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Nursing Students Critical Thinking and Research Utilization

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Introduction

Critical thinking (CT) has been a long-standing interest of scholars, educators, psychologists, and health care professionals (Daly, 1998; Ku, 2009; Pithers & Soden, 2000). It is a desired outcome across the educational spectrum, particularly in higher and professional education, and a common goal that most educators aspire to achieve (Gordon, 2000; Gul et al., 2010; Kalb, 2008; Mundy & Denham, 2008; Ovais, 2008; Renaud & Murray, 2008; Staib, 2003). CT is a phenomenon of worldwide importance (Ku, 2009) and has been identified as an important skill to be assessed and nurtured in higher education and professional programs (Ku, 2009; Mundy & Denham, 2008; Profetto-McGrath, 2005; Spencer, 2008). Several nursing organizations in North America have included critical thinking as a curriculum and graduate outcome competency requirement (Mundy & Denham, 2008; Simpson & Courtney, 2002; Twibell, Ryan, & Hermiz, 2005). CT is a significant component of nursing education and integral to the discipline of nursing (Kim, Moon, Kim, Kim, & Lee, 2014). Health care organizations have made dramatic advances and transformations over the last few decades and these have resulted in the rapid growth of technology and theory; critical thinking is primordial. Some of the issues that nursing faces today are the expansion of technology, consumer demand for quality care, pressure for cost containment, decreased length of stay in hospitals, the aging population, complex disease processes, and increased patient acuity. Nurses must be prepared to function as safe, competent, intuitive, and innovative clinicians in an environment where new information and clinical situations are constantly changing (Seymour, Kinn, & Sutherland, 2003).

Background

Scholars from various disciplines have created a plethora of definitions of CT that are fairly divergent because they are based on their own understandings and emphasize different perspectives (Alazzi, 2008; Mundy & Denham, 2008; Riddell, 2007; Twibell et al., 2005; Walsh & Seldomridge, 2006). Despite the numerous articles, books, and research conferences devoted to CT, educators from various academic disciplines have not been able to agree on its definition (Spencer, 2008; Twibell et al., 2005). Recognizing the need to develop a consensus statement for CT, the American Philosophical Association (APA) conducted a two-year Delphi study (Facione, 1990) with 46 CT-expert participants from the United States and Canada who represented different disciplines. The panel of experts, which included philosophers, educators, social scientists, and physical scientists, concluded that CT is “a purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference” (p. 2).

Most researchers assert that in addition to skills, CT also involves dispositions (Facione, 1990). Critical thinking dispositions (CTDs) are attributes or habits of the mind that are integrated into an individual's beliefs or actions conducive to critical thinking (Profetto-McGrath, Hesketh, Lang, & Estabrooks, 2003). Facione, Sanchez, Facione, and Gainen (1995) suggested that the dimensions of CT are comprised of both cognitive skills and affective dispositions. Cognitive skills are used (a) to interpret problems accurately by using both objective and subjective data from common information sources, (b) to analyze ideas and arguments about the problem, (c) to infer or assess arguments and draw conclusions, (d) to explain the decision, (e) to evaluate the information to ascertain its trustworthiness, and (f) to self-regulate, or constantly monitor one's own thinking for clarity, precision, accuracy, consistency, logicalness, and significance (Simpson & Courtney, 2002). Whereas affective dispositions are (a) open-mindedness: appreciating alternate perspectives and willingness to

respect difference in opinions; (b) inquisitiveness: being curious and enthusiastic about wanting to acquire knowledge; (c) truth-seeking: being courageous about asking questions to obtain the best knowledge; (d) analyticity: thinking analytically and using supporting information; (e) systematicity: valuing organization and taking a focused and diligent approach to problems of all levels of complexity; and (f) self-confident: trusting one's own reasoning and inclination to utilize these skills. Facione (2000) defines critical thinking dispositions as "consistent internal motivations to act toward or respond to persons, events, or circumstances in habitual, yet potentially malleable ways" (p. 64).

Critical thinking skills and dispositions are also vital in developing evidence-based nursing practice. Several authors assert that critical thinking skills reduce the research-practice gap and foster evidence-based nursing practice (e.g., Seymour et al., 2003; Profetto-McGrath, 2005). CTDs are core for nurses who work as scientific practitioners because using research is an essential element of their practice. Nurses who are disposed to think critically are more likely to critically interpret the available evidence and, based on that critical interpretation, are able to make high quality judgments and draw valid inferences (Profetto-McGrath et al., 2003). Moreover, nurses who are disposed to think critically are proficient in critiquing the available evidence and the practice based on that evidence, remain open minded, interpret and evaluate the effectiveness of practice, and search for the evidence which is most suitable and applicable in given context (Profetto-McGrath et al., 2003).

Although many authors have stressed the importance of CT to research utilization (RU), limited empirical evidence has linked CTD with RU. Only a few published studies have established a relationship between RU and some aspects of CTDs. May, Edell, Butell, Doughty, and Langford (1999) reported no significant relationship between critical thinking skills and the transfer of research into nursing practice. Profetto-McGrath and her colleagues (2003) studied the behaviours of practicing nurses on seven hospital units and found a statistically significant relationship between RU and an overall CTD and some of its subscales. Their findings support the belief that nurses whose critical thinking abilities and dispositions are well developed are in a better position to promote CT and RU (p. 334).

In another study, Profetto-McGrath, Smith, Hugo, Patel, and Dussault (2009) examined the CTDs of nurse educators and their RU and found a modest significant correlation between their overall CTD and all measures of RU. Profetto-McGrath et al. (2009) reported that nurse educators who are disposed to think critically and use RU skills are invaluable in educating a workforce of registered nurses who can make a significant contribution in improving the overall patient and systems outcomes. No studies investigated the relationship between CTDs and RU in nursing students. The aim of the study was to investigate the CTD and RU of students enrolled in baccalaureate nursing programs at a university in Western Canada. The following questions guided the study:

1. What are the CTD and RU of baccalaureate nursing students?
2. Do the CTD and RU differ among collaborative and after-degree nursing students?
3. Is there a relationship between CTD and RU of baccalaureate nursing students?

The purpose of this paper is to present the quantitative results of this study. In addition, implications for nursing educators are identified, and recommendations for future research are offered.

Methods

Study Design

The study used a mixed-methods sequential explanatory research design. For the quantitative data collection, a non-experimental cross-sectional design was used which allowed the simultaneous collection and examination of data from two student cohorts enrolled in two baccalaureate nursing programs at one point in time. The cross-sectional study design was also useful to explore the relationships and correlations of CTD and RU among the two cohorts of nursing students.

Population and Sample

The study population included 352 undergraduate students enrolled in their final year of study in two BScN programs (four-year basic program, and a 23-month after-degree program). One hundred and eighty (51%) students from both programs participated in the study. CT and RU are integral to both baccalaureate nursing programs. The program year-end outcomes and the College and Association of Registered Nurses of Alberta (CARNA) *Entry to Practice Competencies* document clearly highlight the importance of CT and RU for nursing graduates and are the basic requirements for entry-level practice (College and Association of Registered Nurses of Alberta, 2013). Learning activities have been designed to integrate CT and RU in theory, lab, and clinical components of courses in both programs.

Ethical Considerations

The study received ethics approval from the Ethics Review Board of the participating university and administrative approval from the Faculty of Nursing to access the student population. Students were informed that participation in the study was completely voluntary. Confidentiality was ensured through the use of code numbers. Students were apprised that the findings would be used in publications and presentations.

Procedure

After obtaining permission to access the population and ethical approval to conduct the study, an information letter was posted on an e-class site available to all nursing students and nurse educators in the selected programs. Access to students was prearranged with the instructors of the courses. Students were visited in class at the prearranged time during the 10-week period available for data collection in fall term 2014. Using a fixed script, the nature of the study was explained prior to data collection. Time for questions was made available. Students who were present and consented to participate in the study were asked to complete three survey questionnaires. Written consent was not required/requested, as participants were informed that completion of the survey was considered implied consent for participation in the quantitative phase of the study. The amount of time required to complete the three questionnaires was approximately 30 minutes. The principal investigator distributed the questionnaires to the students in class.

Instruments

Data was collected using the California Critical Thinking Disposition Inventory (CCTDI), the latest version (2008) of Research Utilization (RU) Survey initially developed by Estabrooks (1997), and the Background/Demographic Data Questionnaire developed specifically for the study.

Background/Demographic Data Questionnaire. A questionnaire was developed to gather background and demographic data from study participants. Based on the literature review, the questions included in the questionnaire requested information about variables relevant to the study and to the understanding of students' CTDs and RU. These variables were age, gender, mother tongue, level of education, prior attendance at any courses or workshops relevant to critical thinking, attendance at any research courses and/or workshops, and involvement in any research project.

California Critical Thinking Disposition Inventory (CCTDI). The CCTDI is designed to measure seven critical thinking dispositions which all stem from the multidisciplinary Delphi Report (Facione, 1990). The CCTDI consists of 75 declarative statements reflecting seven subscales: truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and maturity. The items for the seven subscales are interspersed throughout the instrument (Facione, Facione, & Giancarlo, 2001). This instrument uses a six-point Likert scale from 1 (strongly agree) to 6 (strongly disagree). The total scores range from 60 to 420, while the subscale scores range from 10 to 60. The higher the score the stronger the overall disposition towards critical thinking. A total score above 350 indicates a strong disposition, while a score between 280 and 350 indicates a positive inclination (i.e., high critical thinking score). Total scores between 210 and 279 fall in the ambivalent range, while scores below 210 indicate a significant opposition towards critical thinking (i.e., low critical thinking scores) (Facione et al., 2001). Subscale scores above 50 indicate a strong disposition, scores between 40 and 50 a positive inclination (i.e., high subscale scores), scores between 30 and 39 ambivalence, and scores below 30 indicate a significant opposition towards critical thinking (i.e., low subscale scores) (Facione et al., 2001). The reliability coefficients for the CCTDI range between .80 and .91, demonstrating very strong internal consistency. The reliability of the individual subscales has ranged between .71 and .80 (Facione & Facione, 1992, Facione, Facione, & Giancarlo, 1997; Ip et al., 2000; May et al., 1999; Profetto-McGrath, 1999; Smith-Blair & Neighbors, 2000; Walsh & Hardy, 1999).

Research Utilization Survey. The RU Survey was first developed and reported by Estabrooks (1997). It is one of only a few instruments designed to directly measure nurses' use of research in their practice. It also measures several other factors that contribute to or hinder RU, such as attitude toward research, support, belief suspension, trust, time, and access to research (Estabrooks, 1997, 1999a). The survey used in this study is the shortened version of the original, which was revised in 2008. It measures professional nurses' research use with single items that tap four kinds of research use: (a) Instrumental research utilization refers to the concrete application of research, and the research is normally translated into a material and useable form (e.g., protocol); (b) conceptual research utilization refers to research that might change one's thinking but not necessarily one's particular action; (c) persuasive utilization involves the use of research findings to persuade others (typically those in decision making positions); and (d) overall research utilization refers to the use of research knowledge in any way in one's practice (Estabrooks, 1997, 1999a, 1999b; Estabrooks et al., 2008). Each item is

preceded by a definition of the kind of research use and related examples. For each kind of research use, respondents are asked to indicate, over the past year, how often they have used research in this way. The items are treated individually (i.e., they are not combined to form an index). Items are scored on a five-point scale (10% or less to 100%). Reliability coefficient cannot be obtained for the latest version of the RU measure due to the use of single items. However, construct validity of the model explaining the conceptual structure of the original RU using these measures has been reported elsewhere (Estabrooks, 1999a). Several subsequent researchers (Estabrooks, 1999b; Profetto-McGrath et al., 2003; Kenny, 2005; Milner, Estabrooks, & Humphrey, 2005; Estabrooks, Kenny, Adewale, Cummings, & Mallidou, 2007) have used the items for regression and correlation analyses and reported credible results, which supports validity.

The CCTDI and RU are the most up-to-date instruments available with acceptable levels of reliability and validity. Both are easy to administer and deemed effective in measuring CTD and RU of baccalaureate nursing students. Both instruments have been used widely in the past in the Canadian context (Profetto-McGrath et al., 2003; Profetto-McGrath et al., 2009; Cobban & Profetto-McGrath, 2008).

Data Analysis

Using SPSS version 22.0, data were entered twice to ensure accuracy in the data entry protocol. Further, 10% of all instruments were randomly and manually checked against the existing database. Descriptive statistics were completed using the CTD and the RU scores. As the resulting coefficients were highly congruent, parametric (Pearson's r) correlations were conducted to determine the relationship between CTD and RU. Parametric and nonparametric tests (one-way analysis of variance and Kruskal-Wallis) were performed to analyze the difference between the two cohorts of students with regard to CT and RU. A significance level of p value of .05 or less was set for all analyses a priori.

Results

A total of 180 (51%) nursing students participated in the study (4-Year BScN = 82 and 23-month after-degree students = 98). Based on the information provided on the biographical questionnaire, the majority of students were female ($n = 167$ or 92%), with a mean age range between 20 and 30 years. Twenty-six percent of students reported that they attended some course related to CT, and 57% of students indicated involvement in research projects, i.e., answered "yes". However, the majority of these (48.8%) reported that their involvement in research was as research participants. Only 8% of the 57% of students reported that they had been engaged in actual research projects as co-investigators and all the participants have completed required nursing research courses.

Critical Thinking Dispositions of Baccalaureate Nursing Students

The overall CTD mean score was 243.7 ($SD = 21.3$) with scores ranging from 194 to 321. Table 2 outlines the mean and SD of CCTDI subscales. One hundred twenty six (70%) students scored less than the overall target score of 280, indicating a weakness, while 54 (30%) scored between 280 and 321. None of the students achieved a total score above 350. There was a wide range of individual scores on each subscale, with the largest range (12-45) for the maturity subscale and the smallest range (24-48) for the systematicity subscale. Participants scored highest overall on self-confidence ($M = 42.2$, $SD = 6.2$) and inquisitiveness ($M = 40.08$, $SD =$

4.6) and scored lowest on maturity in critical thinking skills ($M = 24.4$, $SD = 5.6$) and truth-seeking ($M = 30.5$, $SD = 5.6$). The mean scores for open-mindedness, analyticity, and systematicity were all lower than the target score of 40, indicating weaknesses in these CTD. No mean scores were higher than 50. Neither parametric nor nonparametric tests (one-way analysis of variance and Kruskal-Wallis, respectively) revealed significant differences between the two groups of students.

Research Utilization Practices in Baccalaureate Nursing Students

The mean score for overall research utilization was 3.42 ($SD = 1.19$) out of a possible 5, indicating that the majority of nursing students use research in this way (see Table 1). Participants reported conceptual RU ($M = 3.32$, $SD = 1.27$) as used most often, and persuasive/symbolic RU as the least used ($M = 2.03$, $SD = 1.08$). There was a statistically significant difference in RU between students in the two programs; the mean score for instrumental and overall RU was higher for students in the 4-year program $M = 3.53$, than those in the after-degree program ($M = 3.14$, $p = 0.002$).

Relationship between Critical Thinking Dispositions and Research Utilization

There was no significant correlation between total CTD and overall RU ($r = .055$). Overall CTD was not significantly correlated with any form of RU, (see Table 3). Open-mindedness, analyticity, self-confidence and inquisitiveness were also significantly correlated with conceptual RU. When age and type of nursing program were correlated with CTD and RU no difference were detected among the two groups.

Discussion

Critical Thinking Dispositions

The aim of the study was to investigate the CTD and RU behaviours of baccalaureate nursing students in two programs. The nursing students who participated in this study achieved an overall CTD mean score of 243.7, reflecting a weakness in CTDs which suggests that baccalaureate nursing students may lack some of the attributes indicative of the ideal critical thinker. The findings are in line with other studies including baccalaureate nursing students (Profetto-McGrath, 2003; Ip et al., 2000 & May et al., 1999). However, studies conducted with nurses in practice have reported a positive disposition towards CT (Wangensteen, Johansson, Bjorkstrom, & Nordstrom, 2011; Profetto-McGrath et al., 2003; Profetto-McGrath et al., 2009; Smith-Blair & Neighbors, 2000). Therefore, there is potential for enhancing nursing students' CTDs, given the mean scores achieved on the seven subscales which are lower than the target score of 40. The highest subscale score was achieved on the self-confidence and inquisitiveness subscales which measure the intellectual curiosity and desire for learning and reflect curiosity and eagerness to obtain knowledge even when it may not have immediate use. This finding is both encouraging and desirable. In a practice discipline such as nursing, it is important that students maintain a curious nature and continue in the pursuit of knowledge.

The lowest mean score were achieved for the truth-seeking and maturity subscales (30.5 & 24.4) According to Facione and Facione (1992), truth-seeking gauges intellectual honesty, courage to acquire the best knowledge, inclination to ask challenging questions, and willingness to pursue evidence and proof regardless of where it may lead. The low truth-seeking scores observed in this study are consistent with other findings in several published studies conducted with both nursing undergraduate students (May et al., 1999; Ip et al., 2000; Profetto-McGrath,

1999, 2003; Smith-Blair & Neighbors 2000; Tiwari, Avery, & Lai, 2003; Wangenstein et al., 2011; Pai & Eng, 2013; & Kim et al., 2014) and non-nursing undergraduate students (Halpern, 1998; Walsh & Hardy, 1999). More than half of the study participants scored below 30, reflecting a negative inclination toward truth-seeking and maturity. Lack of maturity and truth-seeking scores may be observed in students who are unwilling to re-evaluate new information, and who base their nursing on “how things have always been done” (Smith-Blair & Neighbors, 2000; Wangenstein et al., 2011). The low mean score for the truth-seeking subscale has been explained in several studies by questioning whether nursing programs still have traditional and strictly didactic teaching strategies (May et al., 1999; Walsh & Hardy, 1999; Profetto-McGrath et al., 2003; Wangenstein et al., 2011). It is desirable that senior nursing students have higher scores with respect to truth-seeking, as a higher disposition indicates ability to re-evaluate new information and not base practice on how procedures have always been done. Colucciello (1997) and Profetto-McGrath (1999), in their studies with samples of baccalaureate nursing students, reported that this deficiency might be due to strict didactic teaching strategies that continue to exist in many nursing programs. The baccalaureate nursing programs targeted in this study used an inquiry-based approach to teaching. Several studies (Tiwari, Lai, So, & Yuen, 2006; Worrell & Profetto-McGrath, 2007; Dehkordi & Heydarbejad, 2008; Jones, 2008; Ozturk, Muslu, & Dicle, 2008; Yuan, Williams, & Fan, 2008) have been conducted to examine the effectiveness of inquiry-based or problem-based learning on CT development but have found inconsistent results to support the assertion that CT is an outcome of inquiry-based learning. Kong, Qin, Zhou, Mou, and Gao (2014) make the point that the success of an inquiry-based learning approach has much to do with the role of the facilitator across the full program. Facilitators who enable students’ learning by performing multiple roles, creating mutually beneficial norms in the classroom, respecting students, providing them with opportunities to challenge others’ ideas, promoting their participation, and empowering them to partner in their learning are much more likely to promote CT (Akyuz & Samsa, 2009; Choy & Cheah, 2009). This study did not measure the change of CTDs over a period of time, therefore we cannot conclude that teaching and learning strategies such as inquiry-based learning does not contribute to increasing the critical thinking abilities of nursing students.

Research Utilization

The overall research use reported by students in this study indicates that, on average, they used research in some aspect of their nursing practice ($M = 3.42$, $SD = 1.19$) which is lower when compared to Estabrooks’s (1999a) and Profetto-McGrath et al. (2003) studies that investigated practicing nurses. However, low research use among nurses has been reported in studies by Boström, Nilsson, Nordstrom, and Wallin (2008, 2009), Forsman, Gustavsson, Ehrenberg, Rudman, and Wallin (2009), and Forsman, Rudman, Gustavsson, Ehrenberg, and Wallin (2010). As research use constitutes one of the cornerstones of evidence-based practice (DiCenso, 2005), the low proportion of research users among nursing students was a discouraging finding. The study also found that students in the 4-year program have higher RU mean scores when compared to students in the after-degree program. Longer time in the nursing program may account for the higher results in students of the 4-year program as they need time to understand and then use research in their practice. Nursing students work in different social contexts compared to registered nurses. The lack of professional knowledge and skills, the fear of making mistakes and causing harm, the nature of the clinical practice environment, and the simultaneous academic and clinical demands have been reported as stressful (Gibbons, Dempster, & Moutray, 2007; Melo, Williams, & Ross, 2010). This may suggest that a supportive

social system is important for nursing students' use of research. A supportive environment in terms of availability and support to implement research findings was a significant predictor for research use in the study by Wangenstein et al. (2011). Similar to current research findings with nursing students in this study, both Estabrooks (1999a, 1999b) and Profetto-McGrath (2003) reported conceptual research utilization as the most frequent and persuasive research utilization least observed.

Relationship between Critical Thinking Dispositions and Research Utilization

The study did not find a significant correlation between overall CTD and overall RU scores. A few studies reported a modest but significant correlation between CT and RU among newly graduated and experienced nurses (Wangenstein et al., 2011; Profetto-McGrath et al., 2003), nurse educators (Profetto-McGrath et al., 2009), and dental hygienists (Cobban & Profetto-McGrath, 2008). The present study is unique in that it focused on baccalaureate nursing students' CTD and RU. The most frequent type of research use reported by nursing students is conceptual use. The conceptual RU is similar to Weiss's (1979) enlightenment model of research use. According to this model new information is not necessarily used in its original form. There is a process of information diffusion that is not directly observable but is expressed through changed thinking and attitudes (Weiss, 1979). Open-mindedness, analyticity, self-confidence, and inquisitiveness were also significantly correlated with conceptual RU suggesting that open-mindedness and traits like curiosity and an affinity for seeking out new information have obvious links to the behaviours required to sustain evidence-based practice standards. Without a desire to learn, nursing students may not feel compelled to make time to read or discuss new research in the classroom or in the clinical setting.

Implications for Nursing Education

CT is a complex activity that requires education, ongoing development, time and commitment. Nurse educators who are engaged in scholarship of nursing education, need to be critical thinkers themselves. Profetto-McGrath et al. (2009) reported that nurse educators are in a better position to promote CT and RU among nursing students by using active learning strategies. These include discussions, debates, concept mapping, written problem solving, and higher level questioning that involve analysis, synthesis, and evaluation to foster CT (Profetto-McGrath, Smith, Yonge, & Day, 2004). There is a need for educational institutions to define and share views on CT with their teachers in relation to their curricula (Seymour et al., 2003), identify assessment tools (Adams, Whitlow, Stover, & Johnson, 1996), develop a well-designed CT course (Beeken, Dale, Enos, & Yarbrough, 1997), emphasize that instructions focus on developing critical thinking skills (Facione, Facione, & Giancarlo, 1996), and ensure that teachers use critical thinking strategies in the practice context (Daly, 2001; Profetto-McGrath et al., 2004). Dickerson (2005) described some useful strategies for nurse educators to nurture critical thinking in clinical practice. These include, among other things, assessing one's own critical thinking ability, reflection on one's teaching style, being willing to change the teaching style, being open to challenges, providing time to reflect on learning, and providing realistic feedback (Dickerson, 2005). These aspects are most valuable in practice contexts as well as in nursing education.

To foster RU among nursing students, it is imperative that nurse educators are creative in how they engage their students in learning the research process. Teaching/learning strategies such as journal clubs, clinical rounds, or inquiry-based learning promote RU in nursing students

(Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gushta, 2003). Dunning (2004) demonstrated that by “changing the focus on research from ‘doing’ to ‘using’, linking it to clinical practice and demystifying research terminology [it] improved the uptake and understanding of evidence-based practice” (p. 189). The recognition of CT as an important predictor for research use is important information for nursing practice and nursing education. Nurse educators are role models for nursing students and nurses in clinical practice both with respect to CT and RU. Nurse educators are encouraged to take the time needed to deeply discuss teaching and learning strategies in nursing education. There is a need to assess whether teaching strategies meet the requirements of CT and RU in nursing education.

The results of this study point to the need for more studies focused on undergraduate and graduate nursing students' CT and RU. Critical thinking should be studied from diverse perspectives (e.g., learning strategies to facilitate critical thinking disposition in nursing education and how nursing practice facilitates CT development). More studies are needed on how nursing practice and how nurse education facilitate research use in student nurses' daily practice. Studies contributing to research-based teaching strategies in nursing education are also recommended. Nursing students' health care experience prior to nursing education and their potential impact on critical thinking and research are also worthy of investigation.

Limitations

This study explored the relationship between CT and RU of two cohorts of baccalaureate nursing students at a university in Western Canada. The sample was one of convenience, and, therefore, sampling bias may have existed, which limits generalizability to other populations of baccalaureate nursing students. In addition, testing bias may have been a factor in this study. Self-report questionnaires may be affected by students' mood and attitudes and thus impact their completion, which may in turn result in low external validity of the study.

Conclusion

The results of this study indicate that the majority of baccalaureate nursing students who participated in the study had adequate levels of CTDs and RU. These results also reinforce the need for students' continued development in some of these areas. Nurse educators must renew their commitment to CT and RU as an educational ideal and this ideal must be continually pursued because it is integral to true autonomy in our complex society. The importance of CT and RU in nursing education, practice, and the ongoing development of nursing theory is indisputable. Nurses deal with an ever increasing number of demands associated with educational changes, health care reform, and professional and practice issues. These challenges necessitate that nursing students and professional nurses involved in every area of nursing employ effective CT and RU skills.

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Tables

Table 1: Research Utilization Survey Scores (n = 180)

Kinds of RU	Mean	Range	SD
Overall RU	3.41	1-5	1.19
Instrumental RU	2.60	1-5	1.13
Conceptual RU	3.32	1-5	1.27
Persuasive RU	2.03	1-5	1.08

Table 2: CCTDI Scores (n = 180)

Critical Thinking Dispositions Total and Subscales	Score		
	Mean	Range	SD
Critical thinking disposition total	243.70	194-321	21.33
Truth-seeking	30.55	14-43	5.66
Open-mindedness	33.95	23-49	4.37
Analyticity	38.04	29-54	4.10
Systematicity	34.37	24-48	4.29
Self-confidence	42.27	30-57	6.23
Inquisitiveness	40.08	28-54	4.68
Maturity	24.40	12-45	5.69

Table 3: Correlation between critical thinking dispositions & research utilization

Critical thinking dispositions total and subscales	Research utilization			
	Instrumental RU	Conceptual RU	Persuasive RU	Overall RU
Critical thinking dispositions total	0.034	0.274	0.98	0.055
Truth-seeking	0.070	0.020	0.028	0.005
Open-mindedness	0.086	0.251**	0.048	0.069
Analyticity	0.070	0.238**	.080	0.60
Systematicity	0.052	0.127	0.062	0.032
Self-confidence	0.126	0.207**	0.166*	0.072
Inquisitiveness	0.098	0.301**	0.133	0.063
Maturity	0.122	0.113	0.062	0.041

*Significant at .05 (two-tailed).

**Significant at .01 (two-tailed).