

Enhancing Metacognition Through the Reflective Use of Self-Regulated Learning Strategies

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ABSTRACT

Background: An important concern of nursing practice and education is the difficulty new graduates experience while making the transition from graduate nurse to practicing nurse.

Method: Using a comparative descriptive design, self-regulated learning strategies were used to enhance metacognitive critical thinking abilities as 32 new graduate nurses reflected during 8-week preceptorship programs.

Results: Verbal protocol analysis revealed the majority of noun referents as metacognitive with thinking nouns increasing in rank from Week 1 to Week 8, present tense verbs were used most frequently with lower-level thinking phrases.

Common themes in the narrative were knowledge observation, thinking strategies, judgments of self-improvement, judgments of competence, judgments of resources, self-reactions, and self-correction strategies.

Conclusions: New graduate nurses have unique circumstances to overcome in making a transition to the workplace, and having self-regulatory skills would enable this process. The data suggest nursing education and practice consider self-regulated learning prompts with new graduates to promote thinking strategies.

The quest to improve metacognitive critical thinking abilities has gained increasing momentum during the past 30 years throughout the world. The President's Council of Economic Advisers has mandated that critical thinking is the one characteristic a worker needs for high productivity and to be competitive in the business world by making well thought-out decisions (Paul, 1993). Professional disciplines acknowledge the importance of improving domain specific thinking abilities, but are unable to guarantee it as an educational outcome.

Metacognition is self-communication about task demands and cognitive strategies a person engages in before, during, and after performing a task (Beitz, 1996). Once learned, metacognition supports lifelong reflective thinking in divergent situations, enables one to handle ambiguity, assists with problem solving, promotes responsibility for actions, and fosters devel-

opment of self-confidence for rapid decision making. Metacognitive critical thinking abilities in nursing practice are crucial as health care becomes more complex, the knowledge base expands, and nurses practice more autonomously (Brigham, 1993).

Novice practitioners lack experience in prioritizing and accurately applying domain specific data. Therefore, they have difficulty making efficient and accurate judgments concerning patient care. This situation translates into tremendous economic losses for health care institutions caused by the attrition of new graduate nurses (Anderson, 1989). Thus, underdeveloped metacognitive critical thinking skills impact health care with poor clinical judgments and professional dissatisfaction.

Specifically, the significant problem is helping new graduates problem-solve in clinical situations as they transition from graduate nurses to practicing nurses by using metacognitive critical thinking processes. Self-regulation uses critical thinking skills and refers to metacognitive, motivational, and behavioral activities directed to the learning process (Schunk & Zimmerman, 1994). Theoretically, training self-regula-

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tion is likely to improve metacognition, reduce internal conflicts in new graduates, support the development of the competence valued by educators, and enhance decision-making valued by nursing service employers.

LITERATURE REVIEW

The significant literature from the 20th century that influencing the decisions for the this study's design came from the analysis of the most current state of thinking regarding metacognitive development. Current metacognitive development theories have their roots in information processing (IP) (i.e., data processing within the memory), behaviorism (i.e., response strengthening), and constructivism (i.e., learning from naturalistic settings). The research attempting to describe metacognitive processes in nursing practice has used the critical thinking and IP frameworks. Criticisms of the research suggest thinking in clinical situations is not explained solely by critical thinking ability because levels of practice or education in some studies did not predict better critical thinking scores as measured by standardized tests (Kintgen-Andrews, 1988; Matthews & Gaul, 1979).

The IP model has been the framework for some nursing research studies since the late 1980s. This model compared the problem-solving of students with practicing nurses (Tabak, Bar-tal, & Cohen-Mansfield, 1996; Tanner, Padrick, Westfall, & Putzier, 1987; Westfall, Tanner, Putzier, & Padrick, 1986), and expert nurses with novice nurses (Corcoran, 1986). Novice nurses used more cognitive structuring and fewer analytic processing when clinical information was complex (Corcoran, 1986; Tabak et al., 1996; Tanner et al., 1987; Westfall et al., 1986). The experts used a broad opportunistic approach in complex patient cases, which supports the theoretical assumption that the task is a major determinant of decision-making behavior. Thinking during clinical situations is not entirely dependent on IP because novices and experts, who have different levels of domain specific knowledge, have similar cognitive strategies.

Research from the behaviorist paradigm postulated that promoting reflection would improve cognitive thinking abilities during clinical problem-solving and decision-making. Nurses and students observed in educational and practice settings displayed varying degrees of reflection, but it seems the majority of students used lower levels of reflection and could not demonstrate efforts at validating assumptions or transforming perspectives (Richardson & Maltby, 1995; Wong, Kember, Chung, & Yan 1995; Wong et al., 1997). The reflection model proposition that "knowledge is created from within the learner" was partially support-

ed as the student had a shift in focus from self to client during the length of a course (Davies, 1995, pp. 171-172), and by reflection stimulated by discomfort in the clinical setting (Richardson & Maltby, 1995).

Research framed within the constructivist paradigm used the social cognitive theory and observations of situated learning. Two studies investigating environmental and social influences on clinical practice revealed nursing students, nurses, and nursing faculty have similar personal and interpersonal values of independence, support, goal orientation, and achievement (Saarman, Freitas, Rapps & Riegel, 1992). The findings also suggested observation of sociocultural behaviors of teachers and nurses influenced values and achievement when learning the practice of nursing.

The situated learning studies revealed that interpretation of experience, reflection, and self-evaluation impacted on metacognitive gains. The findings specifically revealed how an evaluation focus during clinical experiences inhibited learning and cognitive flexibility (Loving, 1993), reflective thinking resulted in cognitive gain (Diekelmann, 1993), and self-evaluation resulted in quality goal setting and actions (Wilson, 1994).

This body of cognitive research demonstrates a legacy on which to build future practice, education, and research. The self-regulation learning model is a conceptual framework within the constructivist paradigm in education that incorporates and expands previous models of cognition. Self-regulation is currently receiving much attention from educational theorists because cognitive research shows that with all levels of students, better self-regulators of cognitive strategies have better academic outcomes (Bandura, 1997; Lindner & Harris, 1992; Paris & Newman, 1990; Schoenfeld & Hermann, 1982; Schunk & Zimmerman, 1994; Zimmerman & Martinez-Pons, 1986).

Underdeveloped self-regulation in educational settings constrains the student's ability to reach achievement in later vocational settings (Borkowski & Thorpe, 1994). These self-regulatory and motivational processes persist into adulthood and determine occupational goals individuals set for themselves. Successful self-regulation requires a dependable experiential knowledge base, use of metacognitive critical thinking strategies in a reflective manner, and an understanding of social and cultural influences on learning.

CONCEPTUAL FRAMEWORK

The conceptual model for this study (Figure 1) was adapted from the theoretical conceptions of Bandura (1997), Kanfer and Ackerman (1989), Karoly and Kanfer (1974), Mithaug (1993), Schunk and Zimmerman (1994),

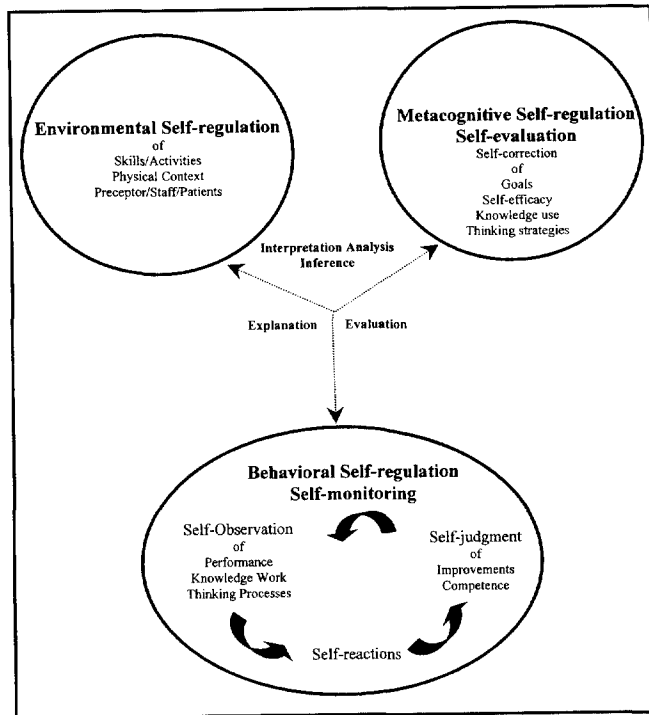


Figure 1. Reflective self-regulated learning in nursing for problem-solving and decision-making. Reflective self-regulated learning from clinical experiences (Kuiper, 1999).

and Zimmerman (1989). Self-regulated learning (SRL) is a synthesis of the academic research supporting the conceptual relationships of:

- Metacognitive processes.
- Behavioral processes.
- Environmental structuring for educational settings.

Bandura (1986) claims that a triadic interaction between the concepts is dynamic, 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.

Metacognitive use of self-evaluation refers to comparing current state of behavior with a goal state to determine the extent of discrepancy (Kanfer & Busemeyer, 1982). Metacognition facilitates organization, monitoring, and evaluation of cognitive thinking processes. The significant metacognitive attributes influencing self-regulation are self-efficacy, goals, knowledge, and effect.

Behavioral self-regulation includes the subprocesses of self-observation, self-reaction, and self-judgment. Self-monitoring refers to deliberate attention to

the behavior one is using to attain goal progress and to motivate improvement in learning (Schunk, 1990). Self-judgment is comparing one's performance with proximity to an anticipated goal and the self-efficacy to achieve it (Schunk & Zimmerman, 1994). When self-judgments are linked directly to goals, self-regulatory processes are reinforced.

Environmental self-regulation, the third component of SRL, includes structuring the context and social interactions as a background for metacognitive skills and monitoring strategies. Self-regulated learning is greatly affected by perceptions of variation in setting conditions, task features, and social contacts (Bandura & Wood, 1989; Schunk, 1995). The SRL model concepts were operationalized by the journaling prompts used in this study (Sidebar on page 81).

PURPOSE

The purpose of this project was to describe the effects of SRL prompts on the cognitive processes of baccalaureate-degree (BSN) and associate-degree (ADN) nurses in clinical settings with the pedagogical strategy of reflective journaling. It was hypothesized that recording actions and reactions would stimulate the participant to reflect on experiences to identify dissonance and move toward remodeling metacognitive thought over time (Boyd & Fales, 1983; Holly, 1989). The SRL model had not been applied to the study of nurse education outcomes, which supported its use in this project.

Research Questions

The major research questions were:

- What are the effects of SRL prompts on the metacognitive processes of new nurse graduates who use reflective journaling during precepted clinical experiences?
- Are there changes in metacognitive processes of new nurse graduates who use SRL prompts for reflective journaling for 8 weeks of precepted clinical experiences?
- 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?

METHODS

Residency Model for Nurses in Transition

The Residency Model for Nurses in Transition was a program developed in response to a Robert Wood Johnson Foundation goal to develop a statewide nursing work force consortium to design and implement a plan to meet South Carolina's current and future nursing care needs (Collins, 1998). The Upstate

Collaborative Nursing Work Force 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 learning program was created for new graduate nurses to be precepted by a curriculum using Benner's framework of professional practice (Benner, Tanner, & Chelsa, 1996) and The Outcome, Present State, Test (OPT) Model of Clinical Reasoning (Pesut & Herman, 1999). The 8-week internship program consisted of clinical practice time and meetings each week to discuss case studies, and participation in educational modules consisting of skill competency, global care perspectives, leadership skills, management issues, and professional goal setting (Collins, 1998).

Design

A comparative descriptive design analyzed the effect of SRL prompts on the metacognitive critical thinking development during reflective journaling. The BSNs and ADNs were compared as they journaled for 8 weeks during an internship program for new graduates. The same SRL prompts were used each week and the narratives were analyzed by qualitative methods to evaluate evolutionary changes in content.

Sample

The convenience sample consisted of 32 new graduate nurses on clinical units, including:

- Medical/surgical.
- Telemetry.
- Critical care.
- Pediatrics.
- Gynecology.
- Operating room.
- Labor and delivery.
- Rehabilitation.

The sample was divided into two groups, 18 BSN-prepared nurses (56%) and 14 ADN-prepared nurses (44%). The demographic description included 1 Asian man, 4 White men, 1 Black woman, and 26 White women with a mean age of 26.09 years ($SD = 6.23$; range, 21 to 45). Twenty of the participants had previous work experience in the medical field, such as nursing assistant, pharmacy technician, and medical office assistant ($M = 3.3$ years; $SD = 3.73$; range, .5 to 17 years). Current employment hours ranged from 16 to 50 hours ($M = 337.76$, $SD = 7.10$). Forty-one percent of the participants were married, 59% were single, and 25% had children (range of number of children, 1 to 3). Prior educational experiences included 9 partic-

SELF-REGULATION LEARNING PROMPTS FOR REFLECTIVE JOURNALING AFTER CLINICAL EXPERIENCES

1. I think I can solve a clinical problem because....and if I have difficulty, I think I....
 2. As I look back, I should have spent:
 - a. More time on....
 - b. Less time on....
 3. When I felt anxious, nervous, frustrated, or felt like leaving the clinical experience, I think I....
 4. When I try to remember or understand important facts to solve a problem or prepare for clinical, I think I....
 5. When I prepare to carry out a nursing activity on the clinical unit, I....
 6. When I am distracted in the clinical area by noise, activity, or by lack of concentration, I....
 7. When I work with others or needed help in the clinical area, I....
 8. My impression of the consequences of my performance in clinical this week....
 9. I made sure I completed my clinical assignment by....and if I need to make changes, I....
 10. Reaction to clinical experiences:
 - a. My reaction to what I liked about the clinical experiences this week was....
 - b. My reaction to what I did not like about the clinical experiences this week was....
- Optional prompt: Other strategies I used this week in clinical were....

Kuiper (1999).

ipants with previous academic degrees (28%) and 13 participants with specialty certifications (40%).

Procedure

Five area acute care institutions were recruited from the southeastern region of the United States where new graduate nurses were asked to voluntarily participate in a preceptorship program. Three groups were sampled from the summer of 1998 to the summer of 1999. During the preceptorship orientation period, the researcher obtained informed consent and asked the new graduate nurses to complete a demographic questionnaire prior to starting the clinical practicum. Self-regulation learning prompts (Sidebar) were developed and validated by experts in the nursing education and educational psychology fields to determine consistency in reflecting SRL processes.

The interrater reliability coefficient was in the acceptable range of .7 to .9 (Polit & Hungler, 1995).

TABLE 1
EXAMPLES OF REFERRING PHRASE NOUNS BY CATEGORY

NOUN CATEGORIES	EXAMPLES
Pronoun-self	I Me Myself My Them Ourselves
Cognitive Resource	Hands Mind Consequences Journals Things Money Medication administration records (MARS)
Knowledge	Data Facts Information Textbooks Goals Resources Questions
Thinking Strategy	Planning Organization Time management Confidence Plan Make a list Problem solving
Activity	Skills Procedures Help Activities Documenting
Reaction	Frustration Exhaustion Good/bad experience Good/bad performance Positive consequence Negative consequences Positive working with others Overwhelmed Eat their young
Person	Staff Nurses Preceptor Patients Co-workers Charge nurse
Place	Unit Home Floor Patient room
Circumstance	Situations Problems Work Job Report Clinical experience
Time	Time This week A few minutes This day This shift

Time was arranged each week in clinical or during the weekly meetings to write on the journal workbook sheets. The participants were instructed to write whatever came to mind as they read the prompts while trying to reflect on the week's clinical experience. Participants were assured that the content of their narratives would have no impact on their employment or success in the internship program.

Journals were collected for 8 weeks for a total of 239 weekly journals, 50% completed by BSN nurses and 50% completed by ADN nurses. The narratives were then preprocessed by transcribing word-for-word the actual written journal entries. The transcripts were then read for general meaning and coded into categories.

ANALYSIS

Verbal Protocol Analysis

Verbal protocol analysis (VPA) is a framework for analyzing verbal data to discover cognitive processes from which predictions can be made (Ericsson & Simon, 1993). Ericsson and Simon (1993) contend that information heeded to during a task (e.g., problem-solving) is available from short term memory. This information is assumed to represent cognitive processes which, when retrieved from long-term memory, could be encoded by an observer.

There are three progressive steps to VPA. The referring phrase analysis (RPA) is identification of noun and referent noun (pronouns) phrases which represents the vocabulary of concepts in the narratives and is the essence of the domain being discussed. The assertional analysis identifies relationships between these concepts by determining the type of assertional statement and verb tense (i.e., past, present, future).

The four possible types of assertions are (Fonteyn, Kuipers, & Grobe, 1993):

- Connotative (relationships of meaning).
- Indicative (relationships of significance).
- Comparative (relationships of contrast)
- Causal (relationships of cause and effect).

Finally, the script or cognitive operator analysis (COA) identifies the actual reasoning strategies that were used.

Establishing analysis reliability and validity attempts to assure researcher's objectivity, or the encoding will be biased toward a preferred interpretation. Collecting data within the context of the descriptive, nonexperimental setting, is a principal source of establishing validity. A test of reliability includes intercoder agreement as different individuals encode independently of one another. The intercoder reliability between the researcher and an expert in VPA for the narratives in this study was 80%.

FINDINGS

The analysis unit for this descriptive study was the written word. The total word count for the entire sample was 46,377 words with a range of 5,359 to 19,077 for the three groups.

Referring Phrase Analysis

The recurrent themes deduced from the nouns in the content of the narratives were divided into the three main concepts of the self-regulation learning model. The analysis revealed 57% of the nouns referred to metacognitive processes, 13% referred to behaviors, and 30% referred to environmental themes. The category of nouns dominating the data sets were metacognitive processes including the reference to self (30%), knowl-

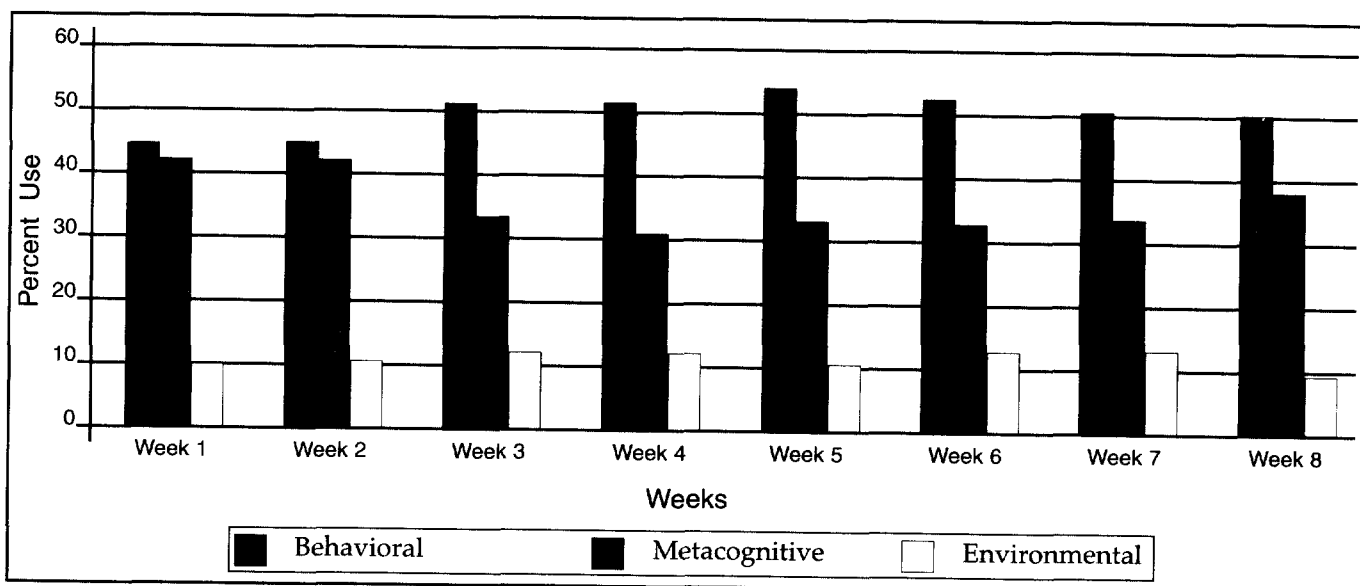


Figure 2. Percent frequency use of three major self-regulation categories for 8 weeks of journaling.

edge usage (12%), thinking strategies (9%), and cognitive resources (5%). The participants also referred to other individuals (12%), circumstances (9%), time (7%), and places (3%). The behavioral category nouns were identified as activities (7%) and reactions (6%). Table 1 displays examples of the most frequently identified specific nouns in each of the 10 noun referent categories.

Because the three groups had an unequal number of participants, frequency differences would reflect group size versus changes in noun categories over time. Therefore, a rank order of nouns was conducted for each week to reveal any trend in the noun usage frequency, from the most frequently used (1) to least frequently used (10). The most significant finding was that the thinking noun referents rank tended to increase by the end of 8 weeks.

Assertional Phrase Analysis

The assertional phrase analysis consisted of counting verbs and coding them according to past, present, and future tense. The total verb usage was determined at 6719 words with 29% reflecting past tense (1912 words), 61% reflecting present tense (4,128 words), and 10% reflecting future tense (679 words). It is significant to note that regardless of the different number of journals each week and the tense of the journaling prompts, the verb tense percentage was consistent across the journaling period.

The 9 prompts included 66% recalling past experiences—33% recalling current state information, and 33% prompting future or forward reasoning (Sidebar

on page 81). This particular sample used primarily current state information. Recalling past experiences was used less than half of the time and future or forward reasoning was used the least amount of time.

The assertional statements provided information concerning how the participants connected the referents in the narratives. The narrative statements were coded by assertion type for each group and for the entire sample. Analysis revealed that this sample used connotative statements 36% of the time ($f = 1836$), indicative statements 34% of the time ($f = 1714$), comparative statements 18% of the time ($f = 879$), and causal statements 12% of the time ($f = 612$). Examples of the four types of statements from the narratives are displayed in Table 2 (page 84).

Cognitive Operator Analysis

The cognitive operator analysis (COA) is how the reasoning strategies are identified. The journal prompts consisted of metacognitive strategies (prompts 1 to 4), behavioral strategies (prompts 5 to 6), and environmental structuring (prompts 7 to 9) (Sidebar on page 81). The significant finding from the COA revealed that the participants used all types of strategies for all prompts, regardless of their intent. This pattern remained fairly consistent for the entire journaling period (Figure 2). The use of strategies in the behavioral category included self-observation ranging from 47% to 59%, self-judgment ranging from 30% to 39%, and self-reaction ranging from 11% to 14%. The use of strategies in the metacognitive cate-

TABLE 2
EXAMPLES OF ASSERTIONAL PHRASES

Text	Type of Assertion
"I was rushed to get my patient prepared for her catheterization, which caused me to be stressed and I had to get help from my preceptor."	Causal Statement
"I can solve clinical problems because I am flexible and open to criticism."	Comparative Statement
"I like being able to take on more responsibility, but I did not like that I was not as organized as I wanted to be."	Comparative Statement
"When I felt anxious or frustrated I thought about how far I have come."	Connotative Statement
"When I have trouble understanding information I look it up in books, and if it didn't help I asked someone else."	Connotative Statement
"I never felt like I had a good grasp on my patients and their care."	Indicative Statement
"I am good at nursing. I'm an intelligent person and have confidence in myself."	Indicative Statement
"It has been frustrating this week. I feel like I'm not given enough independence."	Indicative Statement

gory included knowledge ranging from 45% to 52%, self-efficacy ranging from 17% to 28%, goal state ranging from 10% to 19%, and affect ranging from 6% to 11%. The use of strategies in the environmental category included social interactions ranging from 63% to 77%, and physical context ranging from 23% to 37%.

Script Analysis

Script analysis is the final phase, during which the narratives are examined for overall broad description and meaning to discover any common themes within the data that may be unique to this sample and are not explained by the initial analysis. As the narratives were re-read and content analyzed, common themes emerged:

- Observations of knowledge work.
- Observations of thinking strategies.
- Judgments of self-improvement.
- Judgments of self-competence.
- Self-reactions.
- Self-correction strategies.
- Judgments of resources.

Table 3 displays randomly selected narrative examples of the six predominant themes.

SUMMARY

The first research question asked what effect SRL prompts had on new graduate nurses' metacognitive processes. The top 5 concerns were determined to be

- Focus on the self.
- Knowledge issues.
- Other individuals
- Circumstances (clinical problems and situations).
- Activities.

The participants used lower-level thinking statements with present tense verbs. Journal narratives

reflected a preoccupation with situations surrounding skills and abilities. There was little comparison with past experiences or projections related to 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 was not evident in the self-regulation repertoire of the novices represented in this study.

Script analysis also revealed the critical thinking skills of interpretation, analysis, inference, explanation, and evaluation. Facione and Facione (1996) conjecture that the intersection of these constructs is at the core of clinical practice. Other evidence supporting 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, juxtaposing, reflexive comparison, cue logic, if-then thinking, and schema searching.

These cognitive skills were apparent during the later portion of the journaling period. For example, evaluation was evident in the behavior comparison statements when a participant's goal or prototype image of where they should be clinically did not coincide with reality. This involved the juxtaposing thinking strategy as the participant contrasted present state to the outcome standard. Reflexive comparison was also used when behaviors were remembered from previous experiences to notice progress or the lack thereof.

The second research question asked if any evidence of metacognitive change existed in new graduates who journaled during an 8-week period. This sample revealed an increase in thinking referent nouns. Also, early negative self-reactions changed to later positive

TABLE 3
NARRATIVE EXAMPLES OF PREDOMINANT REASONING PROCESSES

Observations of Knowledge Work	<p>"I have a great background knowledge and if I have difficulty I look it up, study on it, and go to my resources."</p> <p>"Writing it all down and having a to do list helps."</p> <p>"Try to be prepared and knowledgeable of facts."</p>
Observations of Thinking Strategies	<p>"I think through the situation and come up with a solution. I step back and look at it another way."</p> <p>"I need to make sure that I have thought the process completely through and prepare myself."</p> <p>"Tried to organize my task so I don't waste time running back and forth for forgotten items."</p>
Judgments of Self-improvement	<p>"I function so much more efficiently."</p> <p>"I'm beginning to do things more routinely."</p> <p>"I was able to spend more time with my patients and be a better nurse."</p>
Judgments of Self-competence	<p>"I do a great job."</p> <p>"I have confidence and I know I can!"</p> <p>"I do most activities with confidence, most are not too technical."</p>
Judgments of Resources	<p>"I find someone whom I know is reliable or find literature to help me."</p> <p>"I asked a nurse with more experience."</p> <p>"I have resources I can go to or someone who can help me."</p>
Self-reactions	<p>"I feel good about my writing and documentation."</p> <p>"I like feeling more confident about my abilities."</p> <p>"I was surprised at how well I liked by job."</p>
Self-correction Strategies	<p>"I review my actions of the day and think of a more efficient way to work."</p> <p>"Will review the information I need and write down important facts."</p> <p>"Will go home and discuss my feelings with my husband so he can help me make a decision."</p>

self-reactions that coincided with greater perceived social support from preceptors and staff.

This finding may imply a "warming up" period to the social environment for new graduate nurses. The self-correction statements were causal and comparative, and used future tense verbs. This evidence suggests that SRL prompts enhance higher level thinking, and perhaps longer journaling episodes might promote a greater metacognitive growth than was seen in this study.

The third research question asked if there were any differences in metacognitive processes between the subgroups or nurses. The analysis revealed greater gains in thinking noun referent use by ADN new graduates. The data suggest BSN graduates may have had a more habitual use of thinking strategies and were preoccupied with circumstances in the clinical area.

Curricular differences, along with different exposure to faculty mentoring, in part may account for these findings. The BSN student's exposure to faculty scaffolding during a longer academic period may promote critical thinking strategies through repetition and reinforcement. A greater clinical focus for ADN students may allow them to overcome circumstances in health care settings, but the shorter exposure to fac-

ulty mentoring may postpone further critical thinking development until their first clinical assignments as new graduates.

CONCLUSIONS

The findings of this study show the importance of SRL in nursing as new graduate nurses integrate the following:

- Metacognitive evaluative processes for clinical reasoning.
- Environmental structuring to influence cognition and behavior.
- Behavioral monitoring of their progress.

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. While immediate recall is the best method of retrieving data from memory, repeating the same prompts each week revealed trends in cognitive reasoning that may not have been apparent from a report on a single incident. Using the cognitive operators inherent in the SRL model aided in the analysis organization and provided an audit trail, which lends credibility to this qualitative methodology.

TABLE 4
PRACTICAL APPLICATION OF SELF-REGULATED LEARNING STRATEGIES

Orientation Programs	<ol style="list-style-type: none"> 1. Develop orientation programs that include the behavioral, metacognitive, and environmental aspects of clinical settings. 2. Include preceptor/educator classes explaining of self-regulated learning (SRL) model (see below). 3. Use SRL prompts with preceptor-designed scripts or self-reflective exercises (see below). 4. Evaluate clinical experiences or area with an SRL model framework (see below).
Preceptor Classes	<ol style="list-style-type: none"> 1. Teach conceptual basis SRL model to preceptors for understanding of all aspects of cognitive learning. 2. Develop question script based on SRL model to be used by preceptor with new employees to evaluate behaviors, decisions, reasoning, knowledge, goals, self-efficacy, and environmental issues.
Employee Orientation Period	<ol style="list-style-type: none"> 1. Reflective journaling for 2 to 3 months using SRL prompts with pencil and paper or e-mail response. 2. Self-verbalization sessions for 2 to 3 months with educator or preceptor using SRL prompts. 3. Reflective audio taping of clinical experiences for 2 to 3 months using SRL prompts.
Clinical Evaluations	<ol style="list-style-type: none"> 1. Develop evaluation tool to be used by preceptor or educator that includes major concepts of SRL model so goals and progress can be determined. 2. Develop evaluation tool requiring new employees to reflect and self-evaluate using SRL prompts to adjust performance during learning. 3. Evaluate various clinical areas to determine specific learning requirements based on needed behaviors, metacognitive requirements, and environmental structuring.

Critical thinking and reflective practice are important outcomes for educational programs, and 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 to promote critical thinking in diverse clinical areas. Second, this method of reflection would encourage the transfer of metacognitive strategies across various situations which also implies a benefit for learning flexibility and adaptability which is a needed characteristic in nursing.

Nurse educators could implement SRL strategies in a number of practical ways (Table 4). Further research using the SRL model could be designed to discover cognitive differences in student nurses and experienced practicing nurses. The effects of journaling for longer periods of time may also show further changes in noun referents or strategy use.

Self-regulated learning should also be observed in different clinical areas to ascertain strategies needed for differentiated practice areas. Self-regulation strategies are needed for all levels of practice because in terms of decision making, there is evidence that with less certain situations, the experienced person seems no different than the inexperienced person (Corcoran, 1986; Powell, 1989; Tabak et al., 1996). After practi-

tioners are comfortable and confident with SRL strategies, they can employ the strategies independently to adjust to changes in the work environment and use them for lifelong learning.

This study described reflective SRL in nursing as it provides a building block for a clinical reasoning theory in nursing. Because new graduate nurses have unique circumstances to overcome, self-regulatory skills would enable them to make a smoother transition to the workplace. Self-regulation strategies could become an internal support or scaffold for regulating thinking until expertise is gained. It is imperative to foster domain-specific thinking to assure nursing's future in creating professional nurses, in any role, capable of reflecting and critically thinking about their own practice.

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