must be the goal of educators so that each student has a chance for optimal learning. "Learning theories are essential for effective teaching in that they shed light on different aspects of the learning process" (Yilmaz, 2011, p. 204).

Nursing Student Learning Styles Studies

Researchers have conducted a few studies of nursing student preferred learning styles in the United States that are important to this study. The first study, by Fountain and Alfred (2009), used the National League for Nursing (NLN) Student Satisfaction and Self-Confidence in Learning Scale. This learning scale was used to identify students' attitudes and styles in learning with high-fidelity simulation. The study contained a convenience sample of 104 baccalaureate-nursing students from three campuses of one nursing school. The social learning style was the most commonly exhibited learning style found in this sample. These students benefited from comparing, networking, and listening to others.

NLN competencies recommend that nurse educators identify students' unique learning styles to meet the needs of students and implement diverse teaching strategies (National League for Nursing [NLN], 2012). These recommendations are harmonious with Kolb and Kolb's

(2005) recommendations for engaging students to augment their learning abilities. Molsbee (2011) used NLN recommendations regarding teaching and learning to formulate his study. Molsbee's study was based on 271 associate's degree nursing students from a metropolitan university in the southern United States. Molsbee's study concluded that no single dominant learning style exists for nursing students. According to Molsbee, addressing experience can augment nursing students' learning. In addition, Molsbee argued that if a student's preferential way of learning were identified, then instructors could offer appropriate learning experiences for that student.

Another study about nursing students' preferred learning styles was conducted in Australia by Meehan-Andrews (2009). This study of student learning styles and teaching efficacy sampled 86 nursing students. Meehan-Andrews concluded that university populations are diverse in learning styles and have differing abilities. Using the VARK[®] to identify students' learning preferences, the researcher's data identified that most first-year nursing students were kinesthetic learners (Meehan-Andrews, 2009). The study found that laboratory practice and using a variety of teaching methods in the classroom are most effective for optimal learning (Meehan-Andrews, 2009).

AlKhasawneh (2013) used the VARK[®] assessment to determine learning styles of nursing students at a public university in Jordan. The study sample consisted of 197 nursing students across three levels of the nursing program. The study of nursing students in Jordan determined that information about learning styles influence faculty pedagogical strategies and develop lessons that match the student's preferred learning style. This majority of students were kinesthetic learners. The author argued that successful entry into the nursing profession can be enhanced by using the knowledge of student preferred learning styles to aid in designing nursing curriculum that would enhance the preparedness of graduates and lead to competence,

confidence and the appropriate knowledge of science. The author also remarked that having knowledge of a student preferred learning style allows a faculty member to assist a struggling student to improve learning by using strategies that are closely aligned to the student's preferred learning style (AlKhasawneh, 2013).

Cognitive Learning Theory

Cognitive learning theory is closely related to learning style theory. Curry (1981) defined *learning styles* as characteristic cognitive, effective, and psychosocial behaviors that serve relatively stable indicators of how learners perceive, interact with, and respond to the learning environment. Cognitive learning theory traces back to the early twentieth century according to Yilmaz (2011). Prior to cognitive learning theory, behavioral theorists used rewards to correct behavior. Yilmaz maintained that cognitive learning theory or cognitivism began when the behaviorists failed to explain how individuals make sense and process information. Cognitive learning theory has evolved over time and contains many elements such as Gestalt psychology, information processing, human development, social constructivism, and social cognition theories. Researchers identify what is going on inside the learner using these elements. Cognitive learning theory presumably started around 1900 with the Gestalt psychologist perspectives, which focused on the perception of learning and evolved over time through the theories of Knowles, Holton III, and Swanson (2005); Piaget (1952); and Vygotsky (1978).

Piaget is the best-known cognitive theorist and identified four sequential stages of cognitive development from infants to adolescents (Piaget, 1952). Piaget also emphasized that teachers will benefit once they understand at what level their students are functioning (Schunk, 2008). The same can be emphasized for teachers readily knowing the learning styles of students in their classroom. Knowing the learning styles of students will benefit teachers and assist them in changing their pedagogical styles in order to improve student success. Vygotsky (1978)

included a sociocultural aspect to his cognitive theory by embellishing Piaget's assumptions and emphasizing the significance of language, social interaction, and adult guidance in the learning process. Cognitive theorists believe that learning is sequential and admit that some adults never reach the final stage of learning.

Knowles (2005) began his writings about adult learning theory by taking cognitive learning a step further and developing the theory of adult learning. Knowles coined the term *andragogy*, which, simply put, means teaching adults. "Andragogy is a set of core adult learning principles that apply to all adult learning situations" (Knowles, Holton III, & Swanson, 2005, p. 2). Educators must recognize and appreciate how each person learns differently and learn how to facilitate learning by using the learners' preferences and strengths.

Cognitive learning theory has continually developed throughout that last 100 years. The understanding of cognitive learning is attributed to the work of Gestalt theorists. Gestalt is a German word that means *patterns* or *configurations*. The term *aha* comes from the Gestalt era. Aha refers to the insight one gains when learning a concept by trial and error and then discovering a solution. Gestalt psychologists are known for emphasizing that learning is interpreted in terms of perceptual principles of organization. They also believed that people respond to whole situations or patterns rather than parts (Wertheimer, 1959). Cognitive theorists seek the factors that explain complex learning and are concerned with meaning rather than behavior. Cognitive learning suggests that students have an active rather than passive role in their learning experience, which increases their accountability for learning. In later years, cognitive theory was greatly influenced by David Kolb (1984) and his two-dimensional experiential learning style theory. Kolb believed that learning is cyclic and that a learner moves through one stage at a time. He believed that having a concrete experience started the learning process. Next, the learner reflects on that experience and then forms abstract concepts and draws

conclusions. These conclusions are then used in active experimentation and results in a new experience and thus learning (Kolb, 1984). This theory is depicted in Figure 2.

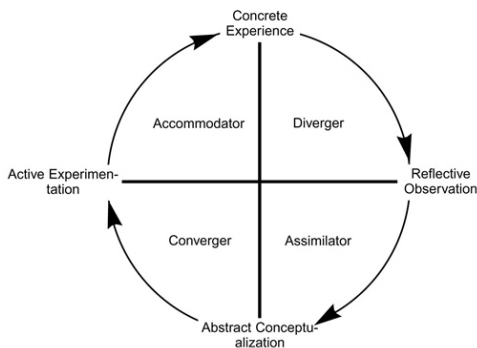


Figure 2. Kolb's two-dimensional learning style theory from Kolb (1984), *Experiential Learning: Experience as a Source of Learning & Development* (1st ed.). Reprinted by permission of Pearson Education, Inc., Upper Saddle River, NJ. (See Appendix A for permissions.)

Braungart, Braungart & Gramet painted an excellent picture of how student learning occurs by citing that humans process information in four separate stages. These include:

- Paying attention to environmental stimuli.
- Information is processed by the senses.
- Information is transformed and encoded into short-term memory, after which it is either forgotten or stored in long-term memory.
- The action or response that the individual makes based on how information was processed and stored (Braungart, Braungart, & Gramet, 2014, p. 74).

Cognitive theory focuses on how learning takes place once a student has received the data. Learning begins with external processes such as Stage 1: getting the student's *attention* to receive the information to be learned. The reception of the data for this study occurs with one of four learning styles as determined by the VARK[®] assessment: *visual*, *aural*, *read/write*, or *kinesthetic* and the cone containing the VARK[®] learning styles was added by this author to form an adaptation of the information processing model of memory shown in Figure 3. Once the data

is received, learning becomes an internal process and moves through stage 2: *processing* and through stage 3: where *memory storage* occurs. Once the memory is stored, the learning process moves back externally into the stage 4: *action* mode and triggers a response (Braungart et al., 2014). Figure 3 illustrates this concept.

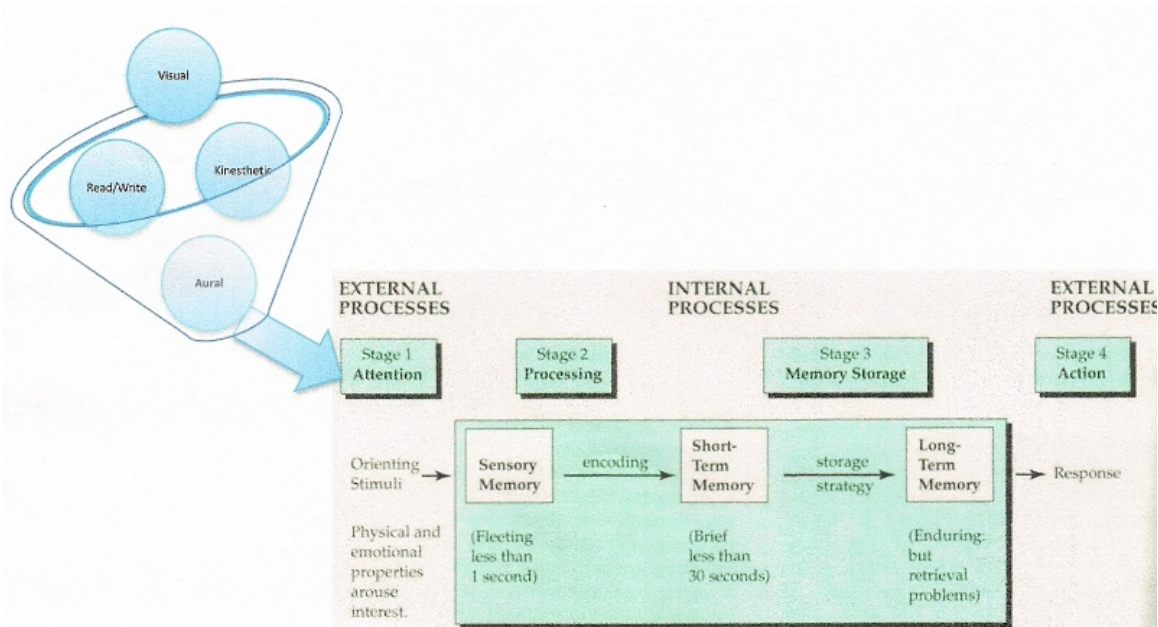


Figure 3. Adapted from the information-processing model of memory. Braungart, M. M., Braungart, R. G., & Gramet, P. R. (2003). Applying learning theories to healthcare practice. In S. B. Bastable (Ed.), *Nurse as educator: Principles of teaching and learning for nursing practice* (2nd ed., pp. 43-72). Burlington, MA: Jones & Bartlett Learning. Reprinted with permission. (See Appendix A for permissions).

McInerney (2005) wrote that “educational psychology should have a strong link with research on teaching and learning processes” (p. 585). McInerney recognized that educational worlds are far more complex and layered than they were even 30 years ago. He also acknowledged that during the last 25 years, cognitive psychology has come to dominate education psychology theorizing and research.

Witkin, Molre, Goodenough, and Cox (1977) defined cognitive style as the individual way a person perceives, thinks, learns, solves problems, and relates to others. Cools and Van Den Broeck (2007) defined cognitive styles as the way people perceive stimuli and how they use

this information to guide their behavior. Cools and Van Den Broeck developed a three-dimensional cognitive style model. The cognitive styles identified in this model are labeled as knowing, planning, and creating. Yilmaz (2011) concurred that Piaget, Vygotsky, and the Gestalt theorists were responsible for shifting learning from behavioral to cognitive learning theories.

The zone of proximal development (ZPD) is when learners cannot solve the problem on their own but need assistance and correlates with a child's developmental stage. Vygotsky (1978) described ZPD as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers" (p. 86). Vygotsky references the ZPD and writes about how learning is matched to a child's developmental level. Learners have the potential to succeed with assistance. Teachers must understand what the learner has mastered and what comes next in order to give the needed assistance for learning to occur. The premise of cognitive learning theory is that learning is interactive and develops because of relationships with people and experience. Interactive learning can be used in the classroom or clinical-learning setting. Faculty should recognize that learners have unique cognitive skills influenced by past social and cultural experiences (NLN, 2012, p. 14).

Knowles, Holton, and Swanson (2005) related cognitive learning to adult learning. Andragogy, a term coined by Knowles, is specifically related to adult cognitive learning theory. Knowles, Holton and Swanson believed that adult learners bring experience from the past into the classroom and that this can have a bearing on how students learn. Both andragogy and Kolb's (1984) models addressed students' past learning experience and easily relate to nursing students.

VARK[®] Learning Style Questionnaire Assessment

In addition to the ILS, another learning style identification tool is called the VARK[®] assessment. The current VARK[®] assessment contains 16 questions that can be used to ascertain the preferred learning style of a student. VARK[®] is an acronym that stands for *visual*, *aural*, *read/write*, and *kinesthetic*. The tool was developed in 1987 by Neil Fleming, an educator for more than 40 years, and contains only 16 questions because Fleming was looking for a simple and quick way to focus students' attention on the ways they address information (Fleming & Mills, 1992). The VARK[®] survey was designed to improve faculty development and assist students in becoming better learners (Marcy, 2001). Before the VARK[®], the VAK was used. In 1987, Fleming split the VAK visual category into *visual*, *read/write* and created the VARK[®]. The read/write category is used for students who have preferences for receiving information printed as words. The visual category is used for students who prefer receiving information in graphical and symbolic ways. The aural category is related to receiving information from lectures, and the kinesthetic category is for students who learn by doing. The VARK[®] is simple to fill out, easy to score, and it can be taken online or in the paper-and-pencil format. Leite et al. (2009) sought to verify the internal validity of the VARK[®]. Internal validity is defined as "the degree to which it can be inferred that an observed outcome is caused by a treatment or an independent variable rather than by an uncontrolled extraneous force" (Polit, 2010, p. 402). Leite et al. determined the VARK[®] to be reliable as a low-stakes diagnostic tool used to determine students' preferred learning styles. They also assessed the internal consistency reliability, which is defined as "the type of reliability that concerns the degree to which the subparts of an instrument are all measuring the same attribute or construct" (Polit, 2010, p. 402). The internal reliability factors in this study are visual, .85; aural, .82; read/write, .84; and kinesthetic, .77 (Leite et al., 2009). Meehan-Andrews (2009) and AlKhasawneh (2013) used the

VARK[®] to ascertain nursing student learning styles for their respective studies discussed earlier in this chapter.

NCSTB and NCLEX[®] Predictors of Success

This study used the ATI Comprehensive predictor[®] to identify National Council Licensure Examination (NCLEX[®]) predicted success. There are several NCLEX[®] comprehensive predictor assessments available for use today. Two of the most popular predictors are the ATI Comprehensive Predictor[®] and the Health Education System, Incorporated Exit Exam (HESI E²[®]). Both of these exams claim to predict the probability of passing the NCLEX[®] on the first attempt and are discussed here.

The National Council of State Boards of Nursing (NCSTB) is tasked with writing and maintaining the security of the NCLEX[®] for both PNs and RNs. The mission of the NCSTB is to provide education, service, and research through collaborative leadership to promote evidence-based regulatory excellence for patient safety and public protection (NCSTB, 2013). First-time NCLEX[®] pass rates are considered the gold standard for defining nursing-program quality according to Giddens (2009). Sayles, Shelton, and Powell (2003) reminded readers that graduating from nursing school is only the first step in becoming a nurse. The second step is successfully passing the NCLEX[®] and becoming a licensed nurse. Spector and Alexander (2006) wrote that exit exams should be used prudently and that they can be a valuable tool for nursing schools in predicting NCLEX[®] success. In addition, these exams are good for identifying areas of remediation students need prior to taking the NCLEX[®].

The exit exam used in this study was the ATI Comprehensive Predictor[®]. The ATI norming phase of the RN Comprehensive Predictor[®] occurred in the summer of 2010. Construct validity ($\alpha = 0.82$) was supported during the norming of the ATI RN Comprehensive Predictor[®]. Sixty-seven nursing programs volunteered to participate in the ATI study. The ATI study

researcher chose a random sample of 960 students from the total population of 3,315 students. The researcher found a statistically significant ($p = .001$) relationship between the predicted score and actual performance on the NCLEX-RN[®] (Assessment Technologies Institute, LLC, 2010). The ATI RN Comprehensive Predictor[®] is a computer-based examination that accurately predicts 87.5% of the time students' outcome on the NCLEX-RN[®]. The exam consists of 180 test items. The ATI RN Comprehensive Predictor[®] contains 150 scored test items and 30 test items that are pilot questions for future exams and are not scored. The test-taking time is limited to 180 minutes, and the ATI researcher made the following assumptions for this study:

- Students taking the assessment are at or near completion of an RN nursing program and are about to sit for the NCLEX[®].
- The probability of passing refers to students' first NCLEX-RN[®] attempt after taking the predictor.
- The typical expectations of students taking a standardized test are met (Assessment Technologies Institute, LLC, 2010, p. 1).

The PN ATI Comprehensive Predictor[®] for is a computer-based examination that accurately predicts 86.7% of the time student outcomes on the NCLEX-PN[®]. Construct validity ($\alpha = 0.845$) was supported during the norming phase of the ATI PN Comprehensive Predictor[®]. The norming phase for the Comprehensive Predictor[®] for PNs was conducted in spring 2011. Sixty-five PN programs volunteered to participate in the ATI norming study. The ATI researcher selected a random sample of 804 students from the total population of 898 to participate in the study. The ATI study showed a statistically significant ($p = .001$) relationship between the ATI PN Comprehensive Predictor[®] and actual NCLEX-PN[®] results (Assessment Technologies Institute LLC, 2011). The Comprehensive Predictor[®] for PNs contains 150 scored

test items and 30 test items that are pilot questions for future exams and are not scored. The ATI researcher made the following assumptions:

- Students taking the assessment are at or near completion of a PN nursing program and are about to sit for the NCLEX[®].
- The probability of passing refers to students' first NCLEX-PN[®] attempt after taking the predictor.
- The typical expectations of students taking a standardized test are met. (Assessment Technologies Institute LLC, 2011, p. 1)

The ATI Comprehensive Predictor[®] can be used effectively to predict student success and to identify areas of remediation the student needs prior to sitting for the actual NCLEX[®] examination.

Another such predictor is the Health Education Systems, Incorporated (HESI) Exit Examination (HESI E2[®]). This examination is similar to the ATI Comprehensive Predictor[®] in that its content is based on the NCLEX[®] test plan and is used to predict student success on the NCLEX[®]. The HESI E2[®] was developed to assess students' knowledge and how they apply nursing concepts in specific content areas (Morrison, Adamson, Nibert, & Hsia, 2008). The HESI E2[®] is a 150-item examination and is designed to be administered near the completion of the nursing curriculum (Morrison et al., 2008). Versions are available for both PN and RN programs to use. No test items on the HESI E2[®] are scored until they have been piloted and item analysis has been completed. According to Spurlock and Hunt (2008), students' scores on the E2[®] first attempt are related to NCLEX[®] success. Taking the test more than one time dilutes the results and therefore renders them statistically insignificant. "HESI determines the reliability of HESI exams by conducting an item analysis on each exam that is administered and returned to the company" (Morrison et al., 2008, p. 42S). Reliability estimates are recalculated every time a

HESI exam is scored. HESI concurrently updates these scores on all examinations containing the same test items.

In addition, HESI quantifies the degree of validity of their exams on an ongoing basis. HESI evaluates the E2[®] validity through assessing content validity, construct validity, and criterion-related validity (Morrison et al., 2008). Morrison et al. (2008) concurred that sufficient scientific data exists to assure nurse educators that HESI exit exams can be used with confidence to assess students' preparedness for taking the NCLEX[®].

Although both ATI and HESI offer comparable products, the ATI Comprehensive Predictor[®] is the instrument the researcher chose for this study. All schools involved in this study use the ATI CARP[®] and the ATI Comprehensive Predictor[®] to assess student learning and readiness for the NCLEX[®].

Summary

This literature review has shown examples of how the study of student's preferred learning styles has progressed over time and how the application of cognitive learning theories may improve nursing-student NCLEX[®] success. The discipline of educational psychology has developed throughout the last 100 years starting with Gestalt theories. In addition, very little research has been done in regard to the preferred learning styles of RN nursing students in relation to success on the NCLEX[®]. Even fewer studies have been conducted to assess the preferred learning styles of PN students. Student learning styles from other disciplines are well documented and can easily be used for comparisons in the study of nursing-student preferences (Felder & Silverman, 1988; Barclay, Jeffres, & Bhakta, 2011; French, Cosgriff, & Brown, 2007).

CHAPTER III: METHODS AND PROCEDURES

Introduction

The primary purpose of this quantitative non-experimental, retrospective study was to identify the preferred learning style for associate degree (ADN) RN and practical nursing (PN) students as determined by the VARK[®] assessment. The secondary purpose of this study was to determine if a difference existed between ADN RN and PN students' preferred learning styles, as determined by the VARK[®] assessment, and predicted success on the NCLEX-PN[®] and the NCLEX-RN[®], as determined by the corresponding ATI Comprehensive Predictor[®]. The study was conducted using ADN students and PN students in a large proprietary education system with campuses located across the United States. The researcher obtained permission from the institution to conduct this study (See Appendix A for permissions). Rudestam and Newton (2007) wrote that causal relationships among variables cannot be made in correlational studies. According to Creswell (2012), conclusions from correlational studies must be inferred from the underlying theory rather than the study data. According to Schunk (2008), correlational research deals with exploring relationships that exist between variables and often suggest directions for further research. Descriptive and inferential statistics were used to analyze collected data. Nominal data was analyzed to determine whether it contributes to the findings and inferential analysis was used to determine whether differences exist among the data. Correlational statistics are important because they permit us to determine the strength and direction of the relationship between different sets of data or to predict scores on one variable based on our knowledge of scores on another (Creswell, 2012).

The study variables evaluated were identified from the VARK[®] assessment and included *aural, visual, read/write, kinesthetic* and the actual score from the ATI Comprehensive

Predictor[®]. Demographic variables of gender, age, race, location, and nursing-program type were collected for the purposes of aggregate description of study participants.

Population and Sample

Between the dates of March 1, 2014 and June 30, 2014, the study population of pre-licensed practical-nursing and associate degree registered-nursing students numbered 271. The total population included 147 PN students and 122 associate degree RN students. The researcher drew a convenience sample of 121 PN and associate degree RN students from one large proprietary educational system with multiple campuses located across the United States. Eight students did not complete the required components for this study leaving 113 (N =113) participants in the study. The sample consisted of students in their last three months of a nursing program and included 56 PN and 57 associate degree RN students. PN and associate degree RN students included in this study, agreed to participate in the study, completed the VARK[®] learning assessment, and completed the ATI Comprehensive Predictor[®] examination at their designated time in class.

Sample Size

To assess the research questions, the researcher conducted chi-square goodness of fit tests and ANOVA. Using a medium effect size ($f = .25$), an alpha of .05, and a power of .80, the required sample size for an ANOVA with four groups is 180. Thus, at least 180 participants from each program type, both associate degree RN and PN were recommended in order to find significance for the ANOVA (Howell, 2010). Participants did not return the required amount of data packets and thus the smaller sample size was taken into account during the data analysis.

Description of Setting

The setting included students the age of majority (18 in the states where campuses are located) or older attending school in a large proprietary college system with campuses located

across the United States and includes four associate degree registered-nursing programs (ADN) and eleven practical nursing (PN) programs operating in the United States and using ATI as their third-party testing vendor. The researcher obtained permission from the vice president of academic operations at the institution to conduct this study (See Appendix A for permissions).

Purpose

The purpose of this study was to determine whether particular perceived learning styles of students in associate's degree and practical nursing programs differed with predicted National Council Licensure Examination (NCLEX[®]) success. In order to do so, the researcher evaluated whether particular perceived learning styles of associate's degree and practical nursing students, as defined by the VARK[®], differed with student scores on the ATI Comprehensive Predictor[®] examination.

Research Design

This study was a quantitative non-experimental retrospective study. Researchers are bystanders in non-experimental studies and collect data without intervening (Polit & Beck, 2012, p. 55). The researcher used inferential statistics to analyze data in order to determine whether a difference exists between the variables. Inferential statistics were used to infer results from a sample in order to obtain results that reflect the entire population (Howell, 2010). In addition, the following operational definitions of variables were used.

Operational definition of variables. Identification of the variables in the study was completed in order to discover whether a differential trend exists. This study contained four independent categorical variables from the VARK[®] assessment (visual, auditory, read/write, kinesthetic) and one dependent continuous variable (ATI Comprehensive Predictor[®] score) for each type of nursing program in the study and included both practical nursing and associate degree nursing programs.

Demographics gathered for this study included age, gender, ethnicity, and location (state) from the supplied data in the convenience sample and were used to identify trends that occurred within these groups. Creswell (2009) wrote that in quantitative studies, demographics usually enter studies as intervening variables and are not considered major independent variables. These variables were extrinsic and were studied in order to add insight into the findings of this study.

Inclusions/Exclusions

Students 18 years of age or older that returned the consent form, VARK[®] assessment, demographic sheet, and completed their respective ATI Comprehensive Predictors[®] were included in this study. Students under 18 years of age, students that did not return the required documents or did not complete the ATI Comprehensive Predictor[®] were excluded from the study.

Data-Collection Methods

Data was collected after meeting the requirements and receiving the approval of the College of Saint Mary Institutional Review Board (IRB). Packets containing VARK[®] assessments, consent forms, demographic sheets, and instructions were sent to the nursing administrators on each campus participating in the study (See Appendix B for Data Packet). The nursing administrators designated a “non-threatening” person on the campus to explain the study to the participants and allow them to ask questions. The students the age of majority or older agreeing to participate in the study filled out and return the completed VARK[®] assessment, demographic sheet, and consent form by placing it in the stamped return envelope. The completed consent forms, VARK[®] assessments, and demographic sheets were returned to the researcher by the nursing administrators via the United States Postal Service. This process is illustrated in Figure 4.

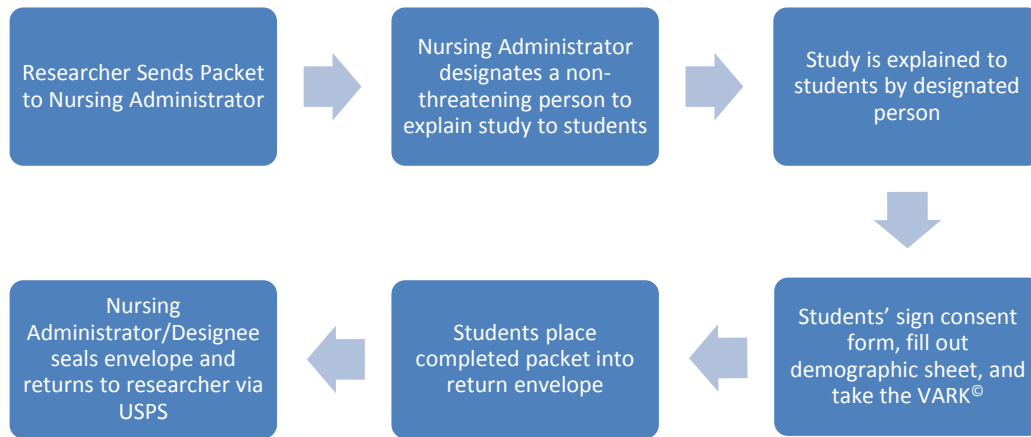


Figure 4. Illustration of data gathering procedure.

The researcher analyzed the returned VARK[®] assessments, using the VARK[®] scoring sheet, to identify the students' preferred learning styles (see Appendix C for VARK[®] scoring sheet). Using the ATI database, the researcher retrieved the ATI Comprehensive Predictor[®] numerical score for each participant. The learning style was placed on a spreadsheet along with the demographic data and the ATI Comprehensive Predictor[®] score. Students provided demographic data by filling out the demographic sheet and that data was included on the data spreadsheet. The data was scrubbed by removing student names and replacing the names with a unique student-identification number. This number was used during the study to ensure anonymity of the participants. The completed VARK[®] assessments and demographic sheets were stored in a locked filing cabinet following the completion of the study. Documents from the study will be retained for seven years and then will be shredded according to school policy and accreditor requirements in place regardless of the study. Electronic data was stored using passwords to protect the files. This information will also be kept seven years and then destroyed by erasing the files.

Data Analysis

The researcher worked with a statistician who entered the data into SPSS version 20.0 for Windows and conducted descriptive statistics to describe the sample demographics and the research variables used in the analysis. The nominal research variables for this study were the VARK[®] learning styles: visual, aural, read/write and kinesthetic. The continuous variable in this study was the ATI Comprehensive Predictor[®] score. The researcher calculated frequencies and percentages for nominal data, such as gender, and calculated means and standard deviations for continuous data, such as predicted success on the NCLEX-RN[®] or NCLEX-PN[®].

Research Question 1. Which learning styles, as determined by the VARK[®] assessment, do associate degree nursing students prefer in a large proprietary education system with campuses located across the United States?

To examine Research Question 1, the researcher conducted frequencies and percentages on the learning styles of the associate's degree nursing students. Learning styles included read/write, visual, aural, and kinesthetic. The researcher identified each participant's preferred learning style from the VARK[®] assessment. In addition, a chi-square goodness of fit test was conducted on the learning styles. The chi square goodness of fit test assessed whether an equal distribution existed among the learning styles, or if certain styles are more or less prominent than others are (Howell, 2010). Research Question 1 was only assessed for associate degree nursing students.

Research Question 2. Which learning styles, as determined by the VARK[®] assessment, do practical nursing students prefer in a large proprietary education system with campuses located across the United States?

To examine Research Question 2, the researcher conducted frequencies and percentages on the learning styles of the practical nursing students. Learning styles included read/write,

visual, aural, and kinesthetic. The researcher identified each participant's preferred learning style from the VARK[®] assessment. In addition, a chi-square goodness of fit test was conducted on the learning styles. The chi-square goodness of fit test was used to assess whether an equal distribution exists among the learning styles or whether certain learning styles are more or less prominent than others are (Howell, 2010). Research Question 2 was only assessed for practical nursing students.

Research Question 3. Is there a difference between associate degree nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States?

H₀3: There is not a difference between associate's degree nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

H_a3: There is a difference between associate's degree nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

To examine Research Question 3, the researcher conducted an analysis of variance (ANOVA) to assess whether the predicted success on the NCLEX-RN[®] was significantly different by the preferred learning style. The ANOVA was the appropriate analysis to conduct when the goal was to assess whether a continuous dependent variable is significantly different by a nominal grouping variable (Pallant, 2007). The continuous dependent variable was the predicted success on the NCLEX-RN[®], measured by the ATI Comprehensive Predictor[®]. The

researcher identified each participant's preferred learning style from the VARK[®] assessment. The nominal grouping variable was preferred learning style, measured by the VARK[®]. Prior to analysis, the researcher assessed the assumption of normality with the Kolmogorov Smirnov (KS) test (Howell, 2010). The researcher assessed the assumption of equality of variance with the Levene's test (Howell, 2010). Research Question 3 was assessed for associate degree nursing students only.

Research Question 4. Is there a difference between practical nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-PN[®] as determined by the ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States?

H₀4: There is not a difference between practical nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-PN[®] as determined by the ATI Comprehensive Predictor in a large proprietary education system with campuses located across the United States.

H_a4: There is a difference between practical nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-PN[®] as determined by the ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

To examine research question 4, an ANOVA was conducted to assess if the predicted success on the NCLEX-RN[®] was significantly different by the preferred learning style. The ANOVA was the appropriate analysis to conduct when the goal was to assess if a continuous dependent variable is significantly different by a nominal grouping variable (Pallant, 2007). The continuous dependent variable was the predicted success on the NCLEX-RN[®], measured by the ATI Comprehensive Predictor[®]. The nominal grouping variable was the preferred learning style,

measured by the VARK[®] assessment. Prior to analysis, the researcher assessed the assumption of normality with the Kolmogorov Smirnov (KS) test (Howell, 2010). The researcher assessed the assumption of equality of variance with the Levene's test (Howell, 2010). Research Question 4 was assessed for practical nursing students only.

Assumptions

The researcher made several assumptions in this study. The following assumptions were made concerning the ATI Comprehensive Predictor[®] for PNs and RNs:

- The students taking the assessment were at the end or near completion of their nursing program and were about to sit for the NCLEX-PN[®] or NCLEX-RN[®].
- The typical expectations of a student taking a standardized test were met (e.g., students are motivated to perform, no cheating has occurred, test is given under standardized conditions in a proctored environment; Assessment Technologies Institute, LLC, 2012c).
- Students took seriously the task of completing the VARK[®] assessment and the ATI Comprehensive Predictor[®].

Ethical Considerations

The purpose of the College of Saint Mary Institutional Review Board is to protect the rights of prospective research subjects. Creswell (2009) wrote that it is important to seek approval from “gatekeepers” prior to beginning a study to ensure the protection of subjects in the study. However, no sensitive ethical issues were encountered during this study. The researcher had no direct contact or authority over the participants involved in this study. In addition, the researcher had no direct supervisory responsibilities to the nursing administrators or the faculty working in the respective nursing programs. The researcher had completed the National

Institutes of Health (NIH) Web-based training course “Protecting Human Research Participants” (See Appendix D for certificate).

The nursing administrators designated a “non-threatening” person on each campus to explain the study to the participants. The designee used a fact sheet prepared by the researcher to explain the study and handed out the research packets containing informed consent forms, VARK[®] assessments, and instructions to the students agreeing to participate in the study (See Appendix B for Research Data Packet). The students were given the opportunity to sign the consent form, fill out the demographic sheet, and the VARK[®] assessment. Students placed the completed documents directly into the return envelope. The nursing administrator/designee immediately sealed the envelope and returned the documents to the researcher via the United States Postal Service. Student participation was voluntary and no compensation was given for participating in the study. Once the study was completed, the results were shared with the respective campus.

Electronic data was password protected and available only to the researcher. Only the researcher has access to a locked filing cabinet where paper data is stored. Data files will be kept seven years and then will be erased or shredded appropriate to the storage method. Every effort was made to guard the privacy and identity of the participants.

Summary

The researcher conducted this study using data derived from the ATI database and from VARK[®] assessments that were returned to the researcher after approval was received from the College of Saint Mary Institutional Review Board (IRB). Statistical analysis was performed using ANOVA to ascertain whether a difference existed between students’ preferred learning styles and predicted success on the NCLEX-PN[®] and NCLEX-RN[®]. In addition, extrinsic

variables equating to demographics were analyzed to add insight into the study. Participants' anonymity was preserved.

CHAPTER IV: RESULTS

Introduction

The purpose of this quantitative non-experimental retrospective study was to explore the potential differences between identified students' preferred learning styles, as determined by the VARK[®] assessment, and predicted success on the National Council Licensure Examination for Practical Nursing (NCLEX-PN[®]) and the National Council Licensure Examination for Registered Nursing (NCLEX-RN[®]).

The researcher conducted this study using associate degree nursing (ADN) students and practical nursing (PN) students in a large proprietary education system with campuses located across the United States. The study entailed using the VARK[®] assessment to determine preferred learning styles. The Assessment Technologies Institute (ATI) RN and PN Comprehensive Predictors[®] were used to predict NCLEX[®] success. Two primary and two secondary questions were posed for this study. Ancillary demographic data was also gathered and the results recorded. The data was gathered between the dates of March 1, 2014 and June 30, 2014. Data packets were mailed separately to each campus and stamped self-addressed return envelopes were included with the data packets. A designee on the campus explained the study to the students using a prepared script and handed out packets to students that volunteered to participate. Students placed their completed packets directly into the return envelope. The designee on each campus sealed the envelopes and placed them in the mail to return them to the researcher.

The researcher compiled and aggregated the data onto an excel spreadsheet. Once the data had been aggregated, the researcher removed the student names and replaced them with a unique identification number known only to the researcher. This ensured the students'

anonymity during the data analysis. The findings of the research are discussed throughout this chapter.

Demographics

One hundred twenty-one (121) participant packets were returned to the researcher from 12 separate campus locations. Eight of the packets were incomplete and excluded from the study leaving 113 participants (N = 113) taking part in the study. About one half of the participants were in the practical nursing program (56, 50%) and half were in the associate degree nursing program (57, 50%) as noted in Figure 5.

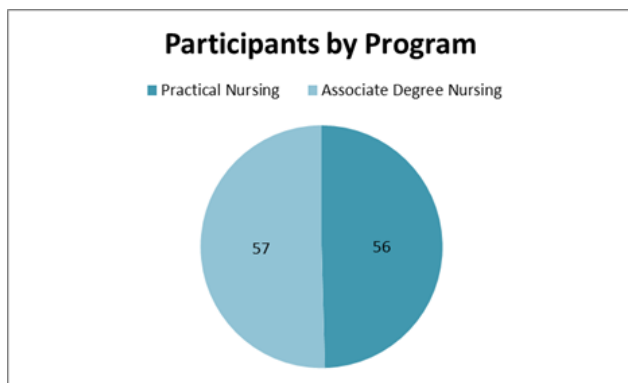


Figure 5. Participants by Program

Many of the participants were from Kansas City, KS (23, 20%), Miami, FL (24, 21%) or Salina, KS (20, 18%) as shown in Figure 6.

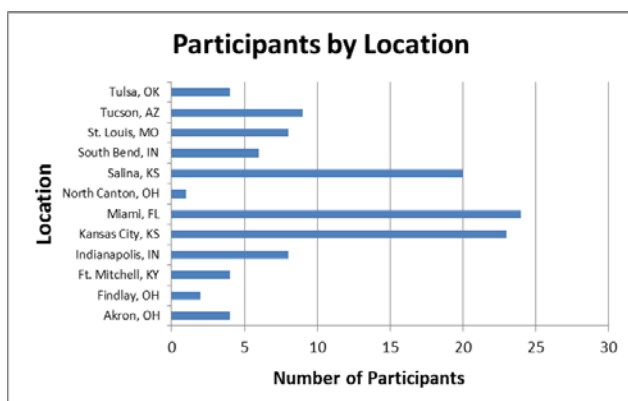


Figure 6. Participants by Location

Figure 7 shows that the participants were 90% female; 9% male and 1% transgendered.

Student ages ranged from 18 to 59 as shown in Figure 8.

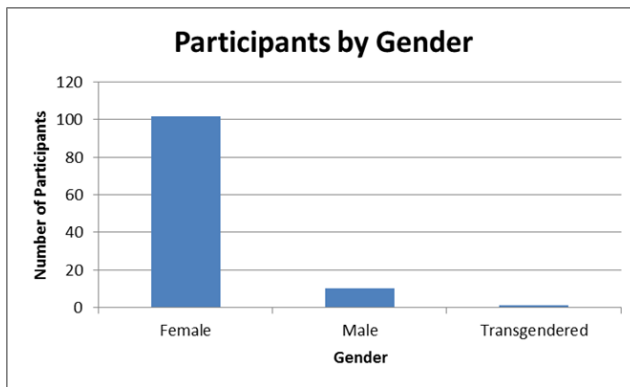


Figure 7. Participants by Gender

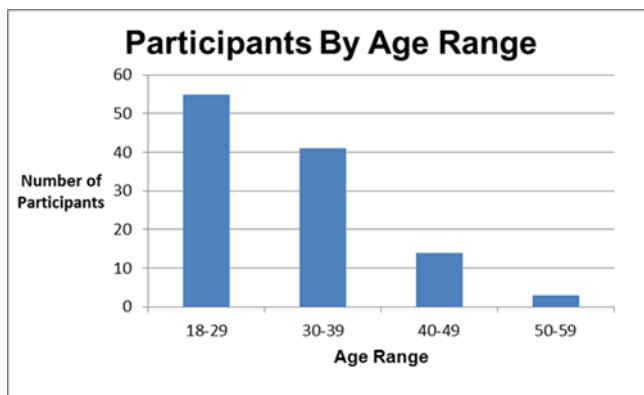


Figure 8. Participants by Age Range

Ancillary analyses were conducted to assess if there was a relationship between preferred learning style and ATI Comprehensive Predictor[®] scores with age and gender. Chi-squares were conducted to assess the relationship between ages, gender and learning style. Results showed no significant relationship between learning style by age, $\chi^2(12) = 14.22$, $p = .275$, nor did it show significance by gender $\chi^2(4)$ a partial η^2 . This finding is shown in Tables 1, 2 and 3.

Table 1.

Chi-square Values for Gender and Age Applied to Learning Style

Variable	Chi-square χ^2	df	p
Age	14.22	12	.287
Gender	4.08	4	.396

Note. * $p \leq .05$

Table 2.

Results of ANOVA for ATI Comprehensive Predictor[®] Scores by Gender

Source	SS	df	MS	F	p	Partial η^2
Gender	226.01	2	113.01	1.82	.168	.03
Error	6,786.18	109	62.26			

Note. * $p \leq .05$

Table 3.

Correlation Matrix Among Age and ATI Comprehensive Predictor[®] Scores

	1
1) Age	-
2) ATI Comprehensive Predictor Scores	.15

Note. * $p \leq .05$

In addition participants' were asked if they knew their learning style before they took the VARK[®] assessment and 36% reported that they did not know their learning style prior to taking

the VARK[®] or did not answer and 64% reported that they did. The actual number of students for associate degree and practical nursing students is almost identical and is depicted in Figure 9.

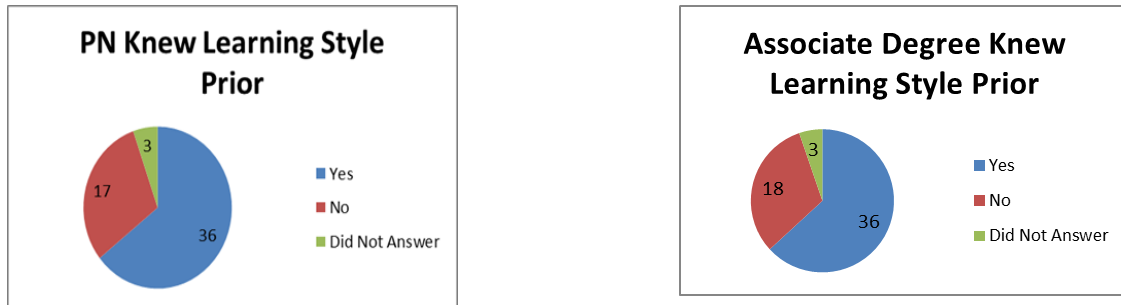


Figure 9. Percentage of Participants Knowing Their Learning Style Previously

Many of the participants were either African American (30, 27%) or Caucasian (56, 50%) as depicted in Figure 10.

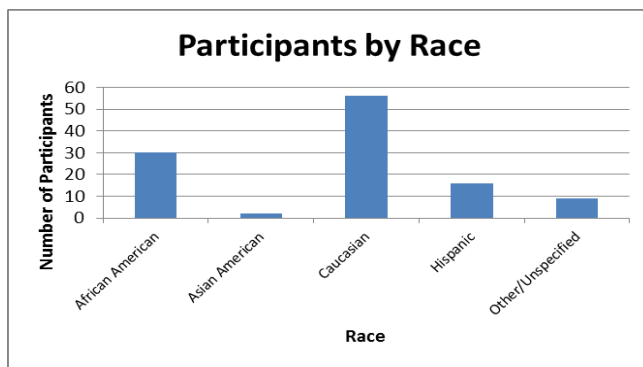


Figure 10. Participants by Race

Research Question 1

Which learning styles, as determined by the VARK[®] assessment, do *associate degree* nursing students prefer in a large proprietary education system with campuses located across the United States?

To examine research question 1, frequencies and percentages were conducted on the learning styles held by associate degree seeking nursing students. Any participants who had a combination of two VARK[®] learning styles were grouped into a “hybrid” category. The most-

common learning style among the nurses was kinesthetic (17, 30%) and read/write (17, 30%). Aural learning style was the least common (7, 12%). Table 4 presents the frequencies and percentages for VARK[®] learning styles for associate degree seekers.

Table 4.

Frequencies and Percentages for Associate Degree Nursing Student Learning Styles

VAR [®] Learning Style	<i>n</i>	%
Aural	7	12
Kinesthetic	17	30
Read/Write	17	30
Visual	11	19
Hybrid	5	9

Research Question 2

Which learning styles, as determined by the VARK[®] assessment, do *practical nursing* students prefer in a large proprietary education system with campuses located across the United States?

To examine research question 2, frequencies and percentages were conducted on the learning styles held by practical nursing students. Any participants who had a combination of two VARK[®] learning styles were grouped into a “hybrid” category. The most-common learning style among the nurses was read/write (20, 36%) followed close by kinesthetic (19, 34%). Visual learning style was the least common (4, 7%). Table 5 presents the frequencies and percentages for VARK[®] learning styles for practical nursing students.

Table 5.

Frequencies and Percentages for Practical Nursing Student Learning Styles

VARK [®] Learning Style	<i>n</i>	%
Aural	8	14
Kinesthetic	19	34
Read/Write	20	36
Visual	4	7
Hybrid	5	9

Research Question 3

Is there a difference between *associate degree* nursing students' preferred learning styles, as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the RN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States?

H₀3: There is no difference between *associate degree* nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the RN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

H_a3: There is a difference between *associate degree* nursing students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the RN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

In order to assess research question 3, an analysis of variance (ANOVA) was conducted on the ATI Comprehensive Predictor[®] score by preferred learning style. Any participants who had a combination of two VARK[®] learning styles were grouped into a “hybrid” category in order to conduct the ANOVA. Prior to analysis, the assumption of normality was assessed using a Kolmogorov Smirnov (KS) test. The results of the test were not significant, $p = .160$, and thus normality was met. Equality of variance was also assessed using a Levene’s test. The results of the test were not significant, $p = .505$, and thus the assumption was met.

The results of the ANOVA did not show significance, $F(4, 51) = 0.46$, $p = .765$, partial $\eta^2 = .04$, suggesting that there were not differences in the ATI Comprehensive Predictor[®] scores by learning style. Because significance was not found, the null hypothesis could not be rejected in favor of the alternative hypothesis. Table 6 presents the results of the ANOVA while Table 7 presents the means and standard deviations for the ATI Comprehensive Predictor[®] scores by preferred learning style.

Table 6.

ANOVA Results for ATI Comprehensive Predictor[®] Scores by Learning Style for Associate Degree Seekers

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	Partial η^2
Learning style	139.89	4	34.97	0.46	.765	.04
Error	3880.90	51	76.10			

Note. * $p \leq .05$

Table 7.

Means and Standard Deviations for ATI Comprehensive Predictor[®] Scores by Learning Style for Associate Degree Seekers

Learning Style	<i>n</i>	<i>M</i>	<i>SD</i>
Aural	7	66.57	5.03
Kinesthetic	17	65.54	7.18
Read/Wright	16	66.99	11.27
Visual	11	68.67	9.05
Hybrid	5	62.80	6.73

Research Question 4

Is there a difference between *practical nursing* students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-PN[®] as determined by the PN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States?

H₀4: There is no difference between *practical nursing* students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-PN[®] as determined by the PN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

H_a4: There is a difference between *practical nursing* students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-PN[®] as determined by the PN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States.

In order to assess research question 4, an analysis of variance (ANOVA) was conducted on the ATI PN Comprehensive Predictor[®] score by preferred learning style. Any participants who had a combination of two VARK[®] learning styles were grouped into a “hybrid” category in order to conduct the ANOVA. Prior to analysis, the assumption of normality was assessed using a Kolmogorov Smirnov (KS) test. The results of the test were not significant, $p = .160$, and thus normality was met. Equality of variance was assessed using a Levene’s test. The results of the test were not significant, $p = .164$, and thus the assumption was met.

The results of the ANOVA did not show significance, $F(4, 51) = 1.19$, $p = .328$, partial $\eta^2 = .09$, suggesting that there were not differences in the ATI PN Comprehensive Predictor[®] scores by learning style. Because significance was not found, the null hypothesis could not be rejected in favor of the alternative hypothesis. Table 8 presents the results of the ANOVA while Table 9 presents the means and standard deviations for the ATI PN Comprehensive Predictor[®] scores by preferred learning style.

Table 8.

ANOVA Results for ATI Comprehensive Predictor[®] Scores by Learning Style for Practical Nursing Diploma Seekers

Source	SS	df	MS	F	p	Partial η^2
Learning style	287.18	4	71.80	1.14	.341	.09
Error	6725.01	107	62.85			

Note. * $p \leq .05$

Table 9.

Means and Standard Deviations for ATI Comprehensive Predictor[®] Scores by Learning Style for Practical Nursing Diploma Seekers

Learning Style	<i>n</i>	<i>M</i>	<i>SD</i>
Aural	8	67.00	8.72
Kinesthetic	19	70.09	6.81
Read/Wright	20	70.20	7.34
Visual	4	69.68	2.47
Hybrid	5	63.46	6.23

Ancillary Analyses

Ancillary analyses were conducted to assess if there was a relationship between preferred learning style and ATI Comprehensive Predictor[®] scores with age and gender. Chi-squares were conducted to assess the relationship between age, gender, and learning style. Results showed no significant relationship between learning style by age, $\chi^2(12) = 14.22, p = .287$, nor did it show significance by gender, $\chi^2(4) = 4.08, p = .396$. These results are depicted in table 1 earlier in this chapter. Additionally, an ANOVA that was conducted between ATI Comprehensive Predictor[®] scores by gender did not show significance, $F(1, 109) = 1.20, p = .275$, partial $\eta^2 = .01$. Finally, a Spearman correlation conducted between ATI Comprehensive Predictor[®] and age did not show significance, $r = .15, p = .113$. This all suggests that age and gender were not significantly related to preferred learning styles or ATI comprehension scores.

Results Summary

This quantitative, non-experimental, retrospective study was conducted between March 1, 2014 and June 30, 2014 with 113 (N = 113) participants submitting the entire dissertation packet and taking the ATI Comprehensive Predictor[®]. The dissertation packet included a completed VARK[®] assessment from which the learning styles of students were determined. Once the packet was received, the researcher retrieved the corresponding ATI Comprehensive Predictor[®] scores from the ATI database. The study showed that there was no significant difference between the students' preferred learning style and their respective scores on the ATI Comprehensive Predictor[®]. In addition, results showed no significant relationship between learning style by age or by gender.

CHAPTER V: DISCUSSION AND SUMMARY

Introduction

A key indicator of the quality of a nursing program is the performance of graduates on the NCLEX[®] (Harding, 2010). Low NCLEX[®] pass rates can damage a program's reputation and can affect student recruitment and student persistence rates. Maximizing student learning is paramount in efforts to improve NCLEX[®] scores. Sales, Shelton, and Powell (2003) noted that graduating from nursing school is just the first step. In order to gain a nursing license in all 50 states, the District of Columbia and eight United States Territories, students must successfully pass the NCLEX[®] in their respective discipline (PN or RN). The NCLEX[®] tests nursing graduates' general knowledge and skills and focuses on determining safe entry-level nursing practice. Nursing schools are evaluated by state boards of nursing and other accrediting bodies on the NCLEX[®] pass rates of first-time test takers. Failure to reach required percentages for first-time test takers can put a school at risk for losing the program. Giddens (2009) reminds us that NCLEX[®] pass rates are the gold standard for defining nursing program quality. This makes graduating students that can perform adequately and pass the NCLEX[®] on the first attempt a primary objective of schools offering a pre-licensure nursing program.

While there are many different vendors offering a variety of NCLEX[®] success predictor examinations, this study focused on the ATI Comprehensive Predictor[®] exclusively. The College also purchased and used the ATI CARP[®] package throughout the program to enhance student learning and to identify student strengths and weaknesses. The study examined only whether there were differences between students' preferred styles of learning and the students' corresponding ATI Comprehensive Predictor[®] score and did not consider the CARP[®] package. This chapter will focus on the importance of students and faculty identifying preferred learning

styles and using that knowledge to develop pedagogy and study habits that will reach all types of learners and maximize student learning.

Discussion of Findings

There were four questions were posed for this study. Two questions related specifically to the practical nursing program and two questions related specifically to the associate degree in nursing program. The first two research questions were identical with the exception of the nursing program identified.

1. Which learning styles, as determined by the VARK[®] assessment, do *associate degree* nursing students prefer in a large proprietary education system with campuses located across the United States?

The answer to this question was determined by using frequencies. Kinesthetic and read/write learning styles were determined to be the most predominate groups of learning styles of *associate degree* students. The visual learning style followed behind kinesthetic and read/write while the aural learning style was the least predominate among the *associate degree* students. There were also five *associate degree* students identified in this study that had more than one learning style preference on the VARK[®] assessment. The students in this group were labeled as “hybrid”, meaning that they identified themselves as having more than one learning style. This is illustrated in Figure 11.

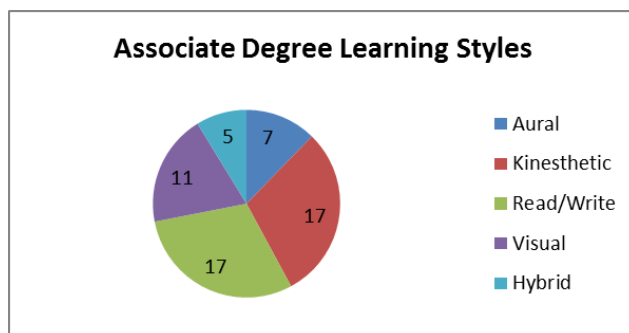


Figure 11. Associate Degree Learning Styles

2. Which learning styles, as determined by the VARK[®] assessment, do *practical nursing students* prefer in a large proprietary education system with campuses located across the United States?

The answer to this question was determined by using frequencies. Results for this question showed that both kinesthetic and read/write learning styles were the most predominate preferred learning styles for PN students. The aural learning style was the third most prevalent learning style while the visual learning style was least prevalent for PN students. Five PN students were grouped into the “hybrid” category, meaning that they were identified as having more than one learning style when the VARK[®] was scored. This is illustrated in Figure 12.

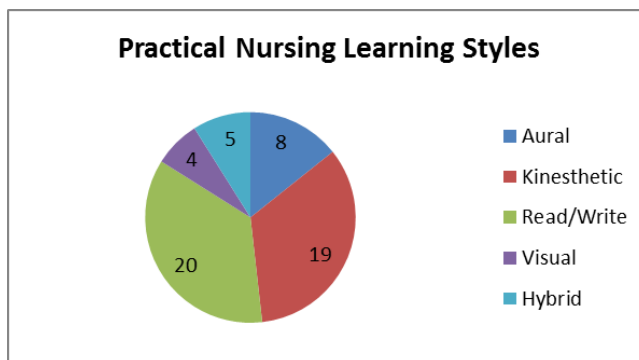


Figure 12. Practical Nursing Learning Styles

The results of this study mimicked Molsbee’s (2011) findings. Molsbee determined in his study that there was no one clear-cut learning style preference that stood out from among the others. He maintained that associate degree nursing students learned in a variety of ways. Koch, Salamonson, Rolley and Davidson (2011) identified that knowing the preferred learning style will allow both faculty and students to enhance learning by using appropriate tools to mirror students’ preferred learning styles. One study worth noting regarding identifying specifically nursing students’ preferred style of learning was conducted by Meehan-Andrews (2009) and

concluded that university populations are diverse in learning styles and have differing abilities. Meehan-Andrews used the VARK[®] learning assessment to identify the students' learning preferences and concluded that most first-year nursing students were kinesthetic learners. She concluded that laboratory practice and using a variety of teaching methods in the classroom were most effective. Findings of this study do not closely mimic Meehan-Andrews in that only about 30% - 34% of nursing students were kinesthetic learners and 30%-36% of students having the read/write preferred learning style. It makes sense that if students have a better understanding of nursing concepts and patient care, they would be more apt to pass the NCLEX[®] on the first attempt. Teaching students using their preferred style of learning can achieve this.

It is important for students to know what their learning style and understand what it means. This knowledge lends valuable insight to students and allows them to apply appropriate study methods to different units in a course and thus to enhance their learning (James, D'Amore, & Thomas, 2011). In addition, during this study, participants' were asked if they knew their learning style before they took the VARK[®] assessment and 36% reported that they did not know their learning style and 64% reported that they did. PN and associate degree students' answers were nearly identical when asked this question. This was illustrated previously in Figure 9. Gilbert and Swanier (2008) conclude that students become uninterested and restless quickly in the classroom when the instructor's teaching style does not match the student's preferred learning style. This leads to boredom and inattentiveness in the classroom and has an impact on overall grades received for the course (Gilbert & Swanier, 2008). Nursing lessons are normally linked back to the NCLEX[®] test plan so students are at risk for failing the NCLEX[®] if they miss portions of lessons due to boredom.

The third and fourth research questions posed for this study were:

3. Is there a difference between *associate degree* nursing students' preferred learning styles, as defined by the VARK[®] assessment and predicted success on the NCLEX-RN[®] as determined by the RN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States?
4. Is there a difference between *practical nursing* students' preferred learning styles as defined by the VARK[®] assessment and predicted success on the NCLEX-PN[®] as determined by the PN ATI Comprehensive Predictor[®] in a large proprietary education system with campuses located across the United States?

In order to assess research question 3 and 4, an analysis of variance (ANOVA) for each group PN and RN was conducted on the ATI Comprehensive Predictor[®] score by preferred learning style. The results of the ANOVA showed no significant differences between the groups as compared to the ATI Comprehensive Predictor[®]. While significance was not found in this between students' preferred learning styles and predicted success on the NCLEX[®], there are studies in the literature showing that learning styles can be linked to academic performance.

The Koch et al (2011) study was one of the first studies to look at student preferred learning styles and link those styles to academic performance. Their study determined that the kinesthetic sensory mode of learning was a positive and significant predictor of academic performance (Koch, Salamonson, Rolley, & Davidson, 2011, p. 614). Felder and Spurlin (2005) concur that instructors should use strategies that appeal to a range of learning styles in order to improve test scores, reduce hostile classes and reduce poor attendance and improve student retention (Felder & Spurlin, 2005). Students are better engaged in the classroom and have an increased chance passing the NCLEX[®] on the first attempt when nursing instructors use a variety of pedagogical strategies. Yannibelli, Godoy, and Amandi (2006) concur that individuals have

their unique ways of learning and this affects the learning process and its outcome (Yannibelli, Godoy, & Amandi, 2006, p. 55). Crannell and Witte (2012) agree that “learning styles are a major consideration in the education process and that knowledge of an individual’s style can be helpful in assisting the individual to be successful in education undertakings” (Crannell & Witte, 2012, p. 1). Crannell and Witte’s study agreed that each person has an individual preferred way of learning. They concluded that nurses are varied in their preferred ways of learning and that the finding is significant finding for the educator of practicing nurses. While the article addresses learning styles of practicing nurses the same may be said for nursing students. This finding compares to this particular study and shows that there is a need for using multiple pedagogical practices in the classroom in order to be congruent with students’ preferred learning styles. Using a variety of pedagogical approaches should lead students to successfully pass the NCLEX® on the first attempt.

Implications and Recommendations

The literature continues to be permeated with studies regarding nursing student preferred learning styles and preferred learning styles from other student disciplines. Studies of nursing students and other disciplines agree that college students have a variety of learning styles and that past experiences influence the way students learn (Felder & Spurlin, 2005; Jones, Reichard, & Mokhtari, 2003; Knowles et al., 2005; Molsbee, 2011). Studies also show that students perceive that different learning strategies are required for various learning situations (Jones et al., 2003, p. 371). This has broad reaching implications for both students and faculty.

Nursing students should know what their preferred learning style is and use that knowledge to develop study habits that will reinforce, retain and clarify their learning. This can be easily accomplished by using the VARK® assessment and VARK® learning strategies. Learning and the retention of concepts has a direct bearing on NCLEX® success. Nursing

curriculum based on concepts from simple to complex and builds on knowledge from the beginning to the end. Retention of these concepts is the key to mastering the next concept and concept mastery is essential to pass the NCLEX[®] on the first attempt.

Faculty should have knowledge regarding learning styles of students in their classroom and be flexible in their delivery methods in order to reach all types of learners (Felder & Spurlin, 2005; Meehan-Andrews, 2009). Nursing faculty need to design effective instruction to meet the needs of all learning styles (Meehan-Andrews, 2009). In addition, nursing faculty are tasked with delivering lessons according to the NLN Core Competencies of Nurse Educators[®]. Nurse educators should identify individual learning styles and provide diverse learners resources to help meet their individual learning needs. They should also create an environment that facilitates student learning and achievement of desired outcomes (NLN, 2012, pp. 16-17). This is accomplished by addressing students' preferred learning styles when presenting content in classroom, lab, and clinical settings.

Limitations of Study

Limitations must be considered when interpreting the findings from this study. Students participating in this study were from one large proprietary institution with 12 campuses located across the United States thus limiting comparisons with other institutions of higher learning. This study was limited by the smaller than expected sample size due to declining enrollments in the available nursing programs. The possibility exists that not all campuses follow the same remediation methods. In addition, two of the campuses have a different curriculum for both PN and RN than the other campuses. The possibility also exists that not all students took their ATI Comprehensive Predictor[®] seriously on the first attempt therefore lowering the score achieved. While the College allows two attempts on the ATI Comprehensive Predictor[®] with remediation time in between, only results from the first attempt were looked at during this study.

Future Research

Because the sample size was smaller than anticipated, some recommendations for future research are made. First, the study should be repeated with a larger sample size to meet the minimum ANOVA requirements and lessen the chance for errors. Second, the study should be replicated using actual NCLEX[®] scores and not simply ATI Comprehensive Predictor[®] scores to see if significance is obtained. The study should be replicated using another tool to identify students' preferred learning styles or a different tool to predict NCLEX[®] success to see if significance is achieved. This particular study did not include the teaching methods used for the participating nursing students. It may be beneficial to add additional parameters to a future study to include only students who were taught using techniques from their preferred learning style to see if there is a more of a difference between preferred learning styles and the score achieved on the ATI Comprehensive Predictor[®]. Lastly an experimental study could be conducted easily by developing four modules on a topic-one written for each VARK[©] learning style. A control group would be used to randomly assign members to any module and an experimental group would be used to assign modules that match a specific learning style. Comprehensive predictor scores could then be reviewed in an effort to identify differences assuming all other factors are the same.

Summary

Studies regarding students' preferred styles of learning continue to be published today. Researchers seem intrigued with exploring how students learn in many different disciplines. Nursing leaders are searching for ways to improve NCLEX[®] pass rates for first time testers. While this particular study did not find differences between students' preferred learning styles and predicted NCLEX[®] success, the mystery regarding learning styles and whether to teach

specifically to a particular style or entice the student to stretch beyond their preferred style to learn in new ways remains.

The results of this study substantiate that nursing students in both associate degree RN and PN programs prefer a variety of learning styles. No specific learning style correlated to the ATI Comprehensive Predictor[®] Examination. Based upon these results, nursing educators need to continue to incorporate a variety of pedagogical strategies into their courses in order to promote NCLEX[®] success on the first attempt. However, the burden of education does not rest solely with nurse educators. Nursing students need to identify their preferred learning styles and adjust their study habits accordingly in order to maximize learning and retain needed information that will prove helpful in achieving NCLEX[®] success on the first attempt. Identification of preferred learning styles are easily accomplished by using the VARK[®] assessment. The VARK[®] assessment and the VARK[®] scoring guide are readily available on-line at <http://www.vark-learn.com>. The website also contains helpful study strategies for each type of learner and information on how to create learnable packages to assist students with increasing their mastery of subject matter and improving their test taking skills. Students can review all learning style strategies and apply them to broaden their learning perspective.

This study had the potential to affect the way lessons are delivered in the classroom as well as the way students learn. It also lent credence to previous studies conducted with regard to students' learning styles. Similarities to other studies were discovered and solutions proposed in those studies were applied to teaching and learning methods embraced at the institution involved with this study.

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Appendix A: Permissions

From: Helscher, Holly
Sent: Tuesday, February 26, 2013 5:44 AM
To: McAllister, Brenda
Subject: Permission to Conduct Research at Brown Mackie College
Importance: High

Dear Ms. McAllister:

Thank you for forwarding the materials in support of your request for permission to conduct research using campus data at Brown Mackie Colleges.

Having reviewed these and verifying that you have provided us with the required information and discussion that your proposal is to conduct a quantitative, non-experimental correlational research study as the basis for your dissertation, I am pleased to provide you with this letter of approval.

We look forward to reading the results of this important research.

If you have any questions, please just let me know.

Holly Helscher
Vice President for Academic Operations
Brown Mackie Colleges – Central Services
625 Eden Park Drive, Ste. 1100
Cincinnati, OH 45202
513-830-2073 – office
513-381-3347 - fax

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From: Richard Felder [<mailto:felder@ncsu.edu>]
Sent: Wednesday, December 19, 2012 9:42 AM
To: Brenda McAllister
Subject: Re: Request to use the following figure in my dissertation

Dear Ms. McAllister,

You're welcome to use it--just be sure to attribute the source.

Good luck with your dissertation.

Richard Felder
 Hoechst Celanese Professor Emeritus of Chemical Engineering
 N.C. State University
http://www.ncsu.edu/effective_teaching

Dimensions of Learning and Teaching Styles

<i>Preferred Learning Style</i>		<i>Corresponding Teaching Style</i>	
sensory } intuitive }	perception	concrete } abstract }	content
visual } auditory }	input	visual } verbal }	presentation
inductive } deductive }	organization	inductive } deductive }	organization
active } reflective }	processing	active } passive }	student participation
sequential } global }	understanding	sequential } global }	perspective

On Wed, Dec 19, 2012 at 7:55 AM, Brenda McAllister <brendamc@netins.net> wrote:

Dear Dr. Felder:

I am formally requesting permission to use your figure (above) published in Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Engineering Education*, 78(7), 674-681 in my dissertation entitled "Student preferred learning styles and their relationship to predicted success on the National Council Licensure Examination". I have long been intrigued with your research on preferred learning styles of engineering students. I believe many of your concepts are also applicable to nursing students.

It would be an honor to be allowed to use this figure in my dissertation.

Sincerely,

Brenda S. McAllister RN, MSN, EdD(c)
181 Bear Creek Court
Palo, IA 52324
brendamc@netins.net
[319-851-4211](tel:319-851-4211)

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<http://www.vark-learn.com/english/page.asp?p=whatsnew>
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To purchase any of these resources (above) you can use a personal check/cheque, a Purchase Order or buy from our secure website with a credit card.

Best wishes for your work.

Neil

Neil Fleming

Designer of the VARK Questionnaire

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c/o College of St. Mary (Omaha,NE)
181 Bear Creek Court

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Appendix B: Research Data Packet

CONSENT FORM

You are invited to take part in a research study of the identification of student preferred learning styles and their correlation to predicted NCLEX[®] success. You were chosen for this study because you are a current nursing student in this nursing program. This form is part of the process called the “informed consent”. This form will allow you to understand this study prior to giving consent to take part.

This study is being conducted by a researcher named Brenda McAllister. Ms. McAllister is a doctoral student at the College of Saint Mary located in Omaha, Nebraska and is the National Director of Nursing for Brown Mackie College.

Background Information:

The purpose of this study is to determine whether particular perceived learning styles of students in Associate Degree and Practical/Vocational Nursing programs are associated with predicted National Council Licensure Examination (NCLEX[®]) success.

Procedures:

If you decide to participate in this study you will be asked to:

- Sign the consent form
- Fill out a VARK[®] learning style assessment
- Return VARK[®] learning style assessment and demographic sheet to your nursing administrator
- It is estimated to take no longer than 20 minutes to complete the VARK learning style assessment and the demographic survey.

Voluntary Nature of the Study:

Your participation in this study is voluntary. This means that everyone will respect your decision of whether or not you want to be in this study. You will not be treated any differently if you choose not to participate. If you feel stressed at any time during this study you may stop without repercussions. You may skip any questions if you feel they are too personal.

Risks and Benefits of Participating in the Study:

The benefit of being in this study will be to aid in the understanding of student preferred learning styles and their correlation to predicted success on the NCLEX[®] and that may contribute to improving educational strategies. The risks are minimal and no personal information will be connected to any results of the VARK[®]. If you feel that participating in this study will cause you unusual stress, please do not participate in this study.

Compensation:

There is no compensation for participating in this study. There are no points or grades attached to participating in this study.

Confidentiality:

Any information you provide will be kept confidential. The researcher will not use your information for any purposes outside of this research project. Your name or anything else that might identify you will not be used in any reports of the study.

Statement of Consent:

The privacy of all participants will be protected. Only the researcher will have access to any information provided for this study. Your signature is required to partake in this study. You must be 18 years of age or older, complete the Consent Form, VARK[®] Assessment, Demographic Data Sheet, and the ATI Comprehensive Predictor[®] to be eligible for this study.

I agree to participate in this study.

Participant Signature: _____

Date: _____

Demographic Data Sheet

Participant Name:

Please print your name on the line

Sex

circle appropriate gender

Male

Female

Age:

write age on line next to corresponding group

_____ 18-29

_____ 30-39

_____ 40-49

_____ 50-59

_____ 60 +

Race

circle appropriate ethnicity

Caucasian

African American

Asian

Hispanic

Native American

Other _____

Location

place X on line next to corresponding school location

_____ BMC Louisville, KY

_____ BMC Ft. Mitchell, KY

_____ BMC Indianapolis, IN

_____ BMC South Bend, IN

_____ BMC Kansas City, KS

_____ BMC Salina, KS

_____ BMC Tucson, AZ

_____ BMC Phoenix, AZ

_____ BMC Miami, FL

_____ BMC Findlay, OH

_____ BMC Akron, OH

_____ BMC North Canton, OH

_____ BMC Cincinnati, OH

Nursing Program Type

place X on line next to corresponding program type

_____ RN

_____ PN

Did you know your learning style prior to taking the VARK[®]

Circle the correct answer

Yes

No



The VARK Questionnaire (Version 7.2)

How Do I LEARN BEST?

Choose the answer which best explains your preference and circle the letter(s) next to it.

Please circle more than one if a single answer does not match your perception.

Leave blank any question that does not apply.

1. You are helping someone who wants to go to your airport, the center of town or railway station. You would:
 - a. *go with her.*
 - b. *tell her the directions.*
 - c. *write down the directions.*
 - d. *draw, or show her a map, or give her a map.*

2. You are not sure whether a word should be spelled `dependent' or `dependant'. You would:
 - a. *see the words in your mind and choose by the way they look.*
 - b. *think about how each word sounds and choose one.*
 - c. *find it online or in a dictionary.*
 - d. *write both words down and choose one.*

3. You are planning a vacation for a group. You want some feedback from them about the plan. You would:
 - a. *describe some of the highlights they will experience.*
 - b. *use a map to show them the places.*
 - c. *give them a copy of the printed itinerary.*
 - d. *phone, text or email them.*

4. You are going to cook something as a special treat. You would:
 - a. *cook something you know without the need for instructions.*
 - b. *ask friends for suggestions.*
 - c. *look on the Internet or in some cookbooks for ideas from the pictures.*
 - d. *use a good recipe.*

5. A group of tourists want to learn about the parks or wildlife reserves in your area. You would:
 - a. *talk about, or arrange a talk for them about parks or wildlife reserves.*
 - b. *show them maps and internet pictures.*
 - c. *take them to a park or wildlife reserve and walk with them.*
 - d. *give them a book or pamphlets about the parks or wildlife reserves.*

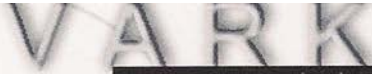
6. You are about to purchase a digital camera or mobile phone. Other than price,

what would most influence your decision?

- a. *Trying or testing it.*
 - b. *Reading the details or checking its features online.*
 - c. *It is a modern design and looks good.*
 - d. *The salesperson telling me about its features.*
7. Remember a time when you learned how to do something new. Avoid choosing a physical skill, eg. riding a bike. You learned best by:
- a. *watching a demonstration.*
 - b. *listening to somebody explaining it and asking questions.*
 - c. *diagrams, maps, and charts - visual clues.*
 - d. *written instructions – e.g. a manual or book.*
8. You have a problem with your heart. You would prefer that the doctor:
- a. *gave you a something to read to explain what was wrong.*
 - b. *used a plastic model to show what was wrong.*
 - c. *described what was wrong.*
 - d. *showed you a diagram of what was wrong.*
9. You want to learn a new program, skill or game on a computer. You would:
- a. *read the written instructions that came with the program.*
 - b. *talk with people who know about the program.*
 - c. *use the controls or keyboard.*
 - d. *follow the diagrams in the book that came with it.*
10. I like websites that have:
- a. *things I can click on, shift or try.*
 - b. *interesting design and visual features.*
 - c. *interesting written descriptions, lists and explanations.*
 - d. *audio channels where I can hear music, radio programs or interviews.*
11. Other than price, what would most influence your decision to buy a new non-fiction book?
- a. *The way it looks is appealing.*
 - b. *Quickly reading parts of it.*
 - c. *A friend talks about it and recommends it.*
 - d. *It has real-life stories, experiences and examples.*
12. You are using a book, CD or website to learn how to take photos with your new digital camera. You would like to have:
- a. *a chance to ask questions and talk about the camera and its features.*
 - b. *clear written instructions with lists and bullet points about what to do.*
 - c. *diagrams showing the camera and what each part does.*

- d. *many examples of good and poor photos and how to improve them.*
13. Do you prefer a teacher or a presenter who uses:
- a. *demonstrations, models or practical sessions.*
 - b. *question and answer, talk, group discussion, or guest speakers.*
 - c. *handouts, books, or readings.*
 - d. *diagrams, charts or graphs.*
14. You have finished a competition or test and would like some feedback. You would like to have feedback:
- a. *using examples from what you have done.*
 - b. *using a written description of your results.*
 - c. *from somebody who talks it through with you.*
 - d. *using graphs showing what you had achieved.*
15. You are going to choose food at a restaurant or cafe. You would:
- a. *choose something that you have had there before.*
 - b. *listen to the waiter or ask friends to recommend choices.*
 - c. *choose from the descriptions in the menu.*
 - d. *look at what others are eating or look at pictures of each dish.*
16. You have to make an important speech at a conference or special occasion. You would:
- a. *make diagrams or get graphs to help explain things.*
 - b. *write a few key words and practice saying your speech over and over.*
 - c. *write out your speech and learn from reading it over several times.*
 - d. *gather many examples and stories to make the talk real and practical.*

Appendix C: VARK Scoring Guide



visual, aural, read/write, kinesthetic

The VARK Questionnaire Scoring Chart

Use the following scoring chart to find the VARK category that each of your answers corresponds to. Circle the letters that correspond to your answers

e.g. If you answered b and c for question 3, circle V and R in the question 3 row.

Question	a category	b category	c category	d category
3	K	V	R	A

Scoring Chart

Question	a category	b category	c category	d category
1	K	A	R	V
2	V	A	R	K
3	K	V	R	A
4	K	A	V	R
5	A	V	K	R
6	K	R	V	A
7	K	A	V	R
8	R	K	A	V
9	R	A	K	V
10	K	V	R	A
11	V	R	A	K
12	A	R	V	K
13	K	A	R	V
14	K	R	A	V
15	K	A	R	V
16	V	A	R	K

Calculating your scores

Count the number of each of the VARK letters you have circled to get your score for each VARK category.

Total number of **V**s circled =

Total number of **A**s circled =

Total number of **R**s circled =

Total number of **K**s circled =

Appendix D: NIH Certificate

