

The Effect of Prompted Self-regulated Learning Strategies
in a Clinical Nursing Preceptorship

by

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DEDICATION

This work is dedicated to my parents and my family for never ending love and support, to my nieces and nephews whom I hope are inspired to achieve their greatest potentials, and in loving memory of my brother Tim who encouraged me to embark on this journey and would have been so proud of this accomplishment.

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ABSTRACT

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RuthAnne Kuiper

The transition of new graduates into the workplace is a concern of nursing practice and education and the development of metacognitive critical thinking skills would facilitate this transition. Aims of this study were to: (a) describe the extent that self-regulated learning strategies could be prompted during precepted clinical experiences of associate and baccalaureate degree new graduate nurses, (b) determine if self-regulated learning strategies could be increased over time, and (c) evaluate differences in self-regulated strategy use among subsets of nurses. A comparative descriptive design was used to examine data written in journals during a 10-week preceptorship program. The sample consisted of 15 new graduate nurses employed on hospital based units in the southeastern United States. Metacognitive, behavioral and environmental strategies adapted from the Self-regulation Learning Model (Schunk & Zimmerman, 1994) were used as a stimulus for reflective journaling. The new graduate nurses responded to self-regulated learning prompts for 8 weeks, and generated 99 separate journals, Verbal protocol analysis revealed the top 5 concerns for the participants to be a (a) focus on the self, (b) knowledge issues, (c) other persons, (d) clinical circumstances, and (e) activities. Both the BSN and ADN graduate had an increased use of thinking strategies and a decreased use of time referents. The ADN graduate showed a greater change for both

referents. Most participants verbalized in the present tense and made lower-level cognitive statements. Self-observation was the most common strategy used for both groups. The BSN graduate used less behavioral strategies but more metacognitive strategies than the ADN graduate. The data suggests the ADN graduates had greater cognitive gains to make to achieve some level of proficiency in clinical reasoning. The data also suggests that the BSN graduate had more experience with metacognitive thinking strategies. New graduate nurses have unique circumstances to overcome and achieving self-regulatory competence would enable them to make a smoother transition into the workplace. Self-regulated learning strategies could become an internal support or scaffold for thinking until expertise is gained.

Major professor/Dissertation chair: Dr. JoAnne Herman

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CHAPTER I

INTRODUCTION

Nurses are required to make accurate and timely decisions in a rapidly changing clinical milieu. Such decisions are situated against economic and social demands in highly technologic arenas where patients are extremely ill (Alspach, 1990; Oermann, 1994). Novice practitioners lack experience in prioritizing and accurately applying domain specific data, therefore, they have difficulty making efficient and accurate judgments concerning patient care. Thus, nursing scholars are encouraging the development of metacognitive critical thinking (CT) abilities in professional education to meet the explosion of knowledge and changing modes of health care (Bevis & Watson, 1989; Brookfield, 1987; Miller & Malcom, 1990; Paul, 1993).

An outcome of nursing education is knowledge acquisition and metacognitive CT skill development for problem solving and decision making (Miller & Malcolm, 1990; Oermann, 1994). Metacognition is self-communication about task demands and cognitive strategies a person engages in before, during and after performing a task (Beitz, 1996). Learning theory research suggests that good learners have strong metacognitive CT abilities. Poor learners can improve information acquisition, information retention and CT ability if taught processes of metacognition (Halpern, 1989). The challenge for nursing education is the development of metacognitive CT thinking abilities in clinical practice.

Four goals of professional education are (a) learning to learn, (b) handling ambiguity, (c) thinking like a professional, and (d) developing a sense of responsibility (Oermann, 1994). These outcomes require an actively engaged learner who handles ambiguity in clinical situations, has a professional approach for problem solving and is responsible and accountable for his/her actions. Self-regulation is a component of metacognition. Once learned, metacognition supports lifelong reflective thinking in divergent situations, enables one to handle ambiguity, assist with problem solving, promote responsibility for actions, and foster development of self-confidence for rapid decision making. The construct of self-regulation refers to metacognitive, motivational and behavioral activities directed to the learning process (Schunk & Zimmerman, 1994). Theoretically, self-regulation learning (SRL) strategies are likely to improve metacognitive CT abilities, reduce internal conflicts in the new graduates and support the development of the competence valued by educators and the decision making valued by nursing service employers.

The Residency Model for Nurses in Transition

The Residency Model for Nurses in Transition was a program developed by nurses representing education and service to meet health care delivery needs of the future (Collins, 1998). It was a response to a Robert Wood Johnson Foundation goal to develop a statewide nursing workforce consortium to design and implement a plan to meet South Carolina's current and future nursing care needs. The Upstate Collaborative Nursing Workforce Development team met in October 1995 and included representatives of nursing education programs, directors of public health nursing districts, and representatives of acute care

institutions. A transitional Residency Model was created as a program for associate degree and baccalaureate degree new graduate nurses to be precepted or mentored by a curriculum utilizing Patricia Benner's framework of professional practice (Benner, Tanner & Chelsa, 1996) and The Outcome, Present State, Test (OPT) Model of Clinical Reasoning (Pesut & Herman 1999).

Along with other measures of cognitive ability, the self-regulation learning model and prompts designed for this study were used to evaluate the metacognitive processes of the new graduate nurses in this preceptor program. The graduates who volunteered to participate in The Residency Model for Nurses in Transition, reflected on clinical experiences weekly using SRL prompts for the duration of their precepted clinical experience.

Self-regulation learning model

The self-regulation learning model, is a conceptual framework within the constructivist paradigm in education that incorporates and expands previous educational research from the behaviorism and information processing models of student cognition. Self-regulation, a concept within the construct of critical thinking, is currently receiving much attention from educational theorists. Cognitive research shows with all levels of students that better self-regulators of cognitive strategies have better academic outcomes (Bandura, 1997; Lindner & Harris, 1992a, 1992b; Paris & Newman, 1990; Zimmerman & Martinez-Pons, 1986; Schoenfeld & Hermann, 1982; Schunk & Zimmerman, 1994). Underdeveloped self-regulation in educational settings constrains the ability of the student to reach achievement in later vocational settings (Borkowski & Thorpe, 1994). Research that tested this theory has isolated significant

concepts from various theoretical viewpoints that suggest students can control their learning in various domain-specific contexts (Mithaug, 1993; Schunk & Zimmerman, 1994). Successful self-regulation requires a dependable experiential knowledge base, use of metacognitive CT strategies in a reflective manner, and understanding social and cultural influences on learning. Self-regulated learning has been defined and studied from various conceptual viewpoints. Self-regulated learning is a complex and interactive process that involves social, motivational and behavioral components. The concept of SRL learning merges personal, behavioral and environmental strategies the learner uses in a situation to cope with demands from internal and external sources. Research has shown that the ability to self-regulate predicts self-efficacy to achieve academic goal setting, self-evaluation standards and final grades in collegiate courses (Lindner & Harris, 1992; Zimmerman & Bandura, 1994). Self-efficacy to achieve academic goals requires self-regulated cognitive skills.

Functions of self-regulation

One assumption of SRL is that behavior is a function of the discrepancy between a goal state and current state, and the greater the discrepancy the greater use and need for self-regulatory behavior (Mithaug, 1993). In addition, the closer the match between the expected and current states as a result of self-regulatory behavior, the more likely similar self-regulatory behaviors will occur for future similar discrepancies between expected and current states (Mithaug, 1993). If the discrepancy between the expectations and current conditions persistent, the more likely the current condition will become the expectation (Mithaug, 1993).

Propositions describing the connections of the variables in the SRL model include 4 self-regulatory functions (Mithaug, 1993).

1. Expectation proposition: The identification of a gain will reduce a discrepancy. For example, adopting a self-regulation behavior that improves learning will lessen the discrepancy between current state and goal state.
2. Choice proposition: The selection of behaviors or operations will produce gain. For example, particular self-regulation strategies are more suited to reach a particular goal state.
3. Response proposition: There is a distribution of responses between producing gain and gathering information. For example, positive responses during information gathering lead to a reduction in the discrepancy on the way to a goals
4. Gain proposition: The gain toward goal attainment is produced by interactions between past gains, expectations, choices and responses. For example, the repetitions of successful behavior sequences become a dominant response to a particular set of problems.

Heuristics for SRL that arise from these assumptions and propositions are that knowledge is achieved through goal attainment and gains in learning. In addition, when expected goals are attained or surpassed, self-reinforcement is likely to occur (Spates & Kanfer, 1977). The discrimination of performance adequacy compared to a subjective standard will determine the extent of covert reward or punishment (Karoly & Kanfer, 1974). Knowledge, as a product of the activity and context in which it develops, includes cognitive development that

begins as a social process where guided regulation eventually becomes self-regulation (Anderson & Armbruster, 1990). This model applied to clinical teaching suggests a teaching strategy of educator guidance with self-regulation strategies until the student internalizes and uses the strategies successfully with subsequent problems.

Significance

Education

The quest to improve metacognitive CT abilities has gained increasing momentum during the past thirty years in education throughout the world. Norris (1985) argues that the justification for teaching metacognitive CT skills is based on the logic that students must be able to question, challenge and reason for choice. The President's Council of Economic Advisers has mandated that CT is the one characteristic a worker needs for high productivity, success and to be competitive in the business world by making well thought out decisions (Paul, 1993). Professional disciplines acknowledge the importance of CT for their domains, but are unable to guarantee it as an educational outcome by traditional pedagogical strategies, or measure it with available instruments.

President Bush's America 2000 education initiative for higher-order thinking charged the US Department of Education to improve college graduate's CT by the year 2000 (Paul & Nosich, 1991). Development of metacognitive CT skills is a mandate at the national and state levels for postsecondary education and professional preparation programs (Facione, 1995). The guidelines for this goal are not clearly delineated so the quest to define, describe, teach and measure CT skills continues to be pursued by individual states and

disciplines (Facione, 1995).

In the early 1990's the American Philosophical Association sponsored a Delphi study of over 40 multidisciplinary CT experts in the United States and Canada that resulted in a consensus definition that describes CT abilities. " We understand critical thinking to be purposeful, self-regulatory judgment that results in interpretation, analysis, evaluation and inference, as well as the explanation of evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based" (Facione, 1990, p. 2). Although the essence of CT is defined, pedagogy for CT is a missing link in education (Brookfield, 1993b; Paul, 1993).

The consensus of scholars from many disciplines is that CT development for professionals is essential to meet future challenges in their respective roles (Bevis & Watson, 1989; Brookfield, 1987; Herman, Pesut & Conrad, 1994; Miller & Malcom, 1990; Miller, Sadler & Mohl, 1993; Paul, 1993; Pesut & Herman, 1992; Ross, Walter, Malenka, & Moore-West, 1989; Royalty, 1994; Scott & Markert, 1994). Current research findings indicate that metacognition is necessary to develop CT to solve problems in new situations and dynamic environments (Pressley & McCormick, 1995). Acquiring domain specific metacognitive CT ability requires opportunities to learn and practice one's reasoning skills within context (Mines, King, Hood & Wood, 1990). This premise can be applied to professional nursing practice since nursing roles exist within dynamic environments that require specific metacognitive processes.

Nursing Education

Metacognitive CT abilities in nursing practice and education are crucial as

health care becomes more complex, the knowledge base expands, and nurses practice more autonomously (Brigham, 1993). Thinking skills are used to make judgments and support reasoning during problem solving and decision making. However, new graduates have difficulty with problem solving and decision making when making the transition from student to practicing nurse (Anderson, 1989). This concern translates into tremendous economic losses for health care institutions because new graduates become frustrated and leave their jobs. There is an attrition rate of up to 25% in the first 6 months of employment (Anderson, 1989).

The tension between nursing education and nursing service on this issue may be the result of different expectations for new graduates. For example, nursing educators perceive an outcome of skill competence as adequate criteria for licensure, since it is what a person knows to do under ideal circumstances (While, 1994). In contrast, nursing service values decision making performance which is situated behavior or what is done in authentic situations (Sternberg, 1990; While, 1994). The disparity of expectations in thinking ability leaves new graduates struggling with the ideals learned in school and the reality of clinical practice as they embark on a new career.

The struggle contributes to the graduate's lack of self-confidence, poor decision making ability and internal conflict (Boyle, Popkess-Vawter & Taunton, 1996; Gardner, 1992). The internal conflict that increases during the first year of employment (Gardner, 1992), may lead to low work motivation and disengagement (Landstrom, Biordi & Gillies, 1989). Such disengagement may also lead to carelessness and the litigation issues of record falsification,

medication errors, and practicing out of the scope of practice. Data from the National Practitioner Data Bank (NPDB) (1997) reveals that in the last 7 years, the majority of incidents against professional nurses have been related to incompetence, malpractice, negligence, fraud and unprofessional conduct. The nurses from the NPDB are 20 to 40 years of age and 84% have graduated from a generic program in the past 10 years. Regionally, 38% to 44% of all the disciplinary actions from the State Boards of Nursing in the Southeastern US., are against nurses who have exceeded the scope of practice or show actions that are inconsistent with good nursing practice (North Carolina Board of Nursing, & South Carolina Board of Nursing, 1997-1999 communication). The 20-30 year old subset of nurses in these groups includes those practitioners who may have underdeveloped CT abilities. Hence, underdeveloped CT skills do not support good clinical decision making. The awareness of these professional practice issues has caught the attention of national accrediting and governmental bodies.

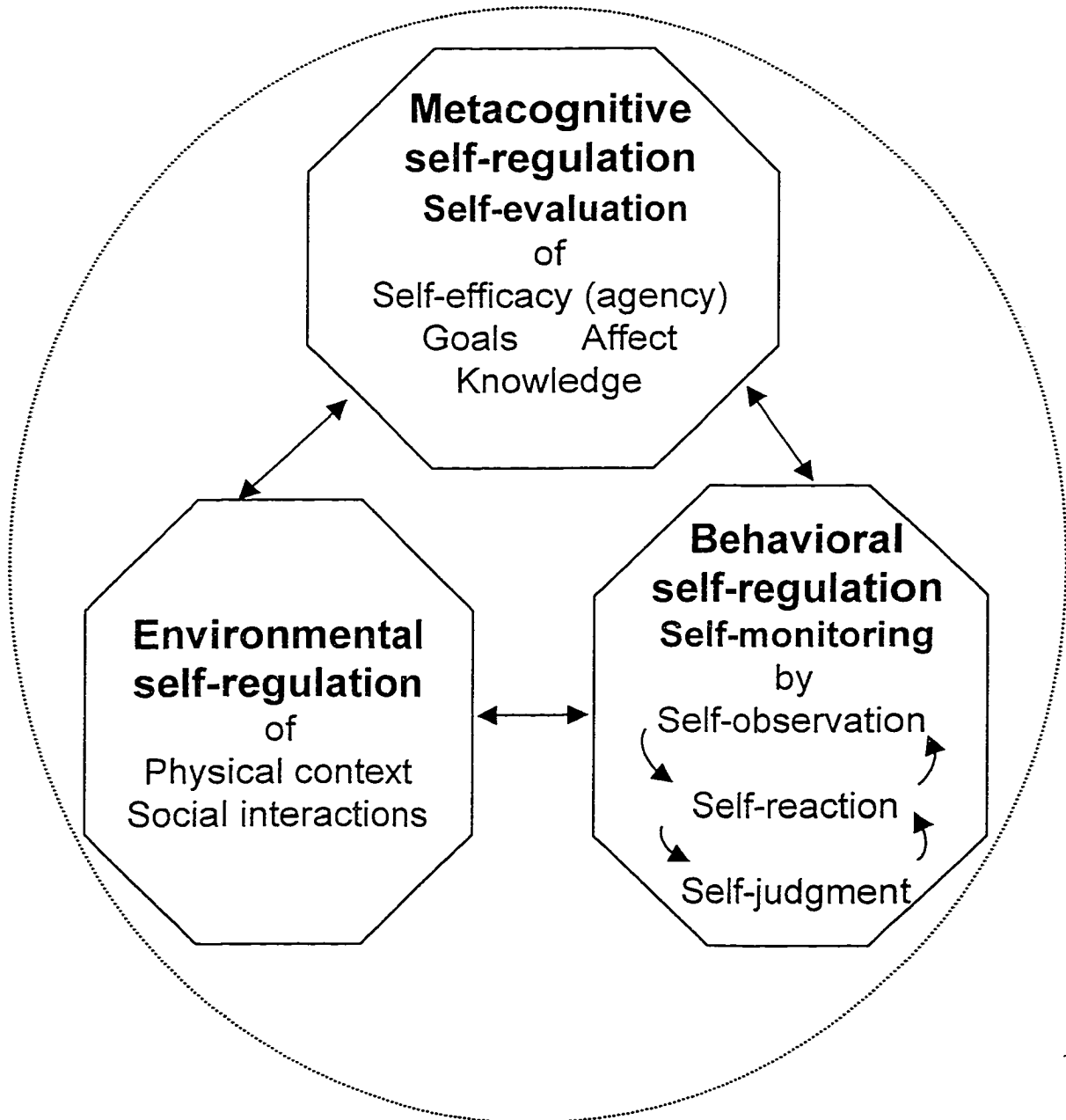
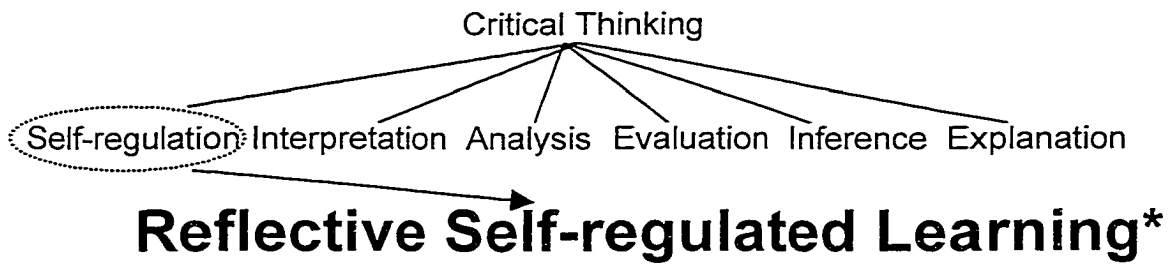
The 1989 position statement from the National League for Nursing (NLN, 1992) stated that CT be demonstrated in graduate and undergraduate nursing programs (Facione, 1995). The Pew's Health Professions Commission analysis of health care trends also identified future health professional competencies that will require metacognitive CT abilities (Oermann, 1994). Departure from the behaviorism model in the late 1980's evolved as a result of changes in health care and reformed thinking in the discipline of education. Themes and core values that have become underpinnings for changes in nursing curricula supported by the NLN include: (a) social responsibility; (b) centrality of caring; (c)

exposure, understanding, and criticism of beliefs and assumptions that guide practice; (d) theoretical pluralism; and (e) the relationship of teacher to student (Tanner, 1990). While the preceding themes and core values have been infused into curricula to varying degrees, CT which is an indirect measurable outcome of their presence is not evident. Research has shown a limited perspective of CT definition and measurement that made it difficult to implement NLN criteria (O'Sullivan, Blevins-Stephens, Smith & Vaughan-Wrobel, 1997). A survey by del Bueno (1994), revealed that 62% of new graduates did not achieve acceptable thinking scores for an entry level of practice as measured by patient simulations. Critical thinking is a desirable trait and projected outcome for nursing, however, current educational strategies in undergraduate curricula or intern mentorships have not guaranteed its development as measured by current methods. Much of the previous nursing research that took place regarding pedagogical strategies for CT was weak from a theoretical standpoint because the studies were based primarily on philosophical definitions of thinking and reflection. The research literature revealed no analytic evaluation of pedagogical strategies or predictive correlates of CT that would guarantee its development. Educators are in need of researched-based strategies to improve student metacognitive CT abilities particularly in practice professions where context defines problems and decisions .

Conceptual Framework

The conceptual model for this study, displayed in Figure 1, was adapted from the theoretical conceptions of Bandura (1997), Kanfer & Ackerman (1989),

Figure 1. Reflective self-regulated learning



*Adapted From: Bandura, 1997; Kanfer & Ackerman, 1989; Karoly & Kanfer, 1974; Mithaug, 1993; Schunk & Zimmerman, 1994; Zimmerman, 1989

Karoly & Kanfer (1974), Mithaug (1993), Schunk & Zimmerman (1994), and Zimmerman (1989). It was a synthesis of the academic research that supports conceptual relationships for educational settings.

Bandura (1986) claims that the triadic interactions between personal, behavioral and environmental self-regulation are dynamic and flow in a bi-directional manner. The strength between the relationships is not always equal and presupposes reflective thought to determine which process is necessary for a given situation. For example, self-observation of behavior may lead to the evaluation that environmental manipulation is needed in one situation and knowledge improvement in another. Bandura (1986), refers to this phenomenon as reciprocal determinism. The following discussion describes the relationship of the concepts in the SRL model.

Metacognitive self-regulation/self-evaluation

Metacognitive use of self-evaluation refers to comparing current state of behavior with the goal state to determine the extent of discrepancy (Kanfer & Busemeyer, 1982). The use of metacognition facilitates organization, monitoring and evaluation of cognitive thinking processes. It makes one aware of the cognitive processes that are being used but by itself neglect self-referent, affective and motivational processes that are also vital to cognitive development (see Figure 1) (Bandura, 1997). Students often know what to do but cannot choose what is necessary for a proficient performance. Metacognitive training can aid academic learning by prompting appropriate self-regulation.

A cognitive attribute that has a significant influence on self-regulation activities is self-efficacy. It refers to personal beliefs about one's ability to learn or

perform behaviors and actions to bring about desired results (Bandura, 1986). It relies on cognitive self-regulation achieved through reflective thought using the knowledge and skills at hand (Bandura, 1997). Students who feel they are self-efficacious in performing academic tasks are self-reinforced to use better quality learning strategies and self-monitoring of learning outcomes (Garcia & Pintrich, 1994; Zimmerman, 1989).

The goal state or standard against which behavior is evaluated refers to performance outcomes of academic achievement (Schunk, 1990). Goals have a reciprocal relationship with self-regulation processes in that their adoption optimizes self-regulatory processes. The connection between self-regulation and goal motivation creates the integrated metacognitive system that drives cognition to maintain strategies in problem solving situations (Borkowski & Thorpe, 1994). Goal directedness is essential to direct the focus of self-regulation (Schunk, 1995).

The metacognitive evaluation of affect primarily refers to feelings of satisfaction as it pertains to goal attainment or academic achievement. If the discrepancy is appraised as small or positive the individual may disengage from self-regulation altogether depending on the satisfaction assessment. If the discrepancy is large or negative there is motivation to reduce it and self-regulation will proceed to resolve it depending on capability (Bandura & Cervone, 1986).

The knowledge necessary for self-regulation includes domain specific background data, cognitive strategies, underlying conditions, allocation of cognitive resources and actions that lead to goal attainment (Schunk, 1995;

Winne, 1995). Declarative knowledge includes domain specific facts that can be recalled from a particular pattern in memory, and procedural knowledge is choosing the best organizational strategy to use that memory (Kanfer & Ackerman, 1989; Reynolds & Wade, 1986; Zimmerman, 1989). The use of declarative knowledge and procedural knowledge about cognitive abilities facilitates the use of self-regulatory strategies to enhance performance (Bandura, 1997; Bielaczyc, Pirolli, & Brown, 1995).

Behavioral self-regulation/self-monitoring

Behavioral self-regulation includes the sub-processes of self-observation, self-reaction and self-judgment (see Figure 1). Self-monitoring refers to deliberate attention to the behavior one is using to attain a goal. Self-observation is evaluated on quantity, quality, rate and originality. It consists of perceived goal progress and motivates improvement in learning (Schunk, 1990). Self-observation is closely related to self-judgment and assisted by the use of self-recording (Schunk & Zimmerman, 1997; Zimmerman & Kitsantas, 1997).

Self-reaction is an overall evaluation of responses to self-judgments such as good/bad, accept/not accept and beyond/below expectations (Schunk & Zimmerman, 1997). Behavioral self-reactions are the beliefs about academic progress and satisfaction and influence student effort to optimize specific learning responses (Zimmerman, 1989). Personal self-reactions refer to student effort to enhance their personal processes during learning (Zimmerman, 1989). Environmental self-reactions refer to student effort to improve the learning environment (Zimmerman, 1989). A positive reaction improves self-efficacy, however, negativity does not have an effect if students think they are improving

(Schunk & Zimmerman, 1994). Internal or external rewards (self-reinforcement) also enhance self-efficacy when they are associated with achievement (Zimmerman, 1989). A compromise between the two is cognitive equilibrium and academic success. The self-reaction of the student should not be underestimated in its effect to attain long-term self-regulation effects.

Self-judgment is comparing one's performance with proximity to an anticipated goal. The bases for judgments are: (a) normative standards; (b) goal properties of proximity, difficulty and specificity; and (c) goal attainment progress. Goals that are proximal and more difficult result in greater motivation, more work and greater self-efficacy (Schunk & Zimmerman, 1994). Self-monitoring in the form of judgment about one's progress is important in college students when it is frequent or supplies information that cannot be acquired in other ways (Schunk, 1996). When self-judgments are linked directly to goals, self-regulatory processes are reinforced.

Environmental self-regulation

Environmental self-regulation, the third component of SRL (see Figure 1), includes structuring the influence of context and social interactions as a background for metacognitive skills and monitoring strategies. Self-regulated learning is greatly affected by variations in contextual variables such as task features and setting conditions (Bandura & Wood, 1989). The learner perceptions of the physical environment will affect their strategy use (Schunk, 1995). The perceptions of teachers, parents and peers will also affect strategy use (Schunk, 1995). Cognitive guidance by others that enhances perceptions of capability may immunize the learner from premature closure and

promote cognitive strategy development (Bandura, 1997).

The SRL model was operationalized in this study by the use of SRL prompts for self-directed journaling during the precepted clinical experiences of associate degree and baccalaureate degree new nurse graduates. As demonstrated in previous research, students learn to generate thought-provoking questions as they are guided and prompted to use strategies at increasingly higher cognitive levels (King, 1992). This was the basis for fostering the beginning framework of SRL that would continue to develop throughout a life time of professional pursuits (Brookfield, 1993b). The description of new graduate nurse metacognitive processes used during precepted clinical experiences can provide nurse educators and preceptors with the necessary data to develop strategies to advance student and nurse CT for problem solving earlier in career development.

Purpose

The goal that unifies nursing education and nursing service is quality patient care outcomes. The way to accomplish this goal begins with the development of practitioners who are cognitively competent problem solvers. Self-regulation of cognition involves planning, the control or thinking strategies, and reflection associated with competent and independent learning (Paris & Newman, 1990). The major premise of this study is: Nursing educators can achieve educational outcomes by promoting self-regulation strategies that improve metacognitive CT abilities in novices. The purpose of this project was to describe the effects of self-regulation learning prompts on the cognitive processes of new associate degree and baccalaureate degree graduate nurses

in clinical settings with the pedagogical strategy of journaling.

The techniques of recording of one's actions and reactions with written reports are methods of behavioral observation. Evidence exists that prompting students to keep records effects their learning, motivation and self-efficacy (Zimmerman, 1989; Zimmerman & Kitsantas, 1997). Introspection forces the student to explore assumptions and prejudices. Reflection involves relating these assumptions and prejudices to experiences (Holly, 1989). As connections and contradictions become obvious, dissonance is created which moves the person toward reflection on new ways of thinking (Boyd & Fales, 1983). A major premise of this study is that guided journaling facilitates reflection and the remodeling of metacognitive thought over time.

Research questions

1. What are the effects of SRL prompts on the metacognitive processes of new nurse graduates who use reflective journaling during precepted clinical experiences?
2. Are there changes in metacognitive processes of new nurse graduates who use SRL prompts for reflective journaling for 8 weeks of precepted clinical experiences?
3. Are there differences in metacognitive processes between associate degree and baccalaureate degree nurse graduates who use SRL prompts for reflective journaling after precepted clinical experiences?
4. What relationships exist among selected cognitive measures, critical thinking variables and metacognitive processes used by participants in this study?

Definition of terms

Age

The number of chronological years recorded for an individual from birth to the present time of investigation.

Precepted clinical experiences

The practice setting of the new graduate nurse where there is direct patient contact while performing skills and making decisions for care under the guidance and supervision of a preceptor.

Knowledge base

The discipline-specific factual knowledge an individual has stored in long-term memory which can be indirectly measured by passing the National Council Licensure Examination for Registered Nurses (NCLEX-RN).

Level of education

Indicators of formal knowledge instruction which include previous educational degrees and current school enrollment.

Metacognitive processes

Metacognition refers to one's awareness of thinking which is linked to the knowledge and beliefs acquired and stored in long-term memory that concern anything pertinent to cognition (Flavell & Ross, 1981). The self-regulatory behaviors that accompany this awareness are metacognitive processes (Driscoll, 1994).

Preceptor

An expert or a specialist, such as a nurse, who gives practical experience and training to a student.

Reflective journaling

Reflection is when an individual cognitively reviews and explores a lived experience to create and clarify meaning within the self (Boyd & Fales, 1983).

Journaling is reflective writing and a record of proceedings where deliberate thought and analysis is applied to the reconstruction of experience (Holly, 1989).

Self-regulated learning prompts

Statements which educators or preceptors provide to guide or cue a nurse's thoughts, ideas, actions or behaviors. Self-regulated learning prompts develop cognitive skills through the use of metacognitive, motivational and behavioral processes that facilitate learning (Zimmerman, 1989).

Assumptions

The following assumptions were made for this study:

1. Self-regulated learning strategies pre-suppose a sense of self-efficacy and goal motivation.
2. There is new graduate nurse commitment to achieve learning goals.
3. The repetitive use of SRL strategies enhances effective teaching and new graduate nurse learning.
4. A nurse preceptor can use prompts to promote SRL strategies in new nurse graduates during precepted clinical experiences.

Limitations

The following were recognized as limitations of the study:

1. The lack of generalizability to the larger population of associate degree and baccalaureate degree new graduate nurses due to selection bias and geographic location.
2. Differences in new graduate nurse precepted clinical experiences may influence the use of particular SRL strategies.
3. Reflection and retrospective retrieval of journaled information from memory following clinical experiences may not be as accurate as immediate retrieval of just finished cognitive tasks.

Summary

The Expertise in Nursing Practice Theory states that engagement with patients is essential for the development of expertise (Benner, Tanner & Chelsea, 1996). This engagement requires learning from experience with a broad knowledge base in the nursing arts, biological sciences and psychosocial sciences. A large knowledge base and different ways of knowing are important, however, the theoretical connections between facts and practice are made through a framework of reflective thinking surrounding clinical experiences (Benner et al., 1996; Facione, Facione & Sanchez, 1994; Meleis & Price, 1988; Tanner 1987). A need exists for nursing research in the area of cognitive training to enhance the transition from educationally structured experiences to authentic practice settings (Alexander & Giguere, 1996). Research in the area of SRL with student nurses is likely to enhance competence in future clinical practice, expand the SRL model and contribute to creative pedagogy.

CHAPTER II

RELATED LITERATURE

The predominant conceptual frameworks that have been used during the 20th century to explain the process of learning includes behaviorism (response strengthening), information processing (IP), and constructivism (Mayer, 1996). Based on British empiricism or objectivism, behaviorism asserts that knowledge is gained from an experiential history where reality is sensory experience that accumulates over time for connection, agreement or disagreement with innate ideas (Aune, 1991; Driscoll, 1994). Environmental cues are antecedents to behavior, and the resultant consequences determine if the behavior will be observed again (Driscoll, 1994). The behaviorist theories described by Thorndike (1874-1949), Pavlov (1849-1946), Watson (1913) and Skinner (1968) are founded in this school of thought. When the framework, as described by Skinner, is applied to the teaching and learning of knowledge acquisition, it includes drill and practice methods with positive or negative reinforcements. The information processing model of knowledge acquisition developed in the 1960's out of reactions to behaviorism and the invention of the computer (Mayer, 1996). Based on British empiricism, IP emerged from cognitive psychology and used the digital computer as a metaphor of how humans acquire and retrieve knowledge, make decisions and answer questions (Mayer, 1996).

Information processing is defined as an intervening variable between the

environment and the individual as information is transformed in the sensory memory, short-term memory and long-term memory for storage (Driscoll, 1994). Newell and Simon (1972) described a problem solving process according to this framework where humans apply cognitive mental operators to input information and produce new output information.

Constructivism is a popular framework in education which has evolved from the legacies and reactions to behaviorism and IP since the 1980's to explain learning. Constructivism became popular as a reaction in education to artificial experimental settings. It challenged the objectivist view that knowledge is separate and independent from the learner. Based on the philosophy of Dewey (1859-1952), Piaget (1969), and Vygotsky (1962), this model holds that knowledge is created from within the learner and observed with emergent or naturalistic research designs (Driscoll, 1994). This type of thinking is characterized by active, persistent and careful consideration of any belief or form of knowledge as is stimulated by conflict within a situation and prompting guesses for resolution. Cognitive processes, an educational imperative, are important to constructivists who define knowledge as what one does in the experiential world and how one successfully thinks with abstract concepts (Steffe 1995). The student's conceptual understandings are thought to play a large part in determining their understanding of situations (Pressley & McCormick, 1995).

The self-regulation learning (SRL) model, which arises from the constructivist framework, blends of previous teaching learning models. It proposes that strategies, such as stimulus-response and memory storage, described by behaviorism and information processing are significant to the

development of metacognitive processes such as self-regulation. This chapter is a critique of significant research that influenced this study as the main components of the SRL model are defined and supported.

Self-regulated Learning

The origins of the SRL model described by Mithaug (1993) are from homeostasis or physiologic self-regulation (Cannon, 1933) and cybernetic or feedback functions of self-regulated systems (Norbert & Weiner, 1948). These homeostatic-cybernetic self-regulation mechanisms have been shown to exist when there is; (a) a discrepancy between expected and observed conditions, (b) a match between expected and current states as a result of self-regulation and (c) a persistence of the discrepancy changing the expected conditions to current state. Constructivism is an outgrowth of cybernetics which includes the processes of self-regulation and self-organization (Steier, 1995).

Piaget's (1969), genetic epistemology and Vygotsky's cognitive development influenced the origins of SRL (Driscoll, 1994). Piaget asserted that within the individual there was a parallel progress made between logical and rational knowledge organization and the psychological processes used to carry it out (Steffe, 1995). Vygotsky maintained that learning depends on intersubjective experiences from gradual internalization of problem solving instruction as the student is progressively exposed to sociocultural contexts (Steffe, 1995). The introduction of problem solving instruction occurs within what Vygotsky called "the zone of proximal development", which refers to the behaviors that are within a student's reach with assistance (Pressley & McCormick, 1995). Knowledge is constructed as mental processes actively search for understanding of incoming

experiences as they are reorganized and integrated with existing knowledge.

The SRL model has been applied to psychological adjustment for human problem solving since the early 1980's (Mithaug, 1993). An example of this process is problem solving which requires self-regulation to identify effective and efficient options to meet particular goals. Problem solving and decision making are behaviors that are used to reach a goal state. Problem solving refers to strategies that generate alternatives, and decision making refers to strategies that select alternatives (Kanfer & Busemeyer, 1982). The motivation for self-regulated thinking is directed toward a gain that justifies goal attainment.

The final purpose for using metacognitive processes for self-regulation is to meet or surpass performance standards resulting in self-reinforcement or external reinforcement (Spates & Kanfer, 1977). Reinforcement of competent professional behaviors is the goal state as nurse educators promote the successful use of self-regulation strategies for student problem solving. The following section describes the research that has investigated metacognitive processes used in domain specific learning.

Metacognition and domain specific learning

There is evidence that teaching students to self-regulate metacognitive processes prepares students to know when and where to use them (Schunk & Zimmerman, 1994). Metacognition research shows that the ability to self-regulate is related to student developmental maturation and domain expertise (Ridley, Schutz, Ganz, & Weinstein, 1991). Metacognitive training by faculty can aid academic learning by prompting appropriate use of self-regulation strategies. This cognitive guidance is important during the early influential stages

of skill development so that they can be later routinized for task demands (Bandura, 1997). Metacognitive CT processes such as analysis, goal setting, planning; organizing, transforming, rehearsing, memorizing, record keeping, self-monitoring and inference may not be recognized as transferable until repeated by affirmative experiences with diverse tasks (Pintrich & De Groot, 1990). This transference is recognized through social interactions with others and reflection on experiences.

Self-efficacy contributes to self-regulation when the individual perceives that certain behavioral strategies and environmental structuring are successful for solving a given problem. The perception of self-efficacy from the use of self-regulatory strategies during learning maintains the motivation to eventually continue them without external controls (Schunk & Zimmerman, 1994). Research shows that persons with high efficacy persist when success is difficult to attain, and persons with low efficacy tend to quit. The personal nature of self-efficacy influences the choice of activities and motivation levels to contribute to knowledge and skill acquisition. The development of self-efficacy increases with age and grade level, as the student shifts from relying on text to self-recorded notes (Zimmerman & Martinez-Pons, 1990). The use of self-regulation strategies has predicted self-efficacy beliefs to achieve academic goals, set self-evaluation standards, and to achieve final grades during collegiate courses (Zimmerman & Bandura, 1994; Zimmerman, Bandura & Martinez-Pons, 1992).

Reinforcement to use SRL strategies are more likely to occur when tasks to achieve goals are challenging, meaningful and self-determined (Alexander, 1995). Enhanced feelings of competence and interest occur when goals are

proximal in time and require discrete actions (Schunk, 1991). Goal research shows that higher levels of performance occur with goals that are specific and challenging (Ridley, Schutz, Ganz, & Weinstein, 1991). Schunk (1995) notes that if goals are too demanding, however, self-monitoring will not lead to a feeling of satisfaction. Educators can reinforce and sustain goals that facilitate academic achievement and gains in learning by making them appropriately challenging, promoting understanding, providing for collaboration and enabling decisions for successful problem solving. The self-regulatory and motivational strategies persist into adulthood and determine the occupational goal students set for themselves. These self-schemas are generated by experiential practice in vocational settings in a given domain.

Novices in vocational settings lack both domain knowledge and strategic knowledge that contribute to successful self-regulation. The schema or patterns adjust as students build a knowledge base connected with their experiences (Zigler, 1994). Thus, metacognitive training by educators can promote self-efficacy in student learning by appropriate goal reinforcement and application of behavioral strategies. The following discussion analyzes the research conducted under the critical thinking (CT) and IP frameworks related to the metacognitive self-evaluation variables of CT efficacy and knowledge organization.

Critical thinking research

Critical thinking definitions are explicit atheoretical frameworks that conceptualize a large group of descriptive studies (see Table 1). The prevailing CT definition is based on Greek philosophy advocating instruction in logic, a premise stemming from Socrates who advocated probing questions to promote

Table 1 Metacognitive Self-regulation - Critical Thinking Research

Research Purpose	Author(s)	Sample	Design	Instruments	Findings
What are the changes in CT scores over a program and do CT scores correlate with problem solving	Frederickson Mayer 1977	55 Nursing students BSN, ADN Purposive sample	Descriptive Correlation	WGCTA Problem solving test	Higher education related to WGCTA scores but not to better problem solving
What is the relationship between CT and ability to derive nursing diagnoses	Matthews Gaul 1979	48 Baccalaureate senior nursing students, graduate students Purposive sample	Descriptive	WGCTA Case Studies	No significant difference between BSN and graduate students on WGCTA, no relationship between nursing diagnosis and critical thinking
Is critical thinking positively related to moral judgment	Ketefian 1980	79 Practicing RN's, Diploma, ADN, BSN, MSN Volunteer sample	Predictive Correlation	WGCTA DIT	Positive corr. between moral judgment & WGCTA ($r = .5326, p < .001$) Significant difference for DIT between professional & technical RN (ANOVA $f = 9.6, p < .01$) WGCTA and education predict variance in moral judgment 32.9% ($F = 18.3, p = .01$)
What are the CT abilities in a group of nursing students	Berger 1984	137 Baccalaureate sophomore students (no sampling strategy)	Descriptive Correlation Pre-test Post-test	WGCTA	No significant corr. between WGCTA & gender & GPA in nursing or science Significant increase from sophomore to senior year ($p < .05, t = 3.98$)

Table 1 Metacognitive Self-regulation - Critical Thinking Research (continued)

Research Purpose	Author(s)	Sample	Design	Instruments	Findings
What are the early predictors of success in a baccalaureate nursing program	Bauwens Gerhard 1987	77 Baccalaureate nurse students 89% generic, 12% previous degree, <8% associate degree/diploma Convenience sample	Longitudinal Descriptive Correlation	WGCTA	WGCTA significant correlation to GPA (r=.26, p<.05)
What is the effect of a nursing curriculum on student's CT abilities	Gross Takazawa Rose 1987	120 Associate degree Baccalaureate degree nursing students Convenience sample	Correlation Pre-test, Post-test	WGCTA NLN NCLEX	WGCTA, entry to exit (t=9.05, p<.000) WGCTA to GPA for BSN (r=.32, p<.05) WGCTA post test to NCLEX (r=.24, p<.05)
What are the differences in CT and decision making abilities in a cross section of nursing students	Pardue 1987	60 Associate degree, Diploma, Baccalaureate, Graduate students Stratified random Sample	Comparative Cross-sectional	WGCTA Decision Making Instrument alpha .95-.97	WGCTA scores higher for baccalaureate & graduate students (p=.05) Significant difference between groups (F=7.20, p=.001) No difference for self-reported frequency in decision or difficulty
Does CT, creativity & clinical performance correlate in a nursing program	Sullivan 1987	51 Baccalaureate students RN completion Program Convenience sample	Correlation Pre-test, Post-test	WGCTA TTCT SS	Significant positive corr. on entry to exit WGCTA scores & entry to exit GPA (p<.05) Significant negative corr. between nursing school graduation date & entry WGCTA scores (p<.05)

Table 1 Metacognitive Self-regulation - Critical Thinking Research (continued)

Research Purpose	Author(s)	Sample	Design	Instruments	Findings
What academic variables are associated with CT	Tiessen 1987	50 Baccalaureate RN students Convenience sample Matching for gender	Predictive Correlation	WGCTA	Significant positive correlation with SAT (Math/Verbal), GPA, credits in arts/humanities (r=.33, .38, .32, .30; p<.05) 24% of variance
What is the difference in CT development over an academic year in a cross section of nursing students	Kintgen-Andrews 1988	177 RN students ADN students Pre-science students BSN sophomores Purposively selected Curricula Volunteer sample	Comparative Pre-test, Post-test	WGCTA	No difference between RN students and pre-health science students on WGCTA, no group made gains in critical thinking over academic year
What is the relationship between CT and clinical decision making in a cross section of senior nurse students	Brooks Shepherd 1990	200 Students: 50 each Baccalaureate degree Associate degree RN completion Diploma Convenience sample	Correlation Cross-sectional	WGCTA NPSI	Significant corr. between clinical decision making and WGCTA (r=.249, p=.05) RN completion scores higher than other groups on NPSI (p=.05) Significant diff. between RN completion/generic students & associate/diploma students (p=.05)
What is the impact of a baccalaureate nursing program on CT scores	Miller 1992	137 RN completion program Convenience sample	Ex-Post Facto Experiment	WGCTA	Nursing GPA significant correlation with WGCTA (r=.204, p=.05, 4% variance) Significant increase from pre to post test (p<.05) No significant difference with general education GPA

Table 1 Metacognitive Self-regulation - Critical Thinking Research (continued)

Research Purpose	Author(s)	Sample	Design	Instruments	Findings
How the CT abilities of nurse educators compare with baccalaureate nursing students	Hartley Aukamp 1994	50 Nurse educators from Missouri 51 Baccalaureate RN completion students Random sample	Descriptive	WGCTA	WGCTA scores higher for nurse educators (t=3.13, p<.005)
What is the relationship between CT scores and academic performance in a diploma program	Behrens 1996	172 Freshman students from 3 classes Convenience sample	Descriptive Correlation	WGCTA Academic Measures	Significant correlation between WGCTA & admission GPA (r= .59, .529, .511, p<.01) Significant lower GPA's for traditional than non-traditional students
Does education or practice change CT. Does CT correlate with Benner's stages of skill acquisition	Maynard 1996	170 Baccalaureate nurse graduates Random sample Cross-section, then Random sample from 2 cohorts	Longitudinal Correlation	WGCTA 6-D Scale	Significant correlation from senior year to practicing nurse (r=.6417, p<.05) No significance between 6-D Scale and WGCTA
What is effect of exp. Teaching method on CT & knowledge during psych. Rotation	Perciful Nester 1996	83 Baccalaureate nurse students 44 control 39 experimental Convenience sample	Quasi-experimental	Psychiatric NLN Mosby Assess Test WGCTA	Significant correlation between WGCTA and assessment, analysis, and evaluation components of NLN (r=.36, p<.005)

Table 1 Metacognitive Self-regulation - Critical Thinking Research (continued)

Research Purpose	Author(s)	Sample	Design	Instruments	Findings
What are the CT abilities of a cross-section of practicing nurses	Howenstein Bilodeau Brognia Good 1996	160 Practicing nurses in two urban hospitals Convenience sample	Cross-section Exploratory Survey	WGCTA	Scores on WGCTA in high range (mean 61.3 [0-80]) Significant negative corr. with age ($r=-.25, p<.05$), yrs. experience ($r=-.24, p<.05$) BSN score higher than diploma & AD graduates ($F=.657, p<.001$)
What is the relationship between selected discourse strategies and level of student CT	Rossignol 1997	57 Baccalaureate senior students Convenience sample	Exploratory	WGCTA Audiotape of 3 clinical post-conferences Bellack's Linguistic Analysis System	WGCTA (mean 55.5, SD 8.26) High level of questions significantly associated with CT (Conference I $p=.045 +$, II $p=.17 -$, $p=.007 +$) Teacher elaboration assoc. with low level CT $p=.045$ Teacher probing questions assoc. with low level CT $p=.009$ Greater student participation related to lower level of CT
What are the CT skills of BSN students for classes 1993-1996	Vaugh-Wrobel O'Sullivan Smith 1997	391 Baccalaureate nursing students at Entry junior level Senior level Convenience sample	Longitudinal Descriptive	WGCTA	WGCTA (mean at entry 56, SD 9.1) Significant correlation between WGCTA and age ($r=.2, p<.001$) previous degree ($t=3.02, p=.03$) Previous nursing experience had lower CT score ($t=2.13, p=.03$) After adjustment for age, degrees and nursing experience there was no difference in WGCTA scores from entry to program end

Table 1 Metacognitive Self-regulation - Critical Thinking Research (continued)

*Key: CT: Critical Thinking
DIT: Defining Issues Test
GPA: Grade Point Average
NCLEX: National Council of Licensure Examinations
NLN: National League for Nursing
NPSI: Nursing Performance Simulation Instrument
SAT: Scholastic Aptitude Test
SS: The Stewart Evaluation of Nursing Scale
TTCT: Torrance Test for Creative Thinking
WGCTA: Watson-Glaser Critical Thinking Appraisal
6-D Scale: Six Dimension Scale of Nursing Performance

critical thought, and Plato who advocated the self as abstract and oriented toward thought and imagination (Brown & Renfro, 1994; Paul & Binker, 1993; Young 1980). The philosophic definition of CT is an abstract construct comprised of multiple concepts and competencies. These characteristics limit internal consistency from a theoretical premise. The absence of a clear definition and a theoretical foundation is in part due to the lack of consensus on the competencies and scope of CT (Facione, 1990). Therefore, multiple discipline specific cognitive models have been proposed to represent the linkages between these concepts for pedagogical strategies and evaluation (Brookfield, 1987; Cholowski & Chan, 1995; Facione, Giancarlo & Facione, 1993; Kataoka-Yahiro & Saylor, 1994; Miller & Malcolm, 1990). The multiple CT definitions show a deficit of semantic clarity and consistent parsimonious relationships among concepts. The variation in definitions results in measurement difficulties and interpretation differences.

Historically, the most common definition cited by Watson and Glaser (1964) is based on the construct of CT developed by Dressel and Meyhew in 1954 (Dressel, 1961). Watson and Glaser define CT as a composite of attitudes (ability to recognize problems and the evidence to support truths), knowledge (ability to weigh the accuracy of logically determined evidence) and skills (ability to activate and apply appropriate attitudes and knowledge) (Watson & Glaser, 1964; Saupe, 1961). The Watson-Glaser Critical Thinking Appraisal (WGCTA) is the most widely used instrument that represents analytic judgment and logical reasoning by testing the skills of argument, drawing inferences, interpretation, deduction, recognizing assumptions, evaluating conclusions and assessing

strengths of reasoning (Kurfiss, 1988). Implied within the test items is the proposition that knowledge, doubt and attitudes are pre-requisites for CT abilities and reflective thinking is necessary for analytic judgment. The philosophical definition has descriptive support but little empirical support for the propositions linking attitudes, knowledge, and skills of cognitive abilities.

Nineteen nursing studies, spanning from 1979 through 1997, use a CT definition as an organizing framework with sample sizes ranging from 50 to 391 subjects (see Table 1). Descriptive designs dominate the field for the purpose of correlating demographic and academic variables to CT scores for predictive power (Bauwens & Gerhard, 1987; Behrens, 1996; Berger, 1984; Brooks & Shepherd, 1990; Frederickson & Mayer, 1987; Hartley & Aukamp, 1994; Howenstein, Bilodeau, Brogna, & Good, 1996; Ketefian, 1980; Matthews & Gaul, 1979; Maynard, 1996; Miller, 1992; Pardue, 1987; Rossignol, 1997; Sullivan, 1987; Tiessen, 1987; Vaughan-Wrobel et al., 1997). The majority of the studies were non-experimental and lack control groups for comparisons. A longitudinal correlational design was used in 6 studies to show differences in CT scores over time (Bauwens & Gerhard, 1987; Gross, Takazawa & Rose, 1987; Kintgen-Andrews, 1988; Maynard 1996; Miller, 1992; Sullivan, 1987; Vaughan-Wrobel et al., 1997). Data are collected primarily from voluntary convenience samples of nursing students and practicing nurses obtained by record retrievals, observations, mailed surveys and classroom testing.

Among the studies analyzed, independent variables of interest were measures of academic achievement (grade point average [GPA], years of education, course grade, standardized test score [SAT], type of program, level in

program), demographic variables (age, work experience, gender, race) and clinical measures (decision making, nursing diagnoses identification). Most studies correlated the WGCTA with other predictive variables for academic success (Bauwens & Gerhard, 1987; Behrens, 1996; Berger, 1984; Gross, Takazawa & Rose, 1987; Hartley & Aukamp, 1994; Matthews & Gaul, 1979; 1996; Maynard, 1996; Miller, 1992; Sullivan, 1987; Tiessen, 1987; Vaughan-Wrobel et al., 1997) or as a dependent variable measurement for cross-sectional investigations of different nursing programs (Brooks & Shepherd, 1990; Howenstein, Bilodeau, Brogna, & Good, 1996; Ketefian, 1981; Kintgen-Andrews, 1988; Pardue, 1987; Gross, Takazawa & Rose, 1987).

Content validity of the WGCTA seems plausible since it is (a) written at a 6th grade reading level; (b) captures informant interest and diligence; (c) is well understood; and (d) has established reliability and validity from many years of testing (Beck, Bennett, McLeod, & Molyneaux, 1992; Miller, 1992; Norris, 1985). Significant reliability coefficients for the test are .69 to .85 for split-half reliability, .73 for test-retest at three month intervals, and .75 on alternative forms (Rane-Szostak & Robertson, 1996). Construct validity was established by its use in instructional settings where CT was taught and by comparison with mental ability and comprehension tests (Beck, Bennett, McLeod, & Molyneaux, 1992). The WGCTA is criticized for not measuring specific CT changes in college students over short periods of time such as semesters in college (Facione, 1990; Kurfiss, 1988; Paul, 1993), and in nursing practice situations (Pless & Clayton, 1993).

A review of studies reveals that the WGCTA is significantly positively correlated with the levels of nursing education (Gross, Takazawa & Rose, 1987;

Hartley & Aukamp, 1994; Kintgen-Andrews, 1988; Maynard, 1996; Miller, 1992; Pardue, 1987), levels within a program (Berger, 1984; Brooks & Shepherd, 1990; Gross, Takazawa & Rose, 1987; Pardue, 1987), academic measures (Behrens, 1996; Kintgen-Andrews, 1988; Miller, 1992; Tiessen, 1987), a clinical decision making measure (Brooks & Shepherd, 1990) and moral judgment (Ketefian, 1981). The demographics positively associated with CT scores are; (a) age (Behrens, 1996; Howenstein, Bilodeau, Brogna & Good, 1996; Kintgen-Andrews, 1988; Vaughan-Wrobel et al., 1997), and (b) previous degrees (Vaughan-Wrobel et al., 1997).

Nonsignificant findings were found between CT scores and academic measures (Berger, 1984), a clinical decision making measure (Maynard, 1996; Pardue, 1987), the ability to identify nursing diagnoses (Matthews & Gaul, 1979) and previous nursing experience (Vaughan-Wrobel et al., 1997). Scores did not change over the course of an academic year in 4 studies (Bauwens & Gerhard, 1987; Kintgen-Andrews, 1988; Maynard, 1996; Sullivan, 1987; Vaughan-Wrobel et al., 1997) and declined slightly in another (Miller, 1992). In a recent study, Rossignol (1997) found that teacher elaboration and probing questions during clinical post-conferences was associated with low levels of CT. It was discovered in the content analysis of audiotapes that the faculty spent approximately only 10% of time in dialogue. The predictive ability of the WGCTA was shown to contribute 22% of the variance for the nurse licensure exam and grade point averages in one study (Bauwens & Gerhard, 1987), and 24% of the variance for GPA, SAT-math and credit hours in arts/humanities in another (Tiessen, 1987).

Bauwens and Gerhard (1987) argue that logic processes are emphasized on the WGCTA since scores do not change consistently over time.

The empirical evidence is inconclusive due to disparity of results, small sample sizes and lack of control for intervening variables. Criticisms of this body of research suggest that any significant correlation of academic success with CT may be related to a general college effect rather than exposure to nursing curricula (Beck, Bennett, McLeod & Molyneaux, 1992). These studies lack control groups for comparison, therefore, internal threats of history, maturation and testing exist (Campbell & Stanley, 1963). The disparity of results may be related to the lack of specific empirical indicators for knowledge, attitudes and skills assumed in the CT definitions. The conflicting results may be related to design issues or choice of dependent variable measurements such as nursing diagnoses and clinical decision making.

A recent quasi-experimental intervention study found the nursing process components of assessment, analysis and evaluation were significantly correlated with the CT scores (Perciful & Nester, 1996). Critical thinking attitudes or dispositions that are assumed under the CT definition still lack empirical support as they were not directly operationalized in any study. The lack of a clear theoretical foundation promotes non-experimental descriptive research with conflicting findings that yield little support for metacognitive development. To date, the significant contributions of this body of literature on nursing education is a description of the predictive relationships among variables for CT (academic measures, age, arts and humanities credits, level of education, type of program, work experience, and years in education). These variables seem to cross

domains and do not impact specific nursing education or practice behavioral issues. While the results of the CT research are conflicting, cognition experts agree that processing information with a solid base of knowledge is required for metacognitive thinking. Other researchers sought to explain the cognitive differences between novices and experts using the IP framework to determine if memory storage had an influence on problem solving and decision making.

Information processing research

The research that investigates IP of students and practitioners in health care make the assumption that learning requires experience with domain specific information. Experience with concepts involves mental processes and representations (mental models), a series of IP stages (short-term and long-term memory) and knowledge acquisition (Mayer, 1996). The student is a recipient of dispensed information from teacher lecture, reading and clinical practice. Information is processed into simplified generalizations of previous learning experiences and later recalled when prompted.

A significant group of studies using the IP framework from the discipline of medicine served as a model for the early educational research in nursing. For example, a large group of studies from medical education investigated the components of clinical judgment. The focus was on retrieval of relevant knowledge from memory during cue recognition, hypothesis testing and the hypo-deductive model of decision making (Barrows & Bennet, 1972; Elstein, Shulman, & Sprafka, 1978). It was concluded that differences between strong and weak problem solvers related to content and knowledge organization stored in long-term memory, not in strategies or thinking methods (Bordage & Zacks,

1984). A variety of clinical models revealed a prototype view of categorization suggesting that experts have greater interconnected knowledge networks allowing easier access for recall (Bordage & Zacks, 1984; Grant & Marsden, 1988). Proficiency in problem solving seemed to be related to pattern-matching due to previous experience (Norman, Tugwell, Feightner, Muzzin & Jacoby, 1989), diagnostic accuracy (Norman, Rosenthal, Brook, Muzzin & Jacoby, 1989), and experiential changes in the content of thinking (Grant & Marsden, 1987). Variables that remained consistent across levels were clinical reasoning (Neufeld, Norman, Feightner & Barrows, 1981), use of basic science information (Claessen & Boshuizen, 1985; Patel, Groen & Scott, 1988), and inductive/deductive approaches to problem solving (Ramsden, Whelan & Cooper, 1989). It appears that information stored in memory is changed and refined each time it is accessed through experience with cogitation.

Studies of long-term memory recall reveal that information is organized with the semantic qualities of opposites that discriminate between pieces of data obtained by integrating theoretical knowledge with clinical experience (Lemieux & Bordage, 1992). For example, making a diagnosis in clinical practice involves asking questions about symptoms using diverse and pertinent oppositions such as sudden-gradual, unilateral-bilateral, focal-diffuse, superficial-deep and peripheral-central (Lemieux & Bordage, 1992). Experts use pattern recognition and consider a broader group of diagnoses when considering data, but forward and backward reasoning is used at all academic levels (Norman et al., 1994). The expert's biomedical knowledge is integrated with clinical knowledge and easily recalled if needed (Boshuizen & Schmidt, 1992; Kaufman & Patel, 1991).

Nursing research using the IP model (see Table 2), investigates problem solving with students as compared with practicing nurses (Itano, 1989; Tanner, Padrick, Westfall & Putzier, 1987; Tabak, Bar-Tal & Cohen-Manfield, 1996; Westfall, Tanner, Putzier & Padrick, 1986), and expert nurses as compared with novice nurses (Corcoran, 1986). The main difference between novice and expert nurses relates to systematic data or cue acquisition and diagnostic accuracy (Itano, 1989; Tanner et al., 1987), complexity of inferences (Tabak et al., 1996; Westfall et al., 1986) and broadness of approach (Corcoran, 1986).

Eight hallmark studies using the IP framework are significant for their contribution to the description of clinical reasoning. Information processing and decision making is measured by simulation analysis (verbal protocol), researcher designed instruments and previously tested clinical judgment scales. Teaching decision analysis to a random experimental group of third and fourth year nursing students, improved clinical decision making which was similar to clinical decisions made by experts (Shamian, 1991). A study of baccalaureate junior students revealed a reciprocal relationship between number of cues recognized and accurate decision making (Thiele, Holloway, Murphy, Pendarvis & Stucky, 1991).

The research comparing expert and novice nurses show that experts consistently use a broad systematic approach in simple patient cases (Corcoran, 1986). In complex patient cases, the experts use a broad opportunistic approach to pursue whatever seems promising at the time. This finding supports the theoretical assumption that the task is a major determinant of decision-making behavior. Practicing nurses activate more complex inferences for diagnostic

Table 2 Metacognitive Self-regulation - Information Processing Research

Research Question	Author(s)	Sample	Design	Instruments	Findings
What are the differences between novices & experts in planning tasks	Corcoran 1986	6 Expert nurses (18 mo. Hospice experience) Purposive sample	Descriptive	Verbal Protocol Analysis	Experts used broad approach significantly more often (Fischer's exact $p=.011$) 1. Opportunistic approach in complex cases 2. Systematic approach in simple cases Novices used opportunistic approach in all cases Experts make better quality plans
What are the differences between nurses & students in hypothesis generation & inference activation	Westfall Tanner Putzier Padrick 1986	28 Baccalaureate senior & junior nursing students 15 Staff nurses (BSN, expert level) Convenience sample	Exploratory	Simulations Verbal Protocol Analysis	No significant difference between groups for number of hypotheses, inferences Nurses used significantly more complex hypotheses (Sheffe: $f=3.3, p=.03$)
Is there a difference between practicing nurses & students in diagnostic reasoning	Tanner Padrick Westfall Putzier 1987	15 Junior nurse students 13 Senior nurse students 15 Practicing nurses Convenience sample	Exploratory	Simulations Verbal Protocol Analysis	Knowledge level did not alter the ability to activate hypotheses Information processing does not explain this difference Experts are more focused Questions asked depend on characteristics other than content of task

Table 2 Metacognitive Self-regulation - Information Processing Research (continued)

Research Question	Author(s)	Sample	Design	Instruments	Findings
What are the differences in clinical judgment between RN's and students	Itano 1989	13 Baccalaureate senior nurse students 13 Practicing nurses Purposive sample of expert nurses	Comparative	Interviews to identify cues & judgments Developed scales (alpha .40-.71)	Current cue state common (63%). No significant diff. in number and type of cues for groups. Significantly higher judgment scores for RN's (F=15.43, p<.01)
What is effect of teaching decision analysis to students	Shamian 1991	68 Baccalaureate nurse students 37 experimental group 31 control group Random sample	Post-test Experimental	Nursing Clinical Case Studies Instrument - 3 cases (alpha .92, .78, .90)	Experimental group selects clinical decisions similar to experts more often than control group for all 3 cases (p<.001)
What are patterns & perceptions of student decision making	Thiele Holloway Murphy Pendarvis Stucky 1991	82 Junior baccalaureate nurse students in first clinical course Convenience sample	Descriptive	Simulations (alpha .89-.90) Clinical Decision Making in Nursing Scale (alpha .83)	Cure 65-85% correct Nsg. Dx. 72% accurate Low scores on CDMNS (possible 200; mean 111-114)
What is effect of information consistency on decision making	Tabak Bar-Tal Cohen-Mansfield 1996	92 Practicing nurses 65 Senior level nurse students Convenience sample	Descriptive	Consistent/Inconsistent Scenarios Decision Difficulty Scale (alpha .87-.90)	Nurses: 1. Certainty of diagnosis based on consistent information 2. Less certain of diagnoses based on inconsistent information Students: No pattern
What is the influence of education & experience on home health nurses used of base rate data	O'Neill 1994	214 Practicing home health nurses 91 ADN 94 BSN 29 Master's degree Random sample	Survey	Clinical inference vignettes representing base rate data (content validity index.75) Pre-test (KR .82)	Novice AD score lower than expert AD (44% vs 67%) Expert BSN, MSN score lower than novice BSN, MSN (42% vs 55%) Novice AD's select more normative options. Expert BSN & MSN select more normative options than AD experts

reasoning than student nurses (Westfall et al., 1986). Other data from this study reveal more systematic data acquisition and diagnostic accuracy with increased levels of knowledge and experience (Tanner et al., 1987). A recent study comparing novice and experienced nurses revealed that novice nurses use more cognitive structuring and less analytic processing when clinical information is complex (Tabak et al., 1996). O'Neill (1994) finds in a group of novice versus expert home care nurses, that novices used more base rate or prototype data than experts. O'Neill theorizes that the differences in educational curricula (using more prototype cases for technical preparation) may influence later clinical reasoning with baccalaureate nurses since they use less normative data.

Pattern or prototype situations (schema) learned from experience or instruction, seem to be a prerequisite for IP in clinical decision making and affect long term memory recall. The expert can narrow the search when gathering data based on preestablished cue patterns. There is only a trend in better decision making and complex hypothesis generation for the expert in clinical situations or simulations. The finding that does not support the IP framework is that data acquisition strategies are similar between novices and experts, particularly when the task is perceived as complex. Verbal protocol analysis (VPA) of the data did not predict the development of expertise in clinical judgment, nor the heuristics educators could use to foster it.

Verbal protocol analysis

The primary method used to analyze internal memory capabilities is VPA. Verbal reports can directly expose the information in short-term memory, and indirectly expose the information in long-term memory as it is retrieved (Ericsson

& Simon, 1993). This information includes declarative or hierarchical knowledge which is unaffected by contextual conditions and refers to how to use strategies (Zimmerman, 1989). It also includes procedural or metacognitive knowledge which is organized around contextual conditions and refers to when to use strategies (Zimmerman, 1989). The IP research in nursing that used VPA was able to show that there was no diagnostic difference between levels of nurses with clinical simulations irregardless of knowledge level (see Table 2). These important findings were the earliest indication that cognitive processes in nurses could be evaluated with VPA. Therefore, VPA is a valid method to analyze the cognitive processes that could be retrieved from verbal data of journal entries.

An evaluation of the research thus far shows that clinical thinking is not entirely dependent on IP since novices and experts, who have different levels of domain specific knowledge, have similar cognitive strategies. Clinical reasoning is also not explained solely by CT ability since levels of practice or education do not predict better CT scores as measured by standardized tests. There is support, however, that clinical reasoning with experience based knowledge results in diagnostic accuracy and/or pattern recognition (Fonteyn, 1998; Grobe, Drew, & Fonteyn, 1991; Kuipers & Kassirer, 1984). There is a lack of explanation, however, when it comes to the actual strategies or processes needed to link IP and metacognition for the development of critical thinking. Other directions of cognitive research to explain clinical thinking are behavioral self-monitoring and environmental structuring.

Behavioral self-regulation/Self-monitoring

Self-regulated learning is determined by cognitive processes but they are also influenced by behavioral and environmental events (Zimmerman, 1989). Behaviors are the self-generated, proactive use of learning strategies that are observed and evaluated by reflection. The current thought on behavioral self-regulation is that it includes the three sub-processes of self-observation, self-reaction and self-judgment (Schunk & Zimmerman, 1997; Zimmerman, 1989). For example, reflecting on one's cognitive thoughts (self-observation) elicits a response (self-reaction) and a subsequent decision (self-judgment). These decisions about behavior determine subsequent willingness (self-reaction) to continue to use strategies (Zimmerman, 1989). The greater use of self-explanation or observation during the encoding phase of learning was accompanied by greater performance gains in problem solving in a group of 24 university students (Bielaczyc, Pirolli, & Brown, 1995). Research also shows that regular and timely self-recording of self-observation is accurate and beneficial for learning (Schunk & Zimmerman, 1994). It appears that over-learned tasks may disrupt self-regulation when behaviors become routine and automatic. Therefore intermittent timing of self-observation may be less demanding and encourage more efficient self-regulation.

Self-reactions, which are beliefs about academic progress and satisfaction, are reinforced by internal or external rewards (Zimmerman, 1990). In a study of 66 college students preparing for the Graduate Record Examination, positive self-judgments and high-mastery led to disengagement from self-regulation (Tomarken & Kirschenbaum, 1982). The key influence over

behavioral self-regulation is the covert personal self-regulation and environmental processes (Zimmerman, 1989). A recent interest in reflective thought and practice attempted to investigate the covert cognitive processes in domain specific contexts. The following discussion describes research using reflection models that determine metacognitive differences among individuals.

Reflective practice research

The significance of the research surrounding reflection relates to the connectedness it has with cognition and self-monitoring. Specifically, the metacognitive CT skills of inference, recognition of assumptions, deductions, interpretation and evaluation are used during the reflection on an experience. The significance of fostering and measuring reflection is subsumed in the construct of CT in nursing (Facione & Facione, 1996), and education (Kompf & Bond, 1995; Mines, King, Hood, & Wood, 1990; Schmidt & Davison, 1983). Reflective practice has also been mandated as an international outcome of education (Powell, 1989). Reflection differs from recalling content knowledge in that it has the potential to generate new knowledge (Boyd & Fales, 1983). The assumption tested in the reflective research is that fostering reflection would improve metacognitive CT abilities during decision making or problem solving.

The models of learning that influence reflective research are the views of reflection described by Mezirow (1990) and reflective practice by Argyris and Schön (1974). Mezirow (1990) describes learning as constructing meaning from experiences by reflecting and comparing them with previously held beliefs, values and schemata. Mezirow's (1981) levels of reflectivity include non-reflection, reflection and critical reflection. Within reflection are the sublevels of

reflectivity (awareness, observation, description), affective reflectivity (awareness of feelings), discriminate reflectivity (assessment of decisions, evaluation of planning) and judgmental reflectivity (being aware of value judgments). Within critical reflection are the sublevels of conceptual reflectivity (assessment of need for further learning) and theoretical reflectivity (awareness that routines are not adequate, change in perspective).

The Argyris and Schön (1974) models of learning are theories of action in practice with the axiom that people design all their actions. Theories of action determine the actual behavior of professional practitioners and are vehicles for explanation, prediction or control. Theory-in-use, or the actual use of theories, is communicated to others to govern actions that may or may not be compatible with espoused theory (written or talked about theories). Model I, the reflection during practice, constitutes a psychology of everyday life that is self-sealing as it prevents learning (single-loop learning). Model II of reflective practice does not self-seal, permits progressive testing of assumptions and progressively greater learning about one's effectiveness (double-loop learning). Transition from Model I to Model II behavior produces individual awareness and growth. The constructs, concepts and propositions of the models are qualitatively observable, however, have not been easy to quantify, operationalize or test as can be seen in the following investigations.

Nursing studies (see Table 3) use the reflective models of Mezirow (1990), and Argyris and Schön (1974), as implicit (Burnard, 1995; Jones, 1995; Landeen, Byrne, & Brown, 1995), and explicit conceptual frameworks (Davies, 1995; Powell, 1989; Richardson, & Maltby, 1995; Wong, Kember, Chung, & Yan,

Table 3 Behavioral Self-regulation - Reflection Model Research

Research Purpose	Author(s)	Sample	Design	Instruments	Findings
Do nurses reflect in action and at what level	Powell 1989	8 Registered nurses hospital based & community Purposive sample	Case Study	Structured Interviews Observations	Professional practice is a continuum between technical-rationality-based practice & practice using reflection in action The majority of these nurses were at the technical-rationality level
What are nurse teacher perceptions of reflection	Burnard 1995	12 Nurse educators Snowball purposive Sample	Descriptive Qualitative	Semi-structured interviews	Majority support reflection but it has unproved value Questions: is it accurate, what about hindsight bias, is it paralyzing?
What effect does reflection have on students as learners in clinical practice	Davies 1995	6 First year nursing students in clinical course Purposive sample	Grounded Theory	Clinical Debriefing Journaling Interviews	Debriefing led to involvement in practice, identification of learning needs, accept self-responsibility & collaboration. Journaling shows patient becomes center of focus in later entries
What is the effect of hindsight bias on the reflective process	Jones 1995	27 Practicing nurses 4 Hindsight groups 1 Foresight group Convenience sample	Exploratory	Vignette's Researcher developed questionnaire	Hindsight bias exists in nursing and prevents access to available data

Table 3 Behavioral Self-regulation - Reflection Model Research (continued)

Research Purpose	Author(s)	Sample	Design	Instruments	Findings
What are the lived experiences of psych. Students by reflective journals	Landeen Byrne Brown 1995	18 Third year nursing students in psychiatric clinical experiences Convenience sample	Field study Descriptive	Journal analysis	Major themes of journaling include: acknowledgment of lack of skills, inexperience in communication, establish relationships, control over patients, personal growth through reflection, identification with patients
What is the extent and level of student reflection during community health experiences	Richardson Maltby 1995	30 Second-year nursing students in community clinical experiences Volunteer sample	Field study Descriptive	Diaries Interviews Reflectivity measurement	Greatest reflections occur at the lower levels of cognition (36% - level 1, 28% - level 4, 2% - level 5, 3% - level 6) Themes from interview analysis include: threat of evaluation, awareness of thinking, analysis & learning, awareness of feelings
Develop a coding system for reflective papers based on Boud's & Mezirow's models	Wong Kember Chung Yan 1995	45 RN students in an education class Purposive sample	Descriptive	Interviews Reflective papers	Three levels of reflection identified as non-reflector (13%), reflectors (75%), & critical reflectors (11%)

1995; Wong, Loke, Tse, Kan, & Kember, 1997). Data is analyzed qualitatively by describing emerging themes and relating them to existing conceptual categories in the theories. The 7 studies of interest span from 1989 to 1995 and include nurses and students in educational and practice settings. Samples range from 6 to 45 informants selected by purposive and convenience methods. The sample size and selection is based on availability of subjects and the researcher's knowledge about the population (Polit & Hungler, 1995). Descriptive qualitative research designs are used to collect interview data which is justified by naturalist axioms that support observations to view reflective practice (Argyris & Schön, 1974). Analysis methods include frequencies of thematically coded categories (Jones, 1995; Landeen et al., 1995; Powell, 1989; Richardson, & Maltby, 1995; Wong et al., 1995), content analysis organized by reflection levels (Burnard, 1995) and grounded theory method (Davies, 1995). Instruments for investigation include researcher created interviews (Burnard, 1995; Davies, 1995; Powell, 1989; Richardson & Maltby, 1995), vignettes and questionnaires (Jones, 1995), reflective papers (Wong et al., 1995), diaries, and journals (Landeen et al., 1995; Richardson & Maltby, 1995; Wong et al., 1997).

The empirical evidence reveals that the reflection, whether it be from journals, diaries or interviews develops in varying degrees depending on the individual subject. Analyses of diaries reveal a shift in focus from self to client in senior (Landeen et al., 1995) and freshman level students (Davies, 1995). It seems that the majority of students use Mezirow's lower level of reflection and cannot demonstrate efforts at validating assumptions or transforming perspectives (75.6%, Wong et al., 1995; 94% Richardson & Maltby, 1995; 30%

Wong et al, 1997). In a recent study, Wong et al., (1997) found that reflective dialogue by faculty could change reflective journal entries if students possessed the attributes of willingness and commitment to reflection, and open-mindedness. The critical level of reflectivity does not appear to be common in the nursing student especially without faculty guidance.

It is also apparent that the ability to reflect takes time to develop when used as self dialogue. Reflection differs between hospital nurses who use lower levels of reflection (consciousness and beliefs), compared with community nurses and nurse practitioners that use higher levels of reflection (critical consciousness, laws and norms). It is suggested that the type of experience may be a variable that affects the ability to reflect and not the years of working experience (Wong et al., 1995). A confounding circumstance that influences reflection is the perception of the informant/researcher relationship. Student's fear of judgment and evaluation by faculty is an issue in three studies (Davies, 1995; Landeen et al., 1995; Richardson & Maltby, 1995). On the other hand, if experiences are shared with peers and faculty in a non-judgmental manner, support became part of the reflective process (Davies, 1995).

A major drawback of this research is a noted lack of reported rigor for data analysis based on qualitative criteria (Morse, 1994). Credibility is suspect when interactions with informants are single interviews and not confirmed with subsequent meetings (Richardson & Maltby, 1995; Powell, 1989), however, narrative examples are used in the reports to reestablish these criteria (Davies, 1995; Landeen et al., 1995; Richardson & Maltby, 1995; Wong et al., 1995; Wong et al., 1997). Inter-rater reliability is usually reported when more than one

rater is involved (Landeem et al., 1995; Richardson & Maltby, 1995; Wong et al., 1995), but only two studies reports reliability coefficients for coding procedures (Wong et al., 1995; Wong et al., 1997). Transferability or generalizability to other populations, is expressed as a design limitation (Burnard, 1995; Jones, 1995; Landeem et al., 1995; Powell, 1989; Richardson & Maltby, 1995; Wong et al., 1995). Research settings from 3 different countries with unique practice environments also limit generalization.

The reflection model proposition that knowledge is created from within the learner is partially supported by the shifts in student focus from self to client during the length of a course (Davies, 1995) and the stimulation of reflection by discomfort in the clinical setting (Richardson & Maltby, 1995). Individual awareness and growth by transition from Model I to Model II behavior is somewhat supported by themes of developing relationships, discussion of feelings and self-reflection (Davies, 1995; Landeem et al., 1995). Model I levels of reflection, are most commonly observed in nursing students with Model II levels appearing only 6% to 11% of the time (Richardson & Maltby, 1995; Wong et al., 1995). The data suggests that reflection increases involvement, understanding and confidence in practice that leads to improved knowledge and skills (Davies, 1995).

The empirical support for reflection as a learning model is weak due to the infancy stage of investigation, lack of consistent evidence, and omission of experimental rigor. The weakness of current methods may be due to the lack of reliable instruments and identification of experimental variables that could test a reflection intervention (Davies, 1995; Powell, 1989; Wong et al., 1995). There is

a need for longitudinal research for prediction, interventions for teaching strategies, and cross-sectional surveys to examine reflection at different levels of education and practice (Wong et al., 1995). It is apparent that reflecting on clinical behavior does not guarantee learning or progression to higher levels of reflection. It appears that reviewing behaviors is not a singular strategy to promote learning or gain meaning from experiences.

Reflective journaling

Evidence exists, however, that prompting students to keep records affects their learning, motivation and self-efficacy (Zimmerman, 1989). It was shown that elementary school children who were taught to self-record had positive self-reactive effects on learning (Schunk, 1983). Students were able to be introspective and reflect by recording and describing experiences, feelings and thoughts (Holmes, 1997). Introspection forces the student to explore assumptions and prejudices, and reflection requires that they relate these to experiences (Holly, 1989). As connections and contradictions become obvious, dissonance is created which moves the person toward reflection on new ways of thinking (Boyd & Fales, 1983).

In the nursing literature, the techniques of recording one's actions and reactions by the use of journals or diaries did capture significant data when reflecting on clinical practice (Davies, 1995; Landeen, Byrne, & Brown, 1995; Richardson & Maltby, 1995; Sedlak, 1997). There was an awareness of thinking processes, clinical skills and patient interaction, but no apparent progress in metacognitive CT abilities. The key difference from the educational literature is that the narratives in the nursing studies were not carefully guided or scaffolded

with prompts over time. If domain specific learning is to be promoted, self-regulatory competence has to be internalized after guidance for independent function (Schunk & Zimmerman, 1997). The assumptions and propositions of SRL that address review of discrepancies between the goal-state and current for learning require probing internal states by verbal methods. This requires cognitive practice with reflection for self-evaluation and self-monitoring which can be captured with written reports such as journaling. Another self-regulation strategy thought to impact ability to reflect is environmental structuring and its influence on metacognitive and behavioral processes.

Environmental self-regulation

Environmental self-regulation refers to the student use of environmental resources and/or context to facilitate learning. Kanfer and Ackerman (1989) describe environmental influences in a related view of self-regulation as "proximal resource allocation". An example is seen when a teacher serves as a guide to the learner who makes sense of information by participating in academic tasks and social negotiation with others (Mayer, 1996; Steffe 1995).

Undergraduate students who receive metacognitive training in a cooperative learning situation with self-regulation prompts benefit from peer support with reduced anxiety, increased motivation, enhanced sense of control and competence (McInerney, 1996). The following discussion includes studies that demonstrate the influence of social interactions and environmental context on nursing student learning.

Social interaction research

Social interaction research that examines clinical learning in nursing uses

the social cognitive theory (SCT) by Bandura (1986). Social cognitive theory is a cognitive behavioral model that has been used in education and tested with a wide variety of populations where learning was assessed. This theory emphasizes that knowledge is obtained by observing others. Observational learning is comprised of four processes; attention, retention, motor reproduction and motivation. The attentional aspect refers to what is being attended to and learned, which depends on the characteristics of the situation and the observer. Retention refers to long term memory and depends on how information is coded through rehearsal processes. Motor reproduction represents skills that develop by attempts at individual trials and/or watching models. Motivation refers to having a value for performance that can be reinforced from within the self or through support of others. The significance for teaching and learning from this theory is that cognitive and academic behaviors can be acquired and developed through observation.

In a 1992 study by Saarmann et al., (see Table 4) Bandura's (1969) SCT is used as a framework for an investigation that reveals nursing students, nurses, and nursing faculty have similar personal and interpersonal values of independence, support, goal orientation and achievement. The same study suggests that student nurses might identify with nursing models or self-select into the profession. In another study of senior nursing students, self reported competencies improved more after a preceptorship versus weekly clinical experiences with an instructor in acute settings (Ridley, Laschinger & Goldenberg, 1995). Although the theoretical concepts were marginally

Table 4 Environmental Self-regulation - Social Interaction Research

Research Purpose	Author(s)	Sample	Design	Instruments	Findings
What are the different values and critical thinking abilities in this cross sectional sample	Saarman Freitas Rapps Reigel 1992	32 Associate degree 32 Baccalaureate degree 32 College faculty 32 Sophomore college students Convenience sample	Cross-section survey	WGCTA Gordon's Personal and Interpersonal Scale	WGCTA scores were not significantly different when age was controlled Values: Faculty: achievement, independence, support Nurses: independence, goals Students: goals, support, benevolence
What is the effect of preceptor-ship on student adaptive competence, environment perceptions & learning styles	Ridley Laschinger Goldenberg 1995	55 Third-year community College nursing Students Convenience sample	Pre-test, Post-test 575 hours preceptor experience	1. Kolb's learning style 2. Environment questionnaire 3. Education assessment	All reported competencies higher after preceptorship

*Key: WGCTA - Watson-Glaser Critical Thinking Appraisal

operationalized, the findings suggest that observation of sociocultural behaviors influence values and achievement when learning the practice of nursing.

Clinical context research

There are 4 qualitative studies within the last 4 years that investigate situated clinical experiences. Loving (1993) conducted a grounded theory study to investigate the phenomenon of judgments students make during clinical experiences (see Table 5). Interviews were conducted with a cross-sectional sectional sample of purposively selected nursing students. Qualitative analysis discovered patterns of clinical judgment (cognitive rigidity versus flexibility), depending on student perception of the clinical experience as an evaluative or learning opportunity. An evaluation focus during clinical experiences inhibited learning and cognitive flexibility (Loving, 1993).

A Heideggerian phenomenological study by Diekelmann (1993) investigated the lived experiences of students and faculty in baccalaureate education. Faculty and students were concerned with cognitive gains, during content application while using reflective thinking. Learning as cognitive gain is interpreted by Diekelmann (1993) as the desired goal of clinical experiences. Rich narrative examples and researcher/informant interactions support the credibility of emergent themes and categories.

Wilson (1994) uses ethnography to explore senior baccalaureate nursing students experiences with acutely ill infants. The students developed a perspective that included goals, actions consistent with goals, criteria for goal achievement, and perceptions of roles in the social environment. Social interactions determined clinical behaviors such as "looking good" for the

Table 5 Environmental Self-regulation - Clinical Context Research

Research Purpose	Author(s)	Sample	Design	Instruments	Findings
Day to day lived experiences of students & teachers in clinical	Diekelmann 1993	21 Faculty 21 Students in baccalaureate nursing program Convenience sample	Qualitative design (Phenomenology)	Unstructured interview	Thinking de-emphasized with learning for content gain Thinking emphasized with reflective or situated thinking
Faculty and student perception of teaching & learning clinical judgment	Loving 1993	22 Baccalaureate nurse students at all levels and graduates Convenience sample	Qualitative design (Grounded Theory)	Interviews Observations	Evaluation in clinical setting causes cognitive rigidity if extrinsically motivated & cognitive flexibility if intrinsically motivated. These themes determine competence validation.
Student experience of learning in clinical setting	Wilson 1994	30 Baccalaureate nurse students, senior level Convenience sample	Qualitative design (Ethnography)	Interviews Observations	Students see clinical as a time to: cause no harm, help patients, integrate theory, learn skills, look good in front of the instructor & fill roles of student nurse.
Students reflections & critical thinking during a clinical course	Sedlak 1997	7 Baccalaureate nurse students, sophomore level Purposive sample	Case Study	Reflective journals Interviews Observations	4 themes to develop: a) professional self-perspective b) perfectionist perspective c) caring perspective d) self-directed learning perspective Critical thinking focus on affective and cognitive aspects of nursing

instructor. Learning takes place with the staff nurse, outside the context of student-instructor interaction. Self-evaluation activities that include the use of internal and environmental evidence are related to quality nursing care (Wilson, 1994).

A case study approach was used with beginning baccalaureate nursing students to describe CT from their perspective (Sedlak, 1997). The themes that emerged were the development of the: professional self-perspective (emotional self), perfectionist perspective (skills), caring perspective (for self and patient), and self-directed learning perspective (balancing resource dependence versus independence). It is suggested that these CT skills can be nurtured with dialogue in a supportive environment.

The idiographic interpretations, tentative applications and focused-determined boundaries displayed in each of these reports lead to a greater understanding of student thinking during experiential situations. Transferability of findings is evident by thick descriptions and exemplary narrative dialogues in all papers. Confirmability of data interpretation was assured by checking with informants, and experts in content and research methodology (Loving, 1993; Sedlak, 1997; Wilson, 1994). Recurrent patterning or saturation of the data is evident with prolonged contact with informants (Loving, 1993; Sedlak, 1997; Wilson, 1994). Similarity of settings and findings increases the generalizability and transferability to other undergraduate student settings. Pragmatic suggestions include ongoing dialogue between students and faculty to promote situated or reflective thinking (Diekelmann, 1993; Loving, 1993; Sedlak, 1997). Faculty examination of clinical teaching styles could distinguish evaluation from

learning periods so the focus is reflective thinking and patient centeredness (Loving, 1993; Sedlak, 1997; Wilson, 1994).

An analysis of the research using the SCT suggests that social and cultural influences impact learning. Modeling by experts and mentors may influence the values of independence, support, goal orientation and achievement of students. Clinical experiences in situated learning settings are imperative to create the environment for this mode of learning. The preceding qualitative studies that describe contextual influences on student teaching and learning show that the focus during clinical experiences can affect thinking processes. Learning as cognitive gain is described in a non-evaluative supportive environment where self-evaluation is promoted. Situated reflective thinking seems to promote patient centeredness. Faculty can prompt these learning strategies, but, they cannot be considered self-regulated unless they are under the influence of metacognitive control (Zimmerman, 1989). Success of environmental self-regulation depends on the perceptions of it's efficacy to assist learning (Zimmerman, 1989). This proposition has implications for research settings where cognitive processes are trained and evaluated.

Clinical settings versus clinical simulations

There is a debate in the literature concerning the use of clinical simulations versus authentic settings. While simulations provide tighter research control and patient safety, the findings reveal some validity problems. In a study of nurse practitioners, assessment data gathering was in close agreement with the optimal route of diagnosing, however not with laboratory or medical management criteria (Holzemer, 1986). Non-significant results were obtained

when treatment groups were instructed to verbalize cognitive processes on a computerized clinical simulation (Henry et al., 1989). These authors admit that the lack of criterion-related validity of simulations may have had an impact on the results. When used for study with nursing students, written simulations and a clinical decision making scales had moderate to low results (Thiele et al., 1991). These authors suggest that perhaps recent clinical experiences had more impact on the results than the data presented in the simulation. In a study comparing medical students and practicing physicians, there was difficulty in demonstrating the differences in clinical reasoning on various evaluation methods (Norman, Trott, Brooks & Smith, 1994). It is suggested that differences may be more obvious when complex realistic clinical cases are used.

Summary

In spite of the shortcomings of the research that investigated singular components of the concepts within the SRL model, there is a legacy upon which to build future study. The evidence supports the use of certain self-regulation strategies such as metacognitive CT thinking skills, social resources and contextual structuring to enable students to acquire knowledge and improve learning.

An analysis of the CT research shows there is very little support for specific strategies to teach CT since there is no overarching theoretical foundation to base them on. The research does show a cluster of predictive variables that support higher CT scores on the available instruments. Students with these characteristics may self select and adapt most easily to common types of problem solving tasks encountered in nursing. The remaining question is

to determine the difference between nursing students and college students regarding metacognitive CT processes as the nursing students function within the organizational framework of domain specific theories.

Both children and adults have been shown to fail to monitor cognition and comprehend when they are solving problems (Garner & Alexander, 1989). It is hypothesized from these studies that engaging in self-regulation early into solving new problems will decrease performance, since there is a struggle with IP for dominance in working memory. The evidence from IP research suggests that prototype patterns learned from experience are necessary to make accurate expedient decisions. Interventions to engage cognitive processing after development of declarative knowledge may be the better regimen to facilitate performance (Kanfer & Ackerman, 1989). The fact that data acquisition strategies are similar for novices and experts suggests that cognitive processes play a significant role in learning once factual knowledge is attained. The IP studies also reveal that a dependable experiential knowledge base for recall is imperative for problem solving. Decision analysis can be taught to nursing students using the hypo-deductive model resulting in improved data acquisition and diagnostic accuracy.

The reflection model research shows that although reflective thought is beneficial at lower levels, it has not been empirically substantiated. There is very little support for specific strategies to promote reflection since the research is still at the descriptive level and the theoretical foundation has not been explicitly tested. Evidently, it takes time to develop reflective thought, over a semester at least, to show some change in a shift of learner focus. The specific cognitive

strategies operating during reflection are not delineated, therefore, conceptual abstractness persists. The question remains whether these cognitive strategies are inherent to nursing problem solvers and whether they can be taught apart from authentic clinical experiences.

The self-regulation research lacks evidence regarding the issues of domain specificity and intra-individual consistency for the transfer of strategies in the work setting (Garcia & Pintrich, 1994; Schunk, 1991). Domain specific experiential learning is a cyclical process of experience, observation and reflection, abstract conceptualization and experimentation (Boekaerts, 1995). Researchers hypothesize that exposure to self-regulation leads to some improvement in strategy use, but practice and reflection leads to a greater magnitude of effectiveness as understanding evolves (Bielaczyc, Priolli & Brown, 1995). There is the question, however, of whether self-regulation strategies are situational (state) or inherent within individuals (trait) (Pintrich, 1994). In a study of 269 undergraduate students making simulated medical decisions, higher levels of state reflective awareness are related to greater task performance (Ridley, 1991). There is a need to study domain specific student cognition, affect and behaviors so a person-environment transaction will take place and SR will surface (Kanfer & Ackerman, 1989).

Self-regulation activities under learning conditions may cause stress and disruption if being observed causes self-consciousness. On the other hand, self-consciousness may cause people to attend to behaviors that deviate from standard expectations and self-regulation may be fostered to bring behavior into conformity (Gallimore, Dalton & Tharp, 1986). The findings from the contextual

studies in nursing also reveal a negative impact on learning when behavior is observed by others. The significant issue worth pursuing in all cases is that observation over time changes the focus from being observed to situated, reflective thinking. It is agreed that learning within domain specific contexts such as nursing require unique environmental strategies that include structuring of context and social resources.

Finally, the literature reveals that failure to use self-regulation strategies and conceptual knowledge arises when there is a lack of declarative knowledge about tasks, and minimal practice with strategies (Kanfer & Ackerman, 1989; Pressley, 1995). The speculated reasons for this failure include:

1. New and old strategies may compete and deeply ingrained strategies have more connections with previous thought patterns.
2. Learning how to self-regulate does not guarantee understanding when and where to use them.
3. Learning how to self-regulate does not guarantee the adaptation of the strategies to new situations (Pressley, 1995).

Pressley (1995) makes the argument that self-regulation instruction should be matched to the student's zone of proximal development as described by Vygotsky (1962). Self-regulation strategy development requires multiple experiences with repeated feedback of success, variable tasks, opportunities for transfer and perceived benefits of use.

Adult education

The principles of adult education are closely aligned with the propositions and assumptions of SRL. Brookfield (1993b) proposes four processes needed to

teach cognitive strategy use to adults. Adults need to control what and how they are learning to be self-directed in this process. The experiences adults have should be honored and analyzed critically by dialogue between learners and educators. Critical reflection is necessary for the personal agency to understand the self with interdependent and social forces. The individuality of learning experiences exposes learning styles, metacognitive processes, self-knowledge, personal perceptions and judgments to control learning processes and outcomes.

Evolutions of adult educational curricula suggest the use of authentic situations that include social environmental influences and personal background. Historically, the Tylerian model in the 1950's filtered knowledge through psychological and physiologic screens of the educator and domain knowledge base. The model developed by Knowles in the 1980's assessed learner needs and designed problem-centered curricula. Experiential theorists such as Dewey, Kant and Mezirow suggest learning conditions be arranged so contradiction and conflict will result in reflection, dialogue and learning. Each experience modifies further experiences by interaction with the social environment where contradiction and doubt allow relevant connections for the learner over time (Wilson & Burkert, 1989). Research has shown that engagement in more self-regulation strategies at each level of difficulty, enhances persistence, memory performance and higher self-efficacy (Berry, 1987; Bouffard-Bouchard, Parent & Larivee, 1991; Lent, Brown & Larkin, 1986).

Mandates from governing bodies have driven educators to implement strategies that are not based on a sound body of discipline specific research. Research shows that CT definitions and measurements have become major problems for graduate and undergraduate programs that have tried to implement the NLN CT outcomes (O'Sullivan, Blevins-Stephens, Smith, & Vaughan-Wrobel, 1997). Descriptive research considering SRL is necessary to build a theoretical foundation for pedagogical strategies in nursing education to meet the goal of developing cognitively prepared novice practitioners. Self-regulated learning is operationalized in this study through the repeated use of self-regulation prompts developed from the triadic model. It is anticipated that through the use of this design there will be an addition to previous findings in cognitive research by describing the strategies new graduate nurses use to regulate their metacognitive abilities and preferences. It is hypothesized that these efforts are likely to show self-regulation strategies used during precepted clinical experiences while problem solving during discrepant clinical situations. As demonstrated in previous research, students learn to generate thought provoking questions as they are guided and prompted to use strategies at increasingly higher cognitive levels (King, 1992). This is the basis for fostering the beginning framework of SRL that continues to develop throughout a lifetime of professional pursuits (Brookfield, 1993a). If the findings show significance, the model could be used to advance novice nurse problem solving earlier in career development. This would meet the professional and societal aims for nursing that are proposed for the 21st century.

CHAPTER III

METHODS AND PROCEDURES

This section of the proposal describes the methods and procedures that were used to describe the metacognitive critical thinking (CT) processes new graduate nurses used during precepted clinical experiences. The methodological discussion includes an overview of the research design, assumptions, setting and sample selection criteria. The procedural discussion establishes the research settings, controls for extraneous variables, intervention plans, instrumentation and proposed analysis. Finally, potential problems and limitations are discussed related to the issues of internal and external validity.

Research Questions

1. What are the effects of self-regulated learning (SRL) prompts on the metacognitive processes of new nurse graduates who use reflective journaling during precepted clinical experiences?
2. Are there changes in metacognitive processes of new nurse graduates who use SRL prompts for reflective journaling for 8 weeks of precepted clinical experiences?
3. Are there differences in metacognitive processes between associate degree and baccalaureate degree nurse graduates who use SRL prompts for reflective journaling after precepted clinical experiences?

4. What relationships exist among selected cognitive measures, critical thinking variables and metacognitive processes used by participants in this study?

Specifically, it was hypothesized that (a) new graduate nurses who are prompted to use SRL prompts for reflective journaling during precepted clinical experiences are likely to demonstrate metacognitive processes; (b) new nurse graduates who are prompted to use SRL prompts for the reflective journaling for 8 weeks during precepted clinical experiences are likely to demonstrate an increase in the use of metacognitive processes; (c) there will be a difference in metacognitive processes between associate degree and baccalaureate degree nurse graduates who use SRL prompts for reflective journaling; and (d) there will be a positive relationship between the metacognitive processes used and the variables of clinical experience, knowledge base, level of education and age.

Methods

Research Design

The purpose of this research study was to expand the work of SRL training to improve metacognitive CT processes of new graduates that will impact educational outcomes. The SRL model has not been applied to the study of nurse education outcomes, which supported its use in this project. A comparative descriptive design analyzed the effect of SRL prompts on the metacognitive CT development by reflective journaling in associate degree and baccalaureate degree new graduate nurses during a precepted clinical experience (see Table 6).

The Residency Model for Nurses in Transition was implemented in the Greenville/Spartanburg area of South Carolina, the regional site for this

Table 6

Descriptive Non-experimental Design

Reflective Journaling New graduate Nurses	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Anderson Area Medical Center	O ¹	O ²	O ³	O ⁴	O ⁵	O ⁶	O ⁷	O ⁸
Greenville Memorial Hospital	O ¹	O ²	O ³	O ⁴	O ⁵	O ⁶	O ⁷	O ⁸
St. Francis Health System	O ¹	O ²	O ³	O ⁴	O ⁵	O ⁶	O ⁷	O ⁸
Spartanburg Regional Medical Center	O ¹	O ²	O ³	O ⁴	O ⁵	O ⁶	O ⁷	O ⁸
Oconee Memorial Hospital	O ¹	O ²	O ³	O ⁴	O ⁵	O ⁶	O ⁷	O ⁸

study. The specific institutions involved were: (a) Anderson Area Medical Center, Anderson, South Carolina; (b) Greenville Memorial Hospital, Greenville, South Carolina; (c) St. Francis Health System, Greenville, South Carolina; (d) Spartanburg Regional Medical Center, Spartanburg, Spartanburg, South Carolina; and (e) Oconee Memorial Hospital, Seneca, South Carolina. New graduate nurses were asked to voluntarily participate in this preceptorship program. During the preceptorship orientation period, the researcher obtained informed consent (see Appendix A) and asked the new graduate nurses to complete a demographic questionnaire (see Appendix B) which included key demographic, academic and experiential variables prior to starting the clinical

practicum. The new graduate nurses was asked to make a journal entry in a clinical log each week, for 8 weeks, after clinical experiences.

Assumptions

The following assumptions were the underpinnings of the conceptual framework and guided the design of the study. The first assumption of this study was that subjects were available for testing. Another assumption was that new graduate nurses available to the researcher would represent a homogenous group of subjects with the significant experiential, academic and demographic variables that are amenable to the planned observations. An assumption based on previous research states that novices need structure until they build a knowledge base of experiences to more easily connect new experiences to what they have learned and discussed (Zigler, 1994). An assumption related to the use of other-directed prompts asserts that external hints can support compilation processes by guiding, providing cognitive support and enhancing executive control to become self-directed over time (Jo, 1993). Finally, through design controls, SRL prompts used during reflective journaling would influence each subsequent experience and promote metacognitive CT development.

Setting

Previous investigations in the domains of medicine and nursing have used simulated experiences with some success for the purpose of studying clinical learning and decision making (Henry, LeBreck & Holzemer, 1989; Holzemer, 1986; Thiele, Holloway, Murphy, Pendarvis & Stucky, 1991). It is thought that by not using authentic situations, safety is provided for patients and less anxiety is invoked in the subjects. The implication from this body of research

was that simulations, although safe and nonthreatening, may be influencing study results by limiting the generalizability of findings to real practice situations. Therefore authentic clinical experiences were the setting for reflective journaling with this sample.

Sample selection criteria

Inclusion criteria. The subjects were associate degree and baccalaureate degree new graduate nurses in a precepted clinical program with practicums on hospital based units and follow up home visits. All new graduate nurses who volunteered to participate in the preceptorship were included in the study. If preceptors on a clinical unit refused to participate or too many subjects dropped out of the preceptorship, recruitment of subjects would be from subsequent sessions.

A convenience sample of 15 subjects was recruited and divided into two groups consisting of 6 associate degree and 9 baccalaureate degree new graduate nurses. The first session was from July 1998 to September 1998. The attrition and/or dropout rate which occurred for the journaling activity was estimated to be 17.5%. All new graduates were English speaking and willing to participate at the onset of the study.

Exclusion criteria. New graduate nurses were to be excluded if journaling with the SRL was not routinely used after each week of precepted clinical experiences. However, all journals and subjects were used for the analysis to describe the entire experience with The Residency Model for Nurses in Transition program. Non-parametric analysis was used to determine differences based on demographic criteria and adjustments were made for the

unequal number of subjects in the two groups.

Procedures

Establishing research settings

The researcher was invited to present the Self-regulated Learning Model and prompts during a planning session of the design team of The Residency Model for Nurses in Transition Project. It was a unanimous decision by the team that the SRL prompts be used as an outcome measure of the preceptorship program since cognitive reflection was a concept that was represented in both Benner's experiential learning and the OPT model of clinical reasoning. The institutional review boards (IRB) of each participating institution were contacted for the appropriate procedure to gain research access to the subjects they employed who were going to participate in the preceptorship program. Letters of request, IRB applications and attendance at IRB meetings transpired to maintain ethical standards for research subjects.

Consent to participate in the study and demographic data were collected during a preceptorship orientation at The University Center of Greenville, Greenville, South Carolina. The clinical practicums included 8 weeks of patient care under the mentorship and guidance of an assigned preceptor. The clinical weeks were 20 to 40 hours in length as the new graduate nurse provided patient care according to the preceptor schedule. Weekly reflective journals were completed as an independent activity by each subject.

Observations

There has been little research on the pedagogical benefits of journaling surrounding the clinical experiences of new graduate nurses. The reflection and

clinical context research that used written reports as a data collection method revealed increased awareness of skills, thinking abilities and personal growth (see Table 3; Table 4). Experiential learning was also shown to occur when students reflected on personal experiences, discussed with others, and re-evaluated their understanding (Colgrove, Schlapman & Erpelding, 1995).

In this study, SRL prompts for the development of domain specific metacognitive processes took place with associate degree and baccalaureate degree nurses as they reflected and journaled after each precepted clinical week. Self-regulation learning prompts (see Appendix C) were developed and based on the Self-regulation Learning Model (see Figure 1) (Schunk & Zimmerman, 1994). A list of prompts which includes metacognitive, behavioral and environmental self-regulation strategies were validated by experts in the field of nursing education and educational psychology. Interrater reliability coefficient in the range of .7 to .9 (Polit & Hungler, 1995) was obtained for these prompts to determine their consistency to reflect SRL processes with journaling. The intervention of using SRL prompts was supported by research that shows learning benefits, cognitive restructuring and strategy understanding from teacher guidance and modeling (King, 1992; Pressley, Harris & Marks, 1992). When strategies were instructed and modeled with students for approximately 1 month, measures of comprehension increased in over 90% of subjects (Brown & Palincsar, 1986; Palincsar, Ransom, & Derber, 1984). Strategies that are scaffolded by the teacher and practiced by the students in meaningful context, are eventually internalized for later independent performance (Brown & Palincsar, 1986).

Instrumentation

Demographic questionnaire

A demographic questionnaire was developed by the researcher based on the literature to include previous work/clinical experience (specialty, number of years in specialty, total years in nursing) academic indicators (undergraduate degree) and personal demographics (age, gender, previous degrees, certifications, marital status, employment, current course enrollment) (see Appendix B). The demographic questionnaire was completed by the subjects after consent was obtained and confidentiality was assured. Questionnaires, such as these, can achieve construct reliability, are easy to administer and easy to analyze. Misinterpretations can occur from cultural differences, honesty in reporting and fit for the research question. The strengths and limitations of the instruments could impact the internal and external validity of the findings from this study.

Pilot study

After obtaining subject permission, a small pilot study of SRL prompts for journaling was given to 9 sophomore nursing students for 8 weeks. Analyses of the transcripts revealed that reflective journaling with SRL prompts encouraged the use of metacognitive processes. Students were concerned with faculty evaluation of the journals, therefore it was decided that the researcher should not have any previous relationship with these students. Prompts were revised to be more concise and open-ended to prevent leading the subjects into responding with certain strategies such as "plan", "organize" and "control". In addition SRL prompts were cumbersome and misunderstood due to theoretical

nomenclature. Therefore, prompts were arranged into the three main categories of thinking, behavioral and environmental strategies. Since journals were not completed by all students within a period of a week, the procedure for this study would include collecting and transcribing journals weekly. These design strategies enabled monitoring and troubleshooting for problems with prompt comprehension and journaling procedures.

Journaling

The future directions for SRL research in college students included assessment of SRL strategies with think-aloud (TA) technique, interview (Schunk, 1996) and written reporting or recording (Zimmerman, 1989). These qualitative methods enabled the researcher to gain information about the course and mechanism of metacognitive processes by probing the subject's inner state. Ericsson and Simon (1993) make the assumption that information held in short term memory or retrieved from long term memory, which was at some previous time held in short term memory, can be observed by verbal reports. The techniques of written reporting and recording of one's actions and reactions are methods of behavioral observation. It seemed likely that journaling would facilitate reflection and remodeling of metacognitive thought provided it was guided over time.

Cognitive processes retrieved from memory can be tapped by written reports when they are elicited with prompts for an understanding of circumstances under which they were obtained. Subjects made weekly journal entries in a clinical log responding to SRL prompts to promote metacognitive, behavioral and environmental processes as they reflected on clinical

experiences. The first week of journals were considered “warm-up” narratives to promote subject comfort with prompts to recall cognitive information that was concurrent with previously encoded tasks. An orientation session was provided for the subjects to answer any questions about the journaling procedure. Previous research has shown that retrieval of long term memory or encoded information is variable, therefore, it is argued that the study of cognitive processes should occur where reports lag tasks by brief intervals (Ericsson & Simon, 1980). The researcher anticipated that as subjects became accustomed to the journaling and review of entries, more involvement would be evident with the problem-solving tasks they encountered (Ericsson & Simon, 1993).

Data Collection

Before data collection began, human subjects approval was obtained from the various participating institutions. One institution requested that the consent include a statement that the patient, family, physicians and personnel not be identified by name. This statement was added to all consents and explained to the subjects (see Appendix A). Subjects were informed of all the ethical considerations outlined in the research consent. The demographic questionnaire was administered in a classroom at The University Center of Greenville and collected by the researcher during the first week of the preceptorship program orientation. If the subjects were unavailable to take the tests at that time, separate appointments were made to administer the instruments as close to the group administration time as possible. Testing took place in a classroom and reflective journaling occurred where the subjects chose to do it. The various sites where journaling took place included clinical units, subject residence and at the

Greenville site. Fatigue of students was anticipated to affect concentration, therefore, journaling sessions were encouraged not be longer than 30 to 45 minutes. The researcher collected and transcribed the clinical logs weekly from all subjects after they came together for group seminars at The University Center of Greenville. If the subjects were unable to attend the seminars, the researcher provided a self-addressed stamped envelope to retrieve the clinical logs.

The researcher's background included two years of study in the discipline of education, nine years of experience in clinical nursing education and extensive literature reviews regarding student thinking and learning theory. Experience as clinical faculty provided a salience for the clinical environment of new graduate nurses.

Analysis

Descriptive analysis

Demographic characteristics and critical thinking variables were summarized with frequencies, means and ranges to describe the sample (see Table 7). Verbal protocol analysis was used to determine frequencies of nouns, verbs and cognitive operators. Content analysis was used to discover themes in the narratives. Correlations and Mann-Whitney U tests were used to correlate demographic characteristics with the frequencies of qualitative data.

Verbal protocol analysis

A general theory of cognitive processes was the framework for analysis of verbal data, from which predictions could be made (Ericsson & Simon, 1993). Transcripts of the journals were read for general meaning and divided into

Table 7

Table of Analyses

Variable	Concepts	Data category	Statistical category	Analysis
Critical thinking variables	Experiences Academic degree Age Gender	Nominal Interval	Non-parametric	Frequency Mean Range
Dependent variable	Self-regulation strategies of associate degree & baccalaureate degree nurses	Written data	Qualitative	Verbal protocol analysis
Critical thinking variables versus dependent variables	Experiences Academic degree Age versus Self-regulation strategies	Nominal Interval Versus Verbal data	Non-parametric	Correlation Mann-Whitney U test

coding categories. Preprocessing was planned to eliminate transcribed data where there were repetitions and non-essential information or fillers. Ericsson and Simon (1980; 1993), contend that information that is needed to during a task (problem-solving), is available from short term memory. Therefore, the remaining data was assumed to represent cognitive processes and encoded into the terminology of the model.

There are three progressive steps to verbal protocol analysis; referring phrase analysis (RPA), assertional phrase analysis (AA), and script analysis (SA) (Fonteyn, Kuipers & Grobe, 1993). Kuipers, Moskowitz and Kassirer (1988), describe the specific components of each phase of these analyses. The RPA is identification of noun phrases and coding them according to concepts in the model. The descriptive aspect of VPA included frequencies for all nouns and

referent nouns. The nouns were then identified and coded to define the vocabulary of concepts the new graduate nurse concentrated on.

The AA identifies relationships between concepts that make up the epistemology for the domain being discussed. Frequencies were tallied for assertions and verb tense. The percentage of verb type (past, present and future) and assertions were calculated along with the differences between associate degree and baccalaureate degree nurses. The four possible types of assertions displayed were; connotative (form relationships of meaning), indicative (form relationships of significance), comparative (form relationships of contrast) and causal (form relationships of cause and effect) (Fonteyn, Kuipers, & Grobe, 1993). Finally the script analysis or cognitive operator analysis identified the SRL strategies used by the subjects during reflective journaling. These reasoning categories were predetermined by the SRL model.

Establishing reliability and validity of analysis attempts to assure objectivity of the researcher or the encoding will be biased toward a preferred interpretation. Collecting data within the context of the descriptive, non-experimental setting, is a principal source of establishing validity. Tests of reliability included inter-coder agreement as different persons encoded independently of each other. The problem is that human coders remember previous information segments, therefore, random order analysis of specifically defined units lessens this effect (Ericsson & Simon, 1993). Bias may occur if an encoder has prior knowledge and believes subjects think the same way they do. Using the model as a basis for category development weakly predicts the type of

information used during the task and inferences about sequences of processes required to reach a correct solution (Ericsson & Simon, 1993).

Potential problems/limitations

Preconceived problems inherent in this study design were controlled as much as possible by maneuvers to eliminate the effects of extraneous variables and threats to validity. In addition, trustworthiness of the data from VPA was promoted with the naturalistic criteria of credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985).

Extraneous variables

Controlling for extrinsic factors was maintained by keeping the journaling protocol as similar as possible for both groups. All new graduate nurses received the same procedures, protocols and clinical logs for journaling to eliminate contamination by ad-libbing. Controlling for intrinsic factors was maintained by comparing an approximate equal number of associate degree and baccalaureate degree graduates to balance the influence of extraneous variables. A certain amount of difference could not be controlled for since randomization was not appropriate for a descriptive design. Schools of nursing attract different types of students based on geography, economics and admission criteria. Therefore, new graduates were reflective of regional admission criteria.

Internal validity

Determining if the findings were only the result of the SRL prompts required controls for threats to internal validity. History effects could occur if preceptors at any site became familiar with SRL and started to use the strategies during clinical experiences. Preceptors were asked to encourage the subjects to

journal but refrain from assisting subjects with writing responses to the prompts. During preceptor orientation session it was stressed by the researcher that journaling should be a solitary experience to produce the maximum cognitive benefit. Prompts were printed in clinical logs to be used only by the new graduate nurses. Selection bias could occur if the groups were extremely different due to college admission criteria or geographical location. Using subjects from a small section of the Southeast eliminated some of these bias effects. Maturation could occur due to the exposure to precepted clinical experience alone, however, previous research has shown that cognitive abilities do not necessarily change over time without some type of strategy. An instrumentation limitation of this design was subject fatigue at the end of a clinical week. Mortality related to attrition did occur, however, the richness of the data in the journals outweighed this limitation. Also, since the dropout subjects were from the same educational programs and had similar demographic characteristics, they were comparable to the subjects that remained and had little effect on the final results.

External validity

External validity refers to the ability to generalize the findings of this study to other nursing preceptorship programs. The accessible population for generalization are associate degree and baccalaureate degree nursing graduates in the southeastern USA. Implications can only be made to the broader target population of new graduate nurses in the country. Some effects that may have existed to limit external validity in this study were (a) if a preceptor and/or new graduate nurse used SR strategies on their own (b) influences from

participation in a research study (c) new literature sources available to preceptor and/or new graduate nurse regarding SR and CT, and (d) any effects the researcher may have had on participants. The ability to generalize these findings was also limited by controlling for extraneous variables, and having a limited pool of race and gender differences. Control for the threats of internal validity took precedence in this study considering the multivariate circumstances surrounding precepted clinical experiences for new graduate nurses.

Trustworthiness

Credibility for naturalistic inquiry is synonymous with the term internal validity and the techniques that promote more credible findings are prolonged engagement and persistent observation (Lincoln & Guba, 1985). Prolonged engagement in this study occurred through weekly reflective journaling sessions for 8 weeks. Prolonged engagement fostered trust between the researcher and subject which limited the Hawthorne effect or threat of evaluation. Persistent observation added to credibility by making the researcher salient about situational factors that might impact on the phenomenon (Lincoln & Guba, 1985). Weekly review and transcription of journal entries was a check for distortions and misunderstandings in prompt or procedural perceptions.

Transferability or external validity is provided by detailed descriptions of qualitative data (Lincoln & Guba, 1985). In this study examples in the narrative form were provided from the stages of VPA to show cognitive processes that represent SRL strategies.

Dependability refers to the reliability of the data (Lincoln & Guba, 1985). If two researchers can come up with compatible observations the findings have

some reliability (Rubin & Rubin, 1995). This was accomplished by consultation with researchers familiar with VPA. Inter-rater reliability by independent coders searches for points of agreement and disagreement on the VPA with a range of .7 to .9 (Schwartz & Sudman, 1996). Ericsson and Simon (1993) suggest that for VPA, different coders look at individual segments of the data versus major decision processes. Individual phrases and words were encoded, and compared between the research and another expert in VPA on 3 randomly selected narratives. The intercoder reliability for the narratives in this study was 80%.

Confirmability refers to maintaining objectivity in reaching conclusions concerning data analysis (Lincoln & Guba, 1985). The process of transcribing and analyzing data weekly maintained interpretations consistent with that week to avoid retrospective influences that would occur if multiple weeks were analyzed simultaneously. Progress notes or field notes were also kept to assist in the audit trail reported in chapter IV. Consultation with an experienced researcher also provided support for objectivity.

Summary

The SRL model was operationalized in this study through the use of researcher-designed prompts for journaling and verbal protocol analysis. It was anticipated that through these design measures the new graduate nurse's ability to self-regulate cognitive processes during clinical experiences would increase for improved understanding. As demonstrated in previous research, novices learn to generate thought provoking questions as they are guided and prompted to use strategies at increasingly higher cognitive levels (King, 1992). This outcome was the basis for fostering the beginning framework of SRL that could

continue to develop throughout a lifetime of professional pursuits (Brookfield, 1993b). The synthesis of the published literature identified gaps in knowledge as it was related to the prediction and development of metacognitive thinking abilities in new graduate nurses. This proposed study attempted to test SRL strategies that support the ability to promote metacognitive thinking.

Chapter IV

Presentation of Findings

The purpose of this chapter is to present a complete overview of the research findings from this project. The discussion is arranged in the following manner: (a) description of the sample, (b) explanation and description of verbal protocol analysis methods, and (c) analysis and comparison of subject groups. The final section discusses the answers to the research questions related to data analysis.

The purpose of this project was to describe the effect of self-regulated learning prompts on the cognitive processes of baccalaureate and associate degree new graduate nurses in precepted clinical experiences using the pedagogical strategy of journaling. The methods used in this project resulted in 99 separate weekly narrative journals with a total of 21,359 words. The following section will provide the reader with a description of the sample.

Sample Description

This convenience sample consisted of 15 new graduate nurses in an experimental precepted program in acute care settings. After institutional review board approval, 5 acute care hospitals in the southeastern region of the United States agreed to participate in this research project to permit journaling as a method of prompting and measuring cognition. The clinical units in which these new graduates practiced included (a) critical care, (b) telemetry,

(c) medical/surgical, (d) gynecology, (e) pediatrics, and (f) labor and delivery.

Figure 2 shows the types of clinical units where the new graduates were employed during this project.

Journals were collected each week by the researcher to ensure continued participation by the subjects and to field any questions that arose during the data collection period. Table 8 shows a summary of the total number of journals collected for eight weeks. There were a total of 99 weekly journals with 62% completed by baccalaureate degree prepared nurses and 38% completed by associate degree prepared nurses.

Figure 2. Clinical practice units for new graduates.

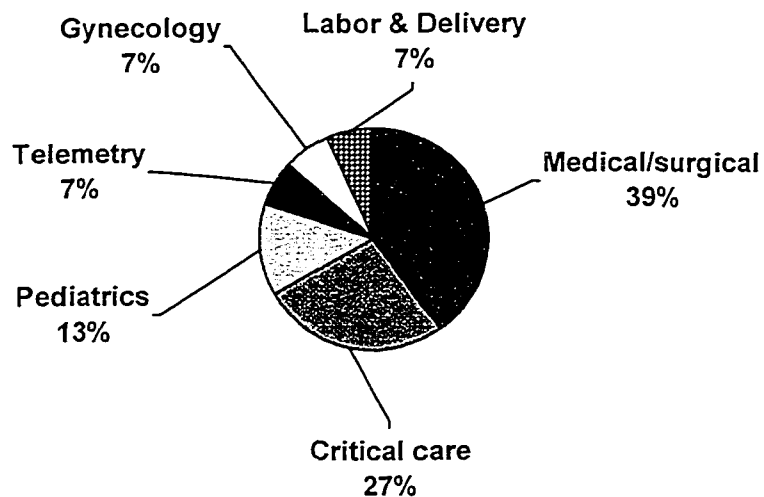


Table 8

Journals Collected per Week

Subjects	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Totals
BSN	9	9	9	8	8	7	7	4	61
ADN	6	5	5	5	5	5	4	3	38
Total	15	14	14	13	13	12	11	7	99

The sample was divided into two groups, 9 baccalaureate degree

prepared nurses (60%) and 6 associate degree prepared nurses (40%). The demographic data reported in Table 9 was collected based on the variables identified in the literature that have been associated with critical thinking and cognitive learning. The subjects were all white females with a mean age of 26.3 years. Eleven of the subjects had previous work experience in the medical field (M = 3 years, SD = 2.95, range = 1 to 10 years) and one had experience as a cosmetologist (7 years). Current employment hours range from 32 to 40 hours (M = 38.93, SD = 2.81). Forty percent of the subjects were single, 60 percent were married and 26.6 percent had children (range = 1 to 2). Prior educational experiences included 3 subjects with previous degrees (20%) and 7 subjects with certifications (46%). Previous degrees included associate degrees in business administration and medical administration, and a baccalaureate degree in business administration. The types of certification included basic cardiac life support, nursing assistant, and patient care technician. Two subjects were taking college courses and 2 subjects were taking non-academic courses. Five subjects participated in volunteer activities, the majority of which were at church functions.

Verbal Protocol Analysis

The researcher followed the process of verbal protocol analysis (VPA) by dividing the content into coding categories and reading the journal transcripts for general meaning. The first step in the procedure was preprocessing the data by transcribing word for word the actual written journal entries. Any written symbols that were used were translated into word format, for example “\$\$\$” was translated to the word “money” and “☺” was translated to the words “positive reaction”. The unit of analysis for this descriptive study was the written word,

therefore, the next step was calculating total word counts for the entire sample and each group. Table 10 displays the total word count, means, ranges, and group differences per week.

Table 9

Demographic Characteristics of Subjects

Characteristic	N	Range	Mean	SD	% of total
Age	15	21-45 yrs	26.33	6.68	
Previous work years	12	1-10 yrs	3.33	2.95	
Current employed hours	15	32-40 hrs	38.93	2.81	
Marital status					
Single	6				40
Married	9				60
Number of children					
0	11				73.3
1	2				13.3
2	2				13.3
Most current degree					
B S N	9				60
A D N	6				40
Previous degree	3				20
Certification	7				46
Previous type work					
Nurse aide	8				53.3
Medical office assistant	1				6.7
Nurse extern	1				6.7
Pharmacy aide	1				6.7
Cosmetologist	1				6.7
Current Course load	2				13.3
Non-academic course load	2				13.3
Volunteer service	5				33.3

The individual words were then identified as being noun, verb or non-essential fillers. For example; (a) "head, performance, experience, time-management" were identified as nouns, (b) "will do, did complete, trying to remember" were identified as verbs and (c) "really, so, and, the" were identified as non-essential fillers.

Table 10

Total Number of Words per Week

Week	B S N mean	A D N mean	Total sample mean	Range
1	274.78	326.17	295.33	136-564
2	218.78	240.80	226.64	101-385
3	178.78	235.40	199.00	122-336
4	178.63	268.80	213.31	103-345
5	229.88	224.20	227.69	86-385
6	182.57	218.60	197.58	127-354
7	207.71	190.67	202.60	112-364
8	200.75	189.00	195.50	118-278
Totals	1606.75	1129.37	2736.12	1173-3866

Referring phrase analysis

The referring phrase analysis (RPA) is a phase of VPA when nouns in a transcript are identified to define the universe of objects, that is the ontology for the domain being studied (Kuipers, Moskowitz & Kassirer, 1988). The nouns in the journals were identified and tallied according to frequency into recurring categories or themes. The referent nouns, ranges, means, standard deviations and total frequencies for the entire sample are summarized in Table 11. The recurrent themes deduced from the nouns in the content of the narratives could be divided into the three main concepts of the self-regulation learning model. Within the metacognitive category, nouns were coded as pronouns referring to the self (54%), cognitive resources (6%), knowledge referents (28%) and thinking strategies (12%). The behavioral category included nouns referring to activities (65%) and reactions (35%). The environmental category nouns included nouns referring to person (38%), place (15%), circumstance (28%) and time (19%).

The overall analysis of the content revealed that 59% of the nouns referred to metacognitive processes, 12% referred to behaviors and 29% referred

to environmental themes. The category of nouns that dominated the data sets were metacognitive processes which included the reference to self (32%), knowledge usage (16%), thinking strategies (7%), and cognitive resources (4%). The subjects also frequently referred to other persons (11%), circumstances (8%), time (6%), and places (4%). The behavioral category nouns were activities (8%) and reactions (4%). Table 12 displays examples of the most frequently used specific nouns that fall into each of the 10 noun referent categories.

Table 11

Recurrent Themes and Nouns from Referring Phrase Analysis

NOUN CATEGORIES (N = 8 weeks)	Range	Mean	SD	Sum
Metacognition				
Pronoun – self	92-417	240.75	93.11	1926
Cognitive resource	10-45	28.00	14.01	224
Knowledge	61-185	123.50	42.42	988
Thinking strategy	19-72	53.63	17.15	429
Metacognition Total				3567
Behavior				
Activity	17-87	59.62	20.62	477
Reaction	14-44	31.50	11.25	252
Behavior Total				729
Environment				
Person	30-137	84.13	43.01	673
Place	14-62	32.88	16.69	263
Circumstance	21-112	62.75	30.78	502
Time	12-60	17.36	17.36	342
Environment Total				1780
Referent Noun Total				6076

Sometimes pronouns referred to other nouns, for example, “it” referred to “documentation” and “them” referred to “changes”. These referents were coded and added to the appropriate categories in Table 11. Table 13 displays examples of text and referents from the journals that were coded and placed into noun categories.

Due to the fact that the two groups had an unequal number of subjects, frequency differences would reflect group size versus changes in noun

Table 12

Examples of Referring Phrase Nouns by Category

NOUN CATEGORIES	EXAMPLES	
Pronoun-self	I Myself	Me My
Cognitive resource	Head Feet Money Mind	Hands Consequences Journals Things
Knowledge	Data Textbooks Goals Questions	Information Objectives Resources Answers
Thinking strategy	Planning Time management Confidence Problem solving	Organization
Activity	Skills Help Documenting	Procedures Activities
Reaction	Frustration Good/bad experience Good/bad performance Positive/negative Positive working with Overwhelmed	Exhaustion Consequence Others
Person	Staff Patients Co-workers	Preceptor Nurses
Place	Home Patient room A quiet place	School
Circumstance	Situations Work Residency project Clinical experience	Problems Job
Time	Time This day	This week This shift

categories over time. Therefore, a rank-order of nouns was done for each week to reveal any changes in the frequency of noun usage. Table 14 displays the rank-order of nouns for the total sample from the most frequently used (1) to least frequently used (10). The use of pronouns referring to self was the most frequently used noun for all weeks. Referring to knowledge ranked second and other persons in the environment ranked 3rd up until the 6th week. Circumstances and activities alternated between ranks 4 through 6. Reactions to experiences, cognitive resources, and place alternated between the ranks of 7 through 10

Table 13

Examples of Pronouns in Text from Referring Phrase Analysis

Text	Referent
"Haven't had this trouble this week."	Understanding information
"Made them as quickly as possible."	Changes
"Think about it ahead of time."	Documentation
"Asked for it ."	Help
" They are quite helpful and encouraging."	Staff
"Will think it through and try to solve it myself."	Clinical problem
" They still have me on orientation."	Nursing management
"Looking for things ."	Supplies
"Working overtime to complete it ."	Clinical assignment
"I am learning new things each week."	Information

***Bold** indicates referents

** *Italics* indicates referring phrase

for the majority of the weeks. The most interesting finding is displayed with the rank of thinking strategies and time referents. The frequency of thinking strategy nouns tended to increase by the end of 8 weeks, and the frequency of time referent nouns tended to decrease by the end of 8 weeks. Figure 3 displays the rank-order of thinking strategy and time referent nouns in graph format for the total journaling period.

Table 14

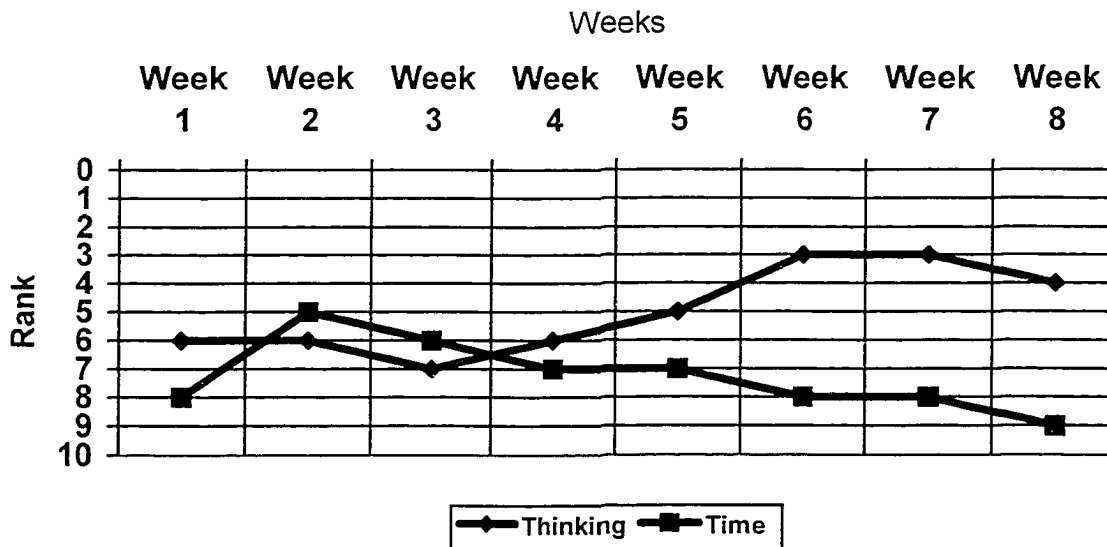
Rank-order of Nouns for 8 Weeks of Journaling

Noun Rank	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
1	Self	Self	Self	Self	Self	Self	Self	Self
2	K	K	K	K	K	K	K	Prs
3	Prs	Prs	Prs	Prs	Prs	Think	Think	Circ
4	Circ	Act	K	Act	Circ	Prs	Prs	Think
5	Act	Time	Act	Circ	Think	Act	Act	Act
6	Think	Think	Time	Think	Act	Circ	Circ	K
7	Place	Circ	Think	Time	Time	React	Cog	Place
8	Time	Place	Place	Cog	Place	Time	Time	React
9	Cog	React	React	React	React	Cog	React	Time
10	React	Cog	Cog	Place	Cog	Place	Place	Cog

*Key: Self = Pronouns-self
 K = Knowledge
 Prs = Person
 Circ = Circumstances
 Act = Activities

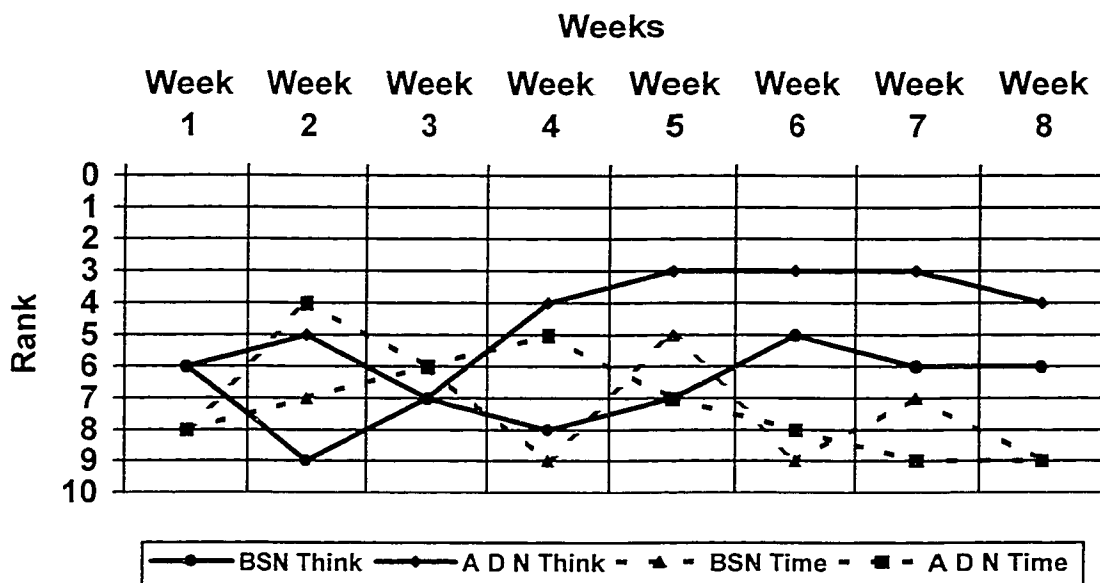
Think = Thinking strategies
 Place = Place
 Time = Time
 Cog = Cognitive resources
 React = Reactions

Figure 3. Rank-order of thinking strategy and time referent nouns.



In order to understand where the changes in noun usage occurred, the baccalaureate and associate degree new graduates were compared with regard to the ranking of thinking strategies and time referents. Figure 4 displays the rank-order of thinking strategies and time referent nouns for the BSN and ADN new graduate nurses in graph format for the total journaling period.

Figure 4. Rank-order of thinking strategy and time referent nouns for baccalaureate and associate degree nurses.



In summary, the referring phrase analysis reveals the major metacognitive noun referents used in clinical situations as self, knowledge, cognitive resources, reactions and thinking strategies. The major behavioral noun referents used during clinical experiences were activities and circumstances. The primary environmental noun referents used during clinical experiences were time concerns, place, and others in the workplace. Differences over time revealed an increasing trend for thinking strategies and a decreasing trend for time related concerns. When the baccalaureate and associate degree groups were

compared, the greatest increase in thinking strategies were seen with the associate degree graduates. A more consistent decreasing trend in time related concerns was noted for the associate degree new graduate. While these trends show a significant change in cognitive processes, the assertional phrase analysis adds a further dimension to understanding the thinking processes of this sample.

Assertional phrase analysis

Assertional analysis (AA) identifies the relationships between concepts, connectives and operators in phrases which reveals the epistemology for the content being analyzed (Kuipers, Moskowitz & Kassirer, 1988). The first step of assertional phrase analysis consisted of counting the frequency of all verbs and coding them according to past, present and future tense. The frequency and percentage of each verb type was calculated weekly for the total sample and then for each group. The second step of assertional phrase analysis consisted of identifying assertional statements and calculating the frequency and percentage weekly for the total sample and then for each group.

The verb tense coding revealed the state of information from thinking processes recalled from short and long term memory as it was induced by the prompts. The total verb usage was determined at 3828 words with 27% reflecting past tense (1043 words), 62% reflecting present tense (2366 words), and 11% reflecting future tense (419 words). Table 15 displays the summary of the verb tense analysis for the entire sample over 8 weeks of journaling. The verbs were also tallied for each week to determine if there was any significant change in tense over time. This analysis revealed that the verb tense use was consistent

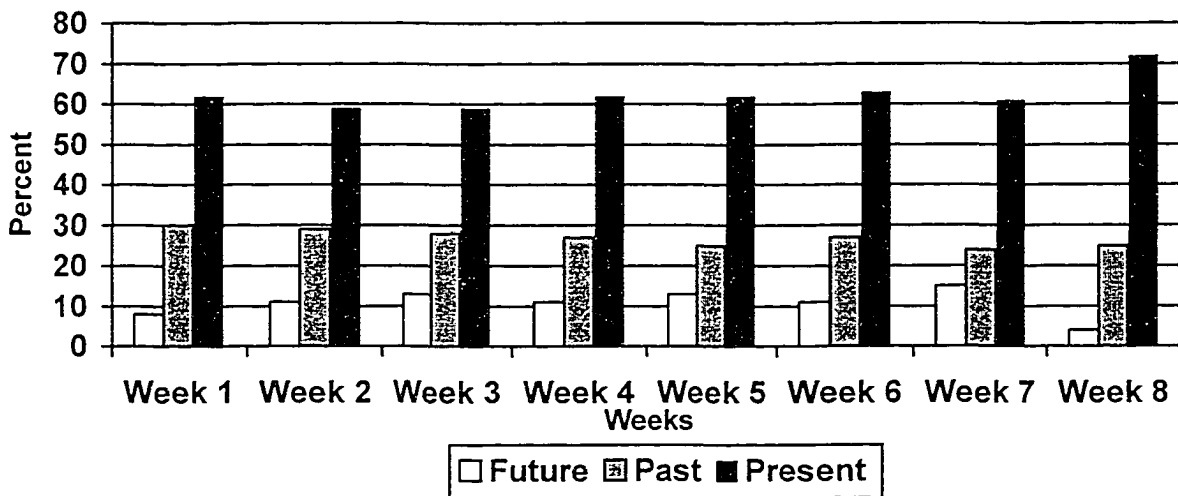
Table 15

Verb Tense Use for 8 Weeks of Journaling

Verb Tense	Frequency	f %	Mean	Std Dev	Range
Past	1043	27%	130.38	50.35	51 – 224
Present	2366	62%	295.75	88.87	149 – 465
Future	419	11%	52.38	19.70	8 – 67

across the eight weeks of journaling with past tense verbs ranging from 24% to 29%, present tense verbs ranging from 59% to 72%, and future tense verbs ranging from 4% to 15%. Figure 5 displays the verb tense percentage across all data sets. It is significant to note that in spite of the change in number of journals

Figure 5. Verb tense percentage for the total sample across 8 weeks of journaling.



each week, the percentage of verb tense shows the same general trend. In addition, it is important to report that 61% of the journaling statements prompted recall of past experiences, 25% of the journaling statements prompted current state information, and 14% of the journaling statements prompted future or forward reasoning (see Appendix C). This particular sample used primarily

current state information. The recall of past experiences was used less than half of the time and future or forward reasoning was used the least amount of time. The analysis comparing BSN and ADN new graduate nurses reveals that there was very little difference between the groups in the use of past, present or future verb tense. The difference in percentages for the last 3 weeks most likely is due to the variable number of journals collected during that period of time since there is no consistent trend. Table 16 displays the comparison of verb tense use for the two groups over the eight weeks of journaling.

Table 16

Verb Tense Use Percentage for Baccalaureate and Associate Degree New Graduate Nurses.

Group	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
BSN Past	23%	16%	14%	14%	12%	9%	10%	2%
A D N Past	20%	15%	12%	11%	12%	11%	11%	8%
BSN Present	19%	15%	13%	13%	13%	10%	13%	4%
A D N Present	20%	13%	12%	13%	13%	11%	8%	10%
BSN Future	15%	16%	17%	12%	15%	9%	15%	1%
A D N Future	14%	15%	16%	14%	17%	13%	7%	4%

An assertion is a statement of meaning. The four categories that represent most assertions in cognitive data include:

1. Causal statements – indicating relationships of cause and effect.
2. Comparative statements – indicating relationships of comparison or contrast.

3. Connotative statements – indicating statements of existence or meaning.
4. Indicative statements – indicating statements of significance.

These types of statements provide information concerning how the subject thinks about the referents identified in referring phrase analysis. Examples of the four types of statements from the narratives of this sample are displayed in Table 17. The narrative statements were coded by assertion type for the entire sample and then for each group. The assertional analysis of statement type reveals that the

Table 17

Examples of Assertional Phrase Analysis

Text	Type of Assertion
“Work is very demanding and my schedule has been sporadic with this residency program. My personal time has suffered and this is why these journals and projects have not received the attention they demand.”	Causal statement
“When I have trouble understanding information I look it up in books and if it didn’t help I asked someone else.”	Comparative statement
“I am good at nursing. I’m an intelligent person and have confidence in myself.”	Connotative statement
“It has been frustrating this week. I feel like I’m not given enough independence.”	Indicative statement

sample used statements indicating meaning or existence 41% time (f = 1368), statements indicating significance 34% of the time (f = 1133), statements indicating relationships of comparison or contrast 15% of the time (f = 500), and statements indicating relationships of cause and effect 10% of the time (f = 358).

There was no significant trend in the type of assertional statement used over the 8 week course of journaling. Table 18 displays the frequency and percentage of assertional statement type by week. A comparison was also made to ascertain the differences between groups. It was discovered that both groups of new graduate nurses were similar in the frequency of assertional type statements they made.

Table 18

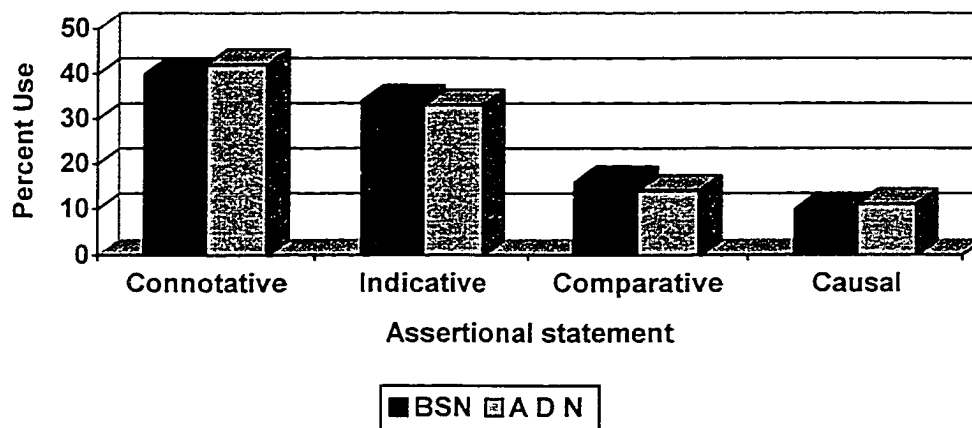
Assertional Statement Type by Week

Week	Connotative		Indicative		Comparative		Causal	
	f	f %	f	f %	f	f %	f	f %
1	175	38%	139	30%	67	17%	75	15%
2	193	45%	161	38%	69	16%	50	11%
3	193	41%	166	35%	70	14%	46	10%
4	177	40%	162	36%	65	15%	41	9%
5	197	42%	154	33%	76	16%	46	9%
6	184	45%	137	33%	54	13%	37	9%
7	163	41%	131	33%	65	17%	35	9%
8	86	37%	83	36%	34	15%	28	12%

Frequency percents were calculated on the totals for each group respectively since the number of subjects in each group was unequal. Connotative statements were most frequently used by both groups (BSN = 40%, ADN = 42%). Indicative statements were the next most frequently used by both groups (BSN = 34%, ADN = 33%). The third in frequency was comparative statements

(BSN = 16%, A DN = 14%) and the fourth in frequency was causal statements (BSN 10%, ADN 11%). Figure 6 displays the differences between the BSN and ADN new graduate nurses as they compare with regard to assertional statement type for the entire journaling period.

Figure 6. Comparison of baccalaureate and associate degree new graduate nurses by assertional statement type.



In summary, AA of the data revealed that this sample wrote primarily about situations of existence and meaning in their most present circumstances. Sixty-two percent of the verbs were stated in the present tense with both BSN and ADN new graduate nurse groups showing current state information processing (Ericsson & Simon, 1993). Past tense was the next most frequently used verb tense indicating thought processes linked to past experiences. Future tense verbs were least used indicating very little planning ahead or forward reasoning. An analysis of the assertional statements revealed that connotative statements were by far the most common method of cognitive expression for both groups. It appears that both groups used an equal percentage of indicative, comparative, and causal statements in responding to the prompts. While the subjects in this sample could identify significance and meaning in clinical

experiences, there was a much lower level of analysis and evaluation during reflection on these experiences. The low level of causal statements for both groups may reflect a lack of experience in making connections in clinical as a novice. After analyzing the assertions surrounding referents, the reasoning processes were then described through script analysis.

Cognitive operator analysis

The cognitive operator analysis (COA) is where the reasoning strategies are identified. Some of these categories have been predetermined by the Self-regulation Learning Model (see Figure 1) and other salient categories that emerged from content analysis of the narratives. The set of cognitive operators or reasoning processes used by subjects in this study, and predetermined by the Self-regulation Learning Model are as follows:

1. Metacognitive self-regulation (self-evaluation)
 - a. Self-efficacy - personal beliefs about one's ability to learn or perform behaviors and actions to bring about desired results.
 - b. Goal state – standard against which behavior is evaluated and refers to performance outcomes of academic achievement.
 - c. Affect – feelings of satisfaction as it pertains to goal attainment or academic achievement.
 - d. Knowledge – domain specific background, data, cognitive strategies, underlying conditions, allocation of cognitive resources and actions.

2. Behavioral self-regulation (self-monitoring)
 - a. Self-observation – deliberate attention to the behavior one is using to attain a goal.
 - b. Self-reaction – evaluation of responses to self-judgments such as good/bad, accept/not accept and beyond/below expectations.
 - c. Self-judgment – comparing one’s performance with proximity to an anticipated goal.
3. Environmental self-regulation
 - a. Physical environment – contextual variables such as task features and setting conditions.
 - b. Social interaction – cognitive guidance and advice from others that enhance perceptions of capability.

In order to determine the cognitive operators used by this sample, the researcher transcribed the journals, read and coded the data twice. The journal narratives were read in a random fashion to avoid forcing the data into specific categories. An example of journal narratives was shared with an expert in VPA to obtain feedback on coding accuracy. Examples of coded data from random journal narratives illustrate the cognitive operators identified.

1. Self-efficacy: “I am becoming more proficient in some clinical skills allowing me more time to solve clinical problems myself.
2. Goal state: “I will try to organize an agenda next week.”
3. Affect: “I feel good about being thorough.”
4. Knowledge: “I will look things up in the drug books, write things out and problem solve and ask my preceptor for help.”

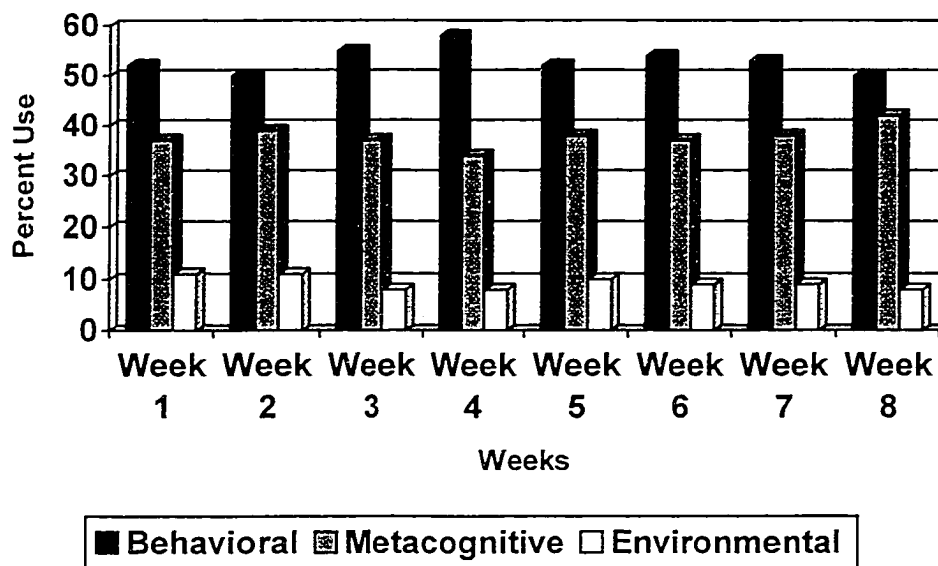
5. Self-observation: "I am starting to think in more complex terms."
6. Self-reaction: "My patients were satisfied and so was I."
7. Self-judgment: "I got so emotional over the patient. I let myself get to attached."
8. Physical: "When I was distracted I stopped what I was doing and went to a quieter place."
9. Social interaction: "I did not get nervous or anxious these last clinical days because I had my preceptor at my side to guide me and answer my questions."

The journals were analyzed by coding the response to each prompt for all subjects. The coding process involved identifying which of the above cognitive operators were used by each subject, for each week and then for the total sample. The prompts were divided into 3 groups as they were intended to elicit metacognitive, behavioral and environmental self-regulation responses (see Appendix C). Prompts 1 through 13 prompted metacognitive strategies, prompts 14 through 19 prompted behavioral strategies, and prompts 20 through 28 prompted environmental strategies. The interesting finding from the COA revealed that all subjects used all types of strategies for all prompts, irregardless of their intent. The results showed that behavioral self-regulation strategies were the most frequently used, followed by metacognitive then environmental. Figure 7 displays the percent use of the three major categories of self-regulation strategies, according to the model.

The percent use of strategies in the behavioral category included self-observation ranging from 45% to 56%, self-judgment ranging from 30% to 45%,

and self-reaction ranging from 10% to 14%. The percent use of strategies in the

Figure 7. Percent frequency use of 3 major self-regulation categories for 8 weeks of journaling.



metacognitive category included knowledge ranging from 38% to 48%, self-efficacy ranging from 28% to 33%, goal state ranging from 12% to 19%, and affect ranging from 6% to 12%. The percent use of strategies in the environmental category included social interactions ranging from 63% to 77% and physical context ranging from 24% to 37%. Figure 8 displays three graphs that reveal the frequency of behavioral, metacognitive and environmental self-regulation strategy use over the 8 weeks for the entire sample.

The final phase of the COA was to determine if there were any differences in self-regulation strategy use between BSN and ADN new graduate nurses. Table 19 displays the percent use of self-regulation strategies for the two groups calculated on their respective total frequencies. The behavioral SRL strategies were used by BSN subjects 5% to 16% of the time and by ADN subjects 8% to

Figure 8. Percent frequency use of self-regulation strategy use for 8 weeks of journaling.

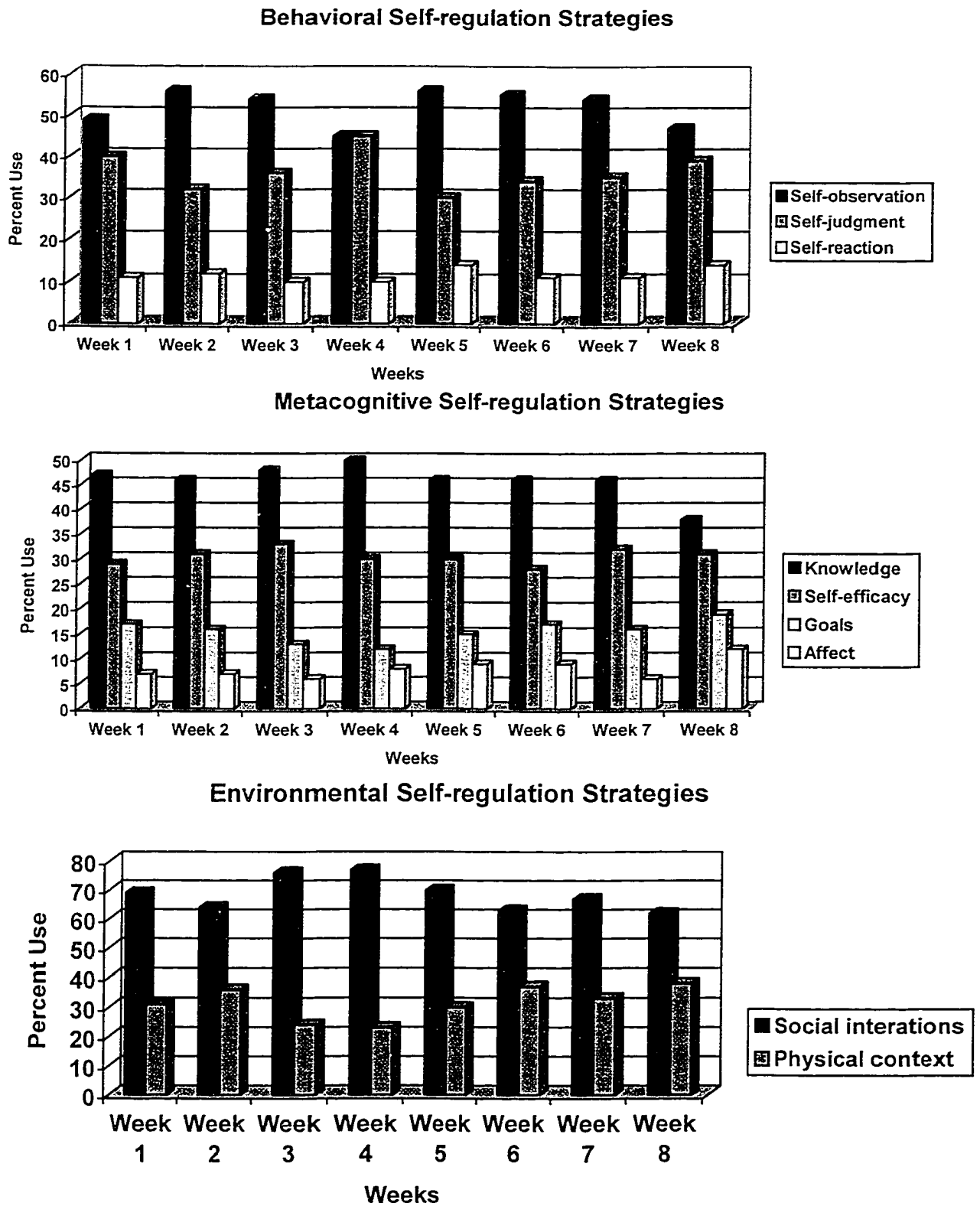


Table 19

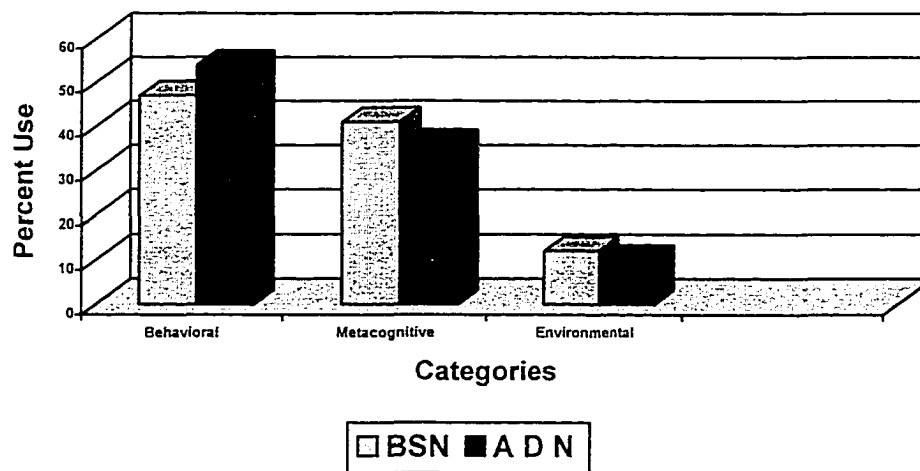
Self-regulation Strategy Use by Group by Week

Week	Behavioral		Metacognitive		Environmental	
	BSN	ADN	BSN	ADN	BSN	ADN
1	14%	16%	13%	16%	13%	18%
2	14%	12%	12%	13%	13%	21%
3	16%	16%	28%	12%	35%	9%
4	13%	13%	11%	13%	9%	12%
5	14%	12%	11%	14%	10%	12%
6	12%	13%	10%	13%	7%	14%
7	12%	10%	10%	10%	10%	8%
8	5%	8%	5%	9%	3%	6%

16% of the time. The metacognitive SRL strategies were used by the BSN subjects 5% to 28% of the time and by the ADN subjects 9% to 16% of the time. The environmental SRL strategies were used by the BSN subjects 3% to 35% of the time and by the ADN subjects 6% to 21% of time. There was an overall decreasing trend in strategy use for all categories with both groups that may signify less need to write and an internalization of these strategies. Figure 9 displays the difference in the two groups with respect to overall category use for the entire journaling period. The BSN subjects used less behavioral SRL strategies (47%) than the ADN subjects (54%), but more metacognitive SRL strategies (41%) than the ADN subjects (36%). The use of environmental SRL strategies were approximately equal between the two groups (BSN = 12%, ADN = 10%). These findings along with the referent and assertional analysis revealed

that the two groups have some similarities and differences in thinking processes after 8 weeks of journaling. The implications of these findings are discussed in chapter V in more detail. The script analysis is the sequel to the RPA and AA and adds a further understanding of cognitive processes.

Figure 9. Total Self-regulation category use for BSN and ADN new graduate nurses.



Script analysis

The final phase of narrative analysis is script analysis where the narrative is analyzed for the overall broad description and meaning of the reasoning processes used while responding to the prompts. This step of the analysis was performed because the researcher desired to ascertain if there were any common themes within the data that may be unique to this sample that were not explained by the Self-regulation Model. The narratives were re-read and content analyzed for predominant reasoning processes that were identified as common to all subjects as they reflected on clinical experiences. The themes that emerge were: (a) observations of knowledge work, (b) observations of thinking strategies, (c) judgments of self-improvement, (d) judgments of self-incompetence, (e) self-

reactions, and (f) self-correction strategies. Table 20 displays narrative examples of the 6 predominant reasoning processes that were evident from the data. The examples shown in table 20 are randomly selected statements from all 8 weeks.

Table 20

Narrative Examples of Predominant Reasoning Processes

<p>Observations of Knowledge Work</p>	<p>"I look at the chart, or look it up in my books." "Wrote myself a note to remind myself." "What resource could I use to solve a problem?" "I study my pharmacology book." "I rehearse outside the room with my preceptor." "I review information before I talk to doctors." "I go back and look it up in the chart! I don't rely on my memory for all the information." "I research using our computer."</p>
<p>Observations of Thinking Strategies</p>	<p>"I solve problems by breaking it into parts." "I think through and find a solution." "I think of alternatives myself, present them to others, gather their opinions, then decide." "I stop and think." "I attempt to solve myself through resources, strategizing etc." "I lean too much on J. My goal is to think things through first." "I clear my mind of past bad experiences." "I concentrate harder." "I re-evaluate the decisions I make and why I made them."</p>
<p>Judgments of Self-improvement</p>	<p>"I'm improving little by little. I definitely need a lot more work." "I am becoming more resourceful and am able to find information more quickly." "I have greatly improved this week and my confidence is much higher." "I have been more successful at starting IV's." "I have been more in tune with report." "I am learning new things each week." "My performance was better. I feel more experienced and I rarely had to ask for help." "My knowledge base is gaining everyday."</p>

Table 20 (continued)

Narrative Examples of Predominant Reasoning Processes

<p>Judgments of Self-Incompetence</p>	<p>"I always ask for help because right now I can't make final decisions." "I feel very inadequate and I am not as knowledgeable as I would like to be." "I think I am too particular and may chart insignificant data in an effort to be attentive." "One day I got very behind and had to stay over late to complete my work. This is frustrating for me." "I lack assertiveness." "I was unorganized and slow." "I was nervous, felt unprepared and not competent." "Still feel like I don't see the whole picture."</p>
<p>Self- Reactions</p>	<p>"Horror! I am very unsure that I will be a competent nurse." "FRUSTRATION." "This week's clinical was overwhelming." "I have finally achieved my calling in life and hope I will be an excellent nurse." "I had the feeling of accomplishment this week." "Overall very satisfying clinical experience." "The consequences of my work this week was very disappointing to me and left me feeling incompetent." "It was truly a chaotic day when everything seemed to go wrong."</p>
<p>Self-Correction Strategies</p>	<p>"I will draw from previous weeks work on prioritizing, time management, and ways to be quicker at what I do." "Wipe the slate clean and start over with the vision that today will be a better day." "I will move at a slow steady pace so I don't feel so overwhelmed." "I need to prioritize and manage my time better." "I will have an open mind about everything." "When I need help, I look for someone in my area I can trust." "I need to take the initiative and find answers for myself." "I need to spend more time on planning." "I will write down what is recent and pertinent to take care of the patient so I can answer the doctor's questions."</p>

Observations of knowledge work were statements of reflection about what subjects would do with data or information that confronted them in the clinical area. These observations would be obtained by the critical thinking skill of interpretation where data and information had to be classified and categorized by

the thinking strategies such as reading, reviewing, rehearsing and writing. From this type of reasoning the meaning of stored data and information was clarified as it was recalled by reflecting on the past week's experiences. The statement "I rehearse outside the room with my preceptor" exemplifies knowledge work carried out in the clinical area. Observations of knowledge work were consistently a large part of all journal narratives.

Observations of thinking strategies were statements of reflection about thinking processes. They were obtained primarily by the critical thinking skills of analysis, and inference. Analysis involved self-examination of thinking processes from specific behavioral cues to general inductive statements such as "I think through and find a solution". The critical thinking skill of inference involved drawing conclusions about the outcomes of their thinking such as "I solve problems by breaking it into parts." The observation of thinking processes tended to increase over time.

Judgments of self-improvement were statements of reflection about how the subjects had made progress in increasing their knowledge base, ability to perform skills, ability to solve problems, and ability to think independently. For example, "I'm improving little by little. I definitely need a lot more work."

Judgments of self-incompetence were statements of reflection about how the subjects had not made progress, were unorganized and had feelings of inadequacy. For example, "I feel very inadequate and I am not as knowledgeable as I would like to be." These judgments were made by using the critical thinking skills of evaluation and explanation. Evaluation was used in statements of behavior comparison when a goal or prototype image they had of where they

should be, did not coincide with reality. This involved a thinking strategy that Pesut and Herman (1998) refer to as juxtaposing as the subject contrasts present state next to the outcome standard. Reflexive comparison was also used when behaviors were remembered from previous experiences to notice progress or a lack there of. The critical thinking skill of evaluation was used when the subjects judged the consequences of behavior for the week such as “My performance was better, I rarely had to ask for help” and “I still feel like I don’t see the whole picture.” Explanations of self-improvement were evident in the journals each week, however, statements of self-incompetence were less frequent after the 6th week of journaling.

Self-reaction statements were primarily negative or positive conclusions regarding experiences. The negative reactions occurred during the early weeks of journaling as the subjects used the critical thinking skills of analysis and inference to draw conclusions. The early weeks revealed feelings of being overwhelmed, exhausted, frustrated and incompetent. With time, experiences became more positive as the subjects gained confidence, for example, “I had the feeling of accomplishment this week.” These positive feelings or internal rewards are the self-reinforcement that enhances self-efficacy from the achievement of goals. This evidence supports the use of metacognitive processes.

The last category, self-correction strategies were used throughout the journaling period. The self-regulation prompts force the process of self-examination and evaluation, thereby stimulating cognition through hypothesizing and if-then thinking. These subjects determined whether they were lacking ability or successful in clinical practice against goals or standards, and made judgments

as to what they needed to do for growth. For example, one subject hypothesized about the cause of her negative feelings arising from her pace of activity when she stated "I will move at a slow steady pace so I don't feel so overwhelmed." If-then thinking was evident in the statement "I will write down what is recent and pertinent to take care of the patient so I can answer the doctor's questions." This thinking strategy was used to prepare the subject for future success with communication skills.

Another thinking strategy that was infrequently used was schema search which Pesut and Herman (1999) refer to as accessing patterns of past experiences that might apply to the current situation. Two subjects exemplify this strategy by the following statements; "When I need to remember important facts, I think about previous experiences to relate them to, and "I can meet objectives because I am drawing on knowledge and experience." Schema search was also supported by the 27% use of past tense verbs in the narratives.

The final script analysis revealed the major cognitive themes of these new graduate nurses during 8 clinical weeks of a preceptorship. The results also show the type of thinking that was generated by self-regulated learning prompts. The last step of data analysis in this study was to answer the research questions first posed in Chapter I. The following section will address each research question based on the evidence that emerged from the data analysis.

Research Questions

The first research question was: **What are the effects of self-regulated learning prompts on the metacognitive processes of new graduates who use reflective journaling during precepted clinical experiences?** The

narrative data demonstrated the use of metacognitive process with reflective journaling with SRL prompts. The second research question was: **Are there changes in metacognitive processes of new nurse graduates who use self-regulated learning prompts for reflective journaling for 8 weeks of precepted clinical experiences?** The narrative data generated in the journal narratives by the prompts revealed that the majority of the nouns referred to metacognitive processes followed by behavioral processes and then environmental processes. In the metacognitive category the rank order of noun frequency was pronoun referring to self, knowledge, thinking strategy and finally cognitive resources. The rank order of noun frequency in the behavioral category was activity then reaction. In the environmental category the rank order of noun frequency was other persons, circumstances, time and place. The rank order of these noun referents changed over the 8 weeks, with thinking strategies increasing and time referents decreasing.

Assertional analysis revealed that the sample used statements that were primarily connotative followed by indicative, comparative and causal. In addition, the verbs used in the responses were primarily in the present tense in spite of the fact that the majority of the prompts asked for recall of past experiences. This rank order of assertions remained consistent over the 8 weeks of journaling.

Cognitive operator analysis revealed that the subjects used all 9 categories of operators for all prompts irregardless of the type of statement. The nine cognitive operators used were derived from the self-regulated learning model and include: (a) self-efficacy, (b) goal state, (c) affect, (d) knowledge, (e) self-observation, (f) self-reaction, (g) self-judgment, (h) physical context, and (l)

social interaction. The rank order for the frequency of cognitive operator used was behavioral, metacognitive and environmental. This rank order remained consistent over the 8 weeks of journaling.

Script analysis revealed the major cognitive themes of observations of knowledge work, observations of thinking processes, judgments of self-improvement, judgments of self-incompetence, self-reactions and self-correction strategies. Observations of knowledge work remained consistent over the 8 weeks. Observations of thinking processes tended to increase over time. Judgments of self-improvement tended to increase over time and judgments of self-incompetence tended to decrease. Self-reactions were more negative during the early weeks of journaling and more positive during the later half of the study. Self-correction strategies were used throughout the journaling period.

The third research question was: **Are there differences in metacognitive processes between associate degree and baccalaureate degree nurse graduates who use self-regulated learning prompts for reflective journaling after precepted clinical experiences?** When the two groups were compared some differences were noted. First, frequency differences were calculated for the two categories of noun referents that changed over time. It was revealed that both BSN and ADN degree nurses increased the use of thinking strategies over time, however, the ADN nurse had a greater increase. Both groups decreased the use of time referents but the ADN nurse showed a more consistent weekly decline. Second, it was discovered that both groups of new graduates made primarily connotative statements. Both groups were equal with regard to comparative, causal, and indicative statements. Third, from the cognitive

operator analysis it was revealed that the BSN nurse used less behavioral self-regulated learning strategies but more metacognitive self-regulated learning strategies. The environmental self-regulated learning strategies were used equally by both groups.

The fourth research question was: **What relationships exist between selected cognitive measures, selected critical thinking variables and metacognitive processes used by participants in this study?** First, the analysis of this question began with bivariate correlations between the demographic data and frequency use of noun categories, verb tense, assertional statements and cognitive operators. Pearson product-moment correlation coefficients were calculated between the raw scores of noun categories, verb tense, assertional statements, cognitive operators, and the demographic variables of age, hours employed, and previous years of work. Spearman's rho correlation was calculated between the raw scores of noun categories, verb tense, assertional statements and cognitive operators with the ordinal variables of marital status, current degree, previous degree, certification, previous work, and number of children. Second, the researcher identified and evaluated significant correlations for relevance since the frequency of ranks within some demographic variables, for some weeks, such marital status, were too small to make an inference. Third, it had to be determined if the correlation was significant on all accounts in order to perform the Mann-Whitney U test to compare the difference of averages between the independent groups. The Mann-Whitney U test was the non-parametric test chosen because the total sample size was small ($N=15$) and unequal ($BSN=9$, $ADN=6$). Non-parametric analysis is

appropriate in this instance because the data from this small convenience sample would involve non-normality and/or heterogeneity of variance (Huck & Cormier, 1996). Finally, the U score was compared to the table of critical values of U for common values of α . The final decision was to determine if the critical value was within the two tails of the distribution of U when $\alpha=.05$.

The results of the analysis between demographic variables and the nouns identified for the entire journaling period revealed a high positive correlation of volunteer activities with clinical activities ($r=.79$, $p=.03$). Using the Mann-Whitney U test, the median difference between the groups who volunteer and those who do not, was significant [$U(5,10)=.79$, $p<.05$]. Nouns were also correlated with demographics per week and revealed a high positive correlation of BSN/ADN degree with referents to knowledge for week 4 and 5 ($r=.59$, $p=.03$). Using the Mann-Whitney U test, the median difference between the groups of BSN and ADN subjects was significant for week 4 and 5 [$U(8,5)=6$, $p<.05$]. For week 6, there was a high positive correlation of marital status with objects supporting cognition ($r=.62$, $p=.02$) and a high negative correlation of marital status with persons ($r=-.61$, $p=.03$). The Mann-Whitney U test revealed the median difference between those subjects who were married and those who were single as significant for both variables [$U(7,5)=5$, $p<.05$]. Table 21 displays the significant relationships between demographic variables and referent nouns.

An analysis was also performed between demographic variables and verb tense. There was a significant high positive correlation of current work related certifications with future tense verbs during week 3 ($r=.64$, $p=.01$). The Mann Whitney U test revealed the median difference between those subjects who were

Table 21

Non-parametric Analysis Between Demographic Variables and Referent Nouns

Demographic Variable	Clinical Activities	Knowledge Referents	Cognitive Supports	Other Persons
Volunteer Status	(all 8 weeks) M SD Yes 44.33 21.73 No 72.80 6.72 $r=.79, p=.03$ $U(5,10)=.5, p<.05$			
Current Nursing Degree		(week 4&5) M SD BSN 8.12 2.53 ADN 12.60 4.03 $r=.59, p=.03$ $U(8,5)=6, p<.05$		
Marital Status			(week 6) M SD Married 4.28 2.20 Single 1.75 .95 $r=.62, p=.02$ $U(7,5)=5, p<.05$	(week 6) M SD Married 6.42 3.69 Single 2.50 1.29 $r=-.61, p=.03$ $U(7,5)=5, p<.05$

certified and those who were not as significant [$U(6,8)=6, p<.05$]. There was also a significant high negative correlation of technical work experience with past tense verbs during week 7 ($r=-.69, p=.01$) and certification with present tense verbs during week 7 ($r=.83, p=.001$). The Mann-Whitney U test revealed the median difference between those subjects who had worked previously and those who had not with past tense verbs as significant [$U(8,3)=1.5, p<.05$]. There was also a significant median difference between those who were not certified and those who were with present tense verbs [$U(7,4)=0, p<.05$]. Finally, there was a significant high negative correlation with the variable of marital status and use of

present tense verbs during week 5 ($r=-.61, p=.02$). The Mann-Whitney U test revealed the median difference between those subjects who were married and those who were single as significant [$U(7,6)=6, p<.05$]. Table 22 displays the significant relationships between demographic variables and verb tense.

Table 22

Non-parametric Analysis Between Demographic Variables and Verb Tense

Demographic Variable	Past Tense	Present Tense	Future Tense
Previous Work History	(week 7)		
	M SD		
Yes	11.37 4.06		
No	4.00 3.00		
	$r=-.69, p=.01$ $U(8,3)=1.5, p<.05$		
Work Related Certifications		(week 7)	(week 3)
		M SD	M SD
Yes		13.50 4.43	2.83 1.47
No		29.85 7.64	6.25 3.19
		$r=.83, p=.001$ $U(7,4)=0, p<.05$	$r=.64, p=.01$ $U(6,8)=6, p<.05$
Marital Status		(week 5)	
		M SD	
Married		28.28 8.19	
Single		17.83 8.08	
		$r=-.61, p=.02$ $U(7,6)=6, p<.05$	

The demographic variables were also correlated with assertional statements. A significant high positive correlation during week 3 was found between the variable of volunteer activity and the number of comparative statements made ($r=.71, p=.004$). The Mann-Whitney U test revealed the median

difference between those subjects who volunteered and those who did not as significant [$U(5,9)=3.5$, $p<.05$]. During week 7 there were significant high negative correlations between marital status and comparative statements ($r=-.79$, $p=.004$) and connotative statements ($r=-.79$, $p=.01$). The Mann-Whitney U test revealed the median difference between those subjects who were married and those who were not as significant [$U(7,4)=1$, $p<.05$]. Table 23 displays the significant relationships between demographic variables and assertional statements.

Table 23

Non-parametric Analysis Between Demographic Variables and Assertional Statements

Demographic Variable	Comparative	Connotative
Volunteer Status	(week 7)	
Yes	M 3.00 SD 1.22	
No	M 6.11 SD 1.96	
	$r=.71$, $p=.004$ $U(5,9)=3.5$, $p<.05$	
Marital Status	(week 7)	(week 7)
Married	M 7.28 SD 2.87	M 16.28 SD 3.49
Single	M 3.50 SD .57	M 12.25 SD .50
	$r=-.79$, $p=.004$ $U(7,4)=1$, $p<.05$	$r=-.79$, $p=.01$ $U(7,4)=1$, $p<.05$

The last analysis consisted of correlations between demographic variables and the cognitive operators of the self-regulated learning model. There was a significant high negative correlation between the variable of previous technical

work experience and goals during week 2 ($r=-.60$, $p=.02$). Further analysis with the Mann-Whitney U test revealed a significant median difference between those subjects who had previously worked and those who had not [$U(11,3)=3$, $p<.05$]. There was a significant high positive correlation between the variable of previous technical work experience and self-observation during week 4 ($r=.61$, $p=.02$). This significant finding was further analyzed and the Mann-Whitney U test revealed a significant median difference between those subjects who had previously worked and those who had not [$U(10,3)=2.5$, $p<.05$]. During week 5 there was a significant high positive correlation between work related certifications and physical contextual cues ($r=.64$, $p=.01$). The Mann-Whitney U test revealed a significant median difference between those subjects who were certified and those who were not as significant [$U(5,8)=5$, $p<.05$]. There was a significant high positive correlation between current BSN/ADN degree and self-reaction during week 6 ($r=.65$, $p=.02$). In this case the Mann-Whitney U test revealed a significant median difference between BSN and ADN subjects as significant [$U(7,5)=4.5$, $p<.05$]. Table 24 displays the significant relationships between demographic variables and cognitive operators.

Summary of Data Analysis

To summarize the data analysis, the following conclusions are made. First, the qualitative analysis of the data revealed recurrent noun themes divided into the metacognitive (self, cognitive resource, knowledge, thinking strategy), environmental (person, place, circumstance, time) and behavioral (activity, reaction) categories. The frequencies of these nouns ranked in descending order were (a) metacognitive, (b) environmental, and (c) behavioral. The cognitive

Table 24

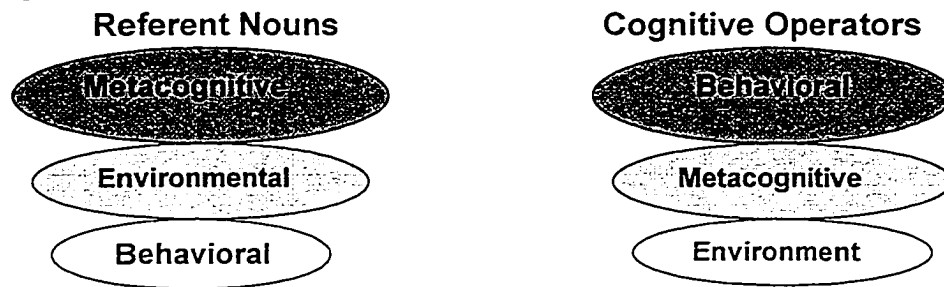
Non-parametric Analysis Between Demographic Variables and Cognitive Operators

Demographic Variable	Self-Observation		Goals		Physical Context	Self-Reaction
Previous Work History	(week4)		(week 2)			
	M	SD	M	SD		
Yes	81.39	4.69	14.23	4.45		
No	91.03	6.44	9.50	2.07		
	$r=.61, p=.02$ $U(10,3)=2.5, p<.05$		$r=-.60, p=.02$ $U(11,3)=3, p<.05$			
Work Related Certifications					(week 5)	
					M	SD
Yes					4.96	3.18
No					11.11	4.44
					$r=.64, p=.01$ $U(5,8)=5, p<.05$	
Current Degree						(week6)
					M	SD
BSN					13.74	4.32
AND					20.68	4.69
					$r=.65, p=.02$ $U(7,5)=4.5, p<.05$	

operators were also ranked, and their descending order was (a) behavioral, (b) metacognitive, and (c) environmental strategies (Figure 1).

The referent noun analysis revealed the top 5 concerns for the subjects to be a (a) focus on the self, (b) knowledge issues, (c) other persons, (d) circumstances (clinical problems/situations), and (5) activities. The difference between the groups revealed a greater increase in thinking referents and a greater decrease in time referents with the ADN graduate. The BSN graduate used less behavioral cognitive operators but more metacognitive cognitive operators than the ADN graduate. While the ADN graduate displayed greater

Figure 10. Contrast of descending order of referent nouns and cognitive operators.



increases in referring to thinking strategies, the BSN graduate was more likely to use metacognitive cognitive operators. The data suggests that the ADN graduate had greater cognitive gains to make to achieve some level of proficiency in clinical reasoning. The data suggests that BSN graduates had more experience with metacognitive thinking strategies. Curricular differences along with different exposure to faculty mentoring may in part account for these findings.

The assertional analysis suggests that new graduates were novices in regards to the role of experience for making comparative and causal statements. Comparative and causal statements require past experiences to form causal relationships and test comparisons. The fact that the subjects used less past tense verb statements also suggests experiential deficits. Limited use of future tense verbs suggests foresight deficits and difficulties with prospective planning. Journal narratives reflect a struggle with present circumstances that appear to overwhelm the subject's ability and skill in comparing the current situation with past experiences or to project about future outcomes. Previous research has shown that an expert is more likely to integrate current state information with relevant past knowledge to frame a situation (Ericsson & Simon, 1993). This cognitive skill would not be in the self-regulation repertoire of the novices

represented in this study.

The script analysis revealed the following themes; (a) self-observation of knowledge work, (b) self-observation of thinking strategies, (c) self-judgments of improvement, (d) self-judgments of competence, (e) self-reactions, and (f) self-correction strategies. These themes emerged as the subjects used the critical thinking (CT) skills of interpretation (categorizing, decoding, clarifying meaning), analysis (examining ideas), inference (questioning evidence, testing alternatives, drawing conclusions), explanation (stating results, justifying procedures, presenting arguments) and evaluation (self-examination, self-correction). Facione and Facione (1996) conjecture that the intersection of these constructs is at the core of clinical practice. They were apparent in varying degrees during the 8 weeks of journaling as evidenced by some of the activities that define each concept. Other evidence that supported the existence of critical thinking skills was the use of thinking strategies that Pesut and Herman (1998) suggest correlate with reflective clinical reasoning such as knowledge work (reading, reviewing, rehearsing, writing), juxtaposing, reflexive comparison, use of cue logic, if-then thinking, and schema searching.

The themes that emerged from the analysis support teaching-learning observations related to students or new graduates. For example, knowledge related issues are a concern to a novice when confronted with a new overwhelming situation. The self-observation of thinking strategies was an unexpected finding. The prompts used in this study have been untested and may direct responses in this direction. Judgments of improvement and competence

revealed perceptions of how they compared behaviors with standards, goals or objectives. These judgments also influenced self-efficacy or the subject's belief of success. Self-reactions influenced thinking for change to meet goals and eliminate discrepancies between understanding and reality. Self-reactions changed for most subjects from negative to positive over the journaling period. Many reactions were associated with perceived support by preceptors and interactions with others. While reactions were evident, there was little reference to self-regulation of affect or specific feelings in the narratives. Perhaps negative feelings may be too uncomfortable to bring into consciousness so they remain repressed until coping mechanisms are in place or feelings resolve. Alternatively, it may be that the prompts and research methods used in this study were not suited to reveal this strategy. The use of self-correction strategies required the critical thinking skill of evaluation. Self-correction was associated with causal and comparative statements and the use of future verb tenses. This evidence suggests that there was metacognitive growth during reflective journaling using SRL prompts. Perhaps longer journaling episodes would reinforce a greater metacognitive growth than was seen in this study.

There were some significant associations revealed when the qualitative analyses were correlated with demographic characteristics and variables of educational preparation. Non-volunteer subjects referred more often to activities and skills, and made more comparative statements. The researcher cannot speculate a reason for these findings since a volunteer characterization is not associated with any other demographic characteristic nor has it been explained in previous research. Further research may reveal additional support for these

relationships.

Subjects in this sample who were married were less likely to refer to other persons, use present tense verbs, and use comparative and connotative statements. Perhaps they were able to debrief with significant others at home and social interactions in clinical were less meaningful for them. Speculations concerning the other findings were difficult to make without the aid of regression analysis to show interrelationships among the demographic characteristics. Non-certification subjects showed a greater use of present and future tense verbs and were more likely to focus on structuring the environment. One explanation for this finding may be that subjects with certification all have work experience, can draw from past experience and already know how to structure the environment. Subjects with previous work experience had an increase use of past tense verbs, had less frequent use of self-observation and referred more often to goal statements. These findings suggest that subjects with previous work experience have past knowledge, use reflexive comparison and schema search to draw on while thinking. Associate degree graduate subjects made more references to knowledge work, such as the need to “look things up” or “review previous texts”. This finding suggests the subjects from shorter nursing programs require or rely on the need for knowledge work while transitioning into clinical practice. Further interpretation of these findings continues in chapter V, while keeping in mind the research setting and problems and limitations of the design.

Problems and Limitations as Identified by Field Notes

Field notes become an important part of the data collection process as a record that may contain an experiences, ideas, fears, mistakes, confusion, break-

throughs, problems that may arise, reactions to informants and feelings sensed from others (Spradley, 1979). This self-awareness enables the researcher to consider personal biases and feelings to understand their influence on the research (Morse, 1989). For this study the researcher made notes after each visit to the weekly seminars of the nurse residency project for the purpose of collecting the journals. It was anticipated that the objective status of the researcher would have very little impact on the residency project or journal responses since contact with the subjects was very limited.

Field notes for week 1 revealed a period of “getting to know” the project participants and this was accomplished by attending the nurse residency orientations and describing the journaling prompts and processes to the nurse preceptors and new graduate nurses. Initially the design team explained their own version of journaling to the subjects and retyped the prompts. The researcher had to review the principles of validity and reliability of qualitative research for the purpose of obtaining accurate research results and projected outcomes from the data collected. Emphasis was also placed on the importance of prompt development related to the theoretical underpinnings, and altering them could affect the results. In addition, participant confidentiality was reaffirmed since it would influence the collection of honest and accurate data.

When the journals were collected the second week, the residents seemed angry about the lack of structure in the nurse residency project. Some subjects were told they did not have to journal at their respective institutional sites. In addition, they were not sure what to put under the prompts as they were “looking for the right answer”. The researcher reassured them that there was no right

answer and to write what first came to mind after reading the prompt. The subjects changed the terminology of some prompts to keep the statements in the past or present tense to avoid futuristic thinking. At this weekly seminar the subjects were provided with self-addressed stamped envelopes for narratives not completed.

At week 3, subjects verbalized resistance to journaling. Some comments made by the subjects included: (a) "It is too much like what we had to do in school.", (b) "There is no time to complete them at work or at home.", and (c) "There are times when the prompts put words into my mouth and I do not like that." One behavior noted was the completion of journals during the weekly seminars for the previous week's clinical experience. This behavior would limit the accuracy of recall from long term memory.

At week 4, some subjects made apologies for not completing journals due to work interference in spite of the fact that they "believed" in the process. The non-verbal behavior from some subjects revealed a disregard for the research study and the journaling as if it was an annoyance. The researcher attempted to remain positive and continued to encourage the subjects to continue the journaling process. Each week the subjects were encouraged ask questions or to call the researcher about problems with methodology. It was reinforced to the subjects that they were to journal after each clinical week as close to the clinical experiences as possible.

The researcher restated at week 5 how important all responses were. A few subjects were beginning to evaluate some prompts as not applicable or redundant. A comment made by one participant this week was that if they were

to write how they really felt, "I", the researcher "would get an ear full". It was emphasized that this was acceptable to do in the journals and that confidentiality would be maintained. This week there were non-verbal behaviors that consisted of unpleasant facial expressions in regards to journaling.

From week 6 to week 7 the journals were starting to decrease in number, however, none of the subjects asked to be removed from the study as the consent form had delineated. Journals were collected every two weeks since seminars were every other week. For the final week a self-addressed stamped envelope was provided to mail in the journals since the researcher would not be in physical contact with subjects after that point in time. The researcher continued to have a reaction of inward discouragement due to a perceived lack of engagement in the journaling process by the subjects.

One's self-awareness is increased by field notes (Morse 1989). Qualitative research suffers from threats to data validity or credibility that include reactive effects, sources of distortion and time sampling. Reactive effects are from artificial conditions imposed on the respondents that affect validity of the data by the virtue of researcher's presence. The field notes brought to light the researcher's reactions that may have introduced bias into data analysis. Data analysis was avoided during data collection to prevent affecting the credibility from reactive effects. A second independent rater evaluated coding categories and their application to the data during analysis to prevent bias. Time sampling is a threat to credibility when data is collected in the absence of the researcher. Frequent contact with the project directors and attendance at project planning meetings helped to maintain consistency and accuracy with methodologies.

Data from the field notes emphasized the strengths as well as changes that would be needed for future journaling episodes and data analyses with similar samples. The results of this study had implications for the Self-regulated Learning Model as it is applied to the discipline of nursing. The revised model and a thorough discussion of findings and conclusions follow in Chapter V.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to make conclusions and recommendations based on the findings of the research conducted. This chapter is divided into two sections; (a) conclusions of self-regulated learning and its relation to verbal protocol analysis, (b) clinical reasoning and the creation of knowledge, and (c) recommendations for future research, education, practice and theory development in nursing. The self-regulated learning model as proposed by Schunk and Zimmerman (1994) and adapted for the study, is presented in a revised form that stems from the research findings. The self-regulated learning process used with a sample of new graduate nurses has shown a unique balance of concepts discovered from this analysis.

Conclusions

This study described the reasoning strategies new graduate nurses used during clinical experiences while transitioning into the workplace. A self-regulated learning model was used to develop prompts that elicited metacognitive, behavioral and environmental responses. Fore to here, the cognitive research in nursing has been limited in regards to explaining or describing these processes or the pedagogical techniques that could be used to foster them. The evaluation of the metacognitive related research revealed that clinical reasoning was not entirely dependent on information processing and critical thinking measurements,

and did not differentiate between levels of practice or education. The behavioral related research revealed that reflection as a learning model did not guarantee progression to higher levels of reflection or improvement in CT abilities. The environmental related research supported a sociocultural influence on values and achievement when learning the practice of nursing. In addition, situated learning experiences were deemed necessary to create an environment for learning provided they were supportive and promoted self-evaluation. The self-regulation research lacks evidence regarding the issues of domain specificity and intra-individual consistency for the transfer of thinking strategies in the workplace. Further research was needed to expand the understanding of cognition in clinical reasoning and to pull together the findings from previous decades of work. The following section will discuss the integration of the major concepts of the SRL model and compare these findings to the constructivist view of learning.

The present study was designed to describe situated learning through prompted reflection based on the interaction of metacognitive, behavioral and environmental influences. The cognitive processes used by new graduate nurses were observed from written data recalled after clinical experiences. The researcher has drawn the following conclusions from the data analysis of this sample:

1. Clinical reasoning of new graduate nurses includes metacognitive efforts surrounding the issues of the self, cognitive resources, knowledge use and thinking strategies.

2. Clinical reasoning of new graduate nurses includes the environmental structuring involving other persons, physical context, circumstances and time periods.
3. Clinical reasoning of new graduate nurses includes the behavioral observations of performance, activities in the work place and reactions to the clinical experiences.
4. The dialogue of new graduate nurses is primarily in the present tense with statements of significance and meaning.
5. A variety of cognitive operators are used with SRL prompted journaling irregardless of the type of prompt. The majority of the operators are behavioral, followed by metacognitive and then environmental.
6. The predominant themes or concerns of new graduates as they transition into the workplace are observations about; (a) knowledge work and thinking strategies, (b) judgments about competence and improvement, and (c) strategies for correction or improvement.
7. Verbal protocol analysis is a valuable method of analysis to understand the cognitive strategies observed in new graduates as they reflect on clinical experiences as compared to content analysis for themes of cognitive focus.
8. Self-regulated learning fostered through prompted journaling can alter the frequency of metacognitive strategies.

9. The Self-regulated Learning Model in Nursing integrates all the concepts described in the educational model and assumes the critical thinking skills of interpretation, analysis, inference, explanation and evaluation for problem solving and decision making.
10. Self-regulated learning is a pedagogical strategy that deserves further research in the domain of nursing.

The findings of this study show the importance of self-regulated learning in nursing as new graduate nurses integrate: (a) metacognitive evaluative processes in clinical reasoning, (b) environmental structuring to influence cognition and behavior, and (c) behavioral monitoring of their progress.

Self-regulated learning and verbal protocol analysis

Verbal protocol analysis (VPA) was a very successful method of analysis to ascertain the reflective thinking and recall of this sample during clinical experiences. The verbal data in this case were in written form, highly significant and informative in ascertaining the subject's cognitive processes and memory structures. By using VPA the researcher was able to make inferences about cognitive strategies, reasoning processes and the domain specific information believed stored in long term memory (LTM) (Fonteyn & Fisher, 1995). The verbal data also provided a means to describe a broad theoretical generalizations regarding SRL which as Ericsson and Simon (1993) suggest "can sometimes be confirmed or refuted by demonstration of the presence or absence of certain information in subjects verbalizations" (p. 220). Since the late 1970's the experts have argued that VPA is a valid measure of a subject's cognitive processes, however, there are limitations to the completeness of the data.

One main postulate of VPA is that cognitive processes underlying verbalization are a subset of all cognitive processes. Investigators have found retrieved information to be valid with error only occurring when subjects are asked to date an instance. To counteract this effect, the subjects in this study were asked to recall instances before and after clinical experiences to prevent conjecture. Recall depends on availability of retrieval cues and in this study they were the key words that prompted the subjects to search LTM for recognition and response. Often times when a response was not available after a heuristic search of LTM the subjects would deem the prompt “not applicable” for that week. The metacognitive group of prompts (Appendix C: prompts 1-13) had the greatest number of “not applicable” responses as compared to the behavioral and environmental group of prompts. The individual prompts which had the highest frequency of “not applicable” responses were those in the behavioral and environmental categories which asked the subjects to recall about preparation at home for subsequent clinical experiences (Appendix C: prompts 19, 23).

Ericsson and Simon (1993) assert that only the end products of perception and retrieval from LTM are those that reach awareness and are verbalized. In addition, only in the context of a task can one make inferences about the underlying cognitive processes so that the normal sequence of cognitive processes is altered when the subject is asked to explain their own cognitive processes. The prompts that were used in this study (Appendix C) did not overtly ask about cognitive processes but asked the subjects to recall experiences to reflect on particular SRL strategies. Another limitation of prompted verbalization

that may cause retrieval failure is the use of fixed questions with the unavailability of alternatives. In this study multiple prompts were used to expose the dichotomous nature of a circumstance such as “what I did like” and “what I did not like about the clinical experience”.

A problem arises when the researcher tries to generalize about problem solving from data obtained from individual protocols that do not coincide with the group. Ericsson and Simon (1993) assert that this is not annoyance with the method but a psychological issue of human behavior. Subjects differ in their knowledge and how they use it particularly with problem solving situations. The verbal behavior that is viewed in a single transcript attests to the complexity of knowledge representation and should not be averaged on all accounts (Kassirer & Gorry, 1978). An example of an inconsistent case in this study was a subject who wrote “not applicable” for prompts 1 and 2 for all eight weeks. This is a notable finding to bear in mind for future study since these are significant metacognitive prompts. One means to assist the researcher to treat each transcript independently is to analyze them in random order to eliminate the possibility of relying on information in preceding narratives to make subsequent decisions. The researcher in this case followed the process of analyzing in the order of weeks 1, 8, 2, 7, 3, 6, 4, and 5.

Another limitation is that statements about problem solving may be misleading, incorrect or incomplete and the researcher may see only the superficial parts of the process. In addition, what the subjects write may be what they think the researcher wants to see. Kassirer & Gorry (1978) made the argument that one cannot make the assumption that the parts in the

subconscious are any different than the parts the subject is able to articulate. The repetition of prompts for 8 weeks of journaling is postulated to have negated some of these effects. The researcher also randomly selected narratives, reanalyzed them and compared them to the original analysis to identify discrepancies. An expert in VPA was also consulted to examine the narratives for any discrepancies.

The primary reason for decreased accuracy of reported data is when self-report is separated in time from actual occurrences of cognitive processes. Retrospective accounts allow the subject to mix current knowledge with past experiences making reliable inference difficult (Newell & Simon, 1972). It has been shown that recall may provide inconsistent data about specific problem solving during a task, but it could still provide a description about one's reasoning strategies. One method to describe reasoning strategies is to organize concepts and assertions within a set of defined cognitive operations that represent predominate reasoning processes (Fonteyn, Kuipers & Grobe, 1993). The cognitive operators of the SRL model were a systematic method of organization that made data analysis easier and added credibility to the findings. The researcher gained a clearer understanding of how the subjects structured information as they reasoned. This type of organization is synonymous with the audit trail used in qualitative research since results from each step can be retraced and explained.

Cognitive direction by instructions seems to have an effect on cognitive processes by changing particular strategies from deliberate cognitive control to automatic status (Ericsson & Simon, 1980). This advantage of verbal protocol

with SRL strategies was not observed due to the journaling limit of 8 weeks. In summary, the verbal reports were a reliable source of information about cognitive processes because they were carefully collected and were interpreted with the understanding of circumstances under which they were obtained.

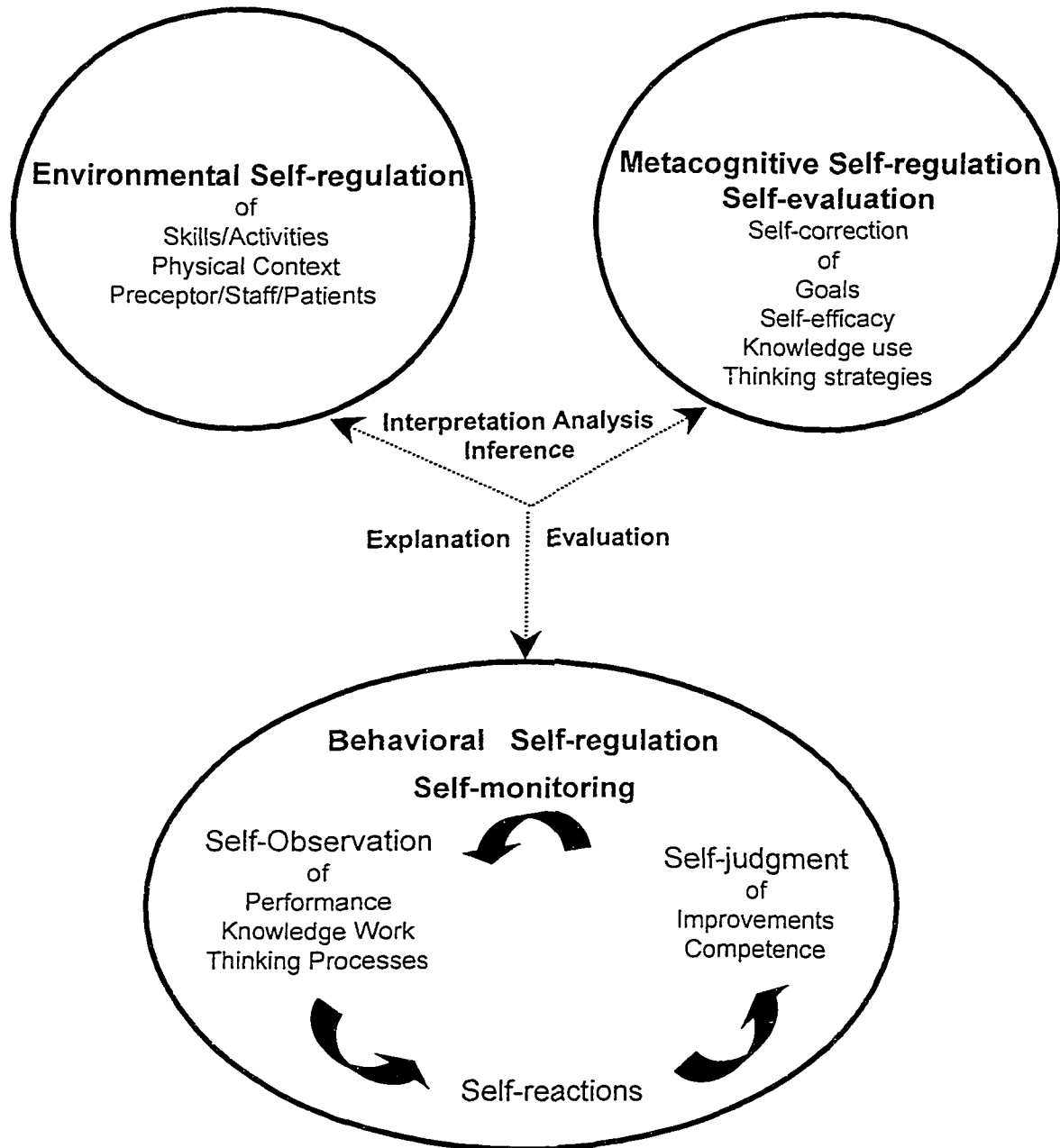
Self-regulated learning and clinical reasoning

This study began with a model from educational psychology (Figure 1) that proposed relationships among concepts to describe self-regulated learning to improve thinking abilities in domain specific situations. Reflective self-regulation is a core concept in current definitions of critical thinking (Facione, 1992) and embedded in the items of current critical thinking instruments. Bandura (1997), and Schunk and Zimmerman (1994) developed the concepts even further to include the major processes of metacognitive or personal self-regulation, behavioral self-regulation and environmental self-regulation that exist in a triadic relationship. They proposed that SRL was a reflective process that was unique to each domain in which it was used. The methods used in this study have yielded data that suggest a revision of the model.

The reflective self-regulated learning model for nursing is illustrated in Figure 11. The use of critical thinking skills was seen within the prompt responses for all the major concepts therefore the researcher suggests that they are not on level with but assumed within the self-regulation process. Behavioral self-regulation seems to be foundational to the other processes in that observation, reaction and judgment has a cyclic function which then influences metacognition and environmental structuring. Similar results were recently found in a study of graduate students taking a statistic course who were prompted to

Figure 11. Reflective self-regulated learning from clinical experiences

Reflective Self-Regulated Learning in Nursing for Problem Solving and Decision Making



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use self-monitoring strategies. The subjects performed better, had better knowledge representations and used other SRL strategies such as self-evaluation, environmental structuring, rehearsal, memorization and review more often than a control group (Lan, 1995).

As a result of journaling with prompts, the practice of new graduates resulted in a focus on observations of performance about knowledge work and thinking processes. Self-reactions took place that led to judgments of improvement and competence. If a correction was needed it was related to goals, knowledge use, self-efficacy and thinking strategies. The environmental influences were related to skills, unit activities, physical context and significant persons such as the preceptor, staff and patients. This triadic relationship which is dynamic for each situation/unit influenced the nurses' ability to make decisions and solve problems.

Some examples that display this model of learning are as follows:

1. "I had a different attitude while in school. I was very nervous in school. I have had to change my way of thinking. This is my job, this is what is expected of me and I just have to go in the patient's room and perform to the best of my ability. There is not room for being afraid to do something."

This subject, during the first week, observes her past thinking processes and reactions and makes the judgment that she was different in the recent past. Her goal is to do what is expected and has the self-efficacy to perform to the best of her ability. She also is determined to just enter the patient's room and carry out activities. She concludes with the judgment that feelings of fear have to be

overcome. This subject has solved her problem of being afraid in clinical by reflecting on her perceptions, comparing the present with the past and projecting into the future what she will need to do in order to be successful.

2. "I feel nervous and anxious because of my lack of clinical skills. I have somewhat of a knowledge basis but it all goes out the window when I am confused with something new. It helps to think about how 20 other girls are as dumb and green as I am!"

In this case during the first week, the subject reflects on her abilities and recognizes a deficit that results in nervousness and anxiety. She assesses her knowledge base but realizes the effect her feelings have on the ability to use it. The judgment is that her feelings make her incompetent. She tries to explain the situation by thinking and comparing herself with the other new graduates as she evaluates the self-efficacy of the group overall.

3. "They are giving me so much independence. They are confident in me so even though it's a little frightening at times, knowing that they have faith and trust in me makes things a little easier."

This subject, during the fifth week, observes her clinical assignments and attributes the arrangement to staff manipulation. She makes the judgment that the knowledge of their confidence improves her competence. Her self-reaction to the assignment is fear but self-efficacy is promoted because of perceived support from others.

4. "I am now taking as many patients as the other nurses and even working on other floors so I feel I am able to do my job with more confidence."

During the eighth week, the subject compares her work to other staff members. She evaluates the environmental influences on her ability and makes the judgment that she performs with more confidence. There is also an affirmation of self-efficacy to perform the job.

The examples presented above show the process of self-regulation as the subject used a variety of the model's concepts within a few sentences. This was not the case for the majority of the narratives where the responses were primarily short phrases or a few words. The subjects in those cases did address many of the model's sub-concepts but through the responses to all 28 prompts. The advantage to prompting sub-concepts is that it fosters metacognitive training but does not necessarily allow the subject to pull together the self-regulation process as a whole. When the subjects used longer narrative responses the concepts were placed side-by-side and allowed the triadic connections to be made. The researcher suggests that repetition of self-regulation prompts over time could promote the understanding of conceptual relationships. Also the use of prompts during dialogue with a mentor could also promote connections between concepts for a student. The implications of these findings will be discussed in the recommendation section.

Self-regulated learning and the creation of knowledge

The Constructivist school suggests that learning knowledge is created from within the learner and observed with emergent of naturalistic designs (Driscoll, 1994). It is a blending of previous teaching learning models which are inclusive of information processing, critical thinking, sociocultural influences, and experiential reflection. When a conflict arises in the experiential world the beliefs

and values of the learner are challenged and strategies are used to settle discrepancies. New values and beliefs are formed and become part of the metacognitive repertoire for future problem solving. The self-regulated learning prompts used in this study were meant to assist the subjects to reflect on experiences to identify and examine what they did during these instances. While the results of the study reveal small changes in thinking strategies, one must keep in mind the size of the sample, geographical location, and period of journaling.

When this research was compared to previous CT research, there were no similarities in terms of correlations between demographic characteristics and CT outcomes. Information processing research in nursing has shown that novices use more cognitive structuring and less analytic processing when clinical information is complex (Tabak et al., 1996). The researcher did not measure the complexity of the clinical information for the subjects but their strong reference to information work, connotative statements and indicative statements suggested less analysis and more attention to present state cognition. Cognitive research in medicine revealed that proficiency in early hypotheses generation and using information for problem solving was related to experiential changes in the content of thinking (Allen, et al., 1998; Grant & Marsden, 1987). This association was not assumed by the research questions in this study however, the changes in thinking that occurred over time may have impacted problem solving on a theoretical level. Further research is needed to test the limits of this hypothesis. Generalizations can only be made with a similar sample with the recommendation that the study be repeated to confirm these learning

characteristics.

Previous descriptions of clinical reasoning and decision making in nursing involve particular thinking strategies such as recognizing a pattern (schema search), setting priorities, searching for information (cue logic), generating hypotheses, making predictions, forming relationships, stating a proposition (if-then thinking), asserting a practice rule, making choices, judging the value, drawing conclusions, and providing explanations (Fonteyn, 1998; Pesut & Herman, 1999). Many of these strategies were identified in experienced practicing nurses, so a comparison with new graduate nurses could be predicted to be different because the underpinnings of the prompts had a specific theoretical model and the experiential history of the sample was at a novice level. In fact, many of these strategies were seldom used since they require familiarity and experience with similar situations. The strategies used by the new graduate nurses were more in line with problem solving since alternatives were generated by organizing, planning, prioritizing, reading, reviewing, practicing, and memorizing. Problem solving refers to strategies that generate alternatives, and decision making refers to strategies that select the alternatives (Kanfer & Busemeyer, 1982). One might conclude that the advanced beginner nurse is more focused on their own knowledge and skill ability and are less engaged with the patient (Benner et al., 1996). These subjects did not discuss many patient situations which may have been a function of the prompts used and a focus on the process of self-regulation versus clinical circumstances.

Recommendations

Implications for future research.

The use of the SRL model in nursing needs further research that builds on this descriptive study. Additional research that could be developed includes descriptions and analysis of self-regulation in student nurses and experienced practicing nurses to discover cognitive differences noted in these populations. The effects of journaling for longer periods of time may also show further changes in noun referents and/or strategy use since there was a slight trend to change in this project. The subjects in this study were very critical of journaling with all 28 prompts and the reasons for these feelings are not entirely clear. The subjects claimed they did not want to do any activity that reminded them of “school work”, however, there may have been a reluctance for prompted thinking particularly when perceptions of success were negative. The researcher suggests using fewer prompts yet still inclusive of the model concepts for participant compliance. Encouraging more narrative with fewer prompts would also promote the triadic connections between the major SRL concepts that did not occur with short responses. A methodological issue is to use think-a-loud recorded by audiotape versus journaling because there are subjects who would prefer not to write and would be more comfortable with verbal reporting. This particular method might capture the affective and self-reaction strategies since responses would be more spontaneous and less inhibited by cognitive restructuring. Another research study could be designed to determine the degree of self-regulation used by nurses as prompted with the strategies used in this study compared with a control group using prompts that do not suggest self-

regulation strategy use. Finally, self-regulated learning should be observed in different clinical areas to ascertain strategies needed for differentiated practice areas. The researcher might do field observations, record think-a-loud statements or arrange journaling sessions in different clinical areas for comparison. These research issues are important for nursing practice and education because of the transitions new graduates have to make into the workplace, the development of new career roles in nursing, and the ever expanding knowledge base needed by all practitioners.

Implications for nursing education

The findings of this study are extremely important for nursing education regardless of geographical location. Mandates discussed in chapter I identified critical thinking and reflective practice as important outcomes for educational programs. The findings of this study have implications for both. First, it was revealed that critical thinking skills are integrated within self-regulation strategy use. Therefore, prompting self-regulation is a pedagogical method that could be used with students as they gain experiences in diverse clinical areas. This method of training would encourage the transfer of metacognitive strategies in various situations which also implies a benefit for learning flexibility and adaptability which is a needed characteristic in nursing.

Second, Schunk and Zimmerman (1997) caution that self-regulatory development is a dynamic sequence of stages that shift from inter-personal to intra-personal activities. The educator must scaffold, mentor and be a cognitive model for student's self-regulatory development during what Vygotsky (1962) refers to as "the zone of proximal development" until they can assume strategy

use on their own. In this way self-efficacy is promoted and self-regulation is internalized for life-long learning. It has been hypothesized that when SRL strategies occupy the information processing capacity it has to be devoted to learning activities and there is no room left for strategy use (Lan, 1995). This is more evidence to support the educator role to provide opportunities for replication of the strategies for internalization of the process.

Set backs may occur with self-regulated strategy use for example with new situations or problems. If the student is properly guided from the beginning, they can recycle back through the stages of self-regulatory development and achieve success for each new circumstance. This feedback loop was supported in a study by Zimmerman and Kitsantas (1997) which revealed the benefits of self-recording for 8 experimental sessions of dart throwing with high-school girls. These subjects practiced self-monitoring and over the course of the experiment had enhanced goal setting, self-efficacy beliefs and self-reactions. The self-recording was hypothesized to have enhanced the self-regulation cycle. The clinical practice of nursing may require longer periods of journaling and domain specific prompts, but the underlying assumption is that repetition with self-regulated learning improves strategy use and performance.

Implications for practice

Self-regulation strategies are needed for the experienced practitioner as well because there is evidence that with less certain situations the experienced person looks no different than the inexperienced person in terms of decision making (Corcoran, 1986; Powell, 1989; Tabak et al., 1996). The self-regulated learning strategies become skills that are necessary for life-long learning and

adjustment to the changes in the work environment. Once the practitioner is comfortable and confident with self-regulation strategies, they can employ them independently. Successful persons have strategies for managing time and organizing data, however, developing a systematic method for clinical reasoning could improve decision making and problem solving as one gains expertise. A recent study of practicing nurse's decision making in different areas of nursing found that it varies according to the nature of the nursing task and context (Lauri & Salanterä, 1998). These authors ask what the relationship is between task and nurse's structure of knowledge and how they use it. Recognizing when to use inductive or deductive reasoning to support an argument can improve competence and reduce discrepancies quickly. This researcher would suggest that knowledge and the use of it could be discovered through observing SRL strategies. One can describe the outcomes of decision making, but the metacognitive processes that underlie successful decisions need to be identified to promote the development of competent practitioners.

The research in medical and nursing cognition has shown that information stores in memory are changed and refined each time they are accessed through experience with cogitation. It would then follow that attention to self-regulation strategies would promote experience with metacognition and refine problem solving and decision making. The volume of knowledge in health care increases daily and the successful practitioner needs to be able to manage data for the problem at hand. Practical social guidance in the clinical environment would be beneficial when learning a new role in a new area. Zimmerman and Kitsantas (1997) argue that if a learner is left to their own discovery, the focus shifts to

performance outcomes and failures, not successes. The researcher suggests that SRL strategies be taught to preceptors so they could be guides and models for new staff to support gains and motivate growth in proteges.

Implications for theory development

The theory of self-regulated learning is borrowed from cybernetics and adapted to learning within the constructivist framework in education. One purpose of this study was to advance nursing science by using the SRL model to describe the cognition of nurses in clinical practice. The problems inherent in borrowing theory could apply in this study if a shift in language takes place as the theory is adapted to the needs of nursing and the words, statements and conclusions are understood in the context that produced them (Donaldson & Crowley, 1978; Kuhn, 1971; Suppe 1992). The ontologic basis may be the same for all disciplines involved, but the difference lies in the application to particular contexts and reconceptualization of the theory. In addition, theories from other disciplines may not take into consideration significant factors influencing a nursing practice situation (Chinn & Kramer, 1995). There can be agreement within and across disciplines if the evidence is obtained by scientifically accepted methods and designs (Meleis, 1991).

The new evidence discovered in this study inspires nurse theorists and scientists to further knowledge development of SRL through theory testing and generating activities. One argument for further developing the theory of SRL in nursing relies on the fact that if nursing does not utilize current theories for their own educational development, another discipline will. The self-regulated learning model is in the early stages of development and continues to be revised along

with the view of constructivism. While the importance of the triadic relationship between the concepts remains, it is hypothesized that the transition from the inter-personal self-regulation to intra-personal self-regulation must occur for the strategies to be internalized and used at a future date. These transitional stages cannot be predicted without research based evidence and theorizing surrounding nursing education and practice situations. In addition the domain specificity continues to be emphasized in terms of how metacognitive knowledge and skill is tied to context. The subtle differences in the SRL model noted in this study from that of education was derived from a snapshot view of new graduate nurses, but what is the salient view in nursing overall? The role of critical thinking skills as they are utilized to move back and forth between different strategies could alter the strategy placement in the model. Further theory development is needed as self-regulated learning in nursing is defined through research as a situational or individual trait. Much of the theory surrounding self-regulated learning involves learning in children. The model in adult learning and professional practice may evolve in it's own right to include other specific sub-concepts and how they are weighted within a discipline.

Summary

This study described reflective self-regulated learning in nursing as it is prompted to improve problem solving and decision making. It provides a building block for a theory of clinical reasoning in nursing. The self-regulation concepts are in a triadic relationship and integrated with critical thinking skills as the practitioner is confronted with clinical problems moment to moment. There are influences from the observation of behavior, environmental structuring, and

metacognitive processes that dynamically change depending on the perceived situation. New graduate nurses have unique circumstances to overcome and by achieving self-regulatory competence it would enable them to make a smoother transition into the workplace. Self-regulation strategies become an internal support or scaffold for regulating thinking until expertise is gained. The transition of new graduate nurses as they shift from the differing values of competence (nursing education value) or performance (nursing service value) requires a supporting structure, and self-regulated learning strategies could assist in this process. It is imperative to foster domain specific thinking to assure the future of nursing in creating practitioners, educators, theorists and scientists who can reflect and critically think about their own practice.

APPENDIX A

Consent to Participate in: "The effect of prompted self-regulated learning strategies in a clinical preceptorship"

Purpose:

You are being asked to volunteer to be a subject in a research study to describe thinking processes used during clinical experiences of a preceptorship program. This study is a part of dissertation requirements of the University of South Carolina College of Nursing. You are being asked to participate because you meet the sample criteria of approximately 15-20 subjects that are associate and baccalaureate degree new graduate nurses in a precepted clinical program with practicums on hospital based units and follow up home visits. This form will provide you with information you need to know or answer questions you may have about participation. You will receive a copy of this form.

Procedures:

If you agree to participate, you will be asked to:

1. Complete the demographic questionnaire at the beginning of your precepted program during a negotiated time with the researcher.
2. Take approximately 30-45 minutes every week to make a journal entry in a clinical log based on guidelines that will be given to you at the beginning of the study.
3. Complete a journal entry every week at the end of your clinical experiences for 8 weeks.

Risks and Discomforts:

The researcher expects that there will be no risks or discomforts associated with completing the questionnaire. There may be some mental fatigue after completing the journal entries. There may also be some mental fatigue after the clinical experiences. There will be no cost to you for participating. The researcher will receive no compensation for your participation.

Potential Benefits:

After data analysis is completed you will receive a report of the thinking processes you used derived from the transcribed journal entries. It is hoped that the knowledge gained by this research study will assist other new graduate nurses who will be developing their thinking abilities for clinical practice in the future.

General Conditions:

1. If you agree to participate, your identity will be kept confidential. Individual responses will not be available to anyone except the researcher conducting the study. All questionnaires, clinical logs and transcribed journal entries will be coded with a number and kept in a locked file during the research study. Your name will never appear on the data reports. The questionnaires, transcribed journal entries and code numbers will be destroyed after the study is over.
2. You will be given a report of the thinking processes you used during the journaling experience.
3. These responses will not influence your status as a new graduate nurse in any way. Your refusal to participate will not have any affect on your new graduate nurse status in this preceptor program. You may withdraw from this project at any time by calling the numbers below and requesting to stop participation.
4. Any further information you need can be obtained by contacting the:
Principle investigator: RuthAnne Kuiper RN PhD (candidate)
USC contact person: Dr. JoAnne Herman, USC College of Nursing
Local contact person:

Agreement to Participate:

I have read the informed consent to participate in this research study. Anything I did not understand was explained to me by: _____.
Therefore, I voluntarily agree to participate in this project.

_____/_____
Print Name of Participant Date Signature of Participant Date

_____/_____
Print Name of Person Date Signature of Person Date
Obtaining Consent Obtaining Consent

_____/_____
Print Name of Witness Date Signature of Witness Date
8/3/98

APPENDIX B

Demographic questionnaire

Date: _____ Participant Number: _____ Institutional setting: _____

1. Age in years: _____

2. Gender: _____

3. Marital status:

a. Married _____

b. Single _____

c. Significant other _____

d. Number of children _____

4. Previous educational degrees: _____

5. Certifications: _____

6. Previous work/clinical experiences:

a. Specialty: _____

b. Number of years: _____

c. Total years in nursing: _____

7. Employment:

a. Type of work _____

b. Hours/week _____

8. Current school enrollment:

a. Course load (credit hours) _____

b. Non academic classes _____

APPENDIX C

Self-regulation learning prompts for reflective journaling after clinical experiences*

Instructions:

1. Please use these prompts to complete log entries for each clinical week.
2. Please respond to each of these cues when you write in the log.
3. After you address all the prompts you will be asked if there are any other processes you usually use that were not mentioned in the preceding list.
4. Your log will be collected weekly, transcribed and returned to you for the next clinical week.

Prompts:

1. I think I can meet the clinical objectives for this week because...
2. I think I can solve clinical problems this week because...
3. When I experience difficulty solving a clinical problem this week, I think I...
4. In thinking about completing the clinical experience, I need to think about...
5. As I look back, I think I should have spent more time on...
6. As I look back, I think I should have spent less time on....
7. When I felt anxious, nervous or frustrated in clinical, I thought about...
8. When I feel like missing this week's clinical experience, I think I...
9. When I tried to remember important facts to solve a patient's problem, I thought about...
10. When I prepare for clinical next week, I will...
11. When I had trouble understanding information in clinical, I thought about...
12. When I think about the data I needed to obtain from the clinical record, I...
13. When I discovered unfamiliar information in the clinical record, I thought about...
14. When I prepared to carry out a nursing activity in the patient's room, I...
15. When I prepared to document on the patient's record or write a care plan, I...
16. When I am distracted in the clinical area by noise, activity or by lack of concentration, I...
17. When I needed help on the clinical unit, I...
18. Working with others during this clinical experience...
19. When I was distracted at home from preparing for clinical, I...
20. My overall impression of my performance this week...
21. The consequences of my work on my assignment this week was...
22. I made sure I completed the clinical assignment by...
23. When I needed resources at home to prepare for clinical this week, I...
24. If I could change the clinical experience this week, I would...
25. When I need to make changes for the next clinical experience, I...
26. What I did like about the clinical experience this week was...
27. What I did not like about the clinical experience this week was...
28. My reaction to this week's clinical experience is...

Optional prompts:

- A. Other thinking strategies I used this week in clinical were...
- B. Other environmental manipulations I used this week in clinical were...
- C. Other behaviors I used this week in clinical were...

*Adapted from: Davis, 1996; Williams & Coombs, 1996; Zimmerman, 1989; Zimmerman & Martínez-Pons, 1986; 1990.
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