INVESTIGATING METACOGNITION IN NEW GRADUATES TRANSITIONING TO PROFESSIONAL NURSING PRACTICE

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INVESTIGATING METACOGNITION IN NEW GRADUATES TRANSITIONING TO

PROFESSIONAL NURSING PRACTICE

BY

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A Dissertation Submitted to the School of Graduate Studies in Partial Fulfillment of the Requirements for the Degree of Doctorate in Nursing Education (Ed.D.)

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Danbury, Connecticut
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Abstract

Annually, large numbers of new nurses are entering the professional practice environment. To function effectively in practice, nurses must reflect on identifying how they learn, be skillful thinkers, and know when to retrieve and apply previously learned information or skills to clinical situations for effective decision-making. There is a lack of nursing literature measuring transfer of knowledge during the nursing student experience and upon attaining nursing licensure, from academia into clinical practice. As minimal nursing research has examined metacognition and metacognitive abilities, it was important to conduct this study to establish a foundation. The intent of this quantitative descriptive study, guided by the 3P Model of Teaching and Learning (Biggs, 2003), was to explore the variables and factors influencing metacognition and what facilitates the transfer of academic knowledge and skills of the newly licensed nurse into professional clinical practice. Using the 52-item Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison, 1994, and researcher developed demographic instrument, the study’s results suggests that newly licensed nurses have metacognitive abilities as measured by the MAI. Metacognition should be assessed and fostered throughout the continuum from academia to professional nursing practice, nurturing reflection on one’s own learning, and making adjustments according to a given topic or clinical situation. Although there were limitations to the present study, based on the correlational findings of this study that show that application of knowledge or skills and experiential learning, particularly in simulation, significantly influence metacognitive abilities, further research is warranted and should be considered by nurse educators.

Keywords: metacognition, transfer of knowledge, knowledge, workplace, work readiness, learning, competence, nurses
Dedication

This study is first lovingly dedicated to my family. Paving the road for my children and grandchildren for a better future held me up through this journey. Remember that everything is possible. You can achieve any-thing you are willing to work for! To my family who could not be present and see this achievement, you are not forgotten. Your spirits live on through this work.

To colleagues and future nurses entering the profession, if you settle for the status quo you will never know how amazing you are and the difference you will make. Rise to the opportunity in being a part of growing the nursing profession to its highest potential. The challenge is worth it!
Acknowledgement

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I cherish and honor my foundation in nursing that began at St. Vincent’s Hospital School of Nursing. The faculty ingrained in me the philosophy, values, and theories of the nursing profession which, I hold near and dear to my heart. In particular, Ms. Joan Caruana who left a lasting impression on me in her manner of nurturing nursing students and delivery of education in both the classroom and on the clinical floors of St. Vincent’s. Later in my career, I would be inspired by a role model and mentor, Patricia Henry, to enter the role of a critical care nurse educator. Thank you, Pat.
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CHAPTER ONE – INTRODUCTION

Introduction of Topic

When the newly licensed graduate nurse begins employment, the expectation is that the individual will transition into the professional work environment within a designated orientation period. Newly licensed nurses are expected to transfer generic nursing knowledge and skills attained in school, acquire new knowledge, and be accountable for the responsibilities of professional practice. The transfer of knowledge and clinical skills between academia and the workplace has implications for nursing practice, particularly when the novice nurse transitions into professional practice. The manner in which the newly licensed nurse transitions into the professional role from the student role has logical implications for the delivery of patient care.

Many factors may influence the ability of the newly licensed nurse to acclimate to the role transition and have been identified as including previous experience and diversity (Kurmaran & Carney, 2014). Another factor, metacognition or having metacognitive abilities or skills, may affect the manner in which newly licensed graduate nurses transition their academic classroom knowledge and clinical school experiences to situations that will be encountered in professional practice (Schraw & Moshman, 1995).

Metacognition involves an awareness of thinking and learning, specifically the process of thinking about one’s thinking (Chick, 2016; Flavell, 1979). Individuals who have metacognitive awareness have knowledge about how one thinks and the ability to self-reflect on knowledge about learning preferences or styles, strengths, areas of opportunity, knowledge that needs to be attained, and the best process to acquire that knowledge (Schraw, 1998).

Numerous sources link metacognition and knowledge to transition to practice; however, little is known of what facilitates the transfer of knowledge and skills from academia into clinical practice. Considering both the number of new nurses entering the profession and the known
attrition rates, which will be discussed later in this chapter, the need to investigate the factors that facilitate transfer of attained academic knowledge and skills into professional practice is essential.

This author hypothesizes that metacognition in newly licensed nurses is integral to the transfer of knowledge and skills into the newly hired practice setting. Furthermore, metacognition is influenced by information exposure, which includes academic preparation, class attendance, completion of assignments, application of content and theory, quality and type of clinical experiences, and motivation towards attainable goals, performance, and achievement (McCormick, Dimmitt, & Sullivan, 2012).

Eraut (2009) indicates, “Transferring a particular concept or idea from an education setting to a workplace setting is particularly difficult, because of the considerable differences in context, culture and modes of learning” (Eraut, 2009, p. 10). Therefore, the actual academic setting, clinical setting, and entry into the workplace environment may also influence the ability to transfer acquired knowledge and skills. There is sparse information in the literature that examines what is known about nursing knowledge, the ability to transfer skills and classroom knowledge to clinical nursing practice, and the predictors of metacognition. The results of the present study add to the body of nursing research knowledge, as metacognition in newly licensed nurse graduates has not been investigated.

**Rationale**

According to the US Department of Health and Human Services, more than 142,000 new graduate nurses passed the NCLEX-RN® in 2011 (US Department of Health and Human Services, Health Resources and Services Administration, 2013, p. viii). The National Council of
State Boards of Nursing 2015 statistics demonstrate that 157,882 first-time United States-educated candidates took the NCLEX-RN® exam, with a percent passing of 84.53%. In 2016, the statistics revealed 157,073 candidates with a percent passing of 84.57% (National Council of State Boards of Nursing (n.d.). The 2017 statistics from January to June show 96,613 July to September candidates with a percent passing of 87.85% (National Council of State Boards of Nursing (n.d.).

Despite the relatively large number of new nurses entering the professional practice environment, there appears to be limited research that reports specific areas of theory-to-practice gaps that occur between the academic setting of learning and the application of attained knowledge and skills into the role of the registered nurse in the practice setting. Botma, Van Rensburg, Coetzee, and Heyns (2015) emphasize the importance for nursing students to apply what was learned in the classroom to practice, thereby connecting theory to the practice gap. Academic nurse educators must consider the factors that promote transfer of learning. As facilitators, creating opportunities for nursing students to construct and apply knowledge to real-life settings requires assessment and measurement of outcomes (Botma et al., 2015). A theory-to-practice gap may exist between academia and the realities as well as expectations of practice settings that inhibits the transfer of acquired knowledge and skills of the novice nurse into professional practice. Eraut (2009) notes that transfer is a learning process, with a need to transfer theoretical knowledge from an academic setting into occupational practice (Eraut, 2009).

Kovner, Brewer, Fatehi, and Jun (2014) conducted a 10-year panel longitudinal study of new registered nurses in the United States. The data were collected from three cross-sectional surveys of three cohorts. The participants included in the study were during the period of first licensure and from varied geographic regions. A mailed survey was sent to each cohort, with
response rates of 58%, 57%, and 47%. Organizational commitment, job satisfaction, intent to remain, attitudes, and work preferences of the participants were examined. Turnover within the same organization that includes attrition to another position or unit was not explored. The study describes the United States national attrition rates for first-time newly hired nurses as 17.5% within the first year of practice. The study findings revealed the common reasons for attrition to include stressful work, wanting experience in a varied clinical area, and poor management (Kovner et al., 2014).

Organizational costs associated with RN turnover can be as much as $6.4 million for a large acute care hospital, and studies have associated turnover among health providers with an increase in the use of physical restraints, pressure ulcers and patient falls. (Robert Wood Johnson Foundation [RWJF], 2014, para. 4)

Considering both the number of new nurses entering professional practice and the known attrition rates, there is a need to understand the variables that facilitate transfer of academic knowledge and skills into professional practice as well as factors influencing metacognition that make possible the transfer of knowledge.

**Significance**

Nursing students are adult learners who must learn and gain knowledge on theory, content, skills, and the philosophy of nursing. They indeed must learn to think like nurses. It is essential that nursing students learn facts, recall information, determine appropriate interventions, comprehend established processes, review data, perform interpretations, and be able to critically think, reflect, and reason. The American Association of Colleges of Nursing (AACN) recommends liberal arts education as well as content covering leadership concepts, evidence-based practice, informatics and technology, regulatory standards, interprofessional
collaboration, health promotion, professionalism, and generalist nursing practice (American Association of Colleges of Nursing [AACN], 2008). There is a large amount of content to absorb and if the student chooses to enter a specialty area, there are additional content, concepts, and theory to learn.

In order for newly licensed nurses to enter practice safely and with a basic level of competence, nursing programs must be designed to facilitate the transition into the professional role with the appropriate curriculum and learning opportunities. Nursing is an art and science that is both an evidence-based and practice-based profession requiring knowledge and skills. Certain basic skills are essential, and include communication, assessment, critical reflection, inquiry, and technical skills. The Institute of Medicine (IOM) supports professional development, skills acquisition, and continued growth of nursing knowledge and attitudes (Institute of Medicine [IOM], 2010). When orienting new graduate or novice nurses, achieving competencies makes the process meaningful to them and assists with connecting knowledge or a skill base to practice. During orientation, reviewing competencies allows for reinforcement of theory and skills, identification of learning needs, opportunities for review to strengthen knowledge deficits, and assists in critical reflection and application to practice (Harton, 2007).

**Problem Statement**

Numerous sources link metacognition and knowledge to transition to practice; however, little is known of what facilitates the transfer of knowledge and skills from academia into clinical practice. Considering both the number of new nurses entering the profession and the known attrition rates, there is a need to investigate the factors that facilitate transfer of attained academic knowledge and skills into professional practice. The study reported here investigated variables and factors influencing metacognition as well as what facilitates transfer of knowledge (recall,
synthesis, and application) by the newly licensed graduate nurse (one who has been employed for at least six months to one year) into clinical practice and explains the transfer of knowledge and skills between academia and the workplace clinical practice setting.

Purpose Statement

The purpose of this quantitative descriptive study was to examine what is known about the variables and factors influencing metacognition as well as the ability of the newly licensed graduate nurse to use metacognitive processes. Determination of what facilitates the transfer of knowledge and skills from academia into clinical practice is important. This study explored metacognitive abilities of newly licensed nurses in transferring knowledge and skills from academia to the clinical practice setting and the factors that facilitate transfer of knowledge into clinical practice. The relevance for nursing education was to examine the outcomes of academic nursing education to evaluate whether the curriculum structure and teaching strategies support metacognition and the transfer of academic knowledge and skills of the newly licensed nurse into the practice setting.

Research Questions

The research was guided by the 3P Model of Teaching and Learning (Biggs, 2003), which influenced the development of the research question (RQ) and sub-questions (RSQ) for the study. The following research questions were investigated:

- RQ1: Do new graduate nurses have metacognitive abilities as measured by the Metacognitive Awareness Inventory (MAI)?
- RSQ1: Do individual demographics (race, age, gender, culture, and prior education) and unit-based factors (adequacy of orientation, preceptor pairing, and facilitation of
the transfer of knowledge with the support of peers, nursing management, and nursing education) influence metacognition?

- RSQ2: Does previous experience in the workforce or within health care foster metacognition?
- RSQ3: What clinical experience factors (both academic and during orientation) influence metacognition?

**Definition of Terms**

**Metacognition**

*Metacognition* is defined as the process of thinking about one’s thinking (Chick, 2016; Flavell, 1979). More precisely, it refers to the processes used to plan, monitor, and assess one’s understanding and performance through self-regulation.

Flavell (1979) further divides metacognition into four classes that include metacognitive knowledge, metacognitive experiences, goals, and actions (Flavell, 1979). Metacognitive knowledge consists of a person’s beliefs or knowledge about what factors or variables influence the course or outcomes of cognitive tasks. This class is then subdivided into three categories (person, task, strategy) of how an individual has knowledge. The first category is *person*, which examines how individuals process information. The next category is *task*, which involves the availability of necessary information during a specific cognitive task. Finally, the category of *strategy* involves knowledge acquisition through effective strategies, such as memory recall, repetition, and mental imagery. Metacognitive knowledge involves a combination of interactions among two or three of these categories (Dunlosky & Metcalfe, 2008; Flavell, 1979).

“Metacognition includes a critical awareness of a) one’s thinking and learning and b) oneself as a thinker and learner” (Chick, 2016, para. 1). Burley, Brown, and Saunders (1985)
suggest that metacognition differs among individuals; college students demonstrate some metacognitive skills, and the use of metacognitive teaching strategies aids in comprehension and skill development (Burley et al., 1985). Metacognition among newly licensed nurses transferring from their student to professional roles is important to study, since this reflective process may enhance their ability to incorporate theoretical and experiential learning from their undergraduate programs into practical applications important to the professional nursing role.

In this study, metacognition was measured using the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994).

Cognition

According to the Merriam-Webster dictionary, cognition is defined as “the activities of thinking, understanding, learning, and remembering” (Merriam-Webster, 2016, para. 1).

Generic nursing knowledge

Hall (2005) suggests that a definition for generic nursing knowledge is difficult to identify, particularly since the profession continues to rapidly evolve. Nursing derives knowledge from a variety of sources and disciplines, embedding both practical and theoretical knowledge into clinical practice. Nursing specialty areas require specialized knowledge, which adds to the question of what defines generic nursing knowledge. Hall concluded that, while knowledge is central to teaching, practice, and research, with a correlation to high-quality patient care, a clear response to this question has not been proposed (Hall, 2005).

The American Nurses Association (ANA) indicates that credentialing boards implement certification exams for nurses who wish to gain recognition by both the profession and public for specialty practice knowledge. However, for entry into professional practice at the basic level, the ANA collaborates with associations and other members of nursing organizations to establish
the specifications for educational requirements (American Nurses Association [ANA], 2010). Even so, the ANA does not define a standard for generic nursing knowledge of the newly graduated nurse.

**Critical thinking**

*Critical thinking* (*CT*) is defined by the Critical Thinking Community (2015) as the ability to use higher-order thinking to make informed judgments and decisions. The process includes self-monitored, self-directive, self-disciplined, and self-corrective thinking. *CT* will vary in individuals according to the motivation.

An additional definition is illustrated by the Critical Thinking Community based on the seminal work of Glaser (1941):

The ability to think critically involves three things: 1) an attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences, 2) knowledge of the methods of logical inquiry and reasoning, and 3) some skill in applying those methods. Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends. (The Critical Thinking Community, 2015, para. 13; Glaser, 1941)

Halpern (1998) includes for *CT* “the use of those cognitive skills or strategies that increase the probability of a desirable outcome” (p. 450). The concept of *CT* is further defined by the American Association of Colleges of Nursing as “All or part of the process of questioning, analysis, synthesis, interpretation, inference, inductive and deductive reasoning, intuition, application, and creativity. Critical thinking underlies independent and interdependent decision making” (AACN, 2008, p. 36).
Clinical judgment

The American Association of Colleges of Nursing defines *clinical judgment* as “the outcomes of critical thinking in nursing practice. Clinical judgments begin with an end in mind. Judgments are about evidence, meaning and outcomes achieved” (AACN, 2008, p. 37).

Clinical reasoning

*Clinical reasoning* is defined by the American Association of Colleges of Nursing as “the process used to assimilate information, analyze data, and make decisions regarding patient care” (AACN, 2008, p. 37). This concept has been further defined as the ability to think through the various aspects of patient care. This incorporates the need to critically think about all the data and information related to an individual patient case to formulate an appropriate and reasonable decision regarding prevention, diagnosis, interventions, or treatment for the plan of care (The Critical Thinking Community, 2015).

Critical reflection

*Critical reflection* is an extension of critical thinking involving reflecting on learning and experiences that have occurred in the past. This involves the ability to use a reasoning process that includes assessing and analyzing assumptions to build a connection between learned content or skills, the experience, and application or transference to the current situation or practice encounter (Kenny, 2010).

Knowledge

*Knowledge* is defined as an awareness, understanding, or skill acquired through learning, education, or experience (Merriam-Webster, 2016).
Declarative knowledge

*Declarative knowledge* is the factual knowledge or information an individual knows and that can be spoken or written. This is the knowledge of one’s intellectual resources, skills, and ability to use critical thinking (Schraw, 1998). According to the Encyclopedia of the Sciences of Learning, “this information is stored in long-term memory and organized into schemas that interconnect to shape comprehension and influence semantic interpretations” ("Declarative knowledge," 2012, para. 1).

Procedural knowledge

*Procedural knowledge* is the knowledge of how to follow a sequence to complete a skill, process, or procedure (Schraw, 1998). This knowledge is tacit knowledge and perfected through application and practice. Over time, procedural knowledge becomes less dependent on declarative knowledge ("Procedural knowledge," 2012, para.1).

Conditional knowledge

*Conditional knowledge* refers to when and why to use procedural knowledge (Schraw, 1998). This knowledge is applied in the context of when to use a specific skill, procedure, or strategy and why it would work under a certain situation or condition ("Conditional knowledge," 2012).

Tacit knowledge

*Tacit knowledge* is the “unspoken, unwritten and hidden store of knowledge held by every human being that is based on experiences, emotions, intuitions, insights and observations” (Black’s Law Dictionary, 2017, para. 1).

In nursing, tacit knowledge acquisition will occur with theory learned in the classroom setting and its application during clinical experiences. This is an ongoing learning process as
nursing students begin the journey from the role of a student to newly licensed graduate nurses, moving from novice to eventual expert. New graduates will distinguish knowing how to care for others and what a nurse needs to know in order to make clinical decisions. This is achieved through clinical reasoning, using theory, assessment, human interaction, and evidence-based practice gained through individual experiences (Benner, 2001)

**Knowledge transfer**

Knowledge transfer and transference of knowledge are terms used and discussed interchangeably in the literature. Organizational theories provide several definitions on knowledge transfer applicable to the practice setting. Argote and Ingram (2000) define *knowledge transfer* in organizations as “the process through which one unit (e.g., group, department, or division) is affected by the experience of another” (Argote & Ingram, 2000, p. 151).

Grant (1996) indicates that management is responsible to develop or coordinate processes that promote knowledge integration (Grant, 1996). Faems, Janssens, and Looy (2007) define *inter-firm knowledge transfer* as a process consisting of two steps. First, knowledge that is divulged by an expert or one that possesses the knowledge. Second, knowledge that flows to another individual or novice who needs to acquire or assimilate the information. However, the ability to acquire or assimilate knowledge may be dependent on the novice’s motivation or ability to transfer this knowledge into practice (Faems, Janssens, & Looy, 2007).

**Far transfer**

*Far transfer* involves knowledge and skills that are applied to environments or situations that change or present variation(s) (Cree & Macaulay, 2000).
Near transfer

*Near transfer* involves knowledge and skills that are always applied in the same order (Cree & Macaulay, 2000).

**Learning**

*Learning* is defined as “the act or experience of one that learns; knowledge or skill acquired by instruction or study; and modification of a behavioral tendency by experience” (Merriam-Webster, 2017, para. 1).

**Deep learning**

*Deep learning* is the ability to find, use, and apply information as appropriately as possible. Learners strive to connect new learning with old to gain the significance of a concept or meaningful understanding and to apply those concepts correctly (Biggs & Tang, 2011, p. 36).

**Surface learning**

*Surface learning* is the ability to recall information. The learner focuses on memorization, selecting what he or she perceives must be learned to find the right answer. This may include facts, rote learning, and treating concepts independently rather than demonstrating the capacity of understanding a concept at a deep level (Biggs & Tang, 2011, p. 24).

**Learning behavior**

*Learning behavior* refers to “the set of cognitive and metacognitive processes that learners draw on to acquire knowledge, skills, and understanding and to shape behavior, attitudes, and beliefs” (Mitchell, Regan-Smith, Fisher, Knox, & Lambert, 2009, p. 919).

**Transition into practice**

*Transition into practice* is defined by the National Council of State Boards of Nursing, Inc. (NCSBN) as “a formal program of active learning for all newly licensed nurses (registered
nurses and licensed practical/vocational nurses) designed to support their progression from education to practice across all settings” (National Council of State Boards of Nursing, 2008, p. 3).

The definitions for metacognition, knowledge transfer, transition into practice, and generic nursing knowledge are not clearly distinguished when applied to the new graduate nurse entering professional practice. The terms clinical reasoning, clinical judgment, problem solving, decision-making, and critical thinking often are used interchangeably in the literature. Additionally, the literature examines the interconnection of metacognition with critical thinking, focused on metacognitive regulation or monitoring skills, and the important contribution of metacognition to critical thinking. The use of metacognition impacts critical thinking performance and is supported by individual intellectual activity (Ku & Ho, 2010). Therefore, it is important for nurse educators to know exactly how these phenomena are described and studied within the professional literature. This information may provide a foundation for strategies to support these processes in actual practice.

The thinking nurse

According to Craig (1994), a thinking nurse is defined as:

A nurse who is a deliberative thinker is fair-minded, reflective (metacognitive), trustful of reason, sees patterns and contradictions, makes connections during their thinking that draws on all they know. Sees the big picture, recognizes many of the implications of possible decisions, and searches for creative solutions. Such an autonomous thinking nurse applies these competencies in making sound decisions and taking action in their personal and professional lives. (California Community Colleges Health Workforce Initiative Online Training, n.d., p. 3)
Introduction to Conceptual Framework

Selection of an appropriate theoretical framework or conceptual model frames and narrows the scope of a study (Roberts, 2010). The framework must be relevant to the research question and may be used to adjust variables. Application of terms or variables related to metacognition can be illustrated here. The conceptual framework that served as the guide for this study was the 3P Model of Teaching and Learning by Biggs, Kember, and Leung (2001). This model takes into account student factors, teaching context, learning-focused activities, and learning outcomes, which influenced the development of the research question and sub-questions for this study (Biggs, Kember, & Leung, 2001). The components of this model interact with each other and consider individual approaches to learning (presage), the influence of context and what has been taught (process), and how these determine the learning outcome (product). The theoretical basis of this model offers a process to examine how nursing students learn and how attained knowledge is transferred (August-Brady, 2005).

Delimitations and Assumptions

The delimitations of this study were based on several aspects. First, the research problem, purpose, and questions that have been presented earlier in this chapter delimit the scope of the study. Second, a quantitative approach was used to gather data regarding the research questions, which may limit the nature and quality of the data obtained. Third, the population was delimited to newly licensed graduate nurses who attained a baccalaureate degree. Participants had to have been in the professional work environment for at least six months and no more than 12 months of employment and be practicing on a medical-surgical unit. Fourth, the sampling of participants was limited to nurses employed in acute care facilities across all four regions of the United States.
An assumption in this study was that the participants would complete the study’s instruments expressing individual views or responses honestly, knowing that identities and confidentiality would be upheld (Simon, 2011).

**Summary**

The intent of this study was to explore the variables and factors influencing metacognition as well as what facilitates the transfer of academic knowledge and skills of the newly licensed nurse into professional clinical practice. The importance of transfer of learning, knowledge, and skills is vital to nursing students, faculty, and practice employers (Wong, 1979). Research was necessary to provide insight on metacognition along with identifying the process of transfer of knowledge and skills to the practice setting. This provides an opportunity for academic and hospital-based educators to identify strategies to promote the effective transfer of knowledge and use of metacognitive abilities by the newly licensed nurse transitioning into professional nursing practice.
CHAPTER TWO - REVIEW OF THE LITERATURE

Overview of Literature Review

When the new graduate nurse begins employment, the expectation is that the individual will transition into the professional role within a designated orientation period. The expectation is for the novice nurse to transfer generic nursing knowledge and skills learned in school, acquire new knowledge, and be accountable for the responsibilities of professional practice. The transfer of knowledge and clinical skills between academia and the workplace has implications for nursing practice, particularly when the novice nurse transitions into practice. Ultimately, role transition affects the delivery of patient care. Previous experiences and, perhaps, diversity in educational preparation may influence the ability of the novice nurse to acclimate to the role transition (Kurmaran & Carney, 2014).

There is sparse literature in nursing that explores what is known about the ability to transfer skills and classroom knowledge to clinical nursing practice and the predictors or factors influencing metacognition. With the number of new graduate nurses entering practice annually in the United States, it is imperative to examine this concept. Chapter One discussed the significance of the problem and introduced the conceptual framework for this study. Chapter Two begins with a literature review on the correlating concepts, historical background, and research studies on metacognition in nursing or other health care professions. This chapter also expands the discussion on the conceptual framework applied in this study.

Review of Research Literature

A literature review was conducted to evaluate the literature for research and conceptual writings regarding metacognition, learning, and the processing and transference of knowledge of the newly licensed novice nurse entering practice.
Framework for literature review

Whittemore and Knafl’s (2005) method was used to guide the process and analysis of this literature review. The framework began with identifying the problem, literature search strategies, and inclusion and exclusion criteria of primary sources. The framework then provided a process to perform evaluation of the literature in order to develop a presentation of the findings based on the evidence, theoretical frameworks, central themes, research, interventions, and identification of gaps or opportunities for further research (Whittemore & Knafl, 2005). This framework assisted in evaluating research in the literature in order to present what is currently known about metacognition and knowledge acquired during the academic journey in nursing school and the transfer of knowledge into the practice setting.

Data search strategies

A literature search was performed using Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete, Google Scholar, and Education Resources Information Center (ERIC) to identify and evaluate the literature available on the concepts and their relationship or correlation to metacognition in nursing in the United States. The following key words were used: metacognition, transfer of knowledge, knowledge, workplace, work readiness, learning, competence, and nurses. The search was focused on the last decade, using the 10-year period from 2005 through 2015, which is appropriate to examine and gain comprehension of a concept or a phenomenon (Creswell, 2015). After a cursory review of the literature, it was noted that the concept of transfer of knowledge was not directly examined in nursing or other health care professions but was found in writings related to organizational theory and organizational behavior management (OBM). There also appeared to be limited reporting on the theory-to-
practice gap that occurs between the academic setting of learning and the application of attained knowledge into the role of the registered nurse in the practice setting.

The search was expanded to 1990 to 2015, as the discussion on cognitive theories and metacognition appeared significant during this period, particularly in educational psychology and neuroscience. A search of ERIC resulted in the return of 3,148 articles. Twenty-three articles were selected for inclusion in this literature review that discuss graduate student learning and entry into the workplace; examination of metacognitive processes; knowledge, education, skills transfer; and the limited number of studies that examined nurses. Google Scholar yielded 6,310 articles and books. These two databases provided duplicate literature. Google Scholar citation tracking was also performed to include articles prior to 1990 that are considered as classic references. The literature review was difficult to conduct and was expanded to available studies outside of the United States, as there is limited literature in nursing or other health care professions related to metacognition. The criteria excluded studies that were not in English or did not pertain to research with nurses or other health care professions and metacognition. However, two studies on metacognition conducted on academic students are included due to the relevance of the research and the findings.

**Correlating Concepts to Metacognition**

Numerous articles discussing work readiness, competencies, and professional competence explored perceptions of transition to practice and identified the need to better prepare graduates for practice. Several concepts that emerged are integral to professional nursing practice and potentially correlate with metacognition. These are critical thinking, work readiness, professional competence, role transition, knowledge transfer, and learning. There is a
lack of research that evaluates metacognition in newly licensed graduates entering professional practice and the transfer of academic knowledge and skills to the clinical setting.

**Critical thinking**

The concept of critical thinking is discussed in the literature as a higher order thinking skill that requires executive control and executive processes. The concepts of critical thinking and metacognition were found to be closely associated in the literature. Similar to metacognition are the numerous definitions of critical thinking. Dean and Kuhn (2003) state that critical thinking “entails awareness of one’s own thinking and reflection on the thinking of self and others as objects of cognition” (Dean & Kuhn, 2003, p. 3). To differentiate between the two concepts, critical thinking involves an awareness of a strategy of thinking within a domain (assessment, appropriateness, application) and metacognition involves an awareness of thinking about the effectiveness (knowledge, self-regulation) of particular strategies (Draeger, 2015).

Magno (2010) conducted a study using an explanatory longitudinal design to examine the influence of metacognition on critical thinking skills in students at different colleges and universities in the National Capital Region of the Philippines. The researcher hypothesized that “critical thinking occurs when individuals use their underlying metacognitive skills and strategies that increase the probability of a desirable outcome” (Magno, 2010, p. 137). A cluster sampling of participants included 240 students in the first year of college with an average age of 16.45. The instruments used were the Metacognitive Assessment Inventory (MAI), containing 52 items using a 7-point Likert scale, and the Watson-Glaser Critical Thinking Appraisal (WGCTA). The WGCTA is a standardized test that includes exercises requiring the use of abilities of critical thinking. This instrument contains 100 items that include “problems, statements, arguments and interpretations of data similar to those which a citizen in a democracy
might encounter in his daily life as he works, reads newspaper or magazine articles, hears speeches, participates in discussions on various issues” (Magno, 2010, p. 144). There are five subtests to measure interdependent aspects of critical thinking, examining inference, recognition of assumptions, deduction, interpretations, and evaluation of arguments. The participants were notified through a formal letter that the instruments were to be administered during selected classes. The MAI was administered first. A month later, the materials (test booklet, pencils, and answer sheet) were provided to complete the WGCTA. Participants were instructed to read the directions for each set of tests carefully and study the example questions. Upon completion, the participants were debriefed as to the purpose of the test (Magno, 2010).

Data were analyzed using descriptive statistics to establish the relationship between the factors of critical thinking and metacognition using Pearson r and chi-square. Two models of Structural Equation Modeling (SEM) were used to test the significant path parameter of metacognition on critical thinking as latent variables composed of a set of manifest variables. The findings demonstrated that in both models, metacognition has a significant path to critical thinking as well as all correlations among the factors, p<.05. The connection of the constructs of metacognition and critical thinking show that a higher use of metacognitive skills results in better critical thinking. Specifically, metacognition assists in developing critical thinking where the individual can identify and use a number of metacognitive skills when required to think critically through the control of cognitive processes. Magno identifies the implications for teaching and learning but does not specify those aspects. The researcher recommends that students should be taught specific ways to think and the need to establish processes to assess how individuals think critically (Magno, 2010).
**Work readiness**

Work readiness considers nurses’ knowledge and clinical competency with the ability to apply concepts to patient care (Ryan & Tatum, 2013). Critical thinking, which is necessary for nursing practice, is considered necessary to prepare nurses for practice (Carter, Creedy, & Sidebotham, 2015). Knowledge and critical thinking are developed over a continuum unrelated to years of experience (Ryan & Tatum, 2013).

Walker and Campbell (2013) conducted a study to evaluate work readiness and the variables that capture the work experience in the first year of practice, including the work outcomes of job satisfaction, work engagement, and intention to remain. A convenience sample of 96 nurses (88 female and 6 males) from two regional hospitals in Victoria, Australia was recruited in the ninth month of a graduate program during graduate nurse study days. Participant ages ranged from 21 to 52 years with a mean of 26 years. A quantitative survey design was used to collect data. The researchers adapted the Work Readiness Scale (WRS), a 64-item instrument, to make the tool relevant for a graduate nurse population. The revised instrument contained 33 items evaluated on a 10-point Likert scale assessing organizational acumen, clinical competence, personal work characteristics, and social intelligence. A job satisfaction scale with 10-items and using a 5-point Likert scale measured extrinsic and intrinsic features of work to assess individual satisfaction with the job. The researchers adapted another instrument from Robinson (1996) measuring intention to remain in the position that contained 4-items using a 7-point Likert scale. Finally, the shortened 14-item version of the Utrecht Work Engagement Scale (UWES) used a 7-point Likert scale. This assessed participants’ vigor, dedication, and absorption in their work (Walker & Campbell, 2013, pp. 1491-1492). Demographic information was also collected. The
study statement, survey, and questionnaire were sent to interested participants in an envelope. Completed materials were placed in a labeled box and collected by research associates.

Data were analyzed using SPSS version 20 with separate multiple regression analyses to examine work readiness. The significant findings included organizational acumen to work engagement ($\beta = .56, p < .001$) and the association between work engagement and intention to remain ($\beta = .22, p < .01$) (Walker & Campbell, 2013, p. 1493). The limitations of this study were the self-report measure, the responses may have been negatively biased, only the participants’ perspectives on work readiness were measured, responses were collected at the end of the graduate year, and not knowing if the participants provided honest responses. The researchers recommended future studies to examine work readiness and the impact of transition and integration into the workplace as well as the work outcome predictors of well-being and stress. Based on this study’s findings, Walker and Campbell emphasize the importance of employer selection and the need to target developing skills, specifically, for employers to develop targeted interventions to develop skills, social intelligence, and work competence (Walker & Campbell, 2013).

Lasater, Nielsen, Stock, and Ostrogorsky (2015) conducted a study in the United States at a tertiary-level medical center hospital to assess newly hired nurses’ readiness for practice. The purposes of the study were to: a) describe the newly developed process for assessing recently hired nurses’ (NHN) clinical judgment; b) report findings from a retrospective analysis of the data collected, specifically describing NHNs’ clinical judgment; and c) briefly explore the implications for both practice and academic educators (Lasater, Nielsen, Stock, & Ostrogorsky, 2015, p. 563). The participants included 202 NHNs who had been hired within the study year.
Exclusion criteria included rehired nurses and those nurses who held a diploma or master’s degree.

The Lasater Clinical Judgment Rubric (LCJR) was modified by the nurse educators and applied to 10 case studies involving cardiovascular, neurologic, pulmonary, and sepsis situations. The rubric assesses clinical judgment, that is, interpreting, responding, and reflecting on clinical experiences or situations. With the instrument author’s permission, the researchers adapted the instrument to include “patient–family teaching, pathophysiology application, and medication administration, to more closely align with the expectations of staff nurses” (Lasater et al., 2015, p. 566). The Tanner Model of Clinical Judgment was also used to assess how participants think about a given clinical scenario. This instrument measures clinical judgment in the domains of noticing, interpreting, responding, and reflecting. Demographic data were also collected.

Data were analyzed using SPSS version 22.0, conducting a one-way ANOVA and Fisher’s least significant difference. The results indicated that one aspect of clinical judgment, interpreting, was significant ($F (1,198) = 5.55, p < .05$) based on years of clinical practice experience and educational background. Interpreting was significantly lower in nurses who had less than one year of experience. Nurses with an associate degree had a slightly higher mean score on the interpreting variable of 3.48 (SD = 0.68) than those with a baccalaureate degree (3.20, SD = 0.71) (Lasater et al., 2015, p. 568). Newly hired nurses with 3 to 5.9 years of clinical practice experience had higher levels of clinical judgment as compared to the less experienced nurse. Although this study included participants who graduated from associate degree, traditional baccalaureate, and accelerated baccalaureate programs, there were no significant differences in academic education in relation to clinical judgment. Regardless of the type of academic program the newly hired nurse graduated from, developing clinical judgment
takes time derived from the experience of working in the practice setting. This correlated with situational practical experience, which is important to clinical judgment. Because data were collected at only one hospital, results may not be generalizable to other organizations. Additionally, the researchers mention the importance of assessing readiness for practice but did not address the correlation of this concept to clinical judgment and the implications for both hospital-based and academic educators.

The researchers concluded, based on the differences in case study responses, nursing care competence, and anecdotal reporting of assessing clinical judgment in this study, that nurses with less than three years’ experience of working in the practice setting require mentorship, flexibility, and more time to develop clinical judgment. Lasater et al. support that newly hired nurses would benefit from a nurse transition program or novice nurse residency program along with more practical experiences (Lasater et al., 2015)

**Professional competence**

Professional competence is linked to individualizing educational programs to the needs of the novice nurse. Important factors are to have collaboration between the organization, educators, preceptors, and nursing leadership (Nilson et al., 2013). Within the concept of professional competence is competence itself, which encompasses societal and professional expectations of the role of the professional nurse and develops across a continuum over time (Lima et al., 2014).

Lima, Newall, Kinney, Jordan, and Hamilton (2014) conducted a descriptive study using two groups of graduate nurses who began a graduate nurse program (GNP) at two different intervals. The study took place in a large pediatric hospital in Australia and involved 47 graduate nurses who were beginning a nurse graduate program. The mean age of participants
was 26 with the average length of employment of the graduate nurse at 6.8 weeks and enrolled licensed nurses at 35.7 months. The instrument used in this study was a 73-item questionnaire, the Nurse Competence Scale, examining seven domains related to nurse competence to assess overall competence in each domain. One of the investigators met with participants on the second day of employment and provided the questionnaire along with an addressed envelope to those who consented to participate in the study. Data were analyzed using descriptive statistics (frequencies, percentages, means, and standard deviations). The findings indicated that competence develops across a continuum. According to the researchers, Patricia Benner’s novice to expert model (Benner, 2001) supports nurse competence development. Novice nurses entering practice are lacking or have limited clinical practice experience. Advanced beginners have practiced in real clinical situations and demonstrate acceptable performance. Competent nurses have remained in the same position or similar clinical practice environment for two to three years. Lima et al. (2014) recommend conducting further studies in order to understand why, when, how, and to what extent competence occurs along the course at various points in nurses’ careers (Lima et al., 2014). Limitations are the size of the sample and that the study was performed only at one hospital, which limits the generalization of findings to other settings. Lima et al. recommend conducting further research across a range of settings using a larger number of participants and to examine the level of competency achieved as well as how to support further development of competence (Lima et al., 2014).

Liou and Cheng (2014) conducted a similar study in Taiwan, examining the perceived clinical competence of upcoming baccalaureate nursing graduates. The researchers developed and tested the Clinical Competence Questionnaire (CCQ), a 47-item questionnaire using a 5-point Likert scale for self-assessment of nursing clinical competence. The researchers
acknowledge learning is a continuous process and competence develops gradually (Liou & Cheng, 2014).

In another study, a multivariate, descriptive, cross-sectional correlation design using a self-report survey strategy was conducted in Finland (Numminem, Leino-Kilpi, Hannu, Isoaho, & Meretoja, 2015). The participants began initially with 1,050 new graduate nurses. Power analysis indicated a minimum sample size of 321 new graduate nurses. Registration as a new graduate nurse needed to occur between November 2011 to October 2012 to participate in the study. Work experience was no more than 12 months, with an average length of work of eight months. Ages of study participants ranged from 22 to 58 years, with a mean of 30 years.

Five instruments were used in this study. First, the Nurse Competence Scale (NCS), a 73-item visual analog scale that examines the helping role, teaching/coaching, diagnostic functions, managing situations, therapeutic interventions, ensuring quality, and the work role. The NCS assesses nurses’ competence in different work environments. Second, the Occupational Commitment Scale (OCS), a 26-item instrument using a 4-point Likert scale, with sub-scales measuring occupational commitment in the areas of affective, normative, accumulated costs, and limited alternatives. This relates to finding meaning at work and the commitment to the job. Third, the Qualities of Empowered Nurse Scale, an 18-item instrument using a 5-point Likert scale, with sub-scales measuring moral principles, personal integrity, expertise, future-orientedness, and sociability. This instrument examines the perceived performance and qualities of an empowered nurse. Fourth, the Practice Environment Scale of Nursing Work Index (PES-NWI), a 31-item instrument using a 4-point Likert scale, was used to benchmark the state of the practice environment, examining nurse participation in hospital affairs, staffing and resource adequacy, nursing foundations for quality of care, nurse manager ability, leadership and support
of nurses, and collegial nurse-physician relations. Finally, the Hospital Ethical Climate Scale (HECS), a 26-item instrument using a 4-point Likert scale, assessed the ethical climate of the work setting and its influence on practice. The sub-scales of this instrument considered peers, patients, managers, hospitals, and physicians (Numminem et al., 2015, pp. 449-450). These instruments were selected based on previous research and adequacy of psychometric properties to measure a variety of concepts in the nursing practice environment. Two questions assessed the intent to leave the current position of employment and baseline demographic data.

The questionnaire was distributed electronically. Analysis was performed examining the relationship(s) among the study instruments. The data were summarized using percentages, means, standard deviations, and ranges. Multivariate path analysis using SPSS Version 22 modeling estimated relationships between variables (Numminem et al., 2015, p. 451). The model demonstrated that nurses who felt more competent also felt empowered, occupationally committed, and perceived the ethical climate and practice environment in a positive manner.

Limitations to this study were the low return rate of 30.3%, self-reporting bias, and potential bias of attracting active responders and not obtaining the views of less active participants that would have added more insight to this study. The researchers did not state whether the study was performed within one or several organizations. The researchers also recommended a longitudinal study to assess proactive measures in enhancing competence and a supportive work environment to maintain new graduate nurses in the workforce. Further recommendations include a collaborative approach between nursing management and nursing education be integrated into the orientation process by including mentoring and group reflection programs. These programs should be evaluated using tools to assess the outcomes in terms of
improving nurse competence and establishing supportive work environments (Numminem et al., 2015).

**Role transition**

Role transition impacts the delivery of patient care. Previous experiences and, perhaps, diversity in educational preparation may influence the ability of the newly graduated nurse to acclimate to the role transition into professional practice (Kurmaran & Carney, 2014). Readiness for practice focuses on experiences and their importance to the development of clinical judgment. Nurses require mentorship and time to develop clinical judgment along with situational practical experiences (Lasater et al., 2015).

Kurmaran and Carney (2014) conducted a study using a Heideggerian hermeneutic phenomenological retrospective approach to understand the influences during the transition period and employed transition theory as a framework. The purposes of this study were to examine the holistic picture of what is being experienced by newly qualified nurses during their role transition and the meaning of their experiences, as well as to identify strategies to promote role transition. Ten newly qualified nurses in a hospital in Dublin, Ireland were the participants for this study. The participants were interviewed for approximately 60 minutes and responses were recorded. “Van Manen's (1990) thematic analysis of data, involving initial descriptive coding, interpretive coding, identification of categories and identification of themes, were utilised” (Kumaran & Carney, 2014, p. 607). An experienced researcher reviewed the transcription and data analysis. “Two themes emerged: 1) Initial feelings, experiences, inherent highs and lows of qualification and 2) Standing on their own two feet” (Kurmaran & Carney, 2014, p. 607). Sub-themes included becoming visible (recognition and acknowledgement);
confidence; anxiety and stress (assimilation); and being responsible and accountable (no longer having student protection and security).

The researchers suggest that nursing students need more supervision at the bedside because professional identity is developed with increased frequency of clinical supervision while in the student role. Teamwork and supportive staff assist with a successful transition process. The researchers recommend supportive preceptorship from experienced staff members to facilitate the transition process. The limitations of this study include the sample size, potential bias due to the use of a purposive sample, and the researcher’s ability to interpret the themes. Repetition of this study on a larger scale is recommended (Kurmaran & Carney, 2014).

Knowledge

Research on the concept of knowledge and knowledge transfer in nursing or other health care professionals is lacking in the literature. The expository writings in this section are included because of the discussion on this concept and its importance to health care organizational management. Argote and Ingram (2000) build on a framework of knowledge reservoirs to show why knowledge transfer can be difficult and to identify the kinds of knowledge that are most difficult to transfer to different environments. The article develops the proposition that interactions among people, tasks, and tools are least likely to fit a new environment and for this reason are the most difficult to transfer. Because people are more similar within an organization than between organizations, interactions involving people transfer more readily within than between firms or external entities. By embedding knowledge in interactions that involve people, organizations can both influence knowledge transfer internally and impede knowledge transfer externally. Transferring knowledge internally and preventing its transfer externally to competitors in other organizations can provide a competitive advantage. This theory correlates
with organizational behavior management in health care. Organizational behavior management (OBM) “focuses on what people do, analyzes why they do it, and then applies an evidence-based intervention strategy to improve what people do” (Henriksen, Battles, Keyes, & Grady, 2008, p. 2). OBM within a health care organization, knowledge transfer, and the strategies needed to retain nurses are necessary to minimize attrition rates.

Kumar and Ganesh (2009), who conducted a literature review on knowledge transfer within organizations, present an illustration of this theory (see Figure 1). The researchers suggest individuals (recipients) can learn and transfer knowledge based on their own experience or the experience of others (source). Knowledge transfer involves two interdependent actions that include information, which comes from the source that provides or delivers information to the recipient, and the receipt and use of that information. The two actions must both occur to complete knowledge transfer (Kumar & Ganesh, 2009).

**Figure 1  A Simple Model of Knowledge Transfer**

![Figure 1](image.png)

(Kumar & Ganesh, 2009, p. 164)

Knowledge transfer can be difficult, as there are different kinds of knowledge manifested within individuals, groups, departments, or divisions. Knowledge can be assessed through the measurement of changes in performance or process. Performance-based measurements are used
to capture tacit knowledge. “Most existing techniques for measuring knowledge, such as questionnaires or verbal protocols, measure changes in knowledge embedded in individuals” (Argote & Ingram, 2000, p. 152).

McGrath and Argote developed a framework of knowledge reservoirs that builds on previous theoretical frameworks. This framework suggests that knowledge involves members, tools, and tasks. Members are the human resources of an organization. Tools are associated with technology, inclusive of hardware and software. Tasks are related to an organization’s purpose, intentions, and goals. Knowledge within the task category can be spread both internally and externally and through networking with the building of interrelationships. Fitting the skills of members and moving skilled members can facilitate transferring knowledge to others within a group through human interaction (Argote & Ingram, 2000).

Barnett and Ceci (2002) conducted a literature review using seminal or well-known research and articles with a focus on the concept of transferring knowledge and learning. This review indicated that there is a lack of agreement between researchers as to the nature of transfer of knowledge. This includes what occurs during transfer, and how to define far transfer as well as how teaching can facilitate or promote the process of transfer (Barnett & Ceci, 2002). According to Cree and Macaulay (2000), far transfer involves knowledge and skills that are applied to environments or situations that change or present variation(s). Near transfer involves knowledge and skills that are always applied in the same order (Cree & Macaulay, 2000).

Barnett and Ceci discuss how knowledge is attained along with the use of processing models that evaluate analogical reasoning and transfer with a development of a framework that makes sense of the conflicting claims about transfer. The aims of this literature review of previous studies involving transfer included the following:
The nature of the skill to be transferred, the performance change measured for this skill, and the memory demands of the transfer task used to measure it, and distance between the training and transfer contexts along multiple dimensions (knowledge domain, physical context, temporal context, functional context, social context, and modality). (Barnett & Ceci, 2002, p. 614)

Learning

A study was conducted by Beccaria, Kek, Huijser, Rose, and Kimmins (2014) in a regional university in Australia with first-year undergraduate nursing students (92 completed a pre-survey and 102 completed a post-survey). The study’s aim was to examine the interrelationships among students, group work characteristics, and approaches to learning, with a focus on the effectiveness of group work and activation of deep learning. Students' approaches to learning were measured using the revised two-factor Study Process Questionnaire (R-SPQ-2F), which is a 20-item instrument that includes deep and surface approach scales. The R-SPQ-2F examines attitudes towards studies and students’ usual way of studying. The scores are divided into a main scale of deep approach (DA) and surface approach (SA) and sub-scales of deep motive (DM), deep strategy (DS), surface motive (SM), and surface strategy (SS) (Biggs, Kember, & Leung, 2001). The Feelings Towards Group Work instrument was adapted for use in this study. This 46-item questionnaire assessed students’ perception of group work and measured attitudes towards student-to-student peer support, confidence working in groups, and procedural knowledge of group work.

Multiple regression analyses were conducted that showed the predictors of deep approaches to learning that included “individual characteristics, metacognitive awareness,
procedure and knowledge in group work, student-to-student peer support, preference for group learning, self-efficacy in group work and values for group work” (Beccaria, Kek, Huijser, Rose, & Kimmins, 2014, p. 1097). Of note, the study showed that older students adapted more quickly to deep learning than their younger colleagues. Analysis of surface learning approaches demonstrated similar results. Metacognitive awareness was found to best predict a deep approach to learning. The researchers recommend that faculty develop and employ strategies that support metacognitive awareness for both group work and for students who feel uncomfortable working with others (Beccaria et al., 2014).

The aim of a study conducted by Chan, Chan, and Liu (2012) was to describe the effectiveness of classroom teaching by clinical nurse specialists (CNS) on students’ transfer of theory into practice. This descriptive qualitative design had a purposive sampling of 75 first-year nursing students. The study consisted of focus groups and the student experience in learning from two CNSs (one in diabetes and the other in colostomy care) before and following clinical placement. The CNSs and clinical instructors were also interviewed. The interviews were transcribed and coded. Study findings showed that the sharing of stories increased students’ motivation to learn. The participants felt what was learned through the sharing of stories helped to enhance practice. The researchers noted that there are opportunities to reflect in theory-to-practice situations, with a need to experience real clinical situations to apply what has been learned to the practice setting. Collaboration between academics and practitioners is needed to facilitate students’ learning in practice (Chan, Chan, & Liu, 2012).

A workshop with a focus on transfer of learning for social work educators, conducted by Cree and Macaulay (2000), was held in 1999 and used as a means to model teaching for transfer, inclusive of prior knowledge. Participants were invited to discuss personal experiences with
transfer of learning as well as what facilitated or impeded the process. Comments were recorded on flipcharts to review the outcomes that were themes. Prior experience, education, positive attitude, motivation and confidence, organization of information, and structure were outcomes that participants identified as factors related to transfer of learning. Conversely, low confidence, lack of motivation, fear of failure, and doubt hindered learning.

Learning is an active process. Learners who are self-aware of their learning process use metacognition and “demonstrate the capacity for self-reflection and critical thinking that goes hand-in-hand with the ability to transfer learning” (Cree & Macaulay, 2000, p. 19). The authors point out that learning needs to be implemented into practice with opportunities for various applications in a variety of settings. “Learning is only fully integrated once it has been put into practice. Furthermore, students need to rotate between acquired learning, simulation, practical tasks, and application to a real situation until transfer of learning is achieved” (Cree & Macaulay, 2000, p. 22).

**Historical Perspectives on Metacognition**

Although first examined in the literature during the 1970’s, metacognition remains a relatively new concept. A variety of definitions and models are provided in the literature, with a lack of consensus on how to define the term. Flavell (1976) first explains that:

> Metacognition refers to one’s knowledge concerning one’s own cognitive processes, or anything related to them, e.g., the learning-relevant properties of information or data. For example, I am engaging in metacognition if I notice that I am having more trouble learning A than B; if it strikes me that I should double check C before accepting it as fact. (Flavell, 1976, p. 232)
Flavell (1979) expands on the nature of metacognition as simply being the process of thinking about one’s thinking or one’s own process of remembering and perception of understanding using cognitive abilities to foster comprehension. This involves the ability to draw on a metacognitive experience and knowledge with available strategies to address a specific task (Flavell, 1979). Kuiper and Pesut (2004) maintain that metacognition is of value to registered nurses (RNs) and is demonstrated to support thinking in the delivery of patient care in a diverse health care environment.

Kuhn (1999) links critical thinking to metacognition. According to Kuhn and Dean (2004), metacognition enables individuals to retrieve previously learned content or strategies and apply that information to a similar experience. To support metacognitive development, students should be encouraged to reflect on and evaluate their activities. This assists with awareness and promotes the management of one’s thinking (Kuhn & Dean Jr., 2004).

**Metacognition in Academic Education**

Young and Fry (2009) conducted a study at an institution in Southeast Texas to further examine the relationship between metacognition and broad-based measures of academic achievement within a natural classroom setting as well as the validity of the Metacognitive Awareness Inventory (MAI) in relation to metacognitive knowledge and regulation and measures of academic achievement. The MAI was used to determine academic students’ metacognitive awareness. Study participants included 178 undergraduate and graduate (master’s in education taking core courses) students taking education classes. Juniors and seniors in reading and learning courses during summer and fall semesters completed the MAI, which was offered in 15 classes. Two classes were delivered the instrument in person and the remaining participants
received the instrument online. All students had access via WebCT, where 45 graduates and 133 undergraduates could complete the MAI at any point during the course.

Statistical analysis used nonparametric correlations and found that there were correlations between MAI responses and cumulative GPA as well as end-of-course grades. Significant findings showed a correlation between the knowledge of cognition factor and the regulation of cognition factor \( (r = .73, p<0.01) \) (Young & Fry, 2008, p. 7). Scores on the MAI differed significantly between graduate and undergraduate students with regard to the regulation of cognition factor \( [f (1,177) = 4.13, p<0.05] \). The mean score on the regulation of cognition factor for graduates was 142.04 and 136.85 for undergraduates (Young & Fry, 2008, p. 8).

Additionally, an ANOVA was conducted to examine if there was a difference between the experienced graduate and the less-experienced undergraduate student. There was no difference between the groups on the knowledge of cognition factor. There was a difference on the regulation of cognition factor. The researchers recommend that faculty use the MAI to screen students and identify those who need metacognitive strategy interventions (Young & Fry, 2008).

**Metacognition in Nursing and other Health Care Professions**

Discussion of the concept of metacognition and transference of knowledge in nursing began in the 1990s and has been minimally explored in the literature. Worrell (1990) summarized the concept of metacognition as “a component of executive control comprised of both knowledge and skills dimensions” (Worrell, 1990, p. 171). Worrell defines metacognitive knowledge and metacognitive skill as follows:

*Metacognitive knowledge* includes beliefs about one's ability, the demand of the task, and potentially effective learning strategies.
**Metacognitive skill** includes mental acts of self-regulation via planning, predicting, monitoring, regulating, evaluating, and revising strategies. Learning strategies are implemented via metacognitive skills that facilitate intentional learning. (Worrell, 1990, p. 171)

Worrell (1990) proposed that educating nursing students on the use of metacognitive skills is important to academic practice, although no study was conducted to support this assertion.

In 1998, Fonteyn and Cahill conducted a pilot study at a large teaching hospital. The participants included nine students in the third year of a baccalaureate nursing program. The researchers sought to examine the effectiveness of reflective writing through the use of clinical logs to enhance thinking strategies and metacognition. Study findings were based on the examination of the clinical logs and responses to two open-ended questions. The first question asked students to compare the use of clinical logs to written care plans. The second inquired whether the logs influenced their thinking about patient care during the semester. The researchers concluded that the use of clinical logs was a teaching strategy for faculty to facilitate students’ ability to identify and develop cognitive skills to be used in professional nursing practice (Fonteyn & Cahill, 1998).

Chartier (2001) conducted a literature review to examine nursing diagnostic reasoning and analytical skills. “The development of expertise in nursing is intimately related to cognitive or metacognitive skills and problem-solving ability” (Chartier, 2001, p. 57). Knowledge develops over time and research has shown that the expert nurse is organized and has the ability to apply strategies for problem solving. To support cognition, learning should be an active process that builds the learning base, constantly organizes information, and provides links for
organizing previous and new information into long-term memory. The individual must use problem-solving cognitive strategies that consider how and when to use attained knowledge.

Based on the literature, Chartier developed a tool to assess clinical reasoning of students. The instrument included a clinical situation with 12 questions to answer accompanied by specific guidelines and rationales. This instrument compelled students to consciously approach clinical situations and enhance their diagnostic reasoning skills. Chartier recommended development of a research framework for further observation to support the use of cognitive psychology as well as to assist educators in guiding novice nurses in decision-making (Chartier, 2001).

Galligan and Pigozzo (2002) sought to examine both cognitive and metacognitive processes in nursing students who experienced problems with drug calculations. One-to-one interviews were employed to identify student strategies and opportunities with controlling of information and the monitoring of information. Control of metacognition promotes development of student performance. It is important for faculty to identify how students are thinking, the manner in which students approach problems, and understand the source(s) of students’ errors:

Metacognitive skill is the control over learning and includes the ability for you to select, evaluate and abandon cognitive tasks, goals and strategies. For example, a student may be aware that he or she has ceased understanding a task (metacognitive knowledge) and then may elect to abandon the task itself (metacognitive skill). (Galligan & Pigozzo, 2002, p. 48)

Metacognition assists with problem solving and increases with age as well as within the context in which learning occurs.

Part one of the study was a series of group interviews and Part two involved a one-to-one trial followed by small group sessions. The sample consisted of first- through third-year nursing
students, ages ranging from 18 to 45, who were enrolled in a medical calculations course in an undergraduate nursing program at the University of Southern Queensland. Thirteen students participated in Part one. The researchers conducted interviews that lasted for one hour for a total of 10 group interviews. The interviews were based on metacognitive and cognitive processes students used solving the problems. The three students who participated in Part two had failed the drug calculations test five times and were involved in a one-to-one trial analyzing the error(s), followed by small group sessions. The interview had a series of six questions that were developed to promote metacognitive thinking. Students received a drug calculation test each week accompanied by a sheet that contained the following questions:

- How much did you like or dislike this type of question and why?
- How confident are you that you can do this question?
- Did you get stumped? Where? Why? How did you feel?
- Do you know you are right? Why?
- What method did you use?
- How do you feel? (when finished the question)

(Galligan & Pigozzo, 2002, p. 49-50).

Students participating in the Part one group were provided the sheet with the questions and a drug calculation test. They were then directed to read each drug problem. The students were then instructed to answer the first two questions provided on the sheet. The first question related to whether the student liked or disliked this type of drug calculation question. The second question asked the level of confidence the student believed that he or she could solve the drug calculation question. Students solved the calculation problems without use of a calculator.
and answered the remaining four questions on the sheet as indicated above. The interviewer guided and prompted group discussion (Galligan & Pigozzo, 2002).

Students in the Part two group repeated the drug calculation test followed by an interview session with specific questions using the Newman technique. All interviews were coded corresponding to metacognitive knowledge and skill. The findings showed that students may be aware of a skill set; however, faculty need to build students’ confidence if they are to succeed. Additionally, students are diverse in preparedness, confidence, study methods, and ability to use both metacognitive and cognitive skills. Academe should promote and foster positive learning environments that are relevant to individual student needs (Galligan & Pigozzo, 2002).

Kuiper and Pesut (2004) examined self-regulated learning on reflective practice in nursing. An integrative literature review was conducted to support the hypothesis that reflective clinical reasoning is dependent on the development of both cognitive and metacognitive skill acquisition (Kuiper & Pesut, 2004, p. 382). The research literature findings support that self-regulated learning strategies assist in the development of both cognitive and metacognitive processes for clinical reasoning. The researchers maintain that metacognition is of value to registered nurses (RNs) (Kuiper & Pesut, 2004).

August-Brady (2005) conducted a quasi-experimental study to examine the effect of concept mapping on the approach to learning and the self-regulation of learning with the variables that affect metacognitive abilities. A pre- and post-test design was used. The study was conducted at four state-approved baccalaureate nursing programs in Eastern Pennsylvania. The convenience sample consisted of 80 students enrolled in a maternal and child health course. The sample was divided into a control and treatment group. The treatment group consisted of 35 students that completed the pre- and post-test and were tasked to develop a concept map related
to the assigned patients using the nursing process. The control group of 45 students also completed the pre- and post-test but did not use concept mapping.

The instrument used to measure metacognition was a “20-item self-report questionnaire consisting of two main scales—deep approach (DA) and surface approach (SA)—each composed of 10 items. Participants responded using a 5-point Likert scale” (August-Brady, 2005, p. 299). A high score on the deep approach to learning scale indicates that the individual is intrinsically motivated to learn and uses appropriate strategies to learn in a meaningful manner. A high score on the surface approach to learning scale indicates that the student’s motivation to learn is extrinsic to the real purpose of the learning task, such as successfully passing an exam, and uses corresponding strategies, such as memorization. The second instrument used to measure self-regulation of learning was the Strategic Flexibility Questionnaire (SFQ), which is a 21-item self-report questionnaire consisting of three main subscales—adaptive, inflexible, and irresolute control beliefs—each composed of seven items. The SFQ uses a 5-point Likert scale. Finally, a researcher-constructed demographic questionnaire was developed to assess sample characteristics. Statistical testing using ANCOVA conducted on the pre- and post-tests showed that the metacognitive intervention of concept mapping increased the deep approach to learning scores. Significant findings were upheld when controlling for the effect of age and GPA on deep approach to learning \[F (1, 72) = 4.34, p = 0.04\] and on adaptive control beliefs \[F (1, 72) = 8.63, p = 0.004\] (August-Brady, 2005, p. 301). The findings indicate the need to develop learners’ ability to critically think and facilitate decision-making. The researcher suggests that metacognitive strategies facilitate a deeper approach to learning (August-Brady, 2005).
An online survey exploratory study was conducted by Mitchell, Regan-Smith, Fisher, Knox, and Lambert (2009) to examine medical residents’ competencies and how they manage complex tasks requiring higher-order thinking by assessing learning behavior(s). The population involved 963 residents from several large US academic medical centers located in the Northeast, South, Midwest, and West Coast over a three-year period from 2000-2002, with 414 residents responding, for a 44% response rate. The postgraduate year (PGY) breakdown of study participants was as follows: 140 interns, 105 second-year residents, 115 third-year residents, 42 fourth-year residents or higher, and 22 residents who were not identified by their PGY (Mitchell, Regan-Smith, Fisher, Knox, & Lambert, 2009, p. 922).

The researchers used the Cognitive Behavior Survey: Residency Level (rCBS) instrument, which profiles cognitive, metacognitive, and experiential aspects of residents’ learning. The instrument was developed after examining the literature as well as the Cognitive Behavior Survey that contains 120 statements (items) describing specific learning behaviors or attitudes in health care related fields that were rated by the respondents. The seven scales of this instrument measure memorization, conceptualization, reflection, independent learning, critical thinking, meaningful learning experience, and attitude toward educational experience.

“Learning behavior refers to the set of cognitive and metacognitive processes that learners draw on to acquire knowledge, skills, and understanding and to shape behavior, attitudes, and beliefs.” (Mitchell et al., 2009, p. 919). At the cognitive level, learning behaviors are linked to memorization, conceptualizing, and reflection. Metacognition directs, guides, and monitors cognitive processes through self-directed or independent learning and the use of critical thinking to evaluate the accuracy and relevance of information.
The researchers performed a factor analysis using a randomly divided group cross-validation design. The result of the cross-validation design was weak, with a result value of .40 (a strong result would be .60). MANOVA results demonstrated that residents who scored in the top 20% on the reflection scale conceptualized, learned independently, and used critical thinking more than the bottom 20%. The instrument appears to have potential for use in similar studies; however, future studies are needed to establish validity and reliability (Mitchell et al., 2009).

In 2009, Hsu and Hsieh conducted a cross-sectional, correlational survey designed to examine how learning factors influence metacognition. Specifically, the authors examined “the influence of demographic, learning involvement, and learning performance variables on metacognitive abilities of undergraduate nursing students in a blended learning environment” (Hsu & Hsieh, 2014, p. 234). A purposive sample of 99 female senior undergraduate nursing students who were enrolled in a two-year RN-to-BSN public nursing program in northern Taiwan participated in the study, with both a 100% participation and completion rate of the questionnaires. The study was conducted in the fall semester with all participants taking a nursing ethics course. The researchers hypothesized that a correlation exists between learning involvement (time on the internet, frequency of online chats) and learning performance variables (attitudes towards case analysis, self-evaluation of case analysis, satisfaction level on blended learning) on the development of metacognitive skills and abilities with academic performance. Blended learning was the intervention used in the study that consisted of online and classroom learning (Hsu & Hsieh, 2014).

The researchers administered four self-report instruments. The first included the Metacognition Scale (MS), which was adapted from Hsu’s (2010) Metacognitive Inventory for Nursing Students (MINS) and contained 40-items (Hsu, 2010). The MS was used to measure
students’ metacognitive abilities using a 5-point Likert scale and 28-items (reduced from the original instrument) with sub-scales that assessed self-monitoring, self-modification, self-awareness, effective learning, and problem solving. The next instrument was the Case Analysis Attitude Scale (CAAS), which measures attitudes towards ethical dilemmas using a 5-point Likert scale. The Case Analysis Self Evaluation Scale (CASES) instrument was used to assess the ability to analyze ethical dilemmas as a measure of students’ thinking, reasoning, and decision-making abilities. This 11-item instrument also used a 5-point Likert scale. Finally, the 18-item Blended Learning Satisfaction Scale (BLSS) was administered to assess students’ perception toward blended learning using a 5-point Likert scale (Hsu & Hsieh, 2014, p. 235-236).

Data were analyzed using SPSS 15.0 and descriptive statistics to show the correlation(s) between participant characteristics and tests among the variables. Simple and multiple linear regressions were conducted. Significant findings after adjusting for age and attitude toward case analysis showed frequency of online chats (p = 0.02), self-evaluation of case analysis based on total CASES score points achieved (p = 0.04 for 43–44 vs. 22–42 or p = 0.001 for 45–55 vs. 22–42), and level of satisfaction with blended learning (p = 0.01) as predictors of metacognitive scores. The participants with higher CASES score (43–44 or 45–55 points) “managed to increase their total MS score by 7.45 points and 18.38 points” (Hsu & Hsieh, 2014, p. 236-237). The study findings revealed that metacognitive strategies evoke behaviors that enable students to supervise and control thinking processes. Students are able to develop metacognitive abilities and various higher order thinking through a blended learning environment as demonstrated by the data, indicating a strong correlation between learning involvement and learning motivation (Hsu & Hsieh, 2014).
A correlational study conducted by Hong, Vadivelu, Daniel, and Sim (2015) at the University of Malaya Medical Programme hypothesized that the two dimensions of metacognitive skills, which consist of knowledge of metacognition and regulation of metacognition, are significantly different at the beginning and end of the academic year. Additionally, the researchers hypothesized that a correlation exists between these two dimensions of metacognitive skills and academic performance. The purposive sample consisted of 159 first-year medical students. The researchers used a self-report instrument, the Metacognitive Skills Inventory, which was adapted from the MAI instrument to make the 52-item 6-point Likert scale instrument relevant to the medical field. The focus of the instrument was on knowledge of metacognition and regulation of metacognition. The researchers used the medical students’ year-end results to measure academic performance with a summative assessment and a written exam that assessed core knowledge content.

Statistical analyses were conducted using paired sample t-tests. There was a strong correlation between students’ end-of-year measured academic results, both summative assessment and written exam, and knowledge and regulation of metacognition before and after the academic year. The statistical significance was at the 0.05 level with correlation of the knowledge of metacognition \( (r = 0.35) \), regulation of metacognition \( (r = 0.50) \), and metacognitive skills \( (r = 0.47) \) and the academic results (Hong, et al., 2015, p. 4). The Metacognitive Skills Inventory focused on two categories of metacognition, knowledge of metacognition and regulation of metacognition. Regulation of metacognition resulted higher than knowledge of metacognition. The researchers suggest that the influences of learning activities and teaching within the medical program promoted students’ metacognition. This study was limited as it was conducted in only one school, with one cohort, students were in their
first year, and the only tool to measure academic performance was the written exam. The authors recommended that further research be conducted using different cohorts and medical schools as well as to further validate the MSI (Hong et al., 2015).

A quasi-experimental study using a single-group and pre-test post-test study design was conducted by Gholami, Moghadam, Mohammadipoor, Tarahi, Sak, Toulabi, and Pour (2016) in Iran to examine problem-based learning (PBL) and its relationship in developing cognitive and metacognitive skills in nursing students. The purpose of this study was to compare the effects of PBL and the traditional lecture method on critical thinking skills and metacognitive awareness in nursing students in a critical care nursing course (Gholami et al., 2016, p. 16). The sample included 40 third-year undergraduate nursing students who had registered for the course Critical Care Nursing at School of Nursing and Midwifery in the second half of the academic year, 2012–2013, in their sixth semester. All participants participated in both the intervention and control groups. The control consisted of the traditional lecture. The intervention consisted of the students receiving a two-hour session of training on teamwork and the principles of PBL. The Critical Care Nursing course content with two-hour session covering 32 topics were randomly divided into 16 topics of lecture and 16 topics taught using PBL. The 40 participants were randomly assigned to one of four groups of 10, with each group led by a facilitator trained in teaching using PBL. During each group session, each facilitator discussed learning objectives, students’ progress, and shared experiences for solving the problems. The PBL process was delivered in stages using group clarification, brainstorming, self-directed learning, group discussion, presenting a care plan, evaluation, and reflection.

Data were collected in three stages with a self-report technique using a demographic instrument and two questionnaires. First, a 34-item multiple-choice questionnaire, The
California Critical Thinking Skills Test form-B (CCTST-B), was used to measure critical thinking skills in five domains: analysis, evaluation, inference, deduction, and induction. The second instrument was the Meta-Cognitive Awareness Inventory (MAI) with 52-items using a 7-point Likert scale. The instruments were used at the inception, mid-point, and end of the academic semester. A statistical analysis using SPSS analyzed descriptive statistics and using a paired t-test showed that PBL had a significant impact on developing metacognitive awareness and critical thinking skills in these students. There was a significant improvement in both the paired t-test and mean scores after the intervention of PBL, with the overall mean scores of critical thinking (p= 0.002) and metacognitive awareness (p = 0.000) (Gholami et al., 2016, p. 19).

The study demonstrated that students’ involvement in learning increased critical thinking skills. The researchers discuss an improvement in metacognitive skills with the implementation of PBL but seem to focus on the critical thinking aspect of this study. The ever-evolving health care environment requires that both registered nurses and nursing students develop critical thinking skills. The recommendation is that curricula train to a high level of metacognitive skills by using self-awareness and self-reflection. Ideally, the main objective in nursing education is to develop autonomous and self-directed learners through metacognitive awareness. Some studies have shown the relationship between poor critical thinking skills and lack of metacognitive awareness and nursing students' inability to solve problems, resulting in the widened gap between theory and practice as evidenced by poor clinical reasoning.

The researchers recommend considering students’ cultural background when using PBL, as some cultures and students from other countries are passive, do not ask teachers questions, and avoid conflict. Further recommendations are that faculty use a variety of strategies, such as
PBL, writing, journaling, questioning, reflective writing, group sessions, and concept mapping to further develop cognitive skills. The limitations to this study were that PBL occurred over eight weeks, the small sample was not divided into two groups of 20, the same participants served as both the control and intervention groups, and that the study was limited to a critical care nursing course. The researchers identified the potential limits to the generalizability of results and recommend further studies to examine the effects of PBL on other teaching strategies for more than a semester (Gholami et al., 2016).

**Synthesis and Critique of Research Findings**

Metacognition is examined and applied in psychology, educational psychology, neuroscience, and organizational behavior management (OBM) but its mention is sparse in the nursing literature. A review of the literature revealed a lack of consensus on the definition of metacognition; however, researchers agree that two components of metacognition consist of cognition and self-regulation. There are inconsistencies with the research that has been conducted in nursing. Nursing research has not established the foundation of predictors or factors of metacognitive abilities or metacognition for research to be built upon.

Studies included in this literature review were noted to examine or explore a partial component of metacognition or metacognitive abilities. The method(s) of measuring metacognition revealed the use of numerous instruments and a lack of consistency in the selection of instruments. Of note, there were 10 instruments, self-reported surveys, and only two studies utilizing the Metacognitive Awareness Inventory (MAI) with another study adapting the MAI instrument. A number of studies failed to report the validity and reliability of the instruments as well as the rationale for the need to use numerous instruments in the study. Depending on the study design, data were collected before, during, or after an intervention.
Interventions were also variable. Interventions included the use of concept maps, clinical logs, reflective writing, clinical situations with questions, group interviews, pre- and post-tests, self-report questionnaires, traditional lecture versus specific topic training, and questions to promote reflective thinking prior to drug calculation testing. The research has not established or explained how the implementation of these interventions demonstrates metacognition or metacognitive abilities. These findings lead to ambiguity and further inconsistency in the nursing literature.

An evaluation of the literature demonstrated that nursing research discusses metacognition has a high correlation with academic performance, specifically student GPA, as well as clinical experience(s) and age. Furthermore, metacognition, having metacognitive awareness, and the use of metacognitive abilities affect individual preparedness for work readiness, clinical competence, clinical judgment, nurse professional competencies, and once employed, both retention and attrition rates. The manner in which metacognition was explored was not clearly captured, identified but not statistically examined, interventions were variable, and representative samples at different time intervals or over a longitudinal period were not conducted. Additionally, an absence of nursing research measuring transfer of knowledge during the nursing student experience and upon attaining nursing licensure, from academia into clinical practice is noted. As minimal nursing research has examined metacognition and metacognitive abilities, it was important to establish the foundation for future studies.

**Conceptual Framework Further Defined**

**Overview**

As discussed in Chapter One, the conceptual framework that served as the guide for this study was the 3P Model of Teaching and Learning (Figure 2) by Biggs, Kember, and Leung
The 3P model was adapted from the Dunkin and Biddle (1974) Model for the Study of Classroom Teaching (Dunkin & Biddle, 1974, p. 38). This model focuses on classroom instruction and the properties of teachers and adult learners. Recognizing the need to shift from a teacher-centered to a student-centered process, the model considers presage, context, process, and product variables. Dunkin and Biddle asserted that the presage variables relate to teachers’ characteristics that include formative and training experiences, and teacher properties. In the model developed by Dunkin and Biddle, presage examines teachers’ behavior and the effects on students’ behaviors and achievement. Context variables concern the teacher environment type and students’ characteristics and demographics. Process relates to the actual learning activities, teacher and student behaviors, and the cause-and-effect relationship resulting from the classroom activity. Product is the outcome of teaching and the learning or change in students’ behavior(s) that occurred. Dunkin and Biddle recommended going beyond traditional test scores and looking to long-term effects of students with acquisition of information and the motivation to enter the workforce with professional or occupational skills (Dunkin & Biddle, 1974).

Biggs went beyond the linear aspect of presage to process to product to demonstrate that each component of the 3P model are interrelated factors influencing student learning outcomes, thereby being multidimensional. Additionally, the focus is on student learning (Keeves & Wantanabe, 2013). 3P takes into account student factors, teaching context, learning-focused activities, and learning outcomes, which influenced the development of the research questions for the study (Biggs, Kember, & Leung, 2001). Furthermore, 3P describes the various points in time in which learning-related factors occur through presage (before learning), process (during learning), and product (learning outcome(s)) (Biggs, 2003).
The components of this model interact with each other and consider individual approaches to learning (presage), the influence of context and what has been taught (process), as these determine the learning outcome (product). Presage refers to the variables the student is exposed to within the learning environment. These include individual student characteristics and the educational context. Process refers to how students approach learning and can be influenced by presage. Product consists of factors that refer to learning outcomes as well as how students develop learning skills. This is a useful framework to explain how students learn and use metacognition and can be applied to the work environment (Biggs & Tang, 2011). Additionally, the theoretical basis of 3P offers a process to examine how nursing students learn and how attained knowledge is transferred (August-Brady, 2005).

**Constructive alignment**

The 3P model has been applied in higher education and educational psychology. Biggs (2003) associates this model with constructive alignment. In constructive alignment, the
learning environment supports activities to achieve desired learning outcomes. Learners build knowledge reflecting on previous knowledge and experiences and assimilating what was learned into new knowledge and experiences selectively using declarative knowledge (Biggs, 2003). The principles of the learning theory of constructivism support that learners construct knowledge and comprehension through experiences and reflecting on previous events. Constructivism maintains that the learner is an active participant, the educator facilitates the learning process through problem-based learning, and previous information is built upon, assimilated, with knowledge occurring through reflection. Coaching and motivation provides meaning to the learning experience. The learner, with an individual perception of experiences, constructs knowledge to be applied in the environment (Brandon & All, 2010).

**Metacognition**

One must consider that learning is not solely based on the activities in academia. Learning provides skills necessary for real life and is brought into the work environment. To support metacognitive abilities with the interrelationships of development of knowledge and use of metacognition requires teaching methods and experiences that engage the learner, encouraging metacognition. The 3P model supports metacognitive control and reflective learning through deep learning. In nursing, this means knowing when to apply procedural, declarative, or conditional knowledge to self-monitor or manage situations in the professional practice environment and improve thinking.

The habit of using their own thinking to improve their own thinking (metacognitive self-correction), is an important nursing skill as nurses must be able to form good judgment in their professional work based on their own critical thinking. (Biggs & Tang, 2007, p. 312)
Framework applied

Each of the elements of the 3P model in combination with the study’s research questions guided this study. This model provided a structural framework within the context of professional nursing practice and the use of metacognitive abilities. The *presage* factors include the development of knowledge and metacognitive abilities. Student context factors that were examined are prior knowledge, learning styles, and socio-economic characteristics. Teaching context factors included academia (traditional versus accelerated baccalaureate program), clinical experiences (academia and workplace orientation), and preceptor, nurse educator, and nursing management support. *Process* factors attempted to identify the result of learning-related factors influenced by variables the individual is exposed to within the learning environment along with personal approaches to learning (presage) and whether newly licensed nurses demonstrated a deep or surface approach in the ability to recall or process information in meaningful ways using metacognitive abilities. *Product* factors examined the outcomes of learning and the potentially variable levels of metacognitive abilities of newly licensed nurses.

As applied to this study, the 3P model holds that the independent variables of race/ethnicity, age, prior education, adequacy of orientation, preceptor pairing, and the support of peers, nursing management, and nursing education; previous work experience; and clinical experiences (academic and orientation) would influence or explain the dependent variable of metacognition. The following research questions were examined:

RQ1: Do new graduate nurses have metacognitive abilities as measured by the Metacognitive Awareness Inventory (MAI)? *(Product)*
RSQ1: Do individual demographics (race, age, gender, culture, and prior education) and unit-based factors (adequacy of orientation, preceptor pairing, and the support of peers, nursing management, and nursing education) influence metacognition? (Presage and Process)

RSQ2: Does previous experience in the workforce or within health care foster metacognition? (Presage)

RSQ3: What clinical experience factors (both academic and during orientation) influence metacognition? (Presage)

**Summary**

Chapter Two provided a comprehensive review and synthesis of the literature as well as correlating concepts and historical perspectives on metacognition. This chapter presented a thorough discussion on metacognition in nursing and other health care professions. Additionally, the 3P Model of Teaching and Learning, the conceptual model that guided this study and its underpinning to this study, was defined.

The nursing literature has identified the importance of metacognitive skills; however, research to delve into this phenomenon is lacking. The research and literature discussions, though inconsistent, suggest that metacognition may be influenced by learning strategies, learning environment, and an individual’s motivation to learn. The outcomes of learning may be linked to previous experiences, educational context, and the extension of learning into the workplace. This study provided an opportunity to explore metacognitive abilities and the factors or variables that influence metacognition. Additionally, this study sought to establish a foundation with the desire that future studies will expand on the concept of metacognition and
contribute to the understanding of this phenomenon in nursing. Chapter Three will discuss the methods used in this study to answer the research questions posed.
CHAPTER THREE – METHODOLOGY

Introduction

The first two chapters reported in this study presented a thorough discussion on metacognition in nursing and other health care professions. Chapter One described the study’s significance in addition to the problem and purpose statements that served as a guide. Chapter Two provided a comprehensive review of the literature as well as correlating concepts and historical perspectives on metacognition.

This chapter outlines the overall design of the study, including an overview of the research design, participants, sample size, inclusion and exclusion criteria, instruments used to collect data, and data analysis procedures. This quantitative research study used a descriptive research design.

The purpose of this study was to explore the variables and factors influencing metacognition as well as what facilitates the transfer of academic knowledge and skills of the newly licensed nurse into professional clinical practice. Determination of what facilitates transfer of knowledge and skills of the new graduate nurse into clinical practice is important for academic nursing education and nursing professional development specialists in the acute care setting.

This research was guided by the 3P Model of Teaching and Learning, which influenced the development of the research question (RQ) and sub-questions (RSQ):

- **RQ1**: Do new graduate nurses have metacognitive abilities as measured by the Metacognitive Awareness Inventory (MAI)?
- **RSQ1**: Do individual demographics (race, age, gender, culture, and prior education) and unit-based factors (adequacy of orientation, preceptor pairing, and facilitation of
the transfer of knowledge with the support of peers, nursing management, and nursing education) influence metacognition?

- RSQ2: Does previous experience in the workforce or within health care foster metacognition?
- RSQ3: What clinical experience factors (both academic and during orientation) influence metacognition?

**Research Design Overview**

A quantitative descriptive study was chosen to investigate metacognitive experiences of a select group of voluntary participants and to explore the relationship among variables thought to be related to metacognition. The study used two instruments: The Metacognition Awareness Inventory (MAI) and a researcher-developed questionnaire.

**Target Population**

The target population was newly licensed nurses with a baccalaureate degree (BSN) who were practicing adult medical-surgical nursing in the acute care setting and had been employed for at least six but no more than 12 months. Data on demographic characteristics, such as gender and ethnic background of participants, were obtained to provide a description of the sample for this study. Exclusion criteria included newly hired experienced registered nurses, newly licensed nurses practicing in specialty areas (e.g., women’s services, pediatrics, critical care), and nurses who had advanced from a diploma or associate degree to obtain a BSN.

**Sampling Method**

A professional listserv and a post on social media were used to recruit participants for this study. The sampling method was a non-probability technique based on convenience and availability (Creswell, 2013).
A professional listserv was used to facilitate recruitment to obtain the sample for this study. This listserv was selected because of the number of subscribing members. The membership consists of approximately 1,200 subscribers primarily from across the US as well as individuals from Canada and other countries. The subscribers comprise a mix of clinical nurse specialists (CNS), advanced practice nurses (APN), and nurse educators. The listserv was utilized for participant recruitment from a widely dispersed membership who are in contact or work directly with newly licensed graduates in the acute care setting. The subscribers were the distribution vehicle to access potential study participants in the practice setting. Social media (Facebook) was used as a secondary approach to the target population through a recruitment notice request for potential study participants through colleagues who would be able to view and distribute the recruitment notification to newly licensed nurses.

Sample Size

Prior to conducting the study, a power analysis was done to determine the required sample size calculated by means of G*Power 3.1 using a medium effect size of 0.3, alpha = 0.05, and a power of 0.8 and using a one-tailed test. The total number of participants needed for this study was 64 participants.

Setting

The research study was conducted via a professional listserv through an electronic mailing list and social media (Facebook) posting with a survey link. Participants had to meet the inclusion criteria and work in an acute care setting. The survey was structured with an introduction section of six screening questions to filter participants for inclusion to this study. Disqualification logic was built into the online survey to exclude respondents who do not consent
to the study or meet the inclusion criteria. The length of the survey was estimated to be 45 to 60 minutes.

**Recruitment**

The researcher recruited participants via a professional listserv through an electronic mailing list and social media (Facebook) posting with a description of the study purpose and design and containing a survey link. Permission was obtained via e-mail from the professional listserv’s owner and moderator. Interested potential participants were invited to contact this researcher for further information about the study, in particular the topic of focus and the time commitment involved in participating in the study. None of the survey questions probed into organization or facility of hire to ensure comfort of subject participation.

Another method used to recruit participants was through a recruitment incentive. A separate link was provided at the end of the study questionnaire. Subjects who participated in the study provided their name and e-mail address in this link for an opportunity to be included in a raffle to receive an Amazon gift card totaling $25.00. Four winners were randomly selected at the end of the data collection period and the reward was disbursed to each winner. Participation in this raffle breeched anonymity since this required both the name and e-mail address of the participant; however, confidentiality was maintained since the raffle link did not connect the participant to the completed survey. Recruitment materials can be found in Appendix A.

**Instrumentation**

**Metacognitive Awareness Inventory (MAI)**

The instrument that was used to collect data related to variables associated with metacognition is the Metacognitive Awareness Inventory (MAI), which can be found in Appendix B. The MAI is published in full in an article in the professional journal of
Contemporary Educational Psychology and has been cited over 1,600 times. The publication includes original psychometric properties across two studies. Permission to use this instrument in this study was obtained from the journal (see Appendix C). The instrument was adapted for use through an online survey (Schraw & Dennison, 1994).

The MAI is a 52-item self-report inventory, designed and tested by Schraw and Dennison in 1994, that uses a MAI total score that is derived by summing all responses to all 52 statements within the respective subcategories. A false response equates to a 0 point and true response to 1 point. The inventory statements are listed randomly and organized into various areas of the instrument.

The 52 MAI statements represent two categories of metacognition, knowledge of cognition and regulation of cognition. Knowledge of cognition (17 statements) is divided into three subcomponents. Declarative knowledge includes knowledge about self-strategies, abilities, and how knowledge is obtained. Procedural knowledge considers knowledge application, implementation, how-to-use strategies, and problem solving. Conditional knowledge includes circumstances on transferring processes or skills as well as when and why to use strategies that include the application of declarative and procedural knowledge. Total possible score for this category is 17 points (Schraw & Dennison, 1994).

Regulation of cognition (35 statements) includes five subcomponents. Planning includes goal setting, planning, and resources prior to learning. Information management strategies reflect organizing skill and strategy sequences utilized to effectively process information. Comprehension monitoring is the self-assessment of strategies used and one’s learning. Debugging strategies are strategies used to correct performance errors and comprehension. Finally, evaluation is the analysis of performance and strategy effectiveness after a learning
episode. Total possible score for this category is 35 points (Schraw & Dennison, 1994). The scores are calculated by adding the point value (true or false) of each statement within the subcomponent of each category. A higher total score corresponds to greater metacognitive knowledge and greater metacognitive regulation.

**Reliability**

Schraw and Dennison (1994) subjected the MAI instrument to unrestricted and restricted factor analyses. A preliminary study included 197 undergraduates enrolled in an introductory educational psychology course. The MAI was exploratory and administered to the participants for the purpose of comparing two- and eight-factor solutions. The ratings for each of the 52 items “were made on a 100-mm, bi-polar scale adapted from the multidimensional scaling literature” (Schraw & Dennison, 1994, p. 463). The right of scale indicated the statement is false and the left of the scale indicated the statement is true. The pilot showed the average completion time was 10 minutes.

The first analyses produced six-factor solutions applying orthogonal and oblique solutions to assess the eight hypothesized subscales and observed factors. Factor loadings for each solution were essentially identical. The orthogonal solution showed that each pair of factor(s) was correlated in excess of $r = 0.30$ and oblique rotation forced factors to be mutually uncorrelated. Additionally, coefficient alpha for five of the six factors were (0.81, 0.74, 0.71, 0.66, 0.65, and 0.59) below the desired criterion value of 0.80. The unrestricted factors did not demonstrate parsimonious interpretation of the data (Schraw & Dennison, 1994, p. 463).

Subsequently the researchers performed a forced, two-factor solution (restricted factor analyses) to compare the factors that correspond, with factor one relating to knowledge of cognition and factor two relating to regulation of cognition. Both solutions resulted in similarly
identical solutions. The exception was that the two factors highly correlated in the oblique solutions $r = .54$. Six items loaded equally on factor one (declarative, procedural, and conditional knowledge) and factor two (regulation of cognition), which explains the correlation between these two factors. Two items failed to load on either factor. The coefficient alpha for items loading on each factor was 0.91, indicating a high degree of internal consistency. The coefficient alpha for the entire MAI instrument reached 0.95 (Schraw & Dennison, 1994, p.464).

Twenty-five items loaded on factor one and 19 items loaded on factor two. The high loadings were noted on factor one for the category of knowledge of cognition. Conversely, high loadings on factor two were noted across each of the five subscales within the category of regulation of cognition. The two factors accounted for 65% of the sample variance. The researchers concluded that the results were in accordance with theoretical predictions, with both factors being reliable and stable without systematic cross-loading between the instrument’s items. The MAI reliably measures two categories of metacognitive knowledge (knowledge of cognition and regulation of cognition) based on a two-factor solution (Schraw & Dennison, 1994).

**Validity**

The MAI was subjected to four analyses to assess predictive validity. If the instrument measures metacognitive awareness, the instrument should correlate with test performance and measures of metacognition. The researchers conducted a second study with the MAI on 110 undergraduates, administering the MAI and five reading comprehension tests. Higher scores on the MAI should “correlate to higher test performance, a greater awareness of one’s own monitoring skills, and accurate monitoring of one’s test performance” (Schraw & Dennison, 1994, p. 466).
The first data analysis replicated the forced, two-factor solution performed in the first study. Means and standard deviations across the sample were conducted at a p = < 0.05 level of significance. In the second analysis, oblique and orthogonal two-factor solutions were conducted and again correlated closely to the results in the first study. The two factors accounted for 58% of the sample variance corresponding to knowledge and regulation of cognition. Two items loaded differently in each study and three items failed to load although these same items had meaningful loading in the first study. The results in both trials showed that factor one corresponds to knowledge of cognition and factor two to regulation of cognition. Items with a loading in excess of 0.30 in factor one and less than 0.30 in factor two created a mean score of knowledge of cognition based on 19 items. The mean for regulation of cognition included 22 items.

The third analysis used a one-way multivariate analysis of variance (MANOVA) with the dependent variables of knowledge and regulation of cognition. The variables did not achieve significance [F(6,210) = 1.89, MS_e = .46]. Finally, a one-way analysis of variance (ANOVA) showed knowledge of cognition scores differed across three groups [F(2,107) = 4.45, MS_e = 681.91] in relation to test performance but not with monitoring accuracy. Regulation of cognition did not vary. The researchers concluded that the instrument provided high reliability and that the “predictive validity will increase as cognitive tasks increase in difficulty” (Schraw & Dennison, 1994, p. 472).

**Demographic instrument**

A demographic instrument developed by the researcher was used to obtain the following data: student demographics (age, gender, race/ethnic group, and US region), previous health care or workforce experience, other baccalaureate degree, type of BSN program, GPA at
graduation, preferred learning style(s), approximate number of clinical experience hours in the program, type of clinical experience, time from NCLEX-RN® to successful employment, number of preceptors, preceptor pairing, review of information (academia and orientation), and what was useful in the transfer of knowledge to professional nursing clinical practice (see Appendix D). This document was exported into Qualtrics® software for the development of an online version of the instruments tool with a survey link.

**Data Collection**

IRB approval was obtained from Western Connecticut State University (WCSU) prior to data collection (see Appendix E). Citi Training requirements had been fulfilled in order to obtain IRB approval from WCSU. The approval process took one week.

**Data Analysis Procedures**

The researcher sought to identify relationships between dependent and independent variables within the data aligned with the conceptual framework of the 3P Model of Teaching and Learning applied to this study (Biggs, Kember, & Leung, 2001). Appropriate parametric and nonparametric statistical tests were conducted using the Statistical Package for the Social Sciences (SPSS) version 24 to analyze the data. A “p” value lower than 0.05 ($p < 0.05$) was used to determine statistical significance. Data were organized, coded appropriately, and read carefully to ensure data had been appropriately cleaned (IBM Corporation, 2013).

To answer the research questions, an analysis of the demographic data of the participants was conducted as well as using the appropriate statistical tests for the identified variables. The dependent variable was metacognitive abilities. The independent variables were expected to be academic setting and clinical experience, workplace orientation, as well as participant factors,
including prior workforce experience, learning styles, self-assessment, and self-reflection to recall and perform synthesis of prior knowledge. Findings are summarized in Chapter Four.

**RQ1: Do new graduate nurses have metacognitive abilities as measured by the Metacognitive Awareness Inventory (MAI)?**

The Metacognitive Awareness Inventory (MAI) (Schraw and Dennison, 1994) was used to examine metacognitive abilities and the relationship of these abilities to the other variables (Appendix B). Descriptive statistics, including means and standard deviations, were used to provide summaries of the quantitative data and patterns that emerged from the MAI.

**RSQ1: Do individual demographics (race, age, gender, culture, and prior education) and unit-based factors (adequacy of orientation, preceptor pairing, and the support of peers, nursing management, and nursing education) influence metacognition?**

In order to answer this sub-question, participant demographics included data related to the academic experience, preferred learning style(s), nursing program clinical hours, and transition into the employment practice setting inclusive of preceptor experience, reflection, review and recall of acquired knowledge, and the transfer of previously learned knowledge facilitated by the preceptor, nurse educator(s), and nursing management (Appendix D). Spearman’s rank-order correlation was used to correlate nominal and ordinal data and Pearson’s r correlation was used for interval and ratio data.

**RSQ2: Does previous experience in the workforce or within health care foster metacognition?**

To answer this question, appropriate demographic data were used to explore the relationship between prior health care or workforce experience and metacognitive abilities (Appendix D). Independent sample t-tests were used to examine the average MAI scores
comparing respondents with previous experience in the workforce or health care to respondents that have no previous experience.

**RSQ3: What clinical experience factors (both academic and during orientation) influence metacognition?**

To answer this question the data obtained in the demographics explored the relationship between the number of clinical hours (simulation, nursing skills lab, patient care, and observation) and metacognitive abilities (Appendix D). Pearson r correlation for interval or ratio data and Spearman rho for nominal or ordinal data were correlated to the MAI scores.

**Tell me one thing that you were academically prepared for that made you successful in nursing practice.**

The responses to this open-ended question were analyzed qualitatively. Each response was reviewed and coded into categories. A frequency distribution was calculated for each of the categories to determine the percentage of respondents indicating that category.

**Limitations of Research Design- Internal and external threats**

There may be several limitations to this quantitative descriptive study. Any alternative explanations that can be provided to explain the results is a threat to internal validity. The threats to external validity are related to the ability to generalize the results from a specific region to other regions within the United States. There is the potential for selection bias related to the willingness of the participants to spend approximately one hour to complete the study’s survey instruments. The sample for the current study was focused on newly licensed nurses working in adult medical-surgical settings, so the results may not generalize to experienced nurses or nurses outside of the medical-surgical setting.
Ethical Considerations

Informed Consent

Informed consent was included in an e-mail as part of the recruitment letter. The social media posting included the same information and content as the recruitment letter. Consent was implied once the respondent clicked on the survey link. Furthermore, potential respondents were offered the opportunity to contact the researcher via e-mail to formally review the study parameters, at which time the researcher would personally explain the study, risks and benefits, answer any questions, and inform the respondent of the ability to withdraw at any time without repercussions. Three individuals from the listserv and three from social media, each a distribution vehicle, contacted the researcher via e-mail to clarify inclusion criteria and the time the study would close. Potential respondents did not contact the researcher. The informed consent section detailing this study appears in the recruitment letter in Appendix A.

Human Subjects Protection

IRB approval was obtained from WCSU (see Appendix E). This is a requirement from the institute of higher learning for any research study of potential nurse participants to be considered or recruited by the researcher. Once IRB approval was obtained, an e-mail with the recruitment letter containing the information of the inclusion criterion was posted on social media and sent to the professional listserv for distribution.

Storage of Data

To ensure security of data collected, any electronic devices used, and all written material were locked and secured in an office cabinet to which only the researcher and the statistician had access. The data collection for this study was generated using Qualtrics® software. Qualtrics® software contains a development tool for survey creation, survey link, and both collection and
analysis of data. Additionally, data collected in Qualtrics® were exported into SPSS.

Qualtrics® and all other Qualtrics® product or service names are registered trademarks or trademarks of Qualtrics®, Provo, UT, USA. (http://www.qualtrics.com). Data were stored in a password-protected electronic format. Qualtrics® does not collect identifying information, such as participant’s name or internet protocol (IP) address. Therefore, participant responses remained anonymous (Qualtrics, 2015). Research records will be retained for three years, beginning April 2019, with subsequent destruction of data at the designated interval.

Summary

This chapter presented an overview of the research design, sample size, inclusion and exclusion criteria, data collection and analysis procedures, limitations of the study, and steps taken to ensure the protection of human subjects. Chapter Four reports on the results of this study.
CHAPTER FOUR: Data Analysis and Results

Introduction

The purpose of this study was to explore the variables and factors influencing metacognition as well as what facilitates the transfer of academic knowledge and skills of the newly licensed nurse into professional clinical practice. This chapter presents the findings pertaining to the sample characteristics and examines the description of the sample, summary of results, and provides a detailed analysis of the data.

The following research questions guided this study:

- **RQ1:** Do new graduate nurses have metacognitive abilities as measured by the Metacognitive Awareness Inventory (MAI)?
- **RSQ1:** Do individual demographics (race, age, gender, culture, and prior education) and unit-based factors (adequacy of orientation, preceptor pairing, and facilitation of the transfer of knowledge with the support of peers, nursing management, and nursing education) influence metacognition?
- **RSQ2:** Does previous experience in the workforce or within health care foster metacognition?
- **RSQ3:** What clinical experience factors (both academic and during orientation) influence metacognition?

Description of the Sample

The research was conducted using a professional listserv and social media (Facebook) post as distribution vehicles that included a recruitment notice containing the online electronic survey link. The target population for the study consisted of newly licensed registered nurses with a baccalaureate degree (BSN), practicing in the United States within an acute care facility.
on a medical-surgical unit for at least six months but no longer than 12 months. Respondents in the study completed the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994) and a demographic instrument created by the researcher.

Survey results of 69 respondents were collected during the seven-month period from February 2018 to August 2018. Of the total 69 respondents that completed the survey, 42 respondents did not meet the inclusion criteria. Seven did not have a BSN, five were not currently employed, five were not practicing in the United States, 13 did not work in an acute care setting, 28 did not work on a medical-surgical unit, and 33 had more than 12 months of employment. Additionally, four respondents who met the inclusion criteria did not complete the survey. The final sample meeting the study criteria numbered 23.

The average age of respondents was 24.7 (SD=2.69) with 91.3% (n=21) that were female and 65.2% (n=15) white. All respondents worked full-time and took an average of 2.2 (SD=1.63) months to obtain employment after passing the NCLEX-RN®. Sixteen respondents (69.6%) lived in the Northeast. In terms of previous workforce experience, 26.1% (n=6) of respondents had previous healthcare experience (e.g., certified nursing assistant [CNA], medical assistant/secretary, nurse extern, or pharmacy technician) and 58.7% (n=13) had non-healthcare experience (e.g., brand ambassador, customer service representative, assistant, hotel/restaurant, lifeguard, or nanny). See Table 1 for respondent demographics and Table 2 for frequencies and means.

Table 1: Respondent Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td></td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>91.3</td>
</tr>
<tr>
<td>Male</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
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<td></td>
</tr>
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<td>American Indian</td>
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<td>0.0</td>
</tr>
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</table>


<table>
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<tr>
<th>Ethnicity/Origin</th>
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<th>Percentage</th>
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</thead>
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<td>0.0</td>
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<tr>
<td>Asian</td>
<td>3</td>
<td>13.0</td>
</tr>
<tr>
<td>Black or African American</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>Hawaiian</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Native American</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>White</td>
<td>15</td>
<td>65.2</td>
</tr>
<tr>
<td>Hispanic or Latino or Spanish Origin</td>
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<td>13.0</td>
</tr>
<tr>
<td>Not Hispanic or Latino or Spanish Origin</td>
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<td>4.3</td>
</tr>
<tr>
<td>Other/Multi-Racial/Multi-Ethnic</td>
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<td>4.3</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>4.3</td>
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<td>16</td>
<td>69.6</td>
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<tr>
<td>Midwest</td>
<td>3</td>
<td>13.0</td>
</tr>
<tr>
<td>South</td>
<td>4</td>
<td>17.4</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Employment Status</th>
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<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Time</td>
<td>23</td>
<td>100.0</td>
</tr>
<tr>
<td>Part-Time</td>
<td>0</td>
<td>0.0</td>
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</table>

<table>
<thead>
<tr>
<th>Previous Healthcare Experience</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homecare CNA</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Medical Assistant/Secretary</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>Nurse Extern</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>Pharmacy Technician</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>74.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-Healthcare Previous Experience</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand Ambassador</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Customer Service Representative</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Daycare Assistant</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Hotel Front Desk</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Nanny</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Lifeguard</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Research Assistant</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Sales Associate</td>
<td>2</td>
<td>8.7</td>
</tr>
<tr>
<td>Server</td>
<td>3</td>
<td>13.2</td>
</tr>
<tr>
<td>Veterinary Assistant</td>
<td>1</td>
<td>4.3</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>43.7</td>
</tr>
</tbody>
</table>
All respondents held a baccalaureate degree with 87% (n=20) completing a traditional 4-year program and 13% (n=3) completing an accelerated program. The average GPA upon graduation reported by respondents was 3.56 (SD=0.32). Respondents in the accelerated program completed their degree within 18 to 24 months. Respondents reported being exposed to the following experiences during the academic nursing program: 95.7% had an average of 29.4 (SD=15.8) hours of simulation experience; all respondents reported experiencing a nursing skills lab for an average of 95.3 (SD=73.8) hours, all had 345.4 (SD=278.3) hours of patient care clinical experiences; 95.7% had 214.9 (SD=225.8) hours of direct patient care skills; and 78.3% had 42.3 (SD=33) hours of observation experiences. Preferred learning styles responses varied. The top two consisted of visual at 73.9% (n=17) and actual practice or some class activities at 65.2% (n=15). In total, respondents had 9.17 (SD=3.90) weeks of orientation during the employment onboarding process with 2.16 (SD=1.62) preceptors during orientation. Tables 2 and 3 (above) and 4 and 5 (below) summarize these findings.
Table 4: Nursing Program Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional (4-Year)</td>
<td>20</td>
<td>87.0</td>
</tr>
<tr>
<td>Accelerated</td>
<td>3</td>
<td>13.0</td>
</tr>
<tr>
<td>Preferred Learning Style</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td>5</td>
<td>21.7</td>
</tr>
<tr>
<td>Visual</td>
<td>17</td>
<td>73.9</td>
</tr>
<tr>
<td>Reading</td>
<td>6</td>
<td>26.1</td>
</tr>
<tr>
<td>Writing</td>
<td>8</td>
<td>34.8</td>
</tr>
<tr>
<td>Auditory</td>
<td>7</td>
<td>30.4</td>
</tr>
<tr>
<td>Practice and Some Class Activities</td>
<td>15</td>
<td>65.2</td>
</tr>
<tr>
<td>Nursing Program Participation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulation Experience</td>
<td>22</td>
<td>95.7</td>
</tr>
<tr>
<td>Nursing Skills Lab</td>
<td>23</td>
<td>100.0</td>
</tr>
<tr>
<td>Patient Care Clinical Experiences</td>
<td>23</td>
<td>100.0</td>
</tr>
<tr>
<td>Direct Patient Care Skills</td>
<td>22</td>
<td>95.7</td>
</tr>
<tr>
<td>Observation Experiences</td>
<td>18</td>
<td>78.3</td>
</tr>
</tbody>
</table>

Table 5: Nursing Program Clinical Experience

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>Nursing Program Participation Hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulation Experience</td>
<td>29.4</td>
<td>15.8</td>
</tr>
<tr>
<td>Nursing Skills Lab</td>
<td>95.3</td>
<td>73.8</td>
</tr>
<tr>
<td>Patient Care Clinical Experiences</td>
<td>345.4</td>
<td>278.3</td>
</tr>
<tr>
<td>Direct Patient Care Skills</td>
<td>206.7</td>
<td>232.0</td>
</tr>
<tr>
<td>Observation Experiences</td>
<td>42.3</td>
<td>33.0</td>
</tr>
</tbody>
</table>

Summary of the Results

The intent of this study was to explore the variables and factors influencing metacognition as well as what facilitates the transfer of academic knowledge and skills of the newly licensed nurse into professional clinical practice. The goal was to identify variables and factors that influence and assist in developing metacognitive abilities.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 24. The results of the Metacognitive Awareness Inventory (MAI) instrument were examined for
normalcy, mean, SD, and range. Descriptive statistics were computed to examine the scores on the MAI and respondent demographics.

As only 23 respondents met inclusion criteria after a 7-month recruitment effort, this small sample limited the statistical analyses using correlations. A post hoc power analysis for a two-tailed correlation with a medium effect size of 0.3, alpha of 0.05 with the current sample size resulted in a power of 0.3. As a result of the low statistical power, additional statistical analyses comparing demographics were not feasible.

**Detailed Analysis**

The first research question was:

- **RQ1:** Do new graduate nurses have metacognitive abilities as measured by the Metacognitive Awareness Inventory (MAI)?

The MAI is a 52-item inventory using a true/false scale. The inventory contains two constructs: knowledge about cognition and regulation of cognition. The knowledge about cognition construct consists of three subcomponents: procedural knowledge (4 items), declarative knowledge (8 items), and conditional knowledge (5 items). Regulation of cognition construct consists of five subcomponents: planning (7 items), information management strategies (10 items), comprehension monitoring (7 items), debugging strategies (5 items), and evaluation (6 items) (Schraw & Dennison, 1994).

For the purpose of this study, forced completion was used with the MAI. Respondents had to answer all the survey items. If a respondent did not answer an item, the survey did not advance to the next page of the electronic survey. This strategy was employed to minimize missing data of the instrument.
Scores were calculated by summing the total number of true responses, dividing this sum by the total items in each subcomponent, and multiplying the result by 100. Higher scores indicate higher metacognitive awareness. The average score for the MAI was 87.0 (SD=10.7), knowledge about cognition was 89.3 (SD=10.6), and regulation of cognition was 85.8 (SD = 12.1). The mean and standard deviations for each of the knowledge about cognition subcomponents are as follows: 89.1 (SD=12.7) for declarative knowledge, 90.2 (SD=14.6) for procedural knowledge, and 88.7 (SD=14.6) for conditional knowledge. The mean and standard deviations for regulation of cognition subcomponents are as follows: 82 (SD =17.3) for planning, 86.1 (SD=17.5) for information management strategies, 86.3 (SD=15.2) for comprehension monitoring, 97.4 (SD=6.9) for debugging strategies, and 79.7 (SD=18.8) for evaluation.

These results indicate high levels of metacognition along with a high standard deviation, which indicates variability in metacognition between nurses. The skewness and kurtosis for the overall scale, knowledge of cognition construct, and regulation of cognition construct were within the range of a normal distribution. Skewness scores around zero (0) indicate normal distribution and kurtosis scores between -2 and 2 indicate a normal distribution. Metacognitive abilities and the process of using metacognition strategically are essential for professional practice, to reflect on cognitive strengths and weaknesses, and identify the need to be further supported in metacognitive development (Seraphin, Philippoff, Kaupp, & Vallin, 2012). The results of the analysis suggest that metacognitive abilities are present among newly licensed graduate nurses based on respondents’ metacognitive awareness scores (see Table 6 for Means and Standard Deviations for the MAI).
The second research question was:

- **RSQ1**: Do individual demographics (race, age, gender, culture, and prior education) and unit-based factors (adequacy of orientation, preceptor pairing, and facilitation of the transfer of knowledge with the support of peers, nursing management, and nursing education) influence metacognition?

This question sought to learn about relationships between metacognition and individual demographics and orientation unit-based factors. Demographic data were analyzed using univariate descriptive statistics. In reviewing the demographics using frequencies and percentages, the sample sizes for gender, race/ethnicity, region of United States, and employment status were too small to compare differences and would result in a low statistical power. Despite this, an exploratory correlation was conducted for the demographic variables for the purpose of guiding future research questions. Race, ethnicity, gender, previous healthcare experience, and region of the United States were nominal variables. Spearman’s Rho correlation was computed for each of these individual demographics with the overall MAI, knowledge of cognition, and regulation of cognition. The results, although the sample size is small, were significant for gender, the overall MAI, and regulation of cognition. A Pearson r correlation coefficient was computed for the continuous variables to determine the relationships of these variables to metacognition. The results were not significant for demographics in relation to the overall MAI, knowledge of cognition, or regulation of cognition scores (see Table 7).
Upon further analysis of the data, the researcher identified the strength of correlation coefficients. Strength of the positive and negative correlation was evaluated using the guide that Evans (1996) suggests for the absolute value of r. The researcher used the standards described by Evans (1996) to interpret the positive and negative correlation coefficients such that .00 to .19 is very weak, .20 to .39 is a weak correlation, .40-.59 is a moderate correlation, .60-.79 is strong, and .80-1.0 is a very strong correlation. Demographic data were analyzed for correlations. The relationship between total score on the MAI, knowledge of cognition, regulation of cognition, and total score on the MAI, and individual demographics overall showed weak correlations.
Moderate correlations between regulation of cognition and for both race and region of the United States were noted (see Table 7).

Unit-based factors during orientation showed significant strong correlations for primary preceptors and the MAI as well as months to pass the NCLEX-RN® and knowledge of cognition. The data support a relationship between metacognition, knowledge of cognition, and regulation of cognition and the variables discussed as positive and significant, with correlations ranging from moderate to very strong (see Table 8).

Table 8: Correlation Coefficients between Clinical Hours and the MAI

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sig. 2-tailed</th>
<th>MAI Overall</th>
<th>Knowledge of Cognition</th>
<th>Regulation of Cognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Hours</td>
<td></td>
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<tr>
<td>Simulation Experience</td>
<td>0.03</td>
<td>0.13</td>
<td>-0.01</td>
<td></td>
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<tr>
<td></td>
<td>r</td>
<td>0.91</td>
<td>0.65</td>
<td>0.97</td>
</tr>
<tr>
<td>Nursing Skills Lab</td>
<td>0.16</td>
<td>-0.16</td>
<td>0.26</td>
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<tr>
<td></td>
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<td>Patient Care Clinical Experiences</td>
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<td>0.23</td>
<td></td>
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<tr>
<td></td>
<td>r</td>
<td>0.70</td>
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<td>0.43</td>
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<tr>
<td>Direct Patient Care Skills</td>
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<td>0.44</td>
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<td>r</td>
<td>0.16</td>
<td>0.47</td>
<td>0.14</td>
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<td>Observation Experiences</td>
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<td></td>
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<tr>
<td></td>
<td>r</td>
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<td>0.15</td>
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<td>Unit-Based Factors</td>
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<tr>
<td>Weeks of Orientation</td>
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<td>-0.02</td>
<td>-0.15</td>
<td></td>
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<tr>
<td></td>
<td>r</td>
<td>0.59</td>
<td>0.94</td>
<td>0.50</td>
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<td>Primary Preceptors</td>
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<td></td>
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<td></td>
<td>r</td>
<td>0.62</td>
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<td>Months to obtain a position after passing NCLEX</td>
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<td>0.09</td>
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<tr>
<td></td>
<td>r</td>
<td>0.40</td>
<td>0.69</td>
<td>0.35</td>
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</table>

*p-value significant at= <0.05
r-Significance of two-tailed t test: Pearson
The third research question asked:

- **RSQ2: Does previous experience in the workforce or within health care foster metacognition?**

Respondents were categorized for workforce as either having previous healthcare experience or no previous healthcare experience. Of the 23 respondents, six respondents had some previous healthcare experience and 13 did not. Independent samples t-test were conducted to compare the scores of the MAI and constructs. The results were not statistically significant for the overall MAI ($t(17)=0.73, p=0.48$), knowledge of cognition ($t(17)=0.05, p=0.96$), or regulation of cognition ($t(17)=0.94, p=0.36$). Previous health care experience data were analyzed for correlations, which were found to be very weak to weak and were not significant (see Table 7).

The final research question asked:

- **RSQ3: What clinical experience factors (both academic and during orientation) influence metacognition?**

In seeking to discover what clinical experience factors influence metacognition, the clinical experience hours for simulation experience, nursing skills lab, patient care clinical experiences, direct patient care skills, and observation experiences as well as weeks of orientation were analyzed using a Pearson r correlation in relation to the overall MAI, knowledge of cognition, and regulation of cognition scores. The results for the Pearson r correlations were not statistically significant.

Clinical experience factors (both academic and during orientation) data were analyzed for correlations. For clinical hours during academia, there were significant correlations for nursing skills lab with total MAI (strong) and knowledge of cognition (moderate). Patient care clinical
experiences were positive with a strong correlation to total MAI and moderate correlations for both knowledge of cognition and regulation of cognition. Direct patient skills were moderate in knowledge of cognition and observation experiences showed a strong correlation with total MAI and very strong for regulation of cognition. The most significant correlations with the MAI and regulation of cognition were found with simulation experience as having a very strong correlation.

Clinical experiences (unit-based factors) occur during orientation and were found to show a very strong relationship with weeks of orientation and knowledge of cognition that is positive and significant. The correlations range from moderate to very strong (see Table 8).

Based on these findings, it appears application of knowledge or skills and experiential learning, particularly in simulation, significantly influence metacognitive abilities.

**Open-ended Responses**

Finally, respondents were asked to identify one factor related to their academic preparation that made the respondent successful in nursing practice.

Data were analyzed according to the guidelines for data interpretation as set forth by Creswell (2013). The elements essential to data analysis according to Creswell are: data organization, reading memoing, describing the data into codes and themes, classifying the data into codes and themes, interpreting the data, and representing or visualizing the data (Creswell, 2013, p. 190-191). The first step was to organize the responses to prepare for the data analysis. The second step was to read through all the data to obtain a broad idea of what the respondents were saying and to reflect on the meaning of the information of each response. The third step began with the process of categorizing the information into themes and coding the data. Fourth, the data were reviewed again, and statements or repeated wordings were grouped into classified
codes. Fifth was the interpretation or meaning of the data. The data were reviewed again to determine how the themes represent the respondents’ responses in order to develop the principal theme. Finally, a final description of the data represented by a frequency distribution (see Table 9) was calculated for each of the themes to determine the percentage of respondents indicating that theme (Creswell, 2013).

The researcher typed notes on key words to permit reflection on their meaning or importance. This process allowed the researcher to identify themes as the phenomenon was explored. The responses were read several times and reviewed to ensure important words were captured. Data were examined and compared for similarities and differences. Each code was typed into a Microsoft Word document to seek connections between categories and identified subcategories.

The following are descriptions of factors related to academic preparation that made the respondent successful in nursing practice according to the respondents participating in this study. Of the 23 completed responses, 20 nurses provided written comments to this particular question. Three respondents gave long responses that included more than one theme. The results of these comments corresponded to the categories of skills, disease, critical thinking, time management, patient care, and medication (see Table 9). Sub-themes surfaced in two categories. Skills include the sub-themes of technical, organizational, time management, practicing, critical thinking, and practicing skills. Patient care includes the sub-themes of interpersonal patient relationship, pathophysiology, physical assessment, and technical skills.
Table 9: Frequency Distribution for Open-Ended Responses

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skills</td>
<td>5</td>
<td>21.7%</td>
</tr>
<tr>
<td>Disease</td>
<td>2</td>
<td>8.7%</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>3</td>
<td>13.0%</td>
</tr>
<tr>
<td>Time Management</td>
<td>2</td>
<td>8.7%</td>
</tr>
<tr>
<td>Patient Care</td>
<td>4</td>
<td>17.4%</td>
</tr>
<tr>
<td>Medication</td>
<td>6</td>
<td>26.1%</td>
</tr>
</tbody>
</table>

Skills

Five respondents in this study describe skills. Each perceived that technical, organizational, time management, critical thinking, and practicing skills assisted in the transition to professional practice. For example, one respondent wrote:

Basic understanding of pathophysiology and basic time management skills.

Additionally, my nursing program prepared me well for nursing skills (e.g., I had sufficient practice starting IVs and inserting Foley catheters before employment as an RN).

Disease

Two respondents wrote that academia provided a foundation related to disease:

Without my baseline knowledge I had from clinical experience working with a renal patient population I think it would have been harder for me to be a practicing nurse working with a renal patient population.

Another example a respondent wrote:

My knowledge of illness/disease. The signs and symptoms that generally accompany that disease and how it is generally treated.
Critical thinking

Three respondents wrote about critical thinking. One respondent perceived that critical thinking skills were made stronger in practice and wrote:

I was academically prepared for utilizing critical thinking skills and working as a RN has made my skills stronger.

Time management

Two respondents mentioned time management. For example, one respondent wrote:

Basic understanding of pathophysiology and basic time management skills.

Patient care

Four respondents perceived that academia prepared them for patient care. This included physical assessment, pathophysiology, clinical experience and “[b]uilding rapport and a relationship with patients, prioritize patient care.” An example from one of the respondents:

The testing format in school prepared me for the patients I would interact with while working as a bedside nurse.

Medication

Six respondents wrote comments related to medication concerning the rights, looking up unfamiliar medications, side effects, drug classes, calculations, using resources to obtain information, and knowledge of certain medications. For example, one respondent wrote:

I was academically prepared for prescription medication identification including side effects, etc. I felt I knew a lot about the cardiac medications (as well as other drug classes) I now administer on the telemetry unit.
The findings for this question show that there is a limited relationship between the respondents’ comments and the whole concept of metacognition, which was the focus of this research study.

**Summary**

The purpose of this study was to explore the variables and factors influencing metacognition as well as what facilitates the transfer of academic knowledge and skills of the newly licensed nurse into professional clinical practice. Summary of the findings, conclusions, implications, study limitations, and recommendations for further study are provided in Chapter 5.
CHAPTER FIVE: Conclusions and Discussion

Introduction

The purpose of this study was to explore the variables and factors influencing metacognition as well as what facilitates the transfer of academic knowledge and skills of the newly licensed nurse into professional clinical practice. The following questions were posed for this study: (RQ1) Do new graduate nurses have metacognitive abilities as measured by the Metacognitive Awareness Inventory (MAI)? (RSQ1) Do individual demographics (race, age, gender, culture, and prior education) and unit-based factors (adequacy of orientation, preceptor pairing, and facilitation of the transfer of knowledge with the support of peers, nursing management, and nursing education) influence metacognition? (RSQ2) Does previous experience in the workforce or within health care foster metacognition? and (RSQ3) What clinical experience factors (both academic and during orientation) influence metacognition?

This chapter summarizes the results and provides a discussion of the results as well as considering the results in relation to the literature and the conceptual framework that provided a context for this study. Limitations of the study and implications of the results for practice are identified. Finally, suggestions for further research are presented.

Summary of the Results

Data were collected using an electronic online survey. Respondents in the study completed the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994) and a demographic instrument created by the researcher (see Appendix B and D). In order to calculate the minimum sample size required for this study, a power analysis was calculated by means of G*Power 3.1 using a medium effect size of 0.3, alpha = 0.05, and a power of 0.8 and using a one-tailed test. The power analysis indicated that 64 participants were

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needed for this study. Although the target sample size was met, only 23 respondents met inclusion criteria after a 7-month recruitment effort; consequently, this small sample limited the statistical analyses using correlations. A post hoc power analysis for a two-tailed correlation with a medium effect size of 0.3, alpha of 0.05 with the current sample size resulted in a power of 0.3. The final sample size for this study was 23 respondents.

Data were analyzed for the average scores of the Metacognitive Awareness Inventory (MAI). The average score for the MAI was 87.0 (SD=10.7), knowledge about cognition was 89.3 (SD=10.6), and regulation of cognition was 85.8 (SD = 12.1). The results of the analysis for mean and standard deviations for the subcomponents of knowledge about cognition and regulation of cognition showed high standard deviation indicating variability in metacognition among nurses.

Demographic data were analyzed for correlations. The standards described by Evans (1996) were used to evaluate and interpret the significance of the strength between the variables of positive and negative correlation, such that .00 to .19 indicates a very weak correlation, .20 to .39 a weak correlation, .40-59 a moderate correlation, .60-.79 a strong correlation, and .80-1.0 a very strong correlation (Evans, 1996). The relationship between total score on the MAI, knowledge of cognition, regulation of cognition, and total score on the MAI, and individual demographics overall showed weak correlations. Moderate correlations were noted between regulation of cognition and for both race and region of the United States.

Unit-based factors during orientation showed significant strong correlations for primary preceptors and the MAI as well as months to pass the NCLEX-RN® and knowledge of cognition. The data support a relationship between metacognition, knowledge of cognition, and
regulation of cognition and the variables discussed as positive and significant, with correlations ranging from moderate to very strong.

Discussion of the Results

In this sample the average age of respondents was 24.7 (SD=2.69); 91.3% (n=21) that were female and 65.2% (n=15) white. All respondents worked full-time and took an average of 2.2 (SD=1.63) months to obtain employment after passing the NCLEX-RN®. Sixteen respondents (69.6%) lived in the Northeast. In terms of previous workforce experience, 26.1% (n=6) of respondents had previous healthcare experience (e.g., certified nursing assistant [CNA], medical assistant/secretary, nurse extern, or pharmacy technician) and 58.7% (n=13) had non-healthcare experience (e.g., brand ambassador, customer service representative, assistant, hotel/restaurant, lifeguard, or nanny).

Discussion of Question RQ1 results

The researcher examined the instrument results of the Metacognitive Awareness Inventory (MAI). The MAI is a 52-item inventory using a true/false scale (Schraw & Dennison, 1994). Descriptive statistics, including means and standard deviations were conducted. The average score for the MAI was 87.0 (SD=10.7), knowledge about cognition was 89.3 (SD=10.6), and regulation of cognition was 85.8 (SD = 12.1). The mean and standard deviations for each of the knowledge about cognition subcomponents are as follows: 89.1 (SD=12.7) for declarative knowledge, 90.2 (SD=14.6) for procedural knowledge, and 88.7 (SD=14.6) for conditional knowledge. The mean and standard deviations for regulation of cognition subcomponents are as follows: 82 (SD =17.3) for planning, 86.1 (SD=17.5) for information management strategies, 86.3 (SD=15.2) for comprehension monitoring, 97.4 (SD=6.9) for debugging strategies, and 79.7 (SD=18.8) for evaluation. These results indicate high levels of metacognition along with a high
standard deviation, which indicates variability in metacognition between nurses, which is consistent with the literature. The results of the analysis suggest that metacognitive abilities are present among newly licensed graduate nurses based on respondents’ metacognitive awareness scores.

Discussion of Question RSQ1 results

Spearman’s rank-order correlation was used to correlate nominal and ordinal data and Pearson’s r correlation was used for interval and ratio data. Demographic data were analyzed using univariate descriptive statistics. In reviewing the demographics using frequencies and percentages, the sample sizes for gender, race/ethnicity, region of United States, and employment status were too small to compare differences and would result in a low statistical power. Spearman’s Rho correlation was computed for each of these individual demographics with the overall MAI, knowledge of cognition, and regulation of cognition. Although the sample size is small, the results were significant for gender for the overall MAI ($r_s = 0.03$), and regulation of cognition ($r_s = 0.03$). Pearson r correlation coefficients were computed for the continuous variables to determine the relationships of these variables to metacognition and were not significant for demographics in relation to the overall MAI, knowledge of cognition, or regulation of cognition scores.

Correlations for the relationship between total score on the MAI, knowledge of cognition, regulation of cognition, and total score on the MAI and individual demographics overall showed weak correlations. Moderate correlations between regulation of cognition and both race and region of the United States were noted.

Unit-based factors during orientation showed significant strong correlations for primary preceptors and the MAI as well as months to pass the NCLEX-RN® and knowledge of
cognition. The data support a relationship between metacognition, knowledge of cognition, and regulation of cognition and the variables discussed as positive and significant, with correlations ranging from moderate to very strong.

**Discussion of Question RSQ2 results**

Independent sample t-tests were conducted to examine the average MAI scores comparing respondents with previous experience in the workforce or health care to respondents that had no previous experience.

Of the 23 respondents, six respondents had some previous healthcare experience and 13 did not. Independent samples t-test were conducted to compare the scores of the MAI and its constructs. The results were not statistically significant for the overall MAI ($t_{(17)} = 0.73$, $p=0.48$), knowledge of cognition ($t_{(17)} = 0.05$, $p=0.96$), or regulation of cognition ($t_{(17)} = 0.94$, $p = 0.36$). Previous health care experience data were analyzed for correlations and results were found to be very weak to weak indicating that there is no significant relationship between MAI and previous workforce experience correlation.

The lack of correlation between the MAI and previous workforce experience, whether in health care or not, may indicate that individuals are not aware of or know how to use metacognitive abilities and may require education on how to use metacognitive strategies to promote the use of metacognitive process in both learning and application.

**Discussion of Question RSQ3 results**

Pearson r correlations for interval or ratio data were computed in relation to the overall MAI, knowledge of cognition, and regulation of cognition scores. The results for the Pearson r correlations were not statistically significant. Data were then analyzed for correlations. For clinical hours during academia, there were significant correlations for nursing skills lab with total
MAI (strong) and knowledge of cognition (moderate). Patient care clinical experiences were strongly correlated to total MAI ($r = 0.70$) and had moderate correlations for both knowledge of cognition ($r = 0.42$) and regulation of cognition ($r = 0.43$). Direct patient skills were moderately correlated with knowledge of cognition ($r = 0.22$) and observation experiences showed a strong correlation with total MAI ($r = 0.74$) and a very strong correlation with regulation of cognition ($r = 0.96$). The most significant correlations with the MAI ($r = 0.91$) and regulation of cognition ($r = 0.97$) were found with simulation experience, with a very strong correlation.

Clinical experiences (unit-based factors) during orientation were found to show a very strong relationship with weeks of orientation and knowledge of cognition ($r = 0.94$) that is positive and significant. The correlations range from moderate to very strong.

Based on these findings, it appears application of knowledge or skills and experiential learning, particularly in simulation, significantly influence metacognitive abilities.

**Discussion of Open-ended Responses**

Data were analyzed qualitatively according to the guidelines for data interpretation as set forth by Creswell (2013). The respondents’ descriptions of perceived factors related to academic preparation that made the respondent successful in nursing practice corresponded to the categories of skills, disease, critical thinking, time management, patient care, and medication. The findings showed that there is a limited relationship between the respondents’ comments and the whole concept of metacognition, which was the focus of this research study.

**Discussion of the Results in Relation to the Literature**

The literature review identified a gap in the literature in the lack of research evaluating metacognition in newly licensed graduates entering professional practice and the transfer of academic knowledge and skills to the clinical setting.
The literature reviewed for this study indicated that the ability to identify and develop cognition skills is important for use in professional practice and problem-solving abilities (Fonteyn & Cahill, 1998; Kuiper & Pesut, 2004; Young & Fry, 2008). In relation to study question RQ1, the overall MAI and subcomponent scores of study respondents suggest that metacognitive abilities are present among the newly licensed graduate nurses studied. However, the results indicated high levels of metacognition along with a high standard deviation, which indicates variability in metacognition between nurses but does not explain the variables or factors that influence metacognitive abilities in nursing.

The literature suggests that metacognition increases with age and correlates with student GPA (August-Brady, 2005; Galligan & Pigozzo, 2002; Hong et al., 2015). In analyzing the data for question RSQ1, results were not significant for demographics in relation to the overall MAI, knowledge of cognition, or regulation of cognition scores. Moderately strong correlations between regulation of cognition and for both race and region of the United States were present. However, individual demographics overall showed weak correlations. Unit-based factors during orientation showed significant positive strong correlations for primary preceptors and the MAI as well as months to pass the NCLEX-RN® and knowledge of cognition. Consistent with the literature, study results suggest that the respondents’ preceptor(s) fostered a positive relationship and learning environment during the orientation process and met individual learning needs of the respondents (Galligan & Pigozzo, 2002). Furthermore, a correlation exists between learning involvement, learning motivation, and learning performance during orientation in developing metacognitive skills and abilities (Hsu & Hsieh, 2014).

In relating question RSQ2 to the literature, Kurmaranan and Carney (2014) identified that previous experience may influence the ability of the newly licensed nurse to acclimate to
professional practice but do not relate those experiences to metacognitive abilities. Kuhn and Dean (2004) theorize that metacognition enables individuals to retrieve previously learned content or strategies and apply that information to a similar experience. The researcher found the results of the present study surprising as it was expected that those respondents who had previous health care experience would have higher MAI scores and stronger correlations with this variable than occurred. The data were not statistically significant for the overall MAI, knowledge of cognition, or regulation of cognition and correlations were found to be very weak to weak and were not significant.

For the final research question RSQ3, the literature examined clinical reasoning and reflecting on the clinical patient care experience using clinical logs to develop cognitive skills (Chartier, 2001; Fonteyn & Cahill, 1998). The correlating concept of learning showed that approaches to learning include metacognitive awareness. Having metacognitive awareness promotes a deep approach to learning (Beccaria, Kek, Huijser, Rose, & Kimmins, 2014). Ensuring opportunities to integrate what is learned by rotating between tasks, simulation, and real practice setting situations with a motivation to learn promotes transfer of learning (Chan, Chan, & Liu, 2012; Cree & Macaulay, 2000).

The findings of this study are consistent with reports in the literature in identifying significant correlations for nursing skills lab, patient care clinical experiences, and direct patient skills, with simulation experience as having a very strong correlation. Additionally, clinical experiences during orientation showed a very strong relationship with weeks of orientation and knowledge of cognition, with correlations ranging from moderate to very strong. The application of knowledge or skills and experiential learning, particularly in simulation, appear to significantly influence metacognitive abilities. Furthermore, the development of metacognitive
abilities may be influenced by nursing faculty and orientation preceptor(s) to promote thinking about thinking related to clinical situations, patient plan of care, pathophysiology, and processing patients’ information or clinical data.

**Discussion of the Results in Relation to the Conceptual Framework**

The conceptual framework that served as the guide for this study was the 3P Model of Teaching and Learning by Biggs, Kember, and Leung (2001). Each of the elements of the 3P model in combination with the study’s research questions guided this study. This model provided a structural framework within the context of professional nursing practice and the use of metacognitive abilities. The theoretical basis of this model offered a process to examine how nursing students learn and how attained knowledge is transferred (August-Brady, 2005). As applied to this study, the 3P model holds that the independent variables of race/ethnicity, age, prior education, adequacy of orientation, preceptor pairing, and the support of peers, nursing management, and nursing education; previous work experience; and clinical experiences (academic and orientation) would influence or explain the dependent variable of metacognition.

From the review of the literature several factors emerged. Deep learning is important to the development of metacognitive abilities. The findings of this study cannot generalize the factors that influence metacognition, as metacognitive abilities are an unobservable process within the mind of a nurse. However, learning approaches, learning environment, and individual characteristics (*presage* and *process*) appear to be influencing factors. Age, prior knowledge, preparedness, and the specific situation(s) encompass *presage* factors. *Process* factors of the use of metacognitive abilities demonstrate self-regulation with the ability to monitor, plan, and evaluate according to the study’s findings as measured by the MAI.
The manner in which an individual interacts with the educational stimulus of the academic and clinical learning environment and then engages in that situation is dependent on individual or situational motivation. This is supported by the correlation findings in relation to clinical experience factors. What is uncertain from the findings of this study is whether this is a surface or deep learning approach to learning and the clinical environment. Transfer of knowledge and, as applicable, successful performance of tasks as an outcome of learning (product) was noted in the strong correlation findings of this study as being influenced by clinical experience factors, preceptors, and weeks of orientation. This aligns with the literature as previously discussed and the process factors of the model’s framework of learning-related factors influenced by variables the individual is exposed to within the learning environment along with personal approaches to learning (presage). This study’s findings are consistent with the 3P model in that its factors are interrelated and a useful framework to explain how students learn and use metacognition and can be applied to nurses in the work environment (Biggs & Tang, 2011). However, an investigation on learning approaches examining both deep and surface learning was not conducted in this study and may be warranted.

Limitations

The limitations of this study were based on several aspects. First, the research problem, purpose, and questions delimit the scope of the study. Second, a quantitative approach was used to gather data regarding the research questions, which may limit the nature and quality of the data obtained. The respondents may have had unique experiences during their academic nursing program and workplace orientation influencing metacognition, which is not reflective in this study’s approach. Third, the population was delimited to newly licensed graduate nurses who attained a baccalaureate degree. This study did not include or account for registered nurses who
are newly licensed but attained a diploma or associate degree and are in the process of pursuing a baccalaureate degree. The type of degree attained may have affected the variables studied and the data results. Of note were the GPA variances among the respondents. Some schools use a four-point scale, where a 4.0 GPA is the highest available; others use a five-point scale, where a 5.0 GPA is the highest available (Moody, 2018). Participants had to have been in the professional work environment for at least six months and no more than 12 months of employment and be practicing on a medical-surgical unit. An increase in the initial length of employment of 18 months up to two years may yield more respondents for future studies. The role of learning and developing metacognition is unique to individuals along with the manner in which information is processed. The length of employment may limit the generalization of this study’s results to all registered nurses. Fourth, the sampling of participants was limited to nurses employed in acute care facilities across all four regions of the United States. The sampling for this study is a potentially biased representation of newly licensed registered nurses as new graduates obtain employment in a variety of settings apart from an acute care facility. Fifth, in answering the open-ended question, respondents did not show a relationship between their responses and having metacognitive abilities. Future studies related to respondents’ perceived influences on the development of metacognition and use of metacognitive abilities may yield meaningful results.

The proposed sample size was a total of 64 residents; however, only 23 respondents who met inclusion criteria participated in this study. This small sample size limited the data analysis, results, and respective findings; a larger sample that satisfied the power analysis may have led to significant findings in the data.
The researcher developed a demographic instrument that included six screening questions. The screening questions filtered participants for inclusion to this study. Disqualification logic was built into the online survey to exclude respondents who did not consent to the study or meet the inclusion criteria. In reviewing the data of the excluded respondents, consideration should be given to clearly defining an acute care setting and a medical-surgical unit with the screening questions as doing so may have yielded a larger sample. Registered nurses may equate working on a specialty unit, such as telemetry, neurology, orthopedics, or post-partum, as not being a medical-surgical unit.

Use of a distribution vehicle and social media appeared to be effective. Members of the vehicle contacted the researcher to inquire if the study was still open and that a number of potential participants were identified. It is possible that the potential participants initially stated they would take part in this study and later self-eliminated or chose not to participate in the study. Using social media as a means of recruitment for research is growing. This platform allows for access to a large and diverse sample. There is an opportunity to target the audience more effectively using more than one social media platform and to design the recruitment posting to be appealing to the potential participant (Gelinas et al., 2017; Kosinski et al., 2015).

An assumption in this study was that the participants would complete the study’s instruments expressing individual views or responses honestly, knowing that identities and confidentiality would be upheld (Simon, 2011).

**Implication of the Results for Practice**

To function effectively in practice, nurses must reflect on identifying how they learn, be skillful thinkers, and know when to retrieve and apply previously learned information or skills to clinical situations for effective decision making. This is the reason it is important to identify the
variables and factors influencing metacognition and establishing the foundation specific for the profession of nursing. In the researcher’s experience, the focus in academia has been on the GPA and the use of standardized tests that measure rote knowledge in preparation for the NCLEX-RN®. Although standardized tests are reflective of adequate knowledge to progress in a nursing program and as a predictor of success on the NCLEX-RN®, this approach promotes only surface learning.

In the professional practice setting, the newly licensed nurse is expected to apply previously acquired knowledge and clinical experiences to clinical situations during the orientation process. The clinical setting requires the use of metacognitive abilities to solve problems, recall information, and think critically. A standard for promoting recall and transfer of knowledge using metacognitive abilities has not been established. The varied correlations in this study between MAI scores and the variables discussed may result from a lack of emphasis on metacognition in nursing. Nursing students and newly licensed nurses may not be directed to develop or use metacognitive skills and may not understand the importance of thinking about thinking.

Fostering successful implementation of metacognitive interventions requires that the nursing profession recognize the relevance of metacognition to learning, transfer of knowledge, critical thinking, professional competence, role transition, and thinking like a nurse as described in the literature. Development of these areas by supporting metacognitive abilities beginning in academia and throughout an individual’s professional nursing career should be assessed and fostered throughout the continuum nurturing reflection on one’s own learning and making adjustments according to a given topic or clinical situation.
As health care continues to rapidly evolve and become more complex, nurse educators in both academic and employment environments need to support the ability to think, self-regulate, and to reflect on actions or strategies using metacognitive abilities. Understanding the relationship between metacognition and learning in nursing students may assist faculty in developing the nursing curriculum, both didactic and clinical, including appropriate teaching strategies to support the preparation for transition into the role of professional practice. Furthermore, employers of newly licensed graduate nurses can identify opportunities to enhance processes in the orientation structure to facilitate metacognition and the transfer of knowledge into professional practice, building upon context, theory, skills, and competence inclusive of a mentoring environment (Wong, 1979).

Suggestions for Further Research

Further research is needed to set the foundation of factors that influence metacognition in nursing students and newly licensed nurses who enter professional practice. Repetition of this study in a broader setting, with a larger sample, and more effective recruitment strategies is necessary. Data on demographic characteristics, such as gender and ethnic background of participants, were obtained to provide a description of the sample for this study. These data might also be used to compare the sample within this study with a larger population of newly licensed baccalaureate-prepared nurses comprised of the researcher’s target population. Employing a combination of passive recruitment (emails, flyers, posters), active recruitment (interacting with potential participants), and social media advertising may prove a more effective strategy to recruit respondents to future studies.

A new method of assessing metacognition may be warranted to gain a deeper understanding on the relationship of learning and metacognitive abilities. The use of a self-
The following is a summary of further recommendations for future research:

- Explore nursing programs to identify exemplars that apply instructional strategies to promote nursing students’ development of metacognitive abilities and skills. The exploration could then be expanded to examining the employment orientation process and specific strategies employed to promote metacognition.
- Examine metacognitive teaching strategies and the effect of such strategies on both metacognitive knowledge and metacognitive regulation.
- Conduct a deeper dive on learning styles to explore effective and ineffective learners and the regulation/development of metacognition and metacognitive abilities. Expand the study to examine deep and surface learning and the effects on metacognition.
- Explore metacognitive abilities across the continuum beginning in academic settings that partner with health care organizations to establish nurse residency programs with the intent to hire upon passing the NCLEX-RN®.

**Summary**

The intent of this study was to explore the variables and factors influencing metacognition as well as what facilitates the transfer of academic knowledge and skills of the newly licensed nurse into professional clinical practice. This study suggests that newly licensed nurses have metacognitive abilities as measured by the MAI. Metacognition should be assessed
and fostered throughout the continuum from academia to professional nursing practice, nurturing reflection on one’s own learning, and making adjustments according to a given topic or clinical situation. Although there were limitations to the present study, based on the correlational findings of this study that show that application of knowledge or skills and experiential learning, particularly in simulation, significantly influence metacognitive abilities, further research is warranted and should be considered by nurse educators.


Kenny, N. (2010). *What is critical reflection?* [Educational article]. Retrieved from Centre for Open Learning and Educational Support:


http://dx.doi.org/10.1108/13673270910971905


Robert Wood Johnson Foundation. (2014). *Nearly one in five new nurses leaves first job within a year, according to survey of newly-licensed registered nurses* [News]. Retrieved from


APPENDIX A: RECRUITMENT LETTER

Dear Potential Participant,

I am a doctoral student from Western Connecticut State University in the EdD in Nursing Education program. I am conducting a study to explore the transfer of knowledge and the use of metacognitive abilities in newly licensed graduate nurses. Metacognition refers to thinking about one’s thinking that includes a self-awareness of how and when to retrieve, regulate, process, and apply previously acquired knowledge or information. Metacognitive abilities may assist the newly licensed graduate nurse with the transition to professional nursing practice.

The study involves completion of a demographic profile and a 52-item research instrument. The length of time to complete this survey is estimated to be 45 to 60 minutes.

Eligibility Criteria:

In order to be eligible to participate in this study you must be:

- A new graduate newly licensed nurse with a baccalaureate degree (BSN)
- Employed at least six but no more than 12 months
- Practicing in an adult medical-surgical nursing unit in the acute care setting
- Practicing in the United States

Consent:

This letter is written to request your participation in this study. Consenting to participate in the study means that you are allowing the researcher to:

- Collect, analyze, and report your demographic, academic, and workforce data in exploring study questions.
  - Demographic data includes age, race, gender, and other information
- Academic data includes overall college grade point average (GPA), type of nursing program (traditional or accelerated), previous attained degrees, and clinical experiences
- Workforce data includes previous employment experience, prior employment in health care, and orientation experience

- Use your overall score on the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994)

Your survey answers will be sent to a link at Qualtrics.com where data will be stored in a password protected electronic format. Qualtrics® does not collect identifying information such as your name, e-mail address, or IP address. Therefore, your responses will remain anonymous. I will not have the ability to identify you or your answers. All participants will complete the demographics survey and the MAI but allowing inclusion of your data in this study is voluntary. If you choose not to have your data included, there are no consequences.

Should you decide to participate, you may withdraw from this study at any time. If the results of this study are published, your responses will be aggregated so that individual participant data is not revealed.

If you have any questions or concerns regarding your participation in this study, please contact me via e-mail me at dellesite001@connect.wcsu.edu. Should you wish to speak with me directly, a contact number will be provided via e-mail.

Your completion of the survey and MAI indicates your willingness to be included as a participant and have your responses, including self-reported demographics, included in the analysis.
Compensation:

All individuals who participate in this study can provide their name and e-mail address in a separate link for an opportunity to be included in a raffle to receive an Amazon gift card totaling $25.00. Four winners will be randomly selected at the end of the data collection and the reward disbursed to each winner. Participation in this raffle would breech anonymity since this requires both the name and e-mail address of the participant. However, announcement of the winners will not occur, and confidentiality maintained since the raffle link does not connect the participant to the completed survey.

Sincerely,

Cynthia (Cyndi) Delle Site, MSN/MBA/HC, NPD-BC, PCCN, CCRN, RN-BC
APPENDIX B: METACOGNITIVE AWARENESS INVENTORY (MAI)

Think of yourself as a learner. Read each statement carefully. Consider if the statement is true or false as it generally applies to you when you are in the role of a learner (student, attending classes, university etc.). Check (√) True or False as appropriate.

<table>
<thead>
<tr>
<th></th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I ask myself periodically if I am meeting my goals.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>I consider several alternatives to a problem before I answer.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>I try to use strategies that have worked in the past.</td>
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<tr>
<td>4.</td>
<td>I pace myself while learning in order to have enough time.</td>
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</tr>
<tr>
<td>5.</td>
<td>I understand my intellectual strengths and weaknesses.</td>
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<tr>
<td>6.</td>
<td>I think about what I really need to learn before I begin a task.</td>
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<tr>
<td>7.</td>
<td>I know how well I did once I finish a test.</td>
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<tr>
<td>8.</td>
<td>I set specific goals before I begin a task.</td>
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<tr>
<td>9.</td>
<td>I slow down when I encounter important information.</td>
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<tr>
<td>10.</td>
<td>I know what kind of information is most important to learn.</td>
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<tr>
<td>11.</td>
<td>I ask myself if I have considered all options when solving a problem.</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>I am good at organizing information.</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>I consciously focus my attention on important information.</td>
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<tr>
<td>14.</td>
<td>I have a specific purpose for each strategy I use.</td>
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<tr>
<td>15.</td>
<td>I learn best when I know something about the topic.</td>
<td></td>
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<tr>
<td>16.</td>
<td>I know what the teacher expects me to learn.</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>I am good at remembering information.</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>I use different learning strategies depending on the situation.</td>
<td></td>
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<tr>
<td>19.</td>
<td>I ask myself if there was an easier way to do things after I finish a task.</td>
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<tr>
<td>20.</td>
<td>I have control over how well I learn.</td>
<td></td>
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<tr>
<td>21.</td>
<td>I periodically review to help me understand important relationships.</td>
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<tr>
<td>22.</td>
<td>I ask myself questions about the material before I begin.</td>
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<tr>
<td>23.</td>
<td>I think of several ways to solve a problem and choose the best one.</td>
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<td></td>
<td></td>
<td>True</td>
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<tr>
<td>25.</td>
<td>I ask others for help when I don't understand something.</td>
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</tr>
<tr>
<td>26.</td>
<td>I can motivate myself to learn when I need to</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>I am aware of what strategies I use when I study.</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>I find myself analyzing the usefulness of strategies while I study.</td>
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</tr>
<tr>
<td>29.</td>
<td>I use my intellectual strengths to compensate for my weaknesses.</td>
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<tr>
<td>30.</td>
<td>I focus on the meaning and significance of new information.</td>
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<tr>
<td>31.</td>
<td>I create my own examples to make information more meaningful</td>
<td></td>
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<tr>
<td>32.</td>
<td>I am a good judge of how well I understand something.</td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>I find myself using helpful learning strategies automatically.</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>I find myself pausing regularly to check my comprehension.</td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>I know when each strategy I use will be most effective.</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>I ask myself how well I accomplish my goals once I’m finished.</td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>I draw pictures or diagrams to help me understand while learning.</td>
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</tr>
<tr>
<td>38.</td>
<td>I ask myself if I have considered all options after I solve a problem.</td>
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</tr>
<tr>
<td>39.</td>
<td>I try to translate new information into my own words.</td>
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</tr>
<tr>
<td>40.</td>
<td>I change strategies when I fail to understand.</td>
<td></td>
</tr>
<tr>
<td>41.</td>
<td>I use the organizational structure of the text to help me learn.</td>
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<tr>
<td>42.</td>
<td>I read instructions carefully before I begin a task.</td>
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<tr>
<td>43.</td>
<td>I ask myself if what I’m reading is related to what I already know.</td>
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<tr>
<td>44.</td>
<td>I reevaluate my assumptions when I get confused.</td>
<td></td>
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<tr>
<td>45.</td>
<td>I organize my time to best accomplish my goals.</td>
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</tr>
<tr>
<td>46.</td>
<td>I learn more when I am interested in the topic.</td>
<td></td>
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<tr>
<td>47.</td>
<td>I try to break studying down into smaller steps.</td>
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<tr>
<td>48.</td>
<td>I focus on overall meaning rather than specifics.</td>
<td></td>
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<table>
<thead>
<tr>
<th></th>
<th></th>
<th>True</th>
<th>False</th>
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<tbody>
<tr>
<td>49.</td>
<td>I ask myself questions about how well I am doing while I am learning something new.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50.</td>
<td>I ask myself if I learned as much as I could have once I finish a task.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51.</td>
<td>I stop and go back over new information that is not clear.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52.</td>
<td>I stop and reread when I get confused.</td>
<td></td>
<td></td>
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117
# Knowledge about Cognition

<table>
<thead>
<tr>
<th>Declarative Knowledge</th>
<th>Score</th>
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<tbody>
<tr>
<td>5. I understand my intellectual strengths and weaknesses.</td>
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<tr>
<td>10. I know what kind of information is most important to learn.</td>
<td></td>
</tr>
<tr>
<td>12. I am good at organizing information.</td>
<td></td>
</tr>
<tr>
<td>16. I know what the teacher expects me to learn.</td>
<td></td>
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<tr>
<td>17. I am good at remembering information.</td>
<td></td>
</tr>
<tr>
<td>20. I have control over how well I learn.</td>
<td></td>
</tr>
<tr>
<td>32. I am a good judge of how well I understand something.</td>
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<tr>
<td>46. I learn more when I am interested in the topic.</td>
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**Total:** 8

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<tr>
<th>Procedural Knowledge</th>
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<tr>
<td>3. I try to use strategies that have worked in the past.</td>
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<td>14. I have a specific purpose for each strategy I use.</td>
<td></td>
</tr>
<tr>
<td>18. I use different learning strategies depending on the situation.</td>
<td></td>
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<tr>
<td>27. I am aware of what strategies I use when I study.</td>
<td></td>
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<tr>
<td>26. I can motivate myself to learn when I need to.</td>
<td></td>
</tr>
<tr>
<td>33. I find myself using helpful learning strategies automatically.</td>
<td></td>
</tr>
<tr>
<td>35. I know when each strategy I use will be most effective.</td>
<td></td>
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**Total:** 4

<table>
<thead>
<tr>
<th>Conditional Knowledge</th>
<th>Score</th>
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<tbody>
<tr>
<td>15. I learn best when I know something about the topic.</td>
<td></td>
</tr>
<tr>
<td>29. I use my intellectual strengths to compensate for my weaknesses.</td>
<td></td>
</tr>
<tr>
<td>35. I know when each strategy I use will be most effective.</td>
<td></td>
</tr>
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</table>

**Total:** 5
APPENDIX C: APPROVAL TO USE METACOGNITIVE AWARENESS INVENTORY (MAI) INSTRUMENT

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<td>Licensed Content Author</td>
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<tr>
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<td>Investigating Metacognition in New Graduates Transitioning to Professional Practice</td>
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<tr>
<td>Expected completion date</td>
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APPENDIX D: PARTICIPANT DEMOGRAPHICS DATA COLLECTION TOOL

Introduction

In order to proceed, please answer the following questions to verify your eligibility to participate in this study.

1. Have you attained a baccalaureate degree in nursing (BSN)?
   
   Yes [ ]
   No [ ]

2. Are you currently employed?
   
   Yes [ ]
   No [ ]

3. Are you practicing in the United States?
   
   Yes [ ]
   No [ ]

4. Are you currently working in an acute care setting?
   
   Yes [ ]
   No [ ]

5. Are you practicing on a medical-surgical unit?
   
   Yes [ ]
   No [ ]

6. Length of employment:
   
   6 months [ ]
   7 to 8 months [ ]
   8 to 9 months [ ]
   10 to 11 months [ ]
12 months □
More than 12 months □

Please answer all the following questions as they describe you. No personal identifying information will be used.

7. Age in years:

     ______

8. Gender:

Female □
Male □
Transgender □

9. Race/Ethnic group (Select all that apply):

American Indian □
Alaska Native □
Asian □
Black or African American □
Native Hawaiian □
Other Pacific Islander □
White □
Hispanic or Latino or Spanish Origin □
Not Hispanic or Latino or Spanish Origin □
Other/ Multi-racial/Multi-ethnic □
10. What region of the United States do you live in?
   
   Northeast ☐
   Midwest ☐
   South ☐
   West ☐

11. What previous health care workforce experience have you had?
   
   Patient care associate ☐
   Telemetry technician ☐
   Nursing assistant ☐
   Medical Assistant ☐
   Radiology technician ☐
   Paramedic ☐
   Emergency medical technician ☐
   Other: (please describe) ☐
   ____________________

12. What other previous workforce experience have you had?
   
   (Please describe) _____________

The following questions relate to your academic experience.

13. Nursing Program:
   
   Traditional (4-year program) ☐
   Accelerated program ☐

14. GPA at graduation ______
15. If you completed a baccalaureate accelerated program, please indicate:
   a. The length of the program in months ______
   b. Your prior degree (specify): ______________

16. Please indicate your preferred learning style(s). Select all that apply:
   - Lecture method
   - Visual
   - Reading
   - Writing
   - Auditory
   - Actual practice and/or some activities in class

17. During your nursing program, did you participate in:
   - Simulation experience
     Yes □
     No □
     If yes, approximately how many hours? ______
   - Nursing skills lab
     Yes □
     No □
     If yes, approximately how many hours? ______
   - Patient care clinical experiences
     Yes □
     No □
If yes, approximately how many hours? ______

Direct patient care skills

Yes □

No □

If yes, approximately how many hours? ______

Observation experiences (no hands on or direct patient care)

Yes □

No □

If yes, approximately how many hours? ______

The following questions relate to your transition into the practice employment setting.

18. How many months did it take to obtain a position after passing the NCLEX?

Months

19. Are you employed:

Full time □

Part time □

Per Diem □

The following questions relate to your orientation experience.

20. Weeks of orientations ______

21. How many primary preceptors did you have during your orientation experience? ______

22. Your preceptor(s) guided you with critical thinking and clinical reasoning.

Strongly Disagree    Disagree    Undecided    Agree    Strongly Agree
23. During your orientation, you reflected upon previously acquired academic knowledge to further develop your skill set as a result of the preceptor pairing.

Strongly Disagree  Disagree  Undecided  Agree  Strongly Agree

24. You reviewed topics or skills you previously or recently mastered during:

a. Your nursing program

Strongly Disagree  Disagree  Undecided  Agree  Strongly Agree

b. Your orientation to clinical practice

Strongly Disagree  Disagree  Undecided  Agree  Strongly Agree

25. During the orientation experience, your preceptor facilitated the transfer of previously learned knowledge.

Strongly Disagree  Disagree  Undecided  Agree  Strongly Agree

26. During the orientation experience, your nurse educator(s) facilitated the transfer of previously learned knowledge.

Strongly Disagree  Disagree  Undecided  Agree  Strongly Agree

27. During the orientation experience, your nursing management facilitated the transfer of previously learned knowledge.

Strongly Disagree  Disagree  Undecided  Agree  Strongly Agree

28. Tell me one thing that you were academically prepared for that made you successful in nursing practice.

________________________________________________________________
APPENDIX E: IRB Approval

Hello Cynthia Belle Site,

I am pleased to inform you that your IRB protocol number 1714-78 has been approved by exempt review. This email is documentation of your official approval to start your research. If you need a copy of this official approval for funding purposes, please let me know oconnor@wcsu.edu. The WCSU IRB wishes you the best with your research.

You have 1 year from the date of this email to complete your research; if you are still conducting that date, you will need to fill out a renewal application. When are you finished with your study please fill out and return via email a Termination/Completion Report (available here: http://www.wcsu.edu/irb-forms.php) so we know your study is complete.

Finally—and most importantly—please remember that current OHIR technology policies do not guarantee privacy of any information on work computer physically, remotely, or otherwise (e.g., laptop, Dropbox, etc.). As such, to maintain the truth of any anonymity or confidentiality promise you made to participants (consent form, for example), you will need to store all electronic data obtained from these human subjects on a system/computer file not connected to any CIV system. It is your responsibility as the primary researcher to make sure personal data of participants remains securely private—something not guaranteed in the currently existing CIV system. As a result, because it’s ridiculous to expect faculty to store work-related research on non-work-related systems and/or to conduct research in work environment, your participants are not guaranteed anonymity/confidentiality. We are working to gain an exception for research purposes to this policy. Until then, it’s technically and legally possible for anyone in the system office to access your participants’ data at any time—without your consent or knowledge before doing so—which makes any guarantee made on research documents (e.g., consent forms) suspect unless it’s stored elsewhere.

Thanks,
Jessica Eckhorn, Ph.D.
Chair, Institutional Review Board
Western Connecticut State University
www.wcsu.edu/irb