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Full Length Research Paper

Metacognitive strategies adopted by nursing students

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In this study, the authors examined the metacognitive strategies adopted by nursing students. The population of the study was nursing students selected from two Nigerian universities, and the sample size was 240. Two research questions and two null hypotheses guided the study. The instrument used for data collection was questionnaire titled metacognitive strategies in Nursing (QMCSN). Mean score, standard deviation (SD) and Spearman Rank Correlation Co-efficient (ρ) were used to answer the research questions while chi-square and Wilcoxon Rank Sum test statistics were adopted in testing the null hypotheses at 0.01 level of significance. The result indicated significant correlation between the students' metacognitive self-regulation and the strategies they adopt in their classroom learning, as well as the students' self-reinforcement of their goal-oriented behaviour. Significant relationship was observed in the metacognitive self-regulation of the students in government and private universities; however, the learning strategies among the students' levels differed significantly. Recommendations were given based on the findings.

Keywords: Metacognition, self-regulation, learning strategies, self-reinforcement, nursing students

INTRODUCTION

Flavell (1979) defined metacognition as the ability to think about thinking. Mezirow (1981) describes metacognition as reflective thinking or a level of consciousness that exists through executive cognitive control and self-communication about experiences. Martinez (2006) views metacognition as monitoring and control of one's thought. Furthermore, Elliott et al (2000) explained that a person's thoughts about a decision he has made or about how he is doing in a project all entail metacognitive processes. It involves 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. Flavell

(1985) has it that metacognitive knowledge leads individuals to select, evaluate, revise or abandon cognitive tasks, goals and strategies in the light of their relationships with one another and with their own abilities and interests with respect to an enterprise. In the classroom, metacognitive knowledge of task operates when the nature of a task forces one to think about how one will manage. If it is a difficult task, perhaps one will decide to allocate more time or perhaps to prepare an outline (Elliott et al, 2000).

According to Anderson (2002), learners who are metacognitively aware know what to do when they do not know what to do, that is, they have strategies for finding out or figuring out what they need to do. The use of metacognitive strategies ignites one's thinking and can lead to profound learning and improved performance especially among learners who are struggling. Graham (1977) opined that metacognitive strategies that allow

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students to plan, control and evaluate their learning have the most central role to play in this respect. As Kuhn and Dean (2004) explained, metacognition is what enables a student who has been taught a particular strategy in a particular problem context to retrieve and display that strategy in a similar but new context. Further, Schraw (1998) describes metacognition as a multidimensional set of general, rather than domain-specific skills; these skills are empirically distinct from general intelligence, and may even help to compensate for deficits in general intelligence and/or prior knowledge on a subject during problem solving.

The essential aspects of metacognition are planning, self-regulation, self-evaluation and self-reinforcement of goal-oriented behaviours (Kuiper and Pesut, 2004; Whitebread et al, 2009). Planning involves identification and selection of appropriate strategies and allocation of resources. Planning include goal-setting, activation of background knowledge and budgeting time.

Self-regulation or self-monitoring refers to deliberate attention to the behaviour used to attain goal progress, and it motivates improvement in learning (Schunk, 1990).

Self-regulation of judgments leads to self-efficacy (Schunk and Zimmerman, 1997). Reflective self-regulated learning in nursing include the sub-processes of self-observation, self reaction and self-judgment (Kuiper, 1999). When self – judgments are linked directly to goals, self-regulatory processes are reinforced.

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. Self-evaluation also implies appraisal of the products and the regulatory processes of one's goals (Shraw et al, 2006). Self – evaluation is the key component of reflection, which in turn influences critical thinking and the development of clinical reasoning skills (Kuiper, 1999).

Self-reinforcement of goal-oriented behaviours refers to students giving themselves a reward following successful completion of the activity being monitored (Elliott et al, 2000).

Self-regulated learning (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, 2000a). In study of a sample of new graduate nurses, Kuiper (2000a) observed that critical thinking strategies increased overtime with use of self-regulation learning prompts.

Kuiper and Pesut (2004) noted that effective clinical reasoning in nursing practice depends on development of both cognitive and metacognitive skills. Robert and Erdos (1993) explained that cognitive strategies are used to help an individual achieve a particular goal (eg understanding a text) while metacognitive strategies are used to ensure that the goal has been reached (eg quizzing oneself to evaluate one's understanding of that

text). Metacognitive experiences usually proceed or follow a cognitive activity. They often occur when cognitions fail, such as recognizing that one did not understand what one just read. Activities of metacognitive processes occur as the learner attempts to rectify the situation.

Fonteyn and Cahill (2001) observed that use of reflective clinical logs assist nursing students to become active learners, to manage their own thinking and to improve their metacognition.

Other metacognitive insights include awareness of the need for knowledge such as using references and resources, judgments of self-improvement, judgments of resources, self-reactions and self-correction strategies (Kuiper, 2000).

Educators, researchers and practitioners have used metacognitive concepts in a variety of ways to understand and explain the dynamics of problem-solving and clinical reasoning in nursing practice, for example, it is desired characteristics of professional practice among nursing regulatory bodies, a desirable outcome associated with curriculum development, effective planning and evaluation of programmes (Patterson et al, 2002).

Nursing service settings expect nurses to be proficient in the reflective thinking required to support clinical decisions and judgments about client care. In addition, reflective thinking is one of the key ingredients in a commitment to lifelong learning that characterizes professional growth and development (Brasford, 2002).

Studies have revealed that student-teacher relationship is a confounding variable that influences acquisition and development of reflective thinking. Davies (1995) and Landeen et al (1995) observed that students' fear of judgment and evaluation by teachers significantly influence their acquisition of reflective thinking. However, sharing experiences with peers and faculty in a non-judgment supportive milieu seem to become an essential aspect of reflective process (Davies, 1995). Reflection differs between hospital nurses who use lower levels of reflection (consciousness) compared with community nurses and nurse practitioners who use higher levels of reflection (critical consciousness). Also the nature of clinical experience may affect ability to reflect rather than the years of working experience (Kuiper and Pesut, 2004).

Studies have revealed some barriers to development of reflective thinking. Palmer et al (1994) observed that reflection is undermined if nurses fail to value experience that does not support standards of professional and personal values.

Recent changes in nursing education have led to the desire to provide meaningful learning rather than rote learning, and metacognitive learning strategies have been identified to promote meaningful learning (Irvine, 2008). However, some metacognitive strategies appear to be under-exploited in Nursing education and practice

(Irvine, 2008). A nursing student who had been practicing under supervision, may, on graduation, find herself working alone in a remote community setting where she will require the metacognitive skills she acquired as a student so as to ensure competency and attainment of standards in the discharge of her professional duties. The problem this study addresses therefore is the metacognitive strategies adopted by students undergoing nursing education programme in universities.

Research Questions

- To what extent do nursing students' metacognitive self-regulatory behaviour relate to their learning strategies in the classroom setting?
- To what extent does nursing students' self-reinforcement of goal-oriented behaviour relate to their metacognitive self-regulatory behaviour?

Hypotheses

- Significant relationship does not exist between the metacognitive self-regulatory behaviour of nursing students in government owned universities and their counterparts in private universities.
- There is no significant difference between the 300 level, 400 level and 500 level nursing students with regard to the learning strategies they adopt in classroom setting.

MATERIALS AND METHODS

The study was a survey. A sample of 240 undergraduate nursing students was selected by simple random sampling technique from two universities (government owned and private universities) in Nigeria. Inclusion factors of the study population were the students in their third year, fourth year and fifth year of the program. The first year and second year students were excluded from the study. Ethical approval and the participants' consent were obtained prior to the study. The instrument used for data collection was questionnaire titled Metacognition strategies in Nursing (QMCSN) which had two parts. Part A of the instrument elicited information on demographic data (eg age, level of the student, units where the student had been posted for clinical practice, etc), while part B elicited information on the metacognitive strategies adopted by the students in both classroom setting and in their clinical practice. The questionnaire items in part B adopted ordinal scales. A four-point scale ranging from 1 – 4 was used to measure the variables which included planning and selection of learning goals, learning strategies used in the classroom, learning strategies used in clinical practice, self-regulation strategies by the

student, strategies adopted for awareness of the need for knowledge, self-evaluation strategies, self-reinforcement of goal-oriented behaviours and the barriers to metacognitive skill acquisition. The four-point scale had strongly disagree/rare rated 1 point, disagree/fair rated 2 points, Agree/ most of the time rated 3 points while strongly agree/ always was rated 4 points. Anonymity was ensured by excluding the names of the respondents in the data collection.

The instrument was personally administered to the respondents by the researchers so as to facilitate work. Descriptive statistics was used to determine the mean and standard deviation (SD) of the variables. Spearman Rank Order Correlation Co-efficient (ρ) was used to answer the research questions while Wilcoxon Rank Sum test and Chi-Square (χ^2) were adopted in testing the null hypotheses at 0.01 level of significance. The statistical analysis was performed using SPSS package.

RESULT

Table 1 shows the descriptive statistics of the measured variables. Out of the 240 respondents, the mean age was 24.1042 with a standard deviation (SD) of 4.98382, mean for metacognitive goal was 2.9556 with SD of 0.67282, mean value for learning strategies adopted by the respondents in the classroom was 2.6736 with SD of 0.50469; for learning strategies in clinical practice, the mean value was 2.9224 with SD of 0.57915, metacognitive self-regulated behaviour had mean value of 3.1706 with SD of 0.44737, mean value for self-evaluation in the clinical setting 3.1031 with SD of 0.62926, self-evaluation in the classroom had mean value of 3.0431 with SD of 0.68149; for self-reinforcement behaviour, the mean was 2.8938 with SD of 0.57097, while barriers to self-reflection had mean value of 2.1417 with SD of 0.62858. The table also indicates minimum and maximum values for each of the variables.

Table 2 shows that the ρ correlational value for the relationship between nursing students' metacognitive self-regulated behaviour and the strategies they adopt in classroom learning was 0.354. This correlational value was significant at 0.01 level.

Table 3 shows that the ρ correlational value for the relationship between nursing students' self-reinforcement of goal-oriented behaviour and their metacognitive self-regulated behaviour was 0.502, and it was significant at 0.01 level.

Table 4 shows that at 0.01 level of significance, the calculated z-score of 0.836 was more than the critical value of 0.403. The null hypothesis is rejected. Therefore there is significant relationship in the metacognitive self-regulatory behaviour between nursing students in government owned universities and their counterparts in private universities.

Table 1 Descriptive Statistics of the measured variables

Variable	N	Minimum	Maximum	Mean (X̄)	SD
Age	240	18.00	51.00	24.1042	4.98382
Metacognitive goal	240	1.00	4.00	2.9556	0.67282
Learning strategies in the classroom	240	1.00	4.00	2.6736	0.50469
Learning strategies in clinical practice	240	1.13	4.00	2.9224	0.57915
Metacognitive self-regulated behaviour	240	1.68	4.00	3.1706	0.44737
Self-evaluation in the clinical setting	240	1.00	4.00	3.1031	0.62926
Self-evaluation in the classroom	240	1.00	4.00	3.0431	0.68149
Self-reinforcement behaviour	240	1.00	4.00	2.8938	0.57097
Barriers to self-reflection	240	1.00	4.00	2.1417	0.62858
Valid N(Listwise)	240				

Table 2 Relationship between Nursing students' metacognitive self-regulated behaviour and the strategies they adopt in classroom learning

Variables	N	X̄	SD	rho value	Level of significance
Self-regulated Behaviour	240	3.1706	0.44737	0.354**	0.01
Learning strategies in classroom	240	2.6736	0.50469		

** Correlation is significant at 0.01 level (1-tailed)

Table 3 Relationship between nursing students' self-reinforcement of goal-oriented behaviour and their metacognitive self-regulated behaviour.

Variable	N	X̄	SD	rho Value	Level of significance
Self-reinforcement Behaviour	240	2.8938	0.57097	0.502**	0.01
Self-regulated Behaviour	240	3.1706	0.44737		

** Correlation is significant at 0.01 level (1-tailed).

Table 4 Wilcoxon Rank Sum test comparison of metacognitive self-regulated behaviour of nursing students in government-owned and private universities.

Variable	Ranking Order	N	Mean Rank	Sum of Ranks	Z-Cal	Z-crit	Probability
University Type- Metacognitive self-regulation	Government	168	118.05	19832.50	0.836	0.403	P<0.01
	Private	72	126.22	9078.50			
Total		240					

NB: Z – cal = standard score

Table 5 Chi-square test comparison of the classroom learning strategies among the nursing students' levels

Student level	N	Mean Rank	df	X ² -cal	X ² -crit	Probability
500 level	96	108.15	2	16.511	0.000	P < 0.01
400 level	72	109.31				
300 level	72	148.17				
Total	240					

In table 5, the calculated X² of 16.511 was more than the critical value of 0.000 at 0.01 level of significance. The null hypothesis is rejected. Therefore there is significant difference between the 300 level, 400 level and 500 level nursing students with regard to their learning strategies in the classroom.

DISCUSSION

Findings from the study indicate significant correlation (rho = 0.354) between nursing students' metacognitive

self-regulated behaviour and the strategies they adopt in their classroom learning (table 2). Evidence suggest that investment in reflection has benefit 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 make practitioners more confident (Davies, 1995), and fosters responsibility and accountability (Astor et al, 1998).

In line with some studies, in the current study, the researchers observed significant correlation (rho=0.502) between nursing students' reinforcement of goal-oriented

behaviour and their metacognitive self-regulated behaviour (table 3). Elliott et al (2000) observed that self-reinforcement can be a very potent strategy for increasing the occurrence of a student's performance. According to Elliott et al. (2000), students can be taught to praise themselves or arrange some pleasant activity as self-reward which then acts to sustain performance. Young (2005) noted that active application-oriented experience delivered by enthusiastic faculty who provide clear goals that emphasize learning over grades increase the use of self-regulated learning strategies.

The significant relationship observed in the metacognitive self-regulatory behaviour between nursing students in government owned universities and their counterparts in private universities (table 4) could be environmental influence. Bandura (1986) claims that a dynamic interaction between the thinking self, environment, and behavioural regulation exists; and that presupposes that reflective thought determines which process is necessary in a given situation. Studies have 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 and Thorpe, 1994; Cheung and Kwok, 1998). In addition, studies have shown that self-awareness may lead to perception that environmental manipulation is needed in one situation and knowledge improvement in another (Bandura and Wood, 1989; Schunk, 1990). Environmental self-regulation includes structuring context and social interactions, and understanding how the context influences cognitive and metacognitive skills and monitoring strategies (Bandura and Wood, 1989; Schunk, 1990).

The significant difference observed between the various levels (300, 400 and 500 levels) of nursing students with regard to their learning strategies in the classroom (table 5) could be associated with maturity and years of experience among the students. Senior level students are expected to demonstrate better learning strategies than the junior ones. Livingston (1996) asserts that simply providing knowledge without experience or the vice versa does not seem sufficient for the development of metacognitive control.

CONCLUSIONS AND RECOMMENDATIONS

This study has demonstrated significant correlation between nursing student's metacognitive self-regulated behaviour and the strategies they adopt in their classroom learning, as well as significant correlation between the students' self-reinforcement of their goal-oriented behaviour and their metacognitive self-regulation. The study also revealed significant relationship in the metacognitive self-regulation of the nursing students in government and private universities,

as well as significant difference between the various levels of nursing students with regard to their learning strategies in the classroom.

Teachers should assist students by making them aware of multiple strategies available to them, show the students how to recognize when one strategy is not working and how to move on to another.

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