Promoting cognitive and metacognitive reflective reasoning skills in nursing practice: self-regulated learning theory

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Background. Effective clinical reasoning in nursing practice depends on the development of both cognitive and metacognitive skills. While a number of strategies have been implemented and tested to promote these skills, educators have not been able consistently to predict their development. Self-regulated learning theory suggests that this development requires concurrent attention to both the cognitive and metacognitive dimensions of reasoning in nursing care contexts.

Aims. This paper reports on a study to explore the impact of self-regulated learning theory on reflective practice in nursing, and to advance the idea that both cognitive and metacognitive skills support the development of clinical reasoning skills.

Methods. Integrative review of published literature in social science, educational psychology, nursing education, and professional education using the Cumulative Index to Nursing and Allied Health (CINAHL), Educational Resource Information Center (ERIC), and American Psychological Association (PsycInfo) Databases. The search included all English language articles with the key words clinical reasoning, cognition, critical thinking, metacognition, reflection, reflective practice, self-regulation and thinking.

Findings. Reflective clinical reasoning in nursing practice depends on the development of both cognitive and metacognitive skill acquisition. This skill acquisition is best accomplished through teaching–learning attention to self-regulation learning theory. A critical analysis of the literature in the areas of critical thinking and reflective practice are described as a background for contemporary work with self-regulated learning theory. It is apparent that single-minded attention to critical thinking, without attention to the influence of metacognition or reflection, is but one perspective on clinical reasoning development. Likewise, single-minded attention to metacognition or reflection, without attention to the influence of critical thinking, is another perspective on clinical reasoning development. While strategies to facilitate critical thinking and reflective practice have been used in isolation from each other, there is evidence to suggest that they are inextricably linked and come together with the use of self-regulated learning prompts.

Conclusions. Students and practising nurses are able to improve their cognitive and metacognitive skills in clinical contexts by using self-regulated learning.
strategies. The self-regulated learning model in nursing is offered to support teaching and learning of reflective clinical reasoning in nursing practice contexts.

**Keywords**: clinical reasoning, critical thinking, cognition, metacognition, reflection, self-regulation, teaching–learning strategies, nurse education

### Introduction

The purpose of this paper is to make the case that reflective clinical reasoning in nursing practice depends on the development of both cognitive and metacognitive skill acquisition. While a number of strategies have been implemented and tested to promote these skills, educators have not been able consistently to predict their development. Effective clinical reasoning can be achieved as the cognitive and metacognitive aspects of critical and reflective thinking in nursing practice are developed. Single-minded attention to critical thinking without attention to the influence of reflection, or single-minded attention to reflection without attention to the influence of critical thinking undermines the complexity that must be embraced in order to explain and understand the thinking processes involved. Self-regulated learning theory suggests that the development of reflective clinical reasoning skills requires concurrent attention to both the cognitive and metacognitive dimensions of reasoning in nursing care contexts (Pesut & Herman 1992, 1999, Kuiper 1999, 2002a).

### Literature search strategy

An analysis of the literature related to critical thinking (cognition) and reflective thinking (metacognition) reveals global educational interest in teaching–learning pedagogy for these processes. Educational and health care research from the past two decades was reviewed in the area of adult learning in the databases of Cumulative Index to Nursing and Allied Health (CINAHL), Educational Resource Information Center (ERIC), and American Psychological Association (PsychInfo). The search included all English language articles with the key words clinical reasoning, cognition, critical thinking, metacognition, reflection, reflective practice, self-regulation and thinking.

### Thinking about thinking: cognition and metacognition

Critical thinking is cognition or the intellectual work of the mind that involves reasoning and self-discipline using particular skills (Paul 1993), while reflective thinking is metacognition or a level of consciousness that exists through executive cognitive control and self-communication about experiences (Flavell 1979, Mezirow 1981). Educators, researchers and practitioners have used critical thinking and reflective thinking concepts in a variety of ways to understand and explain the dynamics of problem-solving and clinical reasoning in nursing practice. A synthesis of the evidence to date is important for the following reasons. First, critical thinking and reflection are desired characteristics of professional practice among nursing regulatory bodies [National League for Nursing 1992, United Kingdom Central Council for Nursing Midwifery and Health Visiting (UKCC) 1999]. Second, both critical thinking and reflective thinking are desirable outcomes associated with curriculum development and effective programme planning and evaluation (Patterson et al. 2002). Third, nursing service settings value critical thinking and expect nurses to be proficient in the reflective thinking required to support clinical decisions and judgements about client care (Walker & Redman 1999). Finally, critical thinking and reflective thinking are key ingredients in a commitment to lifelong learning that characterizes professional growth and development (Brasford 2002).

### Focus on cognition: critical thinking

Through time definitions of critical thinking have evolved and changed. Today prevailing definitions are based on Greek philosophy and the premises of Socrates who advocated probing challenges to promote reasoning with a questioning, critical attitude. Plato advocated an educational stance that enabled students to question, examine and reflect on ideas and values (Young 1980, Paul & Binker 1993, Brown & Renfro 1994). Discipline specific models and pedagogical strategies have been developed to define, evaluate and measure this multifaceted, abstract concept (Brookfield 1987, Miller & Malcolm 1990, Facione et al. 1993, Kataoka-Yahiro & Saylor 1994, Cholowski & Chan 1995).

Critical thinking was established as an important educational outcome for nursing and used as a key criterion for evaluation when accrediting education programmes. Nurse educators set out to meet requirements for critical thinking by defining the concepts, creating measures, and designing curricula to demonstrate positive changes in the critical thinking skills of students (Facione 1995).
Historically, one of the most commonly cited definitions of critical thinking in the research literature is by Watson and Glaser (1964), who define it as a composite of attitudes that enable a person to recognize problems, search for evidence to support truths, and accurately weigh logically determined evidence. Critical thinking is also comprised of skills related to the ability to activate and apply appropriate attitudes and knowledge (Watson & Glaser 1964). The Watson–Glaser Critical Thinking Appraisal (WGCTA) is a measure of critical thinking judgements and logical reasoning derived by testing skills of argument, drawing inferences, interpreting, deducting, recognizing assumptions, evaluating conclusions and assessing reasoning strengths (Kurfiss 1988). Knowing if someone possesses these skills is helpful for planning educational strategies. However, reflective executive control or metacognition surrounding the use of these skills is also important to education and is not evaluated by this test alone.

As time progressed, cognitive information-processing (IP) models were used to explain problem-solving (Newell & Simon 1972). The premise of early research with these models was that knowledge is processed and stored in memory as part of the framework needed for problem-solving (Newell & Simon 1972, Driscoll 1994). Using a cognitive IP framework, nursing research revealed that novice nurses used more cognitive structuring and fewer analytic processing strategies when confronted with complex clinical information (Corcoran 1986, Westfall et al. 1986, Tanner et al. 1987, Tabak et al. 1996). This research shows that novices and experts have different levels of domain specific knowledge, but use similar cognitive strategies to solve clinical problems. The work by Benner (1984) shows that there are differing levels of skill acquisition, and that problem-solving are related to years of practice experience. While the use of critical thinking strategies may be similar for various levels of practice, the quality of nursing care judgements that results from reflective thinking over time requires yet a different model of learning.

Confusion about the definition of critical thinking and nature of the critical thinking process is still evident. For example, in a comparative study of critical thinking definitions, baccalaureate nurse educators including programme deans and directors perceived it as a rational-linear problem-solving process, and a variant of the scientific method (Jones & Brown 1991). In contrast, non-nursing experts were more likely to define critical thinking as purposeful self-regulatory judgement and highlight the metacognitive aspects of the process (Jones & Brown 1991). More recently, Gordon (2000) discovered that, when compared with non-nurse experts, nurse educators are less likely to consider interpretation, explanation and self-regulation as critical thinking skills. Approximately 46% (n = 201) of the nurse educators in the study perceived critical thinking as a step-by-step process like problem-solving, and made a distinction among the terms of clinical decision-making, diagnostic reasoning and the nursing process (Gordon 2000). Apparently, nurse educators have a domain-specific definition of critical thinking that has been influenced by the tradition and heritage of the nursing process as an approach to clinical reasoning. One of the most current definitions for nurse educators is the American National League for Nursing’s Planning for Ongoing Systematic Evaluation and Assessment of Outcomes, in which critical thinking is described as a non-linear process that requires complex methodologies for instruction and evaluation (McDonald 2000). The research that has measured the critical thinking skills of interpretation, analysis, inference, explanation and evaluation using various models has not been able to predict the outcome of their development from various levels of nursing education.

Evidence for critical thinking as an educational outcome

The 1990s provided the context for a number of empirical studies that used the California Critical Thinking Skills Test (CCTST) and California Critical Thinking Dispositions Inventory (CCTDI) as measures of critical thinking achievement and evaluation (Saucier 1995, Colucciello 1997, Stone et al. 2001). These instruments were developed as a result of a Delphi study of critical thinking experts (Facione 1990), who defined it as a complex, multifaceted concept. According to this group, critical thinking is:

- purposeful, self-regulatory judgement 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)

Educational researchers using these instruments documented evidence showing critical thinking is significantly correlated with academic success, and is probably related to a general college effect rather than exposure to nursing curricula or clinical practice (Matthews & Gaul 1979, Ketefian 1981, Gross et al. 1987, Pardue 1987, Kintgen-Andrews 1988, Brooks & Shepherd 1990, Saucier 1995, Adams et al. 1996, Howenstein et al. 1996, Colucciello 1997, Frye et al. 1999, Stone et al. 2001). Critical thinking skills are positively correlated with years of clinical experience (Polge 1995, Hicks 2001), and usually have no relationship with clinical judgement or decision-making (Fredrickson & Mayer 1977, Pardue 1987, Brooks & Shepherd 1990, Shin 1998). In a study by Bowles (2000), however, a positive correlation of clinical judgement is shown with the critical thinking skills of...
inference and inductive reasoning. A few studies show increases in CCTST scores from entry to exit in a programme (McCarthy et al. 1999, Thompson & Rebeschi 1999, Spelic et al. 2001). There is no convincing evidence that critical thinking outcomes can be solely explained by scores on standardized tests. One explanation offered by Hicks (2001) in his review of the literature is that the WGCTA, CCTST and CCTDI do not describe the situational aspects of reflective practice. Consideration of context is desirable because it influences what takes place during observations, reflection and critical thinking.

Strategies for teaching and learning critical thinking: issues and observations

A contributing condition that influences critical thinking development is the emotional attitude of the student. Contextual studies using qualitative approaches show that feelings and emotions are inherent aspects of critical thinking (Wallace 1996). They are also important phenomena of interest in clinical reasoning. The discomfort and dissonance experienced during reflection on an experience adds to the thinking and reasoning repertoire. Sedlak (1997) used a case study approach with baccalaureate students and found that professional, perfectionist, caring and self-directed learning perspectives supported reasoning skills that emerged through professional, perfectionist, caring and self-directed learning study approach with baccalaureate students and found that experiences, identification of the skills, qualities, and knowledge that result, and recording this learning experience in some form (Williams & Lowes 2001). While there types of reflection are proposed, such as thinking in and thinking on action ( Schön 1987), reviewing a situation for greater purpose (Barnett 1994), and using it as a learning style ( Honey & Mumford 1986), the differences may not be related to the types but rather the way that they are used ( Moon 1999).

Barriers to critical thinking skill acquisition exist. Shell’s (2001) survey of over 100 teachers on baccalaureate programmes in Tennessee identified the following barriers to effective critical thinking skills acquisition: student characteristics of resistance and attitude, inadequate time, perceived need to cover content and dispense information, resistance to teaching style changes, institutional barriers, lack of knowledge of the concept, and lack of self-efficacy in ability to teach critical thinking. Locsin (2001) suggests the definition and measurement of critical thinking is not as important as the reflective activities that are required to initiate, sustain, nurture and influence the process over time and between contexts.

The literature has shown thus far that the cognitive skills of critical thinking may be associated with years of practice but not with the clinical judgement or decision-making that is the focus of clinical reasoning. It is interesting that European and Australian nurse educators (Higgs & Jones 2000) seem to put greater emphasis on the development of metacognitive knowledge and reflective practice than their American counterparts (Burns & Bulman 2000).

Einstein [1995 (1927)] noted that it is not possible to solve issues using the same level of consciousness (thinking) that created them. Thus, the challenge for nurse educators and those in staff development is how to embrace concurrently discourse about the different aspects of critical and reflective thinking. We suggest that critical thinking is to cognitive skill acquisition as reflective thinking is to metacognitive skill acquisition, and that both are necessary for effective clinical reasoning. It is easy to get caught in a never-ending circle of discourse if engaging in dualistic either/or thinking related to critical thinking or reflective thinking. The question is how to embrace both.

Focus on metacognition: reflective thinking

Reflective capacities have been required as a level of learning, along with critical thinking and problem-solving, for qualified nursing staff as endorsed by the UKCC (1999) to promote informed, knowledgeable and safe practice. Reflection has also been recognized as beneficial for practice in other countries such as the United States of America (USA), Canada, New Zealand, Australia, Finland and China (Glaze 2001).

Reflective thinking can be first traced to Dewey (1933) and Habermas (1987), and can be defined as careful consideration and examination of issues of concern related to an experience. It is also a review of personal and professional life experiences, identification of the skills, qualities, and knowledge that result, and recording this learning experience in some form (Williams & Lowes 2001). While there types of reflection are proposed, such as thinking in and thinking on action ( Schön 1987), reviewing a situation for greater purpose (Barnett 1994), and using it as a learning style ( Honey & Mumford 1986), the differences may not be related to the types but rather the way that they are used ( Moon 1999).

Some explanatory models suggest that reflection is best described and defined as phases and transitions between phases (Kolb 1984, Atkins & Murphy 1993, Boud 1995). Other theoretical models offer probing questions that stimulate reflection to elicit thinking, feelings, behaviours and theories that may implicitly guide thinking, feeling and doing ( Burrows 1995, Johns 2000). Reflection also includes various levels of dialogue and discussion of contemporary events as a means to develop understanding of values and beliefs and the consequential effects on personal and professional practice ( Wong et al. 1997). For example, guided discussions following a clinical experience may
become a reflective journey or story that stimulates thought about skills performed as well as review of past similar experiences as they relate to a professional practice style.

The research on reflection is strongly linked to the cognitive behavioural skills of self-monitoring, self-evaluating, and self-reinforcing goal-oriented behaviours that are essential aspects of metacognition. Research from the behaviourist paradigm suggests that reflection improves cognitive thinking abilities, and is subsumed within the critical thinking construct in nursing and education (Facione & Facione 1996). The association between reflection and the use of the critical thinking skills of inference, assumption recognition, deductions, interpretation and evaluation has not been specifically measured. Reflection literature in the past has focused primarily on levels of reflexivity and the resultant learning.

The evidence for reflection as an educational outcome

A popular reflective learning model that has influenced research is described by Mezirow (1990) as a process of constructing meaning from experiences through reflection and comparison with previously held beliefs, values and schemata. In his early work, Mezirow (1981) defined three levels of reflectivity. Level one or non-reflection is the absence of reflective thought. Level two reflections are defined as awareness of judgements, observations, and descriptions, evaluation of planning, and assessment of decisions. Critical reflection or level three is the process of reflection, and includes assessment of the need for further learning, and awareness that routines are not adequate and a change in perspective is needed.

A few qualitative nursing studies have applied the reflective model of Mezirow to the analysis of interviews and journals (Wong et al. 1995, Liimatainen et al. 2001), showing that lower levels of reflectivity were measured in undergraduate nursing students and the number of years working was not associated with higher levels of reflectivity in practicing nurses. Evidence suggests that the majority of students using Mezirow’s lower level of reflection, cannot demonstrate efforts at validating assumptions, and cannot reach the third level of critical reflection that includes assessment of the need for further learning, and awareness that routines are not adequate, or that a change in perspective is needed. This was the case for 75.6% (n = 34) of participants in the Wong et al. (1995) study, 94% (n = 30) in the Richardson and Maltby (1995) study, and 30% (n = 73) in a study by Wong et al. (1997).

In contrast, critical levels of reflectivity have been documented in 50% (n = 16) of senior level students who had guided reflection over a 3-year period of time by Liimatainen et al. (2001). Glaze (2001) conducted reflective interviews with MSc students who had completed a reflection module. The majority of students described a process of transformation that included being more aware of nursing, having insight into how their lives shaped their actions, how they were more realistic and confident, and that they had a feeling of enlightenment (Glaze 2001). In these studies, it seemed that guiding the reflective process promoted greater levels of reflectivity, with consequent transformation in the learning process.

Another significant research framework is the reflective learning model of Argyris and Schön (1974), who base reflection capacities on theories of action in practice. A fundamental proposition of their work is that people design all their actions. Theories of action determine the actual behaviour of practitioners and are vehicles for explanation, prediction or control. Argyris and Schön (1974) describe the two levels of reflection as models I and II. Model I of reflection in practice constitutes a psychology of everyday life that is self-limiting as it prevents learning (single-loop learning). Model II of reflective practice does not self-limit, permits progressive testing of assumptions and progressively greater learning about effectiveness (double-loop learning). Transition from models I to II behaviour produces individual awareness and growth.

Several qualitative nursing studies have also applied the reflective model of Argyris and Schön (1974) (Powell 1989, Davies 1995, Jones 1995, Landeen et al. 1995, Richardson & Maltby 1995, Wong et al. 1997). Educational researchers helped to guide and support the reflective process with teaching learning tools such interviews, vignettes, questionnaires, reflective papers, diaries, and journals. In ‘unguided’ reflection studies, nurses and students in educational and practice settings displayed varying degrees of reflection (Richardson & Maltby 1995, Wong et al. 1995). Evidence with the Argyris and Schön model suggests that a majority of students used lower levels of reflection and could not validate assumptions or transform perspectives in given clinical situations (Richardson & Maltby 1995, Wong et al. 1995).

Diary analysis revealed a shift in focus from self to client in senior (Landeen et al. 1995) and junior students (Davies 1995). Wong et al. (1997) found that dialogue with teachers could change reflective journal entries if students possessed attributes such as open-mindedness and commitment to reflection. Empirical evidence suggests that reflective thinking skills develop in varying degrees, depending on the individual subject and support from teachers.

Strategies for teaching and learning reflective thinking: issues and observations

A confounding variable that influences the acquisition and development of reflective thinking is the perception of the
student–teacher relationship. Students’ fear of judgement and evaluation by teachers was a significant issue in three studies (Davies 1995, Landeen et al. 1995, Richardson & Maltby 1995). However, sharing experiences with peers and faculty in a non-judgemental supportive milieu seems to become an essential aspect of the reflective process (Davies 1995). Reflection differed between hospital nurses, who used lower levels of reflection (consciousness) compared with community nurses, and nurse practitioners, who used higher levels of reflection (critical consciousness) (Powell 1989, Wong et al. 1995). The nature of clinical experience may affect ability to reflect rather than the years of working experience (Wong et al. 1995). Reflecting on clinical behaviours is not a singular strategy to promote learning or gain meaning from experiences. It is evident that the ability to reflect through self-dialogue as a strategy used in practice takes time. Evidence suggests that investment in reflection has benefits for learning as it assists in integrating theory with practice (Astor et al. 1998), promotes intellectual growth because it is cyclical rather than linear (Davies 1995, Landeen et al. 1995), develops skills that makes practitioners more confident (Davies 1995), and fosters responsibility and accountability (Wong et al. 1997, Astor et al. 1998).

Another issue concerns strategies used to promote the development of reflection, such as dance, music, poetry, videotaping, singing, discussion, writing, role-play, modelling, coaching/mentoring, supervision, but they may not be suitable for the clinician or the situation (Reed & Proctor 1993). Strategies such as journal writing may be a difficult method for some to express emotions (Reed & Proctor 1993, Haddock 1997, Hancock 1998). Another question relates to the most efficient model of reflection to achieve a desired outcome, such as cyclical (Gibbs 1998), hierarchal (Goodman 1984), or guided models (Johns 2000). The question also remains as to the value of reflective practice for health care. To what degree does reflection influence the development of clinical expertise, and what additional variables impact recall of experiences and subsequent thinking and reasoning (Newell 1994, Heath 1998)? A qualitative study by Conway (1998) examined 35 expert nurses, as identified by their peers. The results revealed that all experts believed they were reflective but the researcher discovered that critical reflective ability was characteristic only of humanistic existentialists, who have a holistic, non-traditional view and a humanistic philosophy of practice. They exemplified self-awareness and risk taking and exerted power and influence in their practice areas (Conway 1998).

Just as there are barriers to critical thinking, there are also barriers to the development of reflective thinking. Initially, blocks to knowing occur as expertise grows because there is a denial of not knowing and satisfaction with level of performance (Heath 1998). Certainty creates premature closure on situations and blocks the development of expertise (H Hancock 1998). Reflection on negative situations promotes helplessness, hopelessness, a loss of self-confidence and damages self-esteem (Rich & Parker 1995, Kitchen 1999, Page & Meerabeau 2000). Reflection is undermined if nurses fail to value experience (Palmer et al. 1994) or if they work in an area that does not support standards of professional and personal values (Williams & Lowes 2001). Short staffing is a barrier to reflection as it often leads to routines that dominate practice and are not questioned (Haddock 1997).

Structured reflection seems to be beneficial to less experienced practitioners because the skills to analyse practice may not yet be in place. Wallace (1996) argues that diversity of experience and learning styles may not be amenable to set criteria related to reflection. Johns (2000) emphasizes the need to guide reflection for the purpose of exposing contradiction and perceived conflict; to expose and confront self-distortion; to understand self-imposed limitations; to nurture commitment; to gain new insights; to achieve critical levels of reflection; and to empower for resolution of contradiction. Competent clinical reasoning requires a carefully constructed design and strategies that prompt guided reflection by a mentor who makes the process meaningful, ties it to experiences, and remains available throughout learning (Johns 2000). Clinical reasoning objectives and outcomes can be achieved with focused self-regulated learning strategies. Such strategies provide structure and are stimuli that guide reflection in the contexts of diverse experiences and individual learning styles.

Self-regulation of learning and reflective clinical reasoning in nursing

The self-regulated learning model in nursing is proposed as a theoretical structure that explains how clinical reasoning skills can be acquired through attention to reflective thinking and critical thinking skill acquisition. Self-regulation of learning (SRL) arises from the constructivist framework and integrates educational theories with teaching–learning strategies. The model suggests that cognitive processes, such as stimulus-response and memory storage described by behaviourism and information processing, are supported, enhanced, monitored and controlled with the development of metacognitive knowledge and processes. Metacognition is the executive cognitive control knowledge used to monitor and manipulate cognitive processes and progress (Pesut & Herman 1992). Metacognitive knowledge leads individuals to select, evaluate, revise or abandon cognitive tasks, goals
and strategies in light of their relationships with one another and with their own abilities and interest with respect to an enterprise (Flavell 1979). Metacognitive skills include self-communication or internal dialogue, self-monitoring and self-regulated strategy to influence diagnostic reasoning when solving clinical problems (Pesut & Herman 1999). Research from nursing has shown evidence of metacognitive processes in a sample of student nurses, who demonstrated higher levels of argument complexity during 'think aloud' activities with patient simulations (Daly 2001). Examples of metacognitive skill acquisition were documented using guided reflective journaling in samples of new graduate nurses (Kuiper 1999), experienced nurses (Kuiper 2000), and student nurses (Kuiper 2002b) in authentic acute care clinical experiences.

Mithaug (1993) traces the history and evolution of self-regulation to the original ideas of homeostasis or physiological self-regulation described by Cannon (1939), and cybernetic or feedback functions of self-regulated systems described by Weiner (1948). Homeostatic-cybernetic self-regulation mechanisms exist when there is a discrepancy between expected and observed conditions to return a situation from a current state to an expected state. The theoretical dynamics of this model were transferred and developed in educational settings to help explain the dynamics of self-regulated learning and environmental structuring for educational settings (Schunk & Zimmerman 1994, Bandura 1997). Cognitive thinking processes are regulated by the executive control processes of metacognition and include the skills of self-monitoring, self-evaluation and self-reinforcement in pursuit of goals. Self-regulation of judgements leads to self-efficacy (Schunk & Zimmerman 1994). Bandura (1986) claims that a dynamic interaction between the thinking self, environment, and behavioural regulation exists, and presupposes that reflective thought determines which process is necessary in a given situation. It has been shown that under-developed self-regulation in educational settings constrains students’ ability to determine occupational goals for themselves and their later achievement in vocational settings (Borkowski & Thorpe 1994, Cheung & Kwok 1998).

The processes of self-regulation are not just focused on learning, but are ways to manage behaviour for many skills and experiences. Self-regulated learning is greatly affected by perceptions of variation in setting conditions, task features and social contacts (Bandura & Wood 1989, Schunk 1990). For example, self-awareness may lead to perception that environmental manipulation is needed in one situation and knowledge improvement in another. Environmental self-regulation includes structuring context and social interactions and understanding how the context influences cognitive and metacognitive skills and monitoring strategies. Attention to the dimensions of reflective self-regulated learning in nursing has produced some interesting results that have implications for nurse educators.

Kuiper (1999) developed the reflective self-regulated learning in nursing model seen in Figure 1 in which behavioural self-regulation or self-monitoring includes the sub-processes of self-observation, self-reaction and self-evaluation. Self-monitoring refers to deliberate attention to the behaviour used to attain goal progress, and it motivates improvement in learning (Schunk 1990). When self-judgements are linked directly to goals, self-regulatory processes are reinforced. Metacognitive self-regulation or self-evaluation includes the sub-processes of goal setting, self-efficacy, knowledge use and thinking strategies. Self-evaluation refers to the reflective thinking about experiences and situations to determine if knowledge is adequate, what goals are to be set, and if there is the self-efficacy required to reach them (Schunk 1990). Self-evaluation is a key component of reflection, which in turn influences critical thinking and the development of clinical reasoning skills.

The SRL model has been used as a conceptual framework to support the development of metacognitive knowledge and build reflection capacity among students in transition from school to work environments (Kuiper 2002a). Research with a sample of new graduate nurses has revealed that critical thinking strategies increased over time with the use of...
self-regulation learning prompts (Kuiper 2002a). Other metacognitive insights or themes that evolved from an analysis of narrative journals included awareness of the need for knowledge such as using references and resources, judgements of self-improvement, judgements of self-competence, judgements of resources, self-reactions, and self-correction strategies. In a group of peri-operative interns that included both new graduates and experienced nurses, similar metacognitive insights and themes emerged, regardless of years of nursing experience (Kuiper 2000). Guidance provided by the SRL model for reflection in this operating room environment positively influenced reflective thinking for all practitioners. Further examination using quantitative content analysis revealed similar use of critical thinking skills such as analysis, inference, explanation and evaluation (Kuiper 2000). Once mastered, reflective clinical reasoning, stimulated by the use of self-regulated learning prompts, supports the development of metacognitive insights and self-management of reflective thinking in divergent situations.

To develop effective reflective clinical reasoning learners need to develop self-management skills and be guided in complex meaningful tasks to gain cognitive (critical thinking) and metacognitive (reflective thinking) knowledge.

Developing teaching-learning methods that build both the cognitive and metacognitive skills of nurses is one way to build on the history of evidence and support more rapid acquisition of the clinical reasoning skills for contemporary nursing practice. The cube represented in Figure 2 was developed to illustrate the fact that shifts of perspectives emerge as people consider how cognitive and metacognitive skills support clinical reasoning. Guided reflection using self-regulated learning strategies prompts the development of metacognitive insights needed to connect the cognitive skills of critical, creative and systems thinking to the clinical reasoning in specific contexts. These perspectives shift from foreground to background based on the teaching–learning focus (Pesut 2001).

By using the self-regulated learning model to prompt reflection, nurse educators can derive tools, strategies and techniques to design and develop teaching learning experiences that promote acquisition of reflective clinical reasoning skills. Kuiper’s (1999) self-regulated learning model in nursing provides strategies, and self-learning prompts that support the student or practitioner with the development of metacognitive insights and skills in self-monitoring, self-evaluation and self-reinforcement in a variety of situations. Using the self-regulation learning model builds both cognitive and metacognitive (attention to executive cognitive control) skill acquisition of students and/or staff. Application of the SRL model builds on previous research (Kuiper 1999, Johns 2000) that structure enhances the development of reflection and good habits of mind.

**Conclusions**

The goals of professional education are learning to learn, handling ambiguity, thinking like a professional, and developing a sense of responsibility (Oermann 1994). These outcomes can only be achieved through development of clinical thinking that arrives at safe sound self-regulatory
judgements. Supporting and using self-regulation learning prompts increases the development of metacognitive insights and strengthens the application of both cognitive (critical thinking) and metacognitive (reflective thinking) in clinical reasoning contexts.

References


Issues and innovations in nursing education


