A Study of the Relationship Between the Preferred Area of Clinical Practice of Registered Nurses and their Learning Style Modality Preference

by

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Abstract

Learning styles are a major consideration in the education process. Knowledge of an individual's learning style can be helpful in assisting the individual to be successful in educational undertakings. Nursing is a discipline that requires ongoing learning. One specific area of learning styles is perceptual modality preferences.

This study investigated the relationship between the preferred area of clinical practice of registered nurses and their preferred perceptual modality preference.

The research questions addressed in this study were (1) What, if any is the relationship between the preferred area of clinical practice of registered nurses and their preferred perceptual modality?; (2) What is the impact of age on the preferred perceptual modality?; (3) What is the impact of experience on the preferred perceptual modality? The preferred perceptual learning modality was measured using the *Perceptual Modality Preference Survey (PMPS).*

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Chapter 1

Background

Registered nurses (RN) comprise the largest group of health care professionals in the United States (NACNEP, 2008). According to the Bureau of Labor Statistics (BLS) (2008-2009), there are approximately 2.5 million jobs for registered nurses in the United States. In addition, there is a projected 587,000 increase in job offerings in the 2010-2016 time period. The majority (59%) of the registered nurses work in the hospital setting (BLS, 2008-2009). Most new graduate nurses seek employment in the hospital setting. Many new graduate nurses become disillusioned shortly after beginning their practice (Adams & Bond 2000). Could this sense of disillusionment be, in part, due to poor job fit between the new graduate's learning style and the clinical area where they are placed?

Registered nurses (RN) are adults when they enter practice. They may be young adults who entered nursing school immediately after graduating from high school; they may be middle-aged adults who entered nursing school during the raising of families, or they may be older adults who entered nursing school as a second career. Therefore, while

all entry-level registered nurses are chronologically adults, they span an age group that can range from 20 to 50 years of age. This is significant when investigating the learning styles of registered nurses and if the nurse's preferred learning style impacts the clinical area of practice.

Knowles (1980) stated that andragogy was "the art and science of helping adults to learn" (p. 43). There are four assumptions that are fundamental to understanding the learning process of adults. First, adults are self-directed learners. Adults will learn whether the teacher is effective or not. This is true because while an adult learner may be dependent on the teacher temporarily to impart information, the adult prefers to take the information and then build upon it in an autonomous fashion. Secondly, adults have experiences they can draw upon to place a learning event in a context familiar to themselves. This rich background of experience allows the adult learner to grasp the concept being offered and expand the concept to an understanding beyond the original intent of the teacher. Third, adults have their own timetable for learning. The adult learner prefers to learn based on what knowledge is needed at the present time. This concept does not imply the adult learner is only interested in the

present, but that the adult learner needs to appreciate the material in terms of its meaning to the individual. Lastly, the adult learner desires to see learning as something that will improve their life experience in the future.

The idea that the adult learner has particular goals in mind when undertaking a learning process has been well established (Dunn & Dunn, 1998; James & Blank, 1993; Saransin, 1999). This is true of an individual embarking on the journey to become a registered nurse. How an individual inputs information, processes that information, stores the information, and then recalls the information is the "learning style" of the individual. One's learning style is individual. While there are persons who have similar styles, each person has an individual spin to their particular style. Researchers have identified various definitions for the term "learning style". Sarasin (1999) defines learning style as:

> A certain specified pattern of behavior and/or performance according to which the individual approaches a learning experience, a way in which the individual takes in new information and develops new skills, and the process by which the individual retains new information or new skills (p. 1).

James and Blank, (1993) define learning style “as the complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store, and recall what they are attempting to learn” (p. 43).

Dunn and Dunn (1998) define learning style as a “biological and developmental set of personal characteristics that makes the identical instruction effective for some students and ineffective for others” (p. 5). Understanding the individual’s learning style is important to satisfactory completion of the learning process.

Problem Statement

There are many areas of clinical practice open to registered nurses. All of the areas require considerable amounts of information processing, the ability to act on the information that has been processed and the ability to evaluate the outcome of the actions taken. All areas of nursing require the ability to analyze symptoms and patient responses to provided therapies. However, each area has its own unique environmental factors. For instance, the nature of the emergency department requires the ability to process incoming information quickly and act on that information quickly whereas on a skilled nursing unit one has more time

to think over the information, formulate a plan and then act on that plan. Some nurses thrive in the atmosphere of not knowing what is coming at any given moment and being ready to respond spontaneously. Other nurses prefer to be able to move at a more relaxed pace as they care for their patients.

Little research has been conducted to determine if there is a relationship between the learning style of registered nurses and their preferred clinical practice area. By focusing on the preferred learning style of registered nurses and determining if there is a relationship between their learning style and preferred clinical practice area nurses could be placed in clinical settings that would be congruent with their goals and objectives. Utilizing this information would increase job satisfaction as well as clinical performance.

Purpose of the Study

The purpose of this study was to determine the relationship, if any, linking the registered nurse’s preferred learning style and their choice of clinical practice. Given the shortage of registered nurses the United States has experienced over the last few years, the preponderance of research relative to registered nurses has been related to job satisfaction. These studies have looked

at staffing levels, (Hall & Doran, 2004; Mark, 2006; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002; Rambur, Palumbo, McIntosh, & Mongeon, 2003), organizational characteristics, (Adams & Bond, 2000; Adams, Bond, & Hale, 1998; Aiken, Clarke, Sloane, Sochalski, & Silber, 2002) and nurse-physician relationships (Adams & Bond, 2000; Manojlovich, 2005). Little information has been gathered that relates to the preferred learning styles of registered nurses and the relationship to preferred clinical practice areas. Determining this relationship could add to the body of knowledge relative to job satisfaction when correlated with current clinical placement.

Research Questions

1. What is the relationship, if any, between the preferred area of clinical practice of registered nurses and their preferred perceptual modality learning style?
2. What is the effect, if any, of years of experience on the preferred perceptual modality learning style of registered nurses?
3. What is the effect, if any, of age on the preferred perceptual modality learning style of registered nurses?

Significance of the Study

Registered nurses remain the largest component of the healthcare workforce (NACNEP, 2008). The problem of too few nurses to fill current positions as well as the outflow of individuals from the nursing workforce continues to plague organizations that depend on registered nurses to provide quality patient care. Job dissatisfaction is often listed as a significant reason for nurses leaving the profession. One possible cause of job dissatisfaction is a mismatch of an individual nurse to a clinical practice area. The results of this study may be used by both individual nurses and employers to better match registered nurses to an area of practice.

The results of this study may also benefit schools of nursing. By investigating and understanding the student's preferred learning style, instructors of nursing will be able to more effectively impart knowledge and students may more easily grasp, retain, recall, and act upon that knowledge. This improved understanding could lead to less attrition of nursing students as well as an enhanced self esteem secondary to the positive reinforcement of successfully completing individual courses that ultimately leads to graduation and licensure.

Assumptions of the Study

The following assumptions were made relative to this study:

1. The participants answered the questionnaires honestly and completely.
2. The *Perceptual Modality Preference Survey (PMPS)* is a valid instrument for assessing participants' preferences for learning styles and abilities.
3. The results as reported on the *Perceptual Modality Preference Survey (PMPS)* reflect participants' learning styles.

Limitations of the Study

1. The sample for this study was taken from nurses in one southeastern state. Therefore, the results may not be representative of nurses across the United States and abroad.
2. The sample size is small; generalizations from this sample may not be accurate.

Definition of Terms

The following definitions are critical terms used within the study and are provided to enhance or delineate specific terminology. All definitions without a citation were developed by the researcher.

1. Adult Learner: any student who has completed the requirements to hold a high school diploma.
2. Learner: a person in the act of acquiring new skills.
3. Learning Styles: “The complex manner in which, and conditions under which, learners most efficiently and most effectively perceive, process, store, and recall what they are attempting to learn” (James & Blank, 1993, p. 43)
4. *Perceptual Modality Preference Survey (PMPS)*: a 42-item questionnaire designed to identify each participant’s perceptual learning style and rank those styles in order.
5. Perceptual Modality of Learning Style: the seven perceptual modalities identified by James and Galbraith (1985) were the basis for this investigation. The seven styles are:
    a. Print: learning through reading or writing.
    b. Aural: learning through listening.
    c. Interactive: learning through verbalization.
    d. Visual: learning through observation of pictures and graphs.
    e. Haptic: learning through the sense of touch or grasp.
    f. Kinesthetic: learning through whole body movement.
    g. Olfactory: learning through the senses of smell and taste.

6. Registered nurse: One who has completed an organized program of study and has passed the National Council Licensure Exam for registered nurses (NCLEX-RN).
7. Student nurse: A person currently enrolled in a program of study that will lead to eligibility to sit for the NCLEX-RN examination.
8. Medical: Nursing care of the non-surgical patient.
9. Surgical: Nursing care of the patient in the perioperative area to include intra-operative, pre-operative, post-operative care.
10. Critical Care (CC): Nursing care of the patient requiring intensive nursing care to include adult intensive care unit, emergency department, and pediatric intensive care.
11. Women and Children (WC): Nursing care of the ante-partum, intra-partum, and post-partum woman and nursing care of the child up to 18 years of age.

Organization of the Study

This study is organized in five chapters. Chapter 1 gives an overview of the problem, the research question, the significance of the study, limitations of the study, and definitions of terms. Chapter 2 is a comprehensive review of the body of literature that addresses perceived

learning styles and their possible relationship to preferred clinical area of practice of registered nurses. Chapter 3 reports the methods used to answer the research questions. Chapter 3 also contains information relative to the sample selection, instrumentation, data collection methods, and data analysis. Chapter 4 contains the analyses and findings of the study. Chapter 5 presents conclusions, discussion, and recommendations for practice and future research.

Chapter 2

Review of the Literature

Introduction

The purpose of this study was to examine the relationship between perceptual modality learning style preference and a registered nurse's preferred area of clinical practice. The following research questions guided this study:

1. What is the relationship, if any, between the preferred area of clinical practice of registered nurses and their preferred perceptual modality learning style?
2. What is the effect, if any, of years of experience on the preferred perceptual modality learning style of registered nurses?
3. What is the effect, if any, of age on the preferred perceptual modality learning style of registered nurses?

This chapter provides a review of the literature related to the history of learning styles beginning with a review of early contributors to the body of knowledge, early instruments utilized in assessing learning styles and

the significance of appreciating the impact of learning styles.

Next, the *Perceptual Modality Preference Survey (PMPS)* was reviewed. The *PMPS* is based on Cherry's (1981) review of the *Multi-Modal Paired Associates Learning Test* (*MMPALT*) with subsequent development of the *MMPALT II*. The *PMPS* was developed by Cherry for his comparative study of the *MMPALT II* (Harvey, 2002).

This was followed by a review of the history of nursing education from the pre-Nightingale era to present day education modalities. Finally, the relevance of learning styles and nursing practice were examined.

Significance of Learning Styles

Learning is a basic part of an individual's being. Many forms of learning begin almost at birth. Individuals learn to crawl, to walk, to talk, to play games; they learn to recognize letters, to spell words, and to read words. There are so many facts, ideas, and concepts one learns that there cannot be one, two, or even three methods that could suit the vast number of individuals' learning needs. The question then arises, with so many individuals and so much to learn, how do those individuals go about taking in, understanding and utilizing information? Keefe (1979) states:

> Learning style diagnosis opens the door to placing individualized instruction on a more rational basis. It gives the most powerful leverage yet available to educators to analyze, motivate, and assist students in school. As such, it is the foundation to a truly modern approach to education. (p. 132)

Overview of History of Learning Styles

Learning style is a broad term that includes the entire learning process. James and Blank (1993) defined learning style as “the complex manner in which, and conditions under which, learners most efficiently and most effectively, perceive, process, store, and recall what they are attempting to learn”. (p. 47) Sarasin (1999) states learning style is “the preference or predisposition of an individual to perceive and process information in a particular way or a combination of ways” (p. 3). While there are many other definitions of learning style, they all encompass the manner an individual takes in, understands, and remembers information.

Interest in learning styles was found in research as early as 1892 (Keefe, 1987). Much of the early research revolved around determining if one could better remember oral or written instruction. Most research during this time focused on determining one specific perceptual mode that

would result in better academic performance (Keefe). One researcher, Fizzell (1984) believed that learning style identification dated back to ancient times. Fizzell writes:

> At that time, people were seen as active or passive and as emotional or thoughtful. From these elements, the ancient Hindus proposed that people needed four pasic ways of practicing religion-the yogas or pathes- which are described in the *Bhagavad Gita*. (p. 304)

A significant component of learning style is modality preference. A definition of modality is “any of the sensory channels through which an individual receives and retains information” (Barbe & Swassing, 1979, p. 1). An important concept of the above statement is the phrase “receives and retains”. For an individual to “receive and retain” information, three functions must occur, sensation, perception, and memory.

James (1905) indicates that sensation and perception describe processes in which we cognize the world; both need stimulation of incoming nerves. Perception always involves sensation as part of itself. Sensation never takes place (in adult life) without perception.

Further explanation of these concepts will assist in understanding as they relate to the idea of modality. First, sensation occurs when an object or energy source is

experienced by an individual. A sensation by itself, without context, has no meaning to the individual. For instance, the cry of an infant generates the sensation of sound. However, without context, the meaning of the cry is lost and the cry is merely an auditory sensation.

When meaning is ascribed to the sensation one then experiences perception, Epstein distinguishes perception from sensation by stating, “Perception is an…inferred process that intervenes between the measurable stimulus conditions and the measurable overt response” (Epstein, 1967, p. 10 as cited in Barbe & Swassing, 1979). The individual experiences the sensation, then, based on previous experience, perceives the stimulus in a particular manner. Using the example of the night cry of the baby, the individual may perceive a need to go and check on the baby when presented with said sensation based on previous experience with the same sensation. Memory then is the storehouse where perceptions and their context are stored (Barbe & Swassing).

Early Contributors

Learning style research evolved from studies involving psychological research on individual differences (Pitts, 2009). In 1828 Weber asked the question, at what point would two objects touched on the skin be perceived as two

touches instead of one? Later he questioned the accuracy with which he was able to distinguish between two weights laid in the hand and how one could distinguish between the perception received through the muscles lifting the weights and the perception received through the skin. These seemingly petty curiosities led to more true progress in psychology than all the acquisitions from Aristotle to Hobbes (Ebbinghaus, 1973). This new knowledge was profound for its day because it examined organs that “do not, like the others, bring to our consciousness external stimuli in the ordinary sense, but processes on the inside of the body” (Ebbinghaus, p. 17). This discovery could be thought of as opening the door for study and understanding of perceptual learning modalities.

Fetchner expanded on Weber’s studies (Ebbinghaus, 1973). During this period, there was a movement toward the exact study of biology in terms of methodology and empirical facts. The movement was away from the study of the philosophy of nature (Ebbinghaus). However, Fetchner was one who was interested in the relationship of both rigorous scientific method and the philosophy of nature. Expanding on Weber’s work, Fetcher formulated the first mathematical law of mental life and named it Weber’s Law (Ebbinghaus; Weber’s Law).

Ebbinghaus (1964) through his work, *Memory*, became instrumental in experimental study of learning through his work with word associations. Ebbinghaus was interested in studying memory (learning) as a pure function, separating any relationship of meaning from the content. He was fascinated by the sheer exploration of what it took to recall a fact, an image, or a song. Ebbinghaus realized items recalled from memory (learned) were called back more or less accurately depending on how well they were learned from the start, what were the circumstances under which the original learning took place and the importance of the learning to the life of the individual.

The method Ebbinghaus developed to study memory was to take consonants and vowels and put them together in the order of consonant-vowel-consonant to form nonsense syllables. Ebbinghaus was careful to review the nonsense syllables for similarities to actual words or concepts that the syllables might evoke that would influence their ability to be retrieved from memory. The result was approximately 2,300 syllables that were then mixed together and randomly drawn out and strung together in varying lengths for memorization. Ebbinghaus noted also that learning the syllables required the use of more than one sensory modality. The sense of sight, hearing, and muscle

sense of organs of speech were required to reach the target. The goal was to determine how many repetitions of the string of syllables would result in recall thereby determining that learning had occurred. While Ebbinghaus' method of verbal learning was used by many, eventually it was replaced by the paired associate method developed by Calkins (Hearst, 1979).

The paired-associates learning task has been prototypical for investigating individual differences in associative learning (Rast & Zimprich, 2009). A major premise of paired associate (PA) learning is the learner will have no prior knowledge of the stimulus-response association and complete the learning task with the pairs coded in associative memory. Wilton (2006) looked at relationships of paired associative learning when one member of a pair is seen as lying on the other member as compared to the two objects being perceived as independent. Wilton's work suggests there are different neural pathways for different types of associative learning.

Again, an important concept in understanding Learning Styles is perception. How a person perceives what is being given to them will determine how well they receive the information. As noted earlier, James (1905) believed that sensation and perception were not well defined in popular

speech. Both need stimulation of incoming nerves to occur. In his book, *The Principles of Psychology* he notes, “Perception always involves sensation as a part of itself, and sensation in turn never takes place in adult life without perception also being there. They are therefore names for different cognitive *functions*, not different sorts of mental fact” (p. 1). The idea of perception and sensation being separate but experienced together has an impact on how an individual learns.

Ebbinghaus (1973) observed that perception is, “the working over by the mind of any aggregate of sensational elements given at the time through the sense organs” (p. 120). In the latter part of the 19th century, physiologists and physicists began to study both structure and function of the senses (Ebbinghaus). The eye was of particular interest as the eye has both intricate mechanical apparatuses yet it also has the ability to perform delicate and diverse functions. While the eye was of particular interest, the sensations of the skin and hearing were also studied.

Lowenfeld (1945) observed a group of partially blind students. He noted that some of these students relied on their limited sight while others relied primarily on their sense of touch to learn. Subsequent research by Lowenfeld

found that one in four persons rely on their sense of touch rather than vision for learning. With his *Tests for Visual and Haptical Aptitudes,* he challenged the then current beliefs of how people learned. Lowenfeld noted that:

> An extreme haptical type of individual is a normal sighted person who uses his eyes only when he is compelled to do so; otherwise, he reacts as would a blind person who is entirely dependent upon touch and kinesthesis. An extreme visually minded person, on the other hand, is one who is entirely lost in the dark, one who depends completely on his visual experiences of the outside world. (p. 101)

The above example is extreme with most persons falling somewhere between the two poles. However, it does illustrate how individuals take in information. Lowenfeld also recognized how the tendency toward the visual or haptic modality could influence the choice of one's occupation. For instance, if one's job was the type that required working within a box with one's hands as in some mechanical occupations, a very visually oriented person would have a difficult time. Likewise, a surveyor who uses his eyes to estimate distances, look through various devices, etc. would be very frustrated if he were primarily haptically oriented. While early work was in the field of

psychology rather than education proper, these early contributors provided much in the way of foundation for subsequent studies on learning styles.

Instruments

The term learning style refers to the cognitive, affective, and physiological traits that determine how an individual perceives, interacts with, and responds to the learning environment (Keefe, 1987). As the theories of how individuals learn vary, so do the methods for assessing those styles. Several of the more widely used instruments are presented in the following pages. Learning style assessment instruments have been reviewed, categorized, and discussed as cognitive, affective, or physiological instruments.

Cognitive Instruments

An early researcher in cognitive learning style was Herman Witkin. A focus of much of his research was how individuals perceive and process information. Witkin (1954) appreciated that earlier research on perception had laid a solid foundation for understanding the main tools man uses to make contact with his environment, but also saw the need to go beyond generalizations and explore the individual's unique contribution to perception. In the book, *Personality through Perception* (Witkin, et al., 1954) Witkin noted, "It

is now coming to be recognized that the process of perception, in order to be fully understood, must be studied in the context of the overall psychological organization of the individual perceiver" (p. 2). This realization prompted considerable research into what later became known as field dependence and field independence.

His early research came from attempting to understand why some pilots did well when executing complicated flight maneuvers and others became disoriented when they could no longer see the ground (Koch, 1998). To begin to answer that question Witkin (1954) developed the Rod and Frame Test. This test involved having the participant sit in a completely darkened room facing a tilted luminous frame that had a tilted luminous rod inside the frame. The participant was required to make the rod upright or vertical. Persons who tended to bring the rod into alignment with the tilted frame were termed field dependent meaning they saw the rod as it related to the axis of the frame (Witkin). However, those participants who were able to move the rod into the upright position were termed field independent meaning they had the ability to orient the rod irrespective of the surrounding frame (Witkin).

Similarly, by developing and utilizing the Embedded Figures Test developed from an earlier study by Gottschaldt

(Witkin, 1950) Witkin was able to determine field dependence or field independence in a way that was more easily accomplished than utilizing the Rod and Frame Test. Field dependence/independence has implications for an individual's approach to problem solving. Just as the person categorized as field independent has the ability to right the rod irrespective of the tilting of the frame, this individual also has the ability to problem solve by moving beyond the information presented. The field independent individual sees the problem outside the context the problem is presented in. Conversely, the field dependent individual sees the problem more in the specific context the problem is presented in and therefore works to solve the problem within the context presented (Witkin, 1965; Witkin, et al., 1977). Witkin and colleagues found the tendency toward field dependence or field independence to be consistent over time (Witkin, Goodenough, & Karp, 1967; Witkin, et al, 1977). Because of the consistent manner of information processing field dependence/independence has been termed a learning style.

Kolb's Learning Style Inventory (LSI) was developed in 1971 to assess individual learning styles of adults (Kolb, Boyatis, Mainimelis, 1999; Kolb & Kolb, 2005). Based on the Experiential Learning Theory (ELT) the LSI originally

consisted of a nine item, forced choice, self report questionnaire (Cassidy, 2004). In 1985 the LSI was revised to a 12 item, forced choice, self report questionnaire (Cassidy). The final result was four statistically prevalent learning styles, the diverger, the assimilator, the converger, and the accommodator (Kolb, et al., 1999; Sugarman, 1985). These styles are based on the learner's preference for perceiving and processing information. Perceiving information follows a line of concrete experience that is looking at things the way they actually are without making any changes. These individuals utilize actual hearing, feeling, seeing, and touching to learn. At the other end of the spectrum from concrete experience is abstract conceptualization (Agourram, 2009). These individuals prefer concepts and ideas; they utilize mental or visual images for understanding information presented to them (Agourram).

The information processing dimension of Kolb's theory follows the line between active experimentation and reflective observation. The active experimenter takes processed information and tries it out to prove that is works. The reflective observer prefers to take their conclusion and watch to see if it works by thinking about it (Agourram, 2009). It is by combining the opposite

dimensions that the four learning styles of converger, diverger, assimilator, and accommodator are determined.

Perceptual Instruments

Perceptual modalities are of particular importance in the education adults (James & Blank, 1993). Perceptual modalities can be defined as the way information is extracted from the environment (James & Galbraith, 1985). James (1905) wrote that sensation and perception describe processes by which we cognize and objectify the world. Both processes need stimulation of incoming nerves and sense organs influence each other in terms of what is perceived.

There is evidence that the ancient Greeks utilized a kinesthetic modality to teach the writing of letters and numbers by having the student trace letters and numbers with a stylus or by guiding the student’s hand through the movements that correspond to the shape of the object (Barbe & Swassing, 1979). The Roman’s added the process of cutting the letter or number into wax tablets. This enabled the student to accurately trace the letter or number. However, the belief that rote learning is superior to learning via a kinesthetic or mixed modality remained prevalent for many years even into the modern day classroom (Barbe & Swassing).

In 1956 Mills developed the *Learning Methods Test (LMT)* (Koch, 1998). Eckwall and Shanker lauded the LMT as "one of the best known instruments for testing learning modalities" (Eckwall & Shanker, 1985, as cited in Koch, 1998). The LMT was designed to measure the student's ability to learn new words using a visual, auditory, and kinesthetic, or combination method. The results indicated that children of average intelligence learned best by combination and visual methods; the auditory method was least effective for children of low intelligence, and the kinesthetic method was least effective for children of high intelligence. Based on the outcomes of this study Mills concluded no one method has maximal effectiveness for all children. Therefore recognizing and addressing individual modality differences will help ensure all students achieve a level of success.

The *Swassing-Barbe Modality Index (SBMI)* was developed by Swassing and Barbe to provide a relatively simple and low cost method to determine the learning modality strengths of children. The *SBMI* is unique compared to the tools in use at the time of its development in that it looked at more than one learning modality (Barbe & Swassing, 1979). The SBMI evaluated three modality strengths, auditory, visual, and kinesthetic (Koch, 1998).

The SBMI is a matching to sample task. The participant is presented with a stimulus item or sample and then is asked to reproduce the sample (Barbe & Swassing). Because the stimulus items are shapes (circle, square, triangle, and heart) the test may be used with school age children as well as preschool children and those whose first language is not English.

Several early studies looked at learning via the paired association method. The paired association method was developed by Calkins and replaced the serial learning method. While later studies utilized the vowel-consonant-vowel method, they did not utilize only nonsense syllables, but incorporated nouns into the sequence. Otto (1961) performed a study looking at 106 students in the second, forth, and sixth grades. The purpose of the study was to determine the relative abilities of good, average, and poor readers to learn and recall a list of paired associates. Likewise Renquest (1970) reported learning occurred through the paired associate method.

The Edmonds Learning Style Identification Exercise (ELSIE) was developed by Harry Reinert in 1971 to determine the learning styles of students in the Edmunds school district in Seattle, Washington (Corbett & Smith, 1984). The instrument is based on the belief that one’s learning

style is the way the individual is “programmed to learn most effectively, i.e., to receive, understand, remember, and be able to use new information” (Reinert, 1976, p. 161). Development of the instrument was the result of improving the individualized foreign language program that was developed in the Edmonds school district in 1969 (Reinert). As the course of study progressed, it was determined that for the course to be truly individualized the instructor needed to be able to recommend which study techniques would be most beneficial for the individual student. In order to accomplish that goal, the Edmonds Learning Style Identification Exercise (ELSIE) was developed.

Based on the hypotheses that “each individual is “programmed” to learn most efficiently in certain ways and less efficiently in others” and “one’s pattern of internalization of his native language gives a profile of his learning style” (Reinert, 1976, p. 160) the ELSIE provides a determination of the individual’s learning style according to patterns of responses to common English words (Reinert). The ELSIE instrument identified four categories of responses. When presented with a word, the individual would:

1. Have a mental image of an object or activity,

2. Have a metal image of the word spelled out,
3. Receive meaning from the sound of the word without any visualization, or
4. Have a fleeting kinesthetic reaction, either emotional or physical (Reinert, 1976, p. 161).

Corbett and Smith (1984) reported validation of the ELSIE for use with individual students. However, they concluded the ELSIE ineffective for measuring strength and preference mode when applied to groups of students.

Affective Instrument

One of the best known affective or personality instruments was developed by Katherine Cook Briggs and her daughter, Isabel Briggs Myers. The tool was developed almost by accident. Katharine Briggs developed an avid interest in personality types around the time of World War I (Myers, 1980). As she was developing hew own typology, she came upon the works of Carl Jung. Discovering Jung had developed a similar system; Briggs embraced Jung's system, and began to elaborate on it (Myers). It was in this atmosphere that that Briggs' daughter, Isabel, grew up.

Isabel Myers was stirred by the tragedies and suffering of World War II and sought to do something to help people understand each other and thereby reduce conflict (Myers, 1980). Having been raised with her

mother’s study of Jung, she determined to devise a practical use of the theory. Thus the Myers-Briggs Typology Instrument was developed.

The instrument is grounded in Carl Jung’s theories of personality type (McCrae & Costa, 1989). Jung proposed the existence of two dichotomous pairs of cognitive functions: rational functions, thinking and feeling and irrational functions, sensing and intuition. Jung further proposed that these functions are expressed in an introverted or extroverted form (Spoto, 1995). From this basis, Myers and Briggs formulated their theory of psychological type. Like Jung, this instrument is based on the theory that individuals have preferred ways of thinking and acting. In the MBTI there are four dichotomous pairs of terms that individuals are forced to choose from in stating how the individual would respond to a statement. The four pairs of terms are extraversion/introversion, sensing/intuition, thinking/feeling, and judgment/perception. The forced choice of the instrument yields 16 different possibilities of personality type (Pearman, 1997). While personality type instruments are utilized in determining learning styles, they do not generally reveal perceptual modality preferences.

Perceptual Modality Preference Survey

Background

The purpose of this study was to determine the relationship, if any, between the preferred area of clinical practice of registered nurses and their perceptual modality learning preference. The tool chosen to determine perceived learning style preference was the *Perceptual Modality Preference Survey (PMPS)* (Cherry, 1981).

The *PMPS* was developed by Cherry (1981) for his doctoral dissertation, *Measurement of Adult Learning Styles: Perceptual Modality.* The purpose of the *PMPS*, as developed, was to provide quantified data on each participant's opinion on their strengths and weaknesses in the seven perceptual modality elements (Cherry). This information was then compared to the objective data produced by the *Multi-Modal Paired Associates Learning Test II (MMPALT II).* The *MMPALT II* was a revision of the *MMPALT* by Cherry for use in his dissertation. While doing preliminary work for the paper, Cherry examined two self-report instruments. These instruments were rejected as inappropriate for the study which necessitated the development of another tool.

A draft of the *PMPS* was submitted to experts in the field of question development. Based on the critique by the

experts, the questions and possible answers were revised and rewritten three times. The final product contained the original 42 question contrasting element approach (Cherry, 1981). There were two positive (accepting) responses, always and usually. There were two negative (rejecting) responses, seldom and never (Appendix B).

Because of the need to rank order the seven style elements for each participant, the scoring system was designed to achieve maximum separation between the answer choices. Therefore, both style elements in each question received a score value (Appendix B).

Validity and Reliability

Harvey's 2002 study indicated strong construct validly by estimating the chi-square (X^2), Goodness of Fit (GFI), Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). Chi-square reported $P>0.05$ ranged from 81.20 to 142.48. All GFI were greater than 0.95. All estimates for the CFI were greater than 0.95. The RMSEA for all modalities were acceptable fits with estimates of less than 0.08.

Harvey (2002) also investigated the reliability of the *PMPS*. He found that the seven perceptual modalities suggested a consistency for satisfactory scores on

reliability. The Cronbach Alpha statistic was utilized as it measures the internal consistency of instruments.

History of Nursing Education

It is of value to review the history of nursing education and practice to more fully appreciate the relevance of learning style preferences and the registered nurse (RN). Nursing education has experienced a long and tumultuous history (Sarkis & Conners, 1986; Reverby, 1987). Reverby, in *Ordered to Care: The Dilemma of American Nursing, 1850-1945*, notes that “Within the boundaries of antebellum women’s lives, nursing played an important and inextricable part as caring and sacrifice became a poignant manifestation of human virtue” (p. 61). Women who bore the title “nurse” had only the training given them by their mothers or other relatives. In the time period prior to 1860 when the Nightingale School of Nursing was established, nursing education consisted of caring for one’s own relatives and then transferring that knowledge to the care of others. The first evidence of any attempt at formalized nurse education was in the seventeenth century by the French Sisters of Charity who instituted simple course in the basic skills of nursing (Grindle & Dallat, 2000). This was a one-year course and those attending were often unskilled as well as illiterate. The focus of this

education was on the repetitious performance of tasks until they could be achieved exactly as instructed with little to no thought process (Grindle & Dallat).

Florence Nightingale sought to raise the level of care patients received by raising the level of nursing care. Building on what she had experienced while caring for soldiers during the Crimean War, Ms. Nightingale began the first formal nursing school, the precursor of today's schools, in England in 1860 (Cook & Webb, 2002). While Nightingale's goal was to improve the education of nurses, there was no place for individuality. The Nightingale School of Nursing was built on "concepts drawn from the sexual division of labor in the family, the authority structure of the military and religious sisterhoods, and the link between her moral beliefs and medical theories" (Reverby, 1998, p. 41). Being a powerful upper-class reformer Nightingale sought to bring efficiency and moral order to nursing. Nightingale had experienced what disorder and lack of moral fortitude brought to the hospitals of the Crimean War and believed that if nurses were trained "properly" they would "impose the nursing order needed to restore health in both homes and hospitals" (Reverby, p. 41). Nightingale believed that learning (for nurses) had to take place within the hospital training school under the

control of a female hierarchy and separate from that of men (Reverby). These early schools had a strong focus on honing the character of the women who were trained to be nurses. Nightingale believed that nursing would be the force that would endure order so that the proper “moral, environmental, and physical” health would be restored to the infirm (Reverby). As the Civil War began in the United States, Nightingale’s principles would be embraced by those in the West who sought to improve care for the ill and infirm here. However, it was not until the establishment of Nightingale inspired schools in New York, Boston, and New Haven in 1873 that the practice of nursing began moving from the untrained woman or almshouse inmate to the “trained” nurse (Reverby).

The early Nightingale schools took root in hospitals and while the school was a part of the hospital, the schools were intended to be supported by separate funds. In this way, the schools would have a measure of independence to arrange schedule, develop curricula, etc. This division did not become reality and the students became the unpaid staff of the hospitals displacing the untrained workers (Robb as cited in Reverby, 1987). This arrangement was quite comfortable for hospitals and as a result one in four hospitals had a nursing school by 1923 (Reverby). There was

no standardization of what was or was not taught at the hospital based schools. Under this model, each hospital drilled into its students the way that particular hospital believed a task should be accomplished. These procedures were rarely based on any clinical evidence and rationale as to “why” something was done in a particular way was absent (Sleeper, 1964). Loyalty to ones’ school’s method was expected and resulted in lack of continuity or standardization of practice upon graduation. It was not until the 1930’s when nurse employment began to move from private duty in the home to practice in the hospital that this model began to fall out of favor (Reverby).

After the end of World War II nurses who had served in the armed forces began to take advantage of the Serviceman’s Readjustment Act of 1944 (Allen, 2010). They began returning to school and obtaining degrees. These nursing educators also began lobbying for more educational content in the nursing programs. They realized that nursing could not move forward as a profession if it remained under the control of hospital administrators and physicians. Nursing leaders wanted to move nursing education out of the apprentice model in hospitals into the university setting. By moving nursing education into an academic setting, nursing would be able to free itself from the

apprenticeship model and begin to base nursing education on scientific based, best practice models. However, these leaders were consistently met with opposition from both hospital administrators who did not want to lose the cheap labor that staffed their institutions and physicians who did not see any need for nurses to become better educated in the sciences and care of the sick. Most physicians still functioned under the belief that the primary responsibility of the nurse was to blindly follow their edicts. An example of this type of thinking is presented by Drs. W. E. Cuff and H. T. Pugh, British physicians who, in their textbook, *Practical Nursing Including Hygiene and Dietetics* state:

> To the medical attendant a nurse's first duty is obedience…and where altered conditions sometimes justify a modification of the doctor's orders, her aim should be to proceed on lines likely to be approved by him rather than those she herself might choose…she should always do her utmost to promote her patient's faith in his medical attendant. (Cuff & Pugh, 1924:5 as cited in Walker & Holmes, 2008, p. 112)

Nonetheless efforts to standardize nursing curricula and take nursing education out of the hospital continued.

What was seen as a major step forward in nursing came on the heels of economic need. After World War II, there

was an increased demand for trained nurses and a decreasing supply (Mahaffey, 2002). The public could no longer afford private duty; home nursing and hospitals needed trained nurses to care for their patients. The Bolton Act of 1943 had been a temporary solution by providing both educational funding and a living stipend for prospective nurses. However, this funding ran out in 1948 and was not renewed (Mahaffey). In January of 1952, a new and innovative program was born. A project that introduced a two-year associate degree in nursing was begun at Teacher's College at Columbia University (Mahaffey; Nelson, 2002). The project was named "Cooperative Research Project in Junior and Community College Education". Its director was Dr. Mildred Montag whose dissertation "Education for Nursing Technicians" formed the basis of the curriculum (Mahaffey). The curricula itself was markedly different from the traditional hospital based school. The curriculum consisted of approximately half general education courses and half nursing courses. There was a broader base for the learner with fundamentals taught the first year and building on that base the second year with more complex concepts. The advent of the associate degree in nursing was seen as a huge step in moving nursing education out of the hospital apprenticeship model and into a more autonomous and well

rounded model. In addition, this genre of education was seen as reaching out to a student population that otherwise would not have been reached. The student population in the pilot programs was older; many were married, widowed, or divorced, as well as a large number of male students.

By moving nursing education out of the hospital and into the domain of higher education, it would logically follow that the apprentice method of learning would be abandoned for a more open method in terms of learning styles. However, the old habits of earlier nursing instructors and practitioners followed into the new educational facilities. While general education and liberal arts courses were woven into the early phase of nursing education, the core nursing courses continued to follow earlier methods of education (Walker & Holmes, 2008). Even though the bulk of core nursing courses continue to follow the traditional lecture method, there was movement toward utilizing learning modalities in nursing education with positive outcomes (Walker & Holmes).

Learning Styles and Nursing

The preponderance of work relative to learning style and nurses has been accomplished with nursing students according to Rassol and Rawaf (2007), Ratoczy and Money (1995), Sutcliffe (1993), and Smith (2010). Less work

however, has been accomplished examining learning styles of practicing nurses. Berings, Poell, Simons, and van Veldhoven (2007) have suggested that learning styles are not static and may change over time. Therefore, the learning style one employed in the academic setting may not be the learning style that is utilized as a practicing nurse.

The intake, assimilation, and utilization of information do not halt upon graduation from nursing school and attainment of licensure as a registered nurse (RN). Graduation and licensure indicate that the neophyte nurse is minimally competent to practice his or her profession. This professional milestone marks the beginning of a learning process that will continue at a minimum until retirement.

Continued professional development has been listed as a major job satisfier (Halfner & Graf, 2006; Harton, 2007; Levett-Jones, 2005). Continued professional education is also a necessity. The professional practice environment is continuously changing because of new technologies in equipment, changing disease patterns and treatment, and changing tasks and patterns (Berings, Poell, Simons, & van Veldhoven, 2007). Williams (as cited in Levett-Jones, 2005) estimates “knowledge has a half-life of approximately 2 ½

years, and that by the end of that period, knowledge gained has become outmoded or obsolete" (p. 229). Therefore ongoing staff development is critical to competent patient care.

The ongoing or continuing education for the practicing RN has unique challenges. Much of the learning must be accomplished in a relatively short time and be retained by busy learners (Harton, 2007). The individual learners are all adults although the learners span a wide age and experience continuum. The learners are working varied shifts. Combined, these challenges underscore the need to use all means available to assist the learner in achieving the goal of receiving, understanding, utilizing, and evaluating new knowledge. Determining learning style is a key component in attaining that goal.

Summary

The review of literature addressed learning styles and the registered nurse (RN). An overview of the background of learning styles was presented including early contributors to the body of knowledge and early instruments utilized. This was followed by an explanation of the *Perceptual Modality Preference Survey* including the background of the survey as well as validity and reliability information. A look into the history of nursing education was presented.

The chapter concluded with learning styles as they relate to the practicing RN.

Chapter 3

Methods

Introduction

The purpose of this study was to determine the relationship, if any, between perceptual modality learning style preference and the preferred area of clinical practice among registered nurses (RN) employed at one acute care hospital in the southeastern United States. The following research questions guided this study:

1. What is the relationship, if any, between the preferred area of clinical practice of registered nurses and their preferred perceptual modality learning style?
2. What is the effect, if any, of years of experience on the preferred perceptual modality learning style of registered nurses?
3. What is the effect, if any, of age on the preferred perceptual modality learning style of registered nurses?

This chapter contains four sections. The first section illustrates the purpose of the study. The second section presents the population and sample selection. The third

section describes the instrumentation utilized in the study. The fourth section discusses the methods and procedures used to collect the data.

For this study, a one-way Multivariate Analysis of Covariance (MANCOVA) was conducted to determine the effect of preferred area of clinical practice on the preferred modality preference of learning style of the sample population while controlling for the years of experience. This test allows for the comparison of the means of the four independent variables, medical nursing, surgical nursing, critical care nursing, and women/children nursing with the seven dependent variables of learning style preference.

Sample Selection

The participants in this study were 77 practicing registered nurses employed at an acute care hospital in the southeastern United States. The sample was taken from 702 practicing registered nurses at the institution. Demographic information was obtained in this study by using a demographic questionnaire designed by the researcher (Appendix A). The demographics of interest were age and years practicing as a registered nurse. There were 11 choices of practice on the demographic questionnaire. However, because of the small number in each area, like

areas were combined resulting in four areas of practice, medical, surgical (perioperative), critical care, and women/children.

Demographic Profile

The age of the participants ranged from 24 to 67. The mean age was 45.5 with a standard deviation of 11.35 (*n*=77). The years of experience ranged from 1 to 45 with the mean years of experience 19.5 with a standard deviation of 11.90 (*n*=77).

Table 1

Means and Standard Deviations for Age and Experience

	N	Minimum	Maximum	Mean	Std. Deviation
Age	77	24.00	67.00	45.7	11.35
Experience	77	1.00	45.00	19.5	11.90

Instrumentation

One instrument and a demographic questionnaire (were used in this study. The instrument utilized was the *Perceptual Modality Preference Survey* (*PMPS*) developed by Cherry in 1981 as part of his doctoral dissertation work (Appendix B). The demographic survey was designed by the researcher to capture demographic characteristics of interest in the study.

The *PMPS* is a product of the *Multi-Modal Paired Associates Learning Tests* (*MMPALT*). The *MMPALT* was developed by Gilley (1975) to measure the ability to recall

paired information in six perceptual modalities: print, aural, visual, interactive, haptic, and kinesthetic. The *MMPALT* was used in testing third grade children. Cherry (1981) revised the *MMPALT* resulting in the *MMPALT II* which included the olfactory modality. The *MMPALT II* focused on an adult population. The *PMPS* was developed by Cherry (1981) to compare the results of persons taking both the *MMPALT II* and the PMPS thereby comparing objective data (*MMPALT II*) and self-reported data (*PMPS*). The *PMPS* was revised in 1997 and publicized by the Institute for Learning Style Research (Harvey, 2002).

The *PMPS* is a forced choice, 42 item questionnaire. Each perceptual style element is contrasted with each of the other style elements twice and in reverse order. The participant responds to each question with one of the following choices: Always, Usually, Seldom, or Never. The responses are scored with a positive score (accepting the statement) or a negative score (rejecting the statement). This methodology resolves any conflicting responses (Cherry, 1981). The scores are arranged from high to low to produce a most preferred modality to a least preferred modality. To achieve maximum separation between elements and refrain from assigning undue value to any one element, Cherry determined that both style elements in each question

should receive a score value. Each modality is scored 12 times, six in the primary position and six in the secondary position. When the modality is in the primary position the scoring system is as follows: always = + 4, usually = +2, seldom = -2, and never = - 4. When the modality is placed in the secondary position, the scoring system is as follows: always = - 2, usually = - 1, seldom = + 1, and never = + 2. The maximum score range is + 36 to – 36. Upon completion of the survey, the scores are totaled and placed in rank order to reveal the participant's most preferred learning style to their least preferred learning style (Cherry, 1981) (Appendix B).

Validity refers to how effective the test of instrument measures what it purports to measure. Reliability refers to the degree the test or instrument yields the same results on repeated occasions (Gall, Gall, & Borg, 2007). Each of these constructs is important when an instrument is chosen. While validity and reliability are each significant in a test or instrument, validity rises above reliability in importance. A test or instrument may produce the same result on multiple occasions (reliable), but if the test or instrument fails to determine an answer to the question, it is deemed invalid. Therefore,

determination of validity and reliability is central to utilization of an instrument.

Harvey's 2002 study indicated strong construct validly using confirmatory factor analysis by estimating the chi-square (X^2), Goodness of Fit (GFI), Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA). Chi-square reported $p>0.05$ ranged from 81.20 to 142.48. All GFI were greater than 0.95. All estimates for the CFI were greater than 0.95 with the exception of interactive (0.91). The RMSEA for all modalities were acceptable fits with estimates of less than 0.08.
The reliability of the *PMPS* was also reviewed in Harvey's 2002 work:

> The seven perceptual modalities demonstrated an overall consistency to score acceptable values for determining reliability. Nunnally (1978) suggested internal consistency acceptable scores are between .60 to .80. Carmines and Zeller (1979) recommend that reliability scores above .80 are sufficient to determine reliability. Visual (.68), interactive (.68), haptic (.69), and aural (.71) all demonstrated acceptable reliability ($.68 \leq \alpha < .80$). The remaining three modalities: olfactory (.84), print (.85), and kinesthetic (.86) scored very high ($\alpha \geq .80$)

demonstrating internal consistency of the *PMPS.* (Table 2) (Harvey, 2002)

Table 2

Reliability Results

Modality	Aural	Haptic	Interactive	Kinesthetic	Olfactory	Print	Visual
(α)	.71	.69	.68	.86	.84	.85	.68

Note (α)=Cronbach Coefficient Alpha

Data Collection and Procedure

The purpose of this study was to determine the relationship, if any, between the preferred areas of clinical practice of registered nurses employed at one acute care hospital located in the southeastern United States and their preferred perceptual modality learning style. The original areas of interest were medical, surgical, adult critical care, pediatric critical care, emergency room, operating room, perioperative care (recovery room, pre-surgery area), labor and delivery, newborn, pediatrics, and geriatric nursing. However, these areas were consolidated based on the number of responses received resulting in four major areas of specialty, medical, surgical (intraoperative and perioperative), critical care, and the nursing care of women and children.

Approval was obtained from the chairperson of the organization's Institutional Review Board (IRB) (Appendix

C). The Vice President of Patient Care Service was contacted to obtain permission to approach the nursing staff (Appendix D). Upon receipt of written permission, the e-mail addresses of registered nurses at the organization were obtained via the organization's e-mail carrier.

The participants were e-mailed a request to participate in the study with an information letter attached (Appendix E). Upon deciding to participate in the study, the participants followed a link that took them to the demographic questionnaire and the *Perceptual Modality Preference Survey*. Participants were allowed to complete the demographic questionnaire and *Perceptual Modality Preference Survey* at a time convenient to their schedule.

Data collection took place between September 12, 2010 and October 30, 2010. A total of 702 e-mail invitations were sent out. A reminder e-mail was sent out on October 18. One hundred and forty five (145) participants completed the demographic survey for a response rate of 21 percent. However, 77 of those completed the entire survey including the demographic questionnaire and the *PMPS* tool resulting in 77 total participants in the study.

Summary

This chapter addressed the purpose of the study, sample selection, instrumentation, data collection, and procedure. The validity and reliability of the *Perceptual Modality Preference Survey* (*PMPS*) was discussed. Data were collected in conformity with the research guidelines set by the Auburn University Institutional Research Board.

Chapter 4

Results

Introduction

The purpose of this study was to determine if there is a relationship between the preferred area of clinical practice of registered nurses employed at one general, acute care hospital located in the southeastern United States and their perceptual modality learning preference. The research questions that guided this study were:

1. What is the relationship, if any, between the preferred area of clinical practice of registered nurses and their preferred perceptual modality learning style?
2. What is the effect, if any, of years of experience on the preferred perceptual modality learning style of registered nurses?
3. What is the effect, if any, of age on the preferred perceptual modality learning style of registered nurses?

Chapter 3 described the method for the study that included details on the population sample, instrumentation, data collection, and procedure. Chapter 4 presents the analysis of the data obtained from the *Perceptual Modality*

Preference Survey (PMPS) as well as the Demographic Questionnaire.

The statistical procedure used in this study was Multivariate Analysis of Covariance (MANCOVA). Descriptive statistics utilized in this study were means and standard deviation. The data analysis was accomplished using the Statistical Package for the Social Sciences (SPSS) version 18.

Data were gathered from 77 practicing registered nurses between September 10, 2010 and October 30, 2010. One instrument with identified validity and reliability was utilized, the *Perceptual Modality Preference Survey* (*PMPS*) developed by Cherry (1981) and revised by Cherry (1997). In addition, a demographic survey, developed by the researcher was used.

Demographic Profile

The demographic variables of interest in this study were age, years in practice, and preferred area of clinical practice. There were 77 participants. The age of the participants ranged from 24 to 67. The mean age was 45.5 with a standard deviation of 11.35. The years of experience ranged from one to 45 with the mean years of experience 19.5 with a standard deviation of 11.90. The preferred areas of clinical practice were medical nursing, 18 (23%),

surgical nursing, 14 (19%), critical care nursing, 37 (48%), women/children nursing, (10%). Given the total number of respondents (77), it was determined that the original 11 practice areas should be consolidated into four groups of like practice. This consolidation resulted in the four major areas of medical nursing, surgical (intraoperative and perioperative), critical care nursing, and women and children nursing.

Statistical Procedures

The descriptive statistic result showed perceptual preference for medical nursing (*n*=18) as follows: Print 3.11, *SD* 10.14, Aural 4.38, *SD* 10.33, Interactive 7.27, *SD* 8.49, Visual -2.11, *SD* 8.73, Haptic 3.33, *SD* 11.08, Kinesthetic 10.88, *SD* 12.95, and Olfactory -24.44, *SD* 8.73. Surgical nursing (*n*=14) results were: Print -3.78 *SD* 12.36, Aural 4.5, *SD* 9.62, Interactive 9.35, *SD* 7.48, Visual, 2.64, *SD* 6.03, Haptic 7.78, *SD* 9.36, Kinesthetic 11.85, *SD* 15.40, and Olfactory -21.21, *SD* 9.59. Critical Care nursing (*n*=37) results were: Print 6.08, *SD* 12.41, Aural 0.56, *SD* 11.22, Interactive 5.70, *SD* 8.86, Visual 2.89, *SD* 8.51, Haptic 6.68, *SD* 9.01, Kinesthetic 1.75 *SD* 14.83, and Olfactory -20.56, *SD* 11.35. Those preferring Women/Children nursing (*n*=8) were: Print -.12, *SD* 13.05, Aural 3.75, *SD* 12.15, Interactive 10.50, *SD* 6.14, Visual -.87, *SD* 6.03,

Haptic 5.50, *SD* 10.07, Kinesthetic 1.50, *SD* 12.82, and Olfactory -17.50, *SD* 3.96 (Table 2).

A one-way Multivariate Analysis of Covariance (MANCOVA) was conducted to determine the effect of perceptual modality learning preference on the preferred area of clinical practice for the 77 practicing registered nurses (RN) while controlling for years of experience. There are four assumptions made when utilizing MANCOVA:

1. The observations within each sample must be randomly sampled and must be independent of each other.
2. The observations on all dependent variables must follow a multivariate normal distribution in each group.
3. The population covariance matrices fro the dependent variables in each group must be equal (this assumption is often referred to as the homogeneity of covariance matrices assumption or the assumption of homoscedasticity).
4. The relationships among all pairs of DVs for each cell in the data matrix must be linear. (Mertler & Vannatta, 2010, p.121)

The Box's M result indicated the equality of covariance matrices assumption was not violated (p=0.072).

The results of the one-way Multivariate Analysis of Covariance (MANCOVA) showed no significant multivariate mean adjustment due to experience (Wilk's lambda=0.865, $F_{(7,66)}$=1.474, p=0.192). However, after controlling the experience, there was statistical significant difference among the four preferred practice areas of registered nurses in their perceptual modality learning preference (Wilk's lambda=0.622, $F_{(21,190.066)}$=1.628, p=0.046. The effect size was large (partial eta squared=0.146.)(Table 4). The follow-up one-way ANCOVA test showed that there were no differences based on experience or practice or practice area.

Table 3

Means and Standard Deviations for Perceptual Modality Preference Survey by Practice Group

Learning Styles	Med (n=18)	Sur (n=14)	CC (n=37)	WC (n=8)
Print	3.11 (10.16)	-3.78 (12.36)	6.08 (12.41)	-.12 (13.05)
Aural	4.38	4.5	.56	3.75

	(10.33)	(9.62)	(11.22)	(12.15)
Interactive	7.27	9.35	5.70	10.50
	(8.49)	(7.48)	(8.86)	6.14)
Visual	-2.11	2.64	2.89	-.87
	(8.73)	(6.03)	(8.51)	(6.03)
Haptic	3.33	7.78	6.68	5.50
	(11.08)	(9.36)	(9.01)	(10.07)
Kinesthetic	10.88	11.85	1.75	1.50
	(12.95)	(15.40)	(14.83)	(12.82)
Olfactory	-24.44	-21.21	-20.56	-17.50
	(8.73)	(9.59)	(11.35)	(3.96)

Table 4

Tests of Between-Subjects Effect

Source	Dependent Variable	F	df	*p*	^{2}	Power
Experience	Print	3.943	1,72	.051	.052	.500
	Aural	3.456	1,72	.067	.046	.450
	Interactive	.144	1,72	.706	.002	.066
	Visual	.867	1,72	.355	.012	.151
	Haptic	2.346	1,72	.130	.032	.327
	Kinesthetic	.041	1,72	.841	.001	.055
	Olfactory	1.876	1,72	.175	.025	.272
Practice	Print	1.833	3,72	.149	.071	.457
	Aural	1.547	3,72	.210	.061	.391
	Interactive	1.008	3,72	.394	.040	.263
	Visual	1.481	3,72	.227	.058	.376
	Haptic	1.090	3,72	.359	.043	.283
	Kinesthetic	2.131	3,72	.104	.082	.522
	olfactory	1.554	3,72	.208	.061	.393

Summary

The purpose of this study was to determine the relationship, if any, between the preferred clinical practice area of registered nurses and their preferred perceptual modality learning style employed at one general, acute care hospital located in the southeastern United States. Participants were 77 actively employed registered nurses. The data that were collected included demographic characteristics of age, years as a practicing registered nurse, preferred area of clinical practice and scores on the *Perceptual Modality Preference Survey*.

According to the analysis of data there appears to be no relationship between a preferred clinical practice area and preferred perceptual modality learning style of registered nurses after controlling for experience.

Chapter 5

Conclusions, Discussion, Recommendations

Conclusions

This study was designed to investigate the relationship between the preferred clinical practice area and perceptual modality learning preference among a sample of registered nurses. Chapter 1 offered an introduction of the study. Chapter 2 offered a review of the literature related to learning styles and the history of nursing education. Chapter 3 presented the method for the study. Chapter 4 presented the results of the data analysis. Chapter 5 offers a summary of the study, presents its major conclusions and recommends future research on the topic.

The purpose of the study was to determine if the choice of clinical practice area was related to the preferred perceptual learning modality of registered nurses employed at one general, acute care hospital located in the southeastern United States. The research questions that guided this study were:

1. What is the relationship, if any, between the preferred area of clinical practice of registered

nurses and their preferred perceptual modality learning style?

2. What is the effect, if any, of years of experience on the preferred perceptual modality learning style of registered nurses?
3. What is the effect, if any, of age on the preferred perceptual modality learning style of registered nurses?

The sample for the study consisted of 77 practicing registered nurses. The instruments used were the *Perceptual Modality Preference Survey* (Cherry, 1981) and a demographic survey developed by the researcher.

The demographic survey looked at age, years in practice, and preferred area of clinical practice. The age range of the participants was 24 to 67 years with a mean age of 45.7 (SD 11.35). The years of experience ranged from one to 45 with a mean of 19.5 (SD 11.90) years of experience. The preferred areas of practice were medical nursing, surgical nursing, critical care nursing, and women/children nursing. There were 18 (24%) participants who preferred medical nursing, 14 (18%) participants who preferred surgical nursing, 37 (48%) participants who preferred critical care nursing and 8 (10%) participants who preferred women/children nursing.

Discussion

Nursing is a profession in which ongoing learning is required (Gallagher, 2006). There are continual advances in the treatment of disease processes as well as preventive healthcare. In addition, innovations in existing equipment along with development of new equipment to improve patient care are constantly being brought into the workplace with the expectation that incumbent nursing staff become proficient in the utilization of such equipment. Most healthcare organizations have an entire department dedicated to the ongoing education and development of its nursing workforce. Therefore, an understanding of how the practicing registered nurse learns is an important concept in the care of patients.

Little research has been conducted on the learning styles of practicing registered nurses. The studies conducted have primarily looked at the learning styles of professional nursing students (Colucciello, 1999; Rakoczy & Money, 1995; Worrell & Profetto-McGrath, 2007). No studies were found that specifically looked at the perceptual modality learning style of either nursing students or practicing registered nurses.

This study specifically looked at nurses' stated preferred area of clinical practice and their self-reported

learning modality preference. The four areas of preferred clinical practice included medical nursing, surgical nursing. The results of this study suggest there is no significant relationship between the preferred area of clinical practice of a registered nurse and their preferred perceptual modality learning style., critical care nursing, and women/children nursing. This finding indicates that, as a group, professional nurses are varied in their perceptual modality style preference. This is a significant finding for the educator of practicing nurses. This result indicates varied methods should be utilized in the ongoing education and development of staff. This is consistent with the finding of Morse, Oberer, Dobbins, & Mitchell (1998). These educators noted that by making multiple learning modalities available for in-service programs, learners (registered nurses) who had previously been listless and inattentive became revitalized and eager to learn the material presented.

Recommendations

This study looked at the relationship between the preferred area of clinical practice of registered nurses and their preferred perceptual modality learning style. The results of this study suggest there is no relationship between the areas of interest. This finding suggests that

practicing registered nurses (RN) have varying learning style preferences across the preferred areas of medical, surgical, critical care, and women/children nursing. Additional studies are needed to further evaluate the learning styles of practicing registered nurses. Derived from the findings of this study, future research might:

1. Replicate the study to examine a variety of health care disciplines.
2. Replicate this study using a multisite sample to increase the validity and reliability of the study.
3. Replicate this study to compare results of the *Perceptual Modality Preference Survey (PMPS)* with a cognitive learning styles instrument.
4. Conduct the study using a cognitive learning style instrument only.
5. Include gender, ethnicity as additional variables.

Keefe (1987) indicated that learners vary in their preference of learning styles. It is important for those responsible for teaching practicing nurses to understand that they may have to employ a variety of teaching styles to achieve maximum effectiveness when working with this population. Based on the results of this study and review

of the literature, organizations should revise their obligations to their professional nursing staff and evaluate their accountability for determining and utilizing a variety teaching styles to meet the complex needs of registered nurses.

References

Adams, A. & Bond, S. (2000). Hospital nurses' job satisfaction, individual and organizational characteristics. *Journal of Advanced Nursing*, *32*(3), 536-543.

Adams, A., Bond, S., & Hale, C. A. (1998). Nursing organizational practice and its relationship with other features of ward organization and job satisfaction. *Journal of Advanced Nursing*, *27*, 1212-1222.

Agourram, H. (2009). The quest for the effectiveness of knowledge creation. *Journal of Knowledge Management Practice. 10,(*2). Retrieved from http://www.tlainc.com/artic188.htm.

Aiken, L. H., Clarke, S. P., Sloane, D.M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Journal of the American Medical Association*, *288* (16), 1987-1993.

Allen, S. (2010). The revolution of nursing pedagogy: a transformational process. *Teaching and Learning in Nursing, 5,* 31-38.

Barbe, W.B., & Swassing, R.H. (1979). *Teaching through modality strengths: Concepts and practices.* Columbus, OH: Zaner-Bloser, Inc.

Berings, M.G.M.C., Poell, R.F., Simons, R-J, & van Veldhoven, M.J.P.M. (2007). The development and validation of the On-the-job learning styles questionnaire for the nursing profession. *Journal of Advanced Nursing, 58*(5), 480-492, DOI: 10.1111/j.1365-2648.2007.04252.x

Bureau of Labor Statistics, United States Department of Labor, Occupational Outlook Handbook, 2008-2009 Ed., Retrieved from http://www.bls.gov/oco/ocos083.htm.

Cassidy, S. (2004). Learning styles: An overview of theories, models, and measures. *Educational Psychology, 24,*(4), 419-444.

Cherry, C.E. (1981). *The measurement of adult learning styles: Perceptual modality. (*Doctoral dissertation). University of Tennessee, Knoxville.

Colucciello, M. L. (1999). Relationships between critical thinking dispositions and learning styles. *Journal of Professional Nursing, 15*(5), 294-301.

Cook, G.C. & Webb, A.J. (2002). Reactions from the medical and nursing professions to Nightingale’s reform(s) of

nurse training in the late 19th century. *Postgraduate Medicine Journal, 78*, 118-123.

Corbett, S. S., & Smith, W.M. (1984). Identifying student learning styles: Proceed with caution! *The Modern Language Journal, 68*(3), 212-221.

Dunn, R. & Dunn, K. (1998). *Practical approaches to individualizing staff development for adults*, Westport, Ct.: Praeger.

Ebbinghaus, H. (1964). *Memory* (H.A. Ruger & C.E. Bussenius, Trans.). New York: Teachers College, Columbia University. (Original work published 1906)

Ebbinghaus, H. (1973). Psychology: An elementary text-book. (M. Meyer, Trans.). Boston: D.C. Heath. (Original work published 1908)

Fizzell, R.L. (1984). The status of learning styles. *The Educational Forum,* Spring, 303-311.

Gall, M.D., Gall, J.P., & Borg, W.R. (2007). *Educational research* (8th ed.) NY: Pearson.

Gallagher, L. (2006). Continuing education in nursing: A concept analysis. *Nurse Education Today, 27*, 466-473.

Gilley, D.V. (1975) *Personal learning styles: Exploring the individual's sensory input processes.* Ed. D. Dissertation, University of Tennessee, Knoxville, August, 1975.

Grindle, M., & Dallat, J. (2000). Nurse education: From casualty to scapegoat? *Teaching in Higher Education, 5*,(2), 205-218.

Halfer, D., & Graf, E. (2006). Graduate nurse perceptions of the work experience. *Nursing Economics, 24,*(3), 150-155.

Hall, L. M., & Doran, D., (2004). Nurse staffing, care delivery model and patient care quality. *Journal of Nursing Care Quality*, *19*(1), 27-33.

Harton, B.B. (2007). Clinical staff development. *Journal for nurses in staff development, 23,*(6), 260-268.

Harvey, M.D. (2002). *A confirmatory factor analysis of the perceptual modality preference survey* (A master's thesis). Auburn University, Auburn, Alabama.

Hearst, E. (1979). *The first century of experimental psychology.* Hillsdale, NJ: Lawrence Erlbaum Associates.

James, W. (1905). *The Principles of Psychology*, Vol. 2. NY: Dover.

James, W. B., & Blank, W. E., (1993). Review and critique of available learning-style instruments for adults, *New Directions for Adult Continuing Education, 39*, 47-56.

James, W. B., & Galbraith, M. W. (1985). Perceptual learning styles: Implications and techniques for the practitioner. *Lifelong Learning, 8*(4), 20-23.

Keefe, J.W. (Ed.) (1979). *Student learning styles: Diagnosis and prescribing programs.* Reston, Va.: National Association of Secondary School Principals.

Keefe, J.W. (1987). Learning style theory and practice. Reston, Va.: National Association of Secondary School Principles

Knowles, M. S. (1980). The modern practice of adult education. Chicago: Follett.

Koch, K.R. (1998). *The relationship between measures of intellectual characteristics and measures of perceptual modality preference using the WAIS-R and MMPALT-II test instruments.* (Doctoral dissertation) University of South Florida, Tampa, Florida.

Kolb, A.Y. & Kolb, D.A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning and Education. 4,*(2), 193-212.

Kolb, D.A., Boyatzis, R.E., Mainemelis, C. (1999). Experiential learning theory: Previous research and new directions. Retrieved from

http://www.d.umn.edu/~kgilbert/educ5165-731/Readings/experiential-learning-theory.pdf

Levett-Jones, T.L. (2005). *The Journal of Continuing Education in Nursing, 36*(5), 229-233.

Lowenfeld, V. (1945). Tests for visual and haptic aptitudes. *American Journal of Psychology, 58*, 100-112.

Mahaffey, E.H. (2002). The relevance of associate degree nursing education: Past, present, and future. *Online Journal of Issues in Nursing, 7*(2), manuscript 2. Retrieved from: http://www.nursingworld.org/ojin/topic18/tpc18 2.htm.

Manojlovich, M. (2005). Linking the practice environment to nurses' job satisfaction through nurse-physician communication. *Journal of Nursing Scholarship, 37*(4), 367-373.

Mark, B. A., (2006). Methodological issues in nursing staff research. *Western Journal of Nursing Research*, *28*(6), 694-709.

McCrae, R.R. & Costa, P.T. (1989). Reinterpreting the Myers-Briggs Type Indicator from the perspective of the Five-Factor Model of personality. *Journal of Personality, 57*(1), 17-40.

Mertler, C.A., & Vannatta, R. A. (2010). *Advanced and Multivariate Statistical Methods. 4th Ed.* Los Angeles, Ca: Pyrczak.

Morse, J.S., Oberfer, J., Dobbins, J., & Mitchell, D. (1998). Understanding learning styles: Implications for in-service educators. In R. Dunn & S.A. Griggs (Ed.). *Learning Styles and the nursing profession,* (p 27-40).

Myers, I.B. (1980). Gifts Differing. Palo Alto, Ca.: Consulting Psychologists Press.

National Advisory Council on Nurse Education and Practice (NACNEP). (2008). *Meeting the Challenges of the New Millennium.* Retrieved from ftp://ftp.hrsa.gov/bhpr/nursing/sixth.pdf.

Needleman, J., Buerhaus, P., Mattke, S., Stewart, M., & Zelevinsky, K. (2002). Nurse staffing levels and the quality of care in hospitals. *New England Journal of Medicine*, *346*(22), 1715-1722.

Otto, W. (1961). The acquisition and retention of paired associates by good, average, and poor readers. *Journal of Educational Psychology, 52*(5), 241-248.

Pearman, R.S. (1997). *I'm not crazy, I'm just not you: the real meaning of the 16 personality types.* Palo Alto, Ca: Davies-Black.

Pitts, J. (2009). Identifying and using a teacher-friendly learning-styles instrument. *Clearing House: A Journal of Educational Strategies, Issues and Ideas. 82*(5), 225-231.

Rakoczy, M., & Money, S. (1995). Learning styles of nursing students: A 3-year cohort longitudinal study. 11(3), 170-174.

Rambur, B., Palumbo, M.V., McIntosh, B., & Mongeon, J. (2003). A statewide analysis of RN's intention to leave their position. *Nursing Outlook*, *51*(4), 182-188.

Rassool, G.H., & Rawaf, S. (2007). Learning style preferences of undergraduate nursing students. *Nursing Standard, 21*(32), 35-41.

Rast, P., & Zimprich, D. (2009). Individual differences and reliability of paired associates learning in younger and older adults. *Psychology and Aging, 24*, 1001-1006.

Reinert, H. (1976). One picture is worth a thousand words? Not necessarily! *Modern Language Journal, 60*(4), 160-168.

Reverby, S. (1987) *Ordered to care: The dilemma of American nursing, 1850-1945*. United Kingdom: Cambridge University Press.

Sarasin, L. C. (1999). *Learning style perspectives: Impact in the classroom*. Madison, WI: Atwood.

Sarkis, J.M., & Conners, V.L. (1986). Nursing research: Historical background and teaching information strategies. *Bulletin of the Medical Library Association, 1974,*(2), 121-125.

Sleeper, R. (1964). Nursing education in evolution. *New England Journal of Medicine. 271* (27-30).

Smith, A. (2010). Learning styles of registered nurses enrolled in an online nursing program. *Journal of Professional Nursing, 26*(1), 49-53. doi:10.1016/j.profnurs.2009.04.006

Spoto, A. (1995). *Jung's typology in perspective.* Wilmette, Ill. Chiron.

Sugarman, L. (1985). Kolb's model of experiential learning: Touchstone for trainers, students, counselors, and clients. *Journal of Counseling and Development, 64,* 264-268.

Sutcliffe, L.S. (1993). An investigation into whether nurses change their learning style according to subject area studied. *Journal of Advanced Nursing, 18,* 647-658.

Walker, K., & Holmes, C.A. (2008). The 'order of things': Tracing a history of the present through a re-reading of the past in nursing education. *Contemporary Nurse,* 30, 106-118.

Weber's law and Fechner's law. Retrieved from http://www.cns.nyu.edu/~msl/courses/0044/handouts/Weber.pdf.

Wilton, R.N. (2006). The effect of relations in paired-associate learning. *Memory*, *14*(2), 214-231.

Witkin, H.A. (1950). Individual differences in ease of perception of embedded figures. *Journal of Personality. 19*(1), 1-15.

Witkin, H.A. (1965). Psychological differentiation and forms of pathology. *Journal of Abnormal Psychology. 70,* 317-336.

Witkin, H.A., Goodenough, D.R., & Karp, S.A. (1967). Stability of cognitive style from childhood to young adulthood. *Journal of Personality and Social Psychology, 7*(3), 291-300.

Witkin, H.A., Friedman, F., Goodenough, D.R., Moore, C. A., Oltman, P. K., Owen, D. R., & Raskin, E. (1977). Role of the field-dependent and field-independent cognitive styles in academic evolution: A longitudinal study. *Journal of Educational Psychology 69*(3), 197-211.

Witkin, H.A., Hertzman, M., Lewis, H.B., Machover, K., Meissner, P.B., Wapner, S. (1954). *Personality through perception.* Harper & Brothers: New York.

Worrell, J. A. & Profetto-McGrath, J. (2007). Critical thinking as an outcome of context-based learning among post RN students: A literature review. *Nurse Education Today*, 27, 420-426.

Appendices

Appendix A

Demographic Questionnaire

Demographic Questionnaire

Please answer the questions below to the best of your ability. For the purposes of this survey,

- medical nursing is defined as caring for the non-critical care patient who has a medical condition that has not experienced a surgical intervention*
- surgical nursing is defined as caring for the non-critical care patient who has undergone a surgical procedure*
- critical care, adult is defined as caring for the patient who requires intensive care and is 18 years or older
- critical care, pediatric is defined as caring for the patient who requires intensive care and is less than 18 years (17 years and below)
- perioperative care is defined as an area that cares for the surgical patient in the immediate preoperative or postoperative period
- geriatric care is defined as caring for the patient who is aged 70 and above

Please choose only one area of preferred practice. **Note that your preferred area of practice may or may not be where you currently practice nursing.**

Age_____

Years Practicing Nursing _____

Preferred Area of Clinical Practice:

Medical	Surgical	Critical Care Adult	Critical Care Pediatric	Emergency Department	Operating Room	Perioperative care (Recovery Room, etc)	Labor\ Delivery	Newborn	Pediatrics	Geriatric

* Both medical and surgical nursing encompass what is often referred to as “step-down” care

Appendix B

Perceptual Modality Preference Survey

PMPS

1. I can learn better by reading than by listening.

2. I can learn better by listening than by talking with others.

3. I can learn better by talking with others than by looking at things like movies and slides.

4. I can learn better by looking at things like movies and slides than by touching or holding objects.

5. I can learn better by touching or holding objects than by physically participating in activities such as sports or games.

6. I can learn better by physically participating in activities such as sports or games than by smelling things.

7. I can learn better by smelling things than by reading.

8. I can learn better by reading than by talking with others.

9. I can learn better by talking with others than by touching or holding objects.

10. I can learn better by touching or holding objects than by smelling things.

11. I can learn better by smelling things than by listening.

12. I can learn better by listening than by looking at things like movies and slides.

13. I can learn better by looking at things like movies and slides than by physically participating in activities such as sports and games.

14. I can learn better by physically participating in activities such as sports and games than by reading.

15. I can learn better by reading than by looking at things like movies and slides.

16. I can learn better by looking at things like movies and slides than by smelling things.

17. I can learn better by smelling things than by talking with others.

18. I can learn better by talking with others than by physically participating in activities such as sports and games.

19. I can learn better by physically participating in activities such as sports and games than by listening.

20. I can learn better by listening than by touching or holding objects.

21. I can learn better by touching or holding objects than by reading.

22. I can learn better by reading than by smelling things.

23. I can learn better by smelling things than by physically participating in activities such as sports and games.

24. I can learn better by physically participating in activities such as sports and games than by touching or holding objects.

25. I can learn better by touching or holding objects than by looking at things like movies and slides.

26. I can learn better by looking at things like movies and slides than by talking with others.

27. I can learn better by talking with others than by listening.

28. I can learn better by listening than by reading.

29. I can learn better by reading than by physically participating in activities such as sports and games.

30. I can learn better by physically participating in activities such as sports and games than by looking at things like movies and slides.

31. I can learn better by looking at things like movies and slides than by listening.

32. I can learn better by listening than by smelling things.

33. I can learn better by smelling things than by touching or holding objects.

34. I can learn better by touching or holding objects than by talking with others.

35. I can learn better by talking with others than by reading.

36. I can learn better by reading than by touching or holding objects.

37. I can learn better by touching or holding objects than by listening.

38. I can learn better by listening than by physically participating in activities such as sports and games.

39. I can learn better by physically participating in activities such as sports and games than by talking with others.

40. I can learn better by talking with others than by smelling things.

41. I can learn better by smelling things than by looking at things like movies and slides.

42. I can learn better by looking at things like movies and slides than by reading.

Response Sheet

Circle or Cross Out Your Response to Each Statement

1. Always Usually Seldom Never
2. Always Usually Seldom Never
3. Always Usually Seldom Never
4. Always Usually Seldom Never
5. Always Usually Seldom Never
6. Always Usually Seldom Never
7. Always Usually Seldom Never
8. Always Usually Seldom Never
9. Always Usually Seldom Never
10. Always Usually Seldom Never
11. Always Usually Seldom Never
12. Always Usually Seldom Never
13. Always Usually Seldom Never
14. Always Usually Seldom Never
15. Always Usually Seldom Never
16. Always Usually Seldom Never
17. Always Usually Seldom Never
18. Always Usually Seldom Never
19. Always Usually Seldom Never
20. Always Usually Seldom Never
21. Always Usually Seldom Never
22. Always Usually Seldom Never
23. Always Usually Seldom Never
24. Always Usually Seldom Never
25. Always Usually Seldom Never
26. Always Usually Seldom Never
27. Always Usually Seldom Never
28. Always Usually Seldom Never
29. Always Usually Seldom Never
30. Always Usually Seldom Never
31. Always Usually Seldom Never
32. Always Usually Seldom Never
33. Always Usually Seldom Never
34. Always Usually Seldom Never
35. Always Usually Seldom Never
36. Always Usually Seldom Never
37. Always Usually Seldom Never
38. Always Usually Seldom Never
39. Always Usually Seldom Never
40. Always Usually Seldom Never
41. Always Usually Seldom Never
42. Always Usually Seldom Never

Scoring Logic for the *PMPS*

Each question contrasts two learning styles.

One is in what is called the primary position or first style in the sentence.

The other is in the secondary or last position in the sentence.

Each question has four possible answers: always, usually, seldom, or never.

Each possible answer is scored twice: once for the primary style in the question and once for the secondary style in the sentence, as follows:

Always = 8 for the primary and 0 for the secondary

Usually = 6 for the primary and 1 for the secondary

Seldom = 2 for the primary and 3 for the secondary

Never = 0 for the primary and 4 for the secondary

The logic is:

An always response reflects a strong acceptance for the primary style and a strong rejection of the secondary style.

A usual response reflects an acceptance for the primary style and a rejection of the secondary style.

A seldom response reflects a rejection of the primary style and an acceptance for the secondary style.

A never response reflects a strong rejection of the primary style and a strong acceptance for the secondary style.

The differentiated scoring is based on the fact that each question focuses on the style listed in the primary position. It is also balanced because each style is compared to each of the other styles in both the primary to secondary comparison and the secondary to primary comparison.

Appendix C

Organization IRB Approval

LETTER OF APPROVAL
Institutional Review Board

TO: Billie A. Crannell
Principal Investigator

FROM: Michael J. Lisenby, M.D.
Chairperson, IRB

DATE: April 19, 2010

The research project submitted for Expedited Review and approval entitled, "An Investigation of the Relationship Between the Preferred Learning Style and Registered Nurses and Their Preferred Area of Clinical Practice", was reviewed and approved with the following stipulations:

A. Investigators acknowledge and accept their responsibility for protecting the rights and welfare of human research subjects and for complying with all applicable thereof.

B. Investigators must report promptly to the IRB:

(1) Any proposed changes in IRB approved research and acknowledge such research may not be initiated without IRB review and approval except where necessary to eliminate apparent immediate hazards to the human subjects.
(2) Any unanticipated problems involving risks to human subjects or others.
(3) Any instance of serious or unexpected adverse events arising during the research.

C. The above titled project is approved April 19, 2010 through April 18, 2011.
If the project is to continue beyond the ending date of approval, application for renewal must be made as of February 18, 2011 to be further approved by the IRB.

D. Approval is contingent upon modifications, if any, of the protocol or consent form and approved documentation of such modifications.

Michael J. Lisenby — IRB Chairperson
4-19-2010 — Date

Please acknowledge your agreement to abide by these stipulations by your signature, keep a copy and return the original to the IRB office.

Billie A. Crannell — Principal Investigator
4-19-2010 — Date

2000 Pepperell Parkway • Opelika/Auburn, Alabama 36801-5422 • Telephone (334) 749-3411 • www.eamc.org

Appendix D

Vice President Patient Care Services Permission

June 1, 2010

Auburn University Institutional Review Board
c/o Office of Human Subject
307 Samford Hall
Auburn, AL 36849

Please note that Ms. Billie A. Crannell, AU Doctoral Candidate, has the permission of East Alabama Medical Center to conduct research at our organization for her study, "An Investigation of the Relationship Between the Preferred Learning Style of Registered Nurses and Their Favored Area of Clinical Practice".

Ms. Crannell will contact the registered nurses to recruit them by either letter or e-mail. The employees will receive a letter/e-mail explaining the project and asking for their voluntary participation. The employees will then be directed to a website where they will fill out a brief demographic questionnaire. The employees will then follow a link to the Institute for Learning Styles Research where they will complete the Preferred Modality Preference Survey (PMPS). Our Human Resources department will provide Ms. Crannell with the mailing addresses and/or e-mail addresses of our registered nursing staff.

Ms. Crannell has agreed to provide my office with a copy of the Auburn University IRB-approved, stamped consent document before she recruits participants and will also provide a copy of any aggregate results.

If there are any questions, please contact my office.

Sincerely,

Laura D. Grill
Executive Vice President/Administrator

2000 Pepperell Parkway • Opelika/Auburn, Alabama 36801-5422 • Telephone (334) 749-3411 • www.eamc.org

Appendix E

Participant Participation Request Letter

AUBURN
UNIVERSITY

COLLEGE OF EDUCATION
DEPARTMENT OF EDUCATIONAL FOUNDATIONS,
LEADERSHIP AND TECHNOLOGY

4036 HALEY CENTER
AUBURN, AL 36849-5221

TELEPHONE:
334-844-4460

FAX:
334-844-3072

www.auburn.edu

DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL INFORMATION HAS BEEN ADDED TO THIS DOCUMENT.

Information Letter for a Research Study entitled

"An Investigation of the Relationship between the Preferred Learning Style of Registered Nurses and their Favored Area of Clinical Practice"

You are invited to participate in a research study to determine the relationship between the preferred learning style of registered nurses and their favored area of clinical practice. The study is being conducted by Billie A. Crannell, Doctoral Candidate, under the direction of Dr. James Witte, PhD in the Auburn University Department of Educational Foundations and Leadership. You were selected as a possible participant because you are a practicing registered nurse and are age 19 or older.

What will be involved if you participate? Your participation is voluntary. If you decide to participate in this research study, you will be asked to follow the link below that will take you to a demographic survey. Upon completion of the demographic portion of the study, you will be directed to the website of the Institute of Learning Styles Research where you will complete the Perceptual Modality Preference Survey. Your total time commitment will be approximately 20-30 minutes.

There are no anticipated risks or discomforts associated with participation in this project.

If you change your mind about participating, you can withdraw at any time by closing your browser window. Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University, the Department of Educational Foundations and Leadership Technology, or East Alabama Medical Center.

Any data obtained in connection with this study will remain anonymous. We will protect your privacy and the data you provide by collecting only anonymous data. Information collected through your participation will be presented in the form of a dissertation and possibly presented in professional meetings or journals.

If you have questions about this study, please contact Billie Crannell at (334) 257-1320, crannba@auburn.edu, Dr. James Witte at (334) 844-3054, witteje@auburn.edu, or Dr. Michael Lisenby, Chair, IRB East Alabama Medical Center, (334) 528-5981 michael.lisenby@eamc.org.

If you have questions about your rights as a research participant, you may contact the Auburn University Office of Research Compliance or the Institutional

Review Board by phone (334) 844-5966 or e mail at husubjec@auburn.edu or IRBComplianceChair@auburn.edu.

HAVING READ TH E INFORMATION ABOUT, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, PLEASE CLICK ON THE LINK BELOW. YOU MAY PRINT A COPY OF THIS LETTER TO KEEP.

http://www.surveymonkey.com/s/H5SB6Y8

The Auburn University Institutional Review Board has approved this document for use from August 3, 2010 to August 2, 2011. Protocol # 10-216 EX 1008

Billie Crannell, Investigator

The Auburn University Institutional Review Board has approved this document for use from 8/3/10 to 8/2/11 Protocol # 10-216 EX 1008

Appendix F

Auburn University IRB Approval

AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD for RESEARCH INVOLVING HUMANSUBJECTS

RESEARCH PROTOCOL REVIEW FORM

For Information or help contact **THE OFFICE OF HUMAN SUBJECTS RESEARCH**, 307 Samford Hall, Auburn University
Phone: 334-844-5966 **e-mail:** hsubjec@auburn.edu **Web Address:** http://www.auburn.edu/research/vpr/ohsr

APPROVED

Complete this form using Adobe Acrobat Writer (versions 5.0 and greater). Hand written copies not accepted.

1. PROPOSED START DATE of STUDY: Aug 16, 2010

PROPOSED REVIEW CATEGORY (Check one): ☐ FULL BOARD ☑ EXPEDITED ☐ EXEMPT

2. PROJECT TITLE: An Investigation of the Relationship Between the Preferred Learning Style of Registered Nurses and their Favored Area of Clinical practice

3. Billie A. Crannell	doctoral candidate	EFLT	334 257 1320	crannba@auburn.edu
PRINCIPAL INVESTIGATOR	TITLE	DEPT	PHONE	AU E-MAIL
115 E. Main Street		334 528 3036	billie.crannell@eamc.org	
MAILING ADDRESS		FAX	ALTERNATE E-MAIL	

4. SOURCE OF FUNDING SUPPORT: ☑ Not Applicable ☐ Internal ☐ External Agency:_____ ☐ Pending ☐ Received

5. LIST ANY CONTRACTORS, SUB-CONTRACTORS, OTHER ENTITIES OR IRBs ASSOCIATED WITH THIS PROJECT:
East Alabama Medical Center

6. GENERAL RESEARCH PROJECT CHARACTERISTICS

6A. Mandatory CITI Training

Names of key personnel who have completed CITI:
Billie A. Crannell VSBR + Records-Based
James White, PhD VSBR SRA 1/20/10

CITI group completed for this study: ☑ Social/Behavioral ☐ Biomedical

Protocol-Specific modules completed:
☐ Genetic ☐ Vet.'s Administration
☐ International ☐ Prisoner Research
☐ Public School Students ☐ Pregnant Women/Fetuses
Other _____

6B. Research Methodology

Please check all descriptors that best apply to the research methodology.

Data Source(s): ☑ New Data ☐ Existing Data

Will data be recorded so that participants can be directly or indirectly identified? ☐ Yes ☑ No

Data collection will involve the use of:

☐ Educational Tests (cognitive diagnostic, aptitude, etc.)
☑ Surveys / Questionnaires
☑ Internet / electronic
☐ Audio / Video / Photos
☐ Interview / Observation
☐ Physical / Physiological Measures or Specimens (see Section 6E.)
☐ Private records or files

6C. Participant Information

Please check all descriptors that apply to the participant population.
☑ Males ☑ Females ☐ AU students

Vulnerable Populations
☐ Pregnant Women/Fetuses ☐ Children and/or Adolescents (under age 19 in AL)
☐ Prisoners

Persons with:
☐ Economic Disadvantages ☐ Physical Disabilities
☐ Educational Disadvantages ☐ Intellectual Disabilities

Do you plan to compensate your participants? ☐ Yes ☑ No

6D. Risks to Participants

Please identify all risks that participants might encounter in this research.
☐ Breach of Confidentiality* ☐ Coercion
☐ Deception ☐ Physical
☐ Psychological ☐ Social
☑ None ☐ Other _____

*Note that if the investigator is using or accessing confidential or identifiable data, breach of confidentiality is always a risk.

6E. Institutional Biosafety Approval

Do you need IBC Approval for this study? ☑ No ☐ Yes - BUA #_____ Expiration date _____

FOR OHSR OFFICE USE ONLY

DATE RECEIVED IN OHSR: 7-19-10 by BJR
DATE OF IRB REVIEW: 8/3/10 by KJE
DATE OF IRB APPROVAL: _____ by _____
COMMENTS: revisions 8/25/10 - reviewed, "approved" 8/27/10 SRA

PROTOCOL # 10-216 EX 1008
APPROVAL CATEGORY: 45 CFR 46.101 (b)(2)
INTERVAL FOR CONTINUING REVIEW: 1 year

The Auburn University Institutional Review Board has approved this document for use from 8/30/10 to 8/29/11 Protocol # 10-216 EX1008

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