

**Research Utilization and Critical Thinking of Undergraduate Nursing
Students**

by

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Abstract

In the nursing profession, the concept of critical thinking (CT) has been increasingly the focus of investigation for the past several years. CT is a valuable skill in nursing practice. Nurses need complex thinking skills to manage effectively the fast-paced and constantly changing health care environments in which they work. Critical thinking skills are also vital in developing evidence-based nursing practice. Nurses who are disposed to think critically are more likely to interpret the available evidence critically, and more able to make high quality judgments and draw valid inferences. Currently, I did not find any published studies that specifically examined the relationship between Critical Thinking Dispositions (CTDs) and research utilization (RU) of undergraduate nursing students. The overall aim of the research was to investigate the critical thinking dispositions (CTDs) and Research Utilization (RU) of undergraduate nursing students enrolled in a baccalaureate nursing program at a university in Western Canada. It was also the purpose of this research study to identify undergraduate nursing students' perceptions about critical thinking and its relationship to research utilization. A mixed method sequential explanatory design was used to answer the research questions. In the first paper (Chapter 3), quantitative data and findings related to CTDs and RU are reported. 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 reinforce the need for students' continued development in the areas of CT and RU. In the second paper (chapter 4), qualitative findings related to research utilization are reported. The study findings are categorized into the components of PARIHS framework evidence, context and facilitation. Findings disclose some key themes of factors

perceived by nursing students that facilitate or restrict them to use research in practice setting. In the third paper (chapter 5), I discuss some of the challenges that one researcher faced when undertaking a mixed methods research project.

The combined findings of this dissertation discussed in chapter 6, demonstrate that dispositions are crucial to critical thinking; without them CT and RU do not happen or may be substandard. Through my research, I was able to identify several ways by which educational and clinical organizational culture and context exert an influence on undergraduate nursing students CTDs and RU behaviors. Recommendations, limitations and avenues for future research are also presented in this chapter.

Preface

This dissertation is an original work of Salima Moez Meherali. It commenced after receiving ethics approval from University of Alberta under the title Research Utilization and Critical Thinking of Nursing Students, no Pro00042481, and was approved on May 21, 2014. Three papers in this dissertation have been submitted to journals for consideration. Chapter 3 is a manuscript that presented quantitative analysis of data entitled “Nursing students critical thinking and research utilization.” It has been published in Journal “Quality Advancement in Nursing Education” (Volume 1, issue 3, 2015). Chapter 4 is the second manuscript, called “Use of research by undergraduate nursing students: A qualitative descriptive study exploring nursing students’ perceptions about research utilization.” In this manuscript, the proposed authors are: Salima Meherali, Pauline Paul and Joanne Profetto-McGrath. This paper is submitted for publication in “The Qualitative Report.” Chapter 5 is the third manuscript entitled “Methodological challenges in sequential explanatory mixed methods research. In this manuscript, the proposed authors are: Salima Meherali, Joanne Profetto-McGrath and Pauline Paul. In all three manuscripts, I was responsible for data collection, analysis and composition of the draft manuscript. Joanne Profetto-McGrath and Pauline Paul, as supervisors, gave me supervisory inputs during all phases of the project, manuscript writing and contributed to the fine-tuning of the concepts as well as editorial work.

Dedication

This thesis is dedicated to my daughter (Kainat), my husband (Moez) and my mother (Halima). It is due to their constant support, motivation, encouragement, and sincere prayers that I have been able to pursue higher studies and successfully reach my destiny.

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List of acronyms

CT: Critical Thinking

CTDs: Critical Thinking Dispositions

CCTDI: California Critical Thinking Disposition Inventory

RU: Research Utilization

PARIHS: Promoting Action on Research Implementation in Health Services

QUAL: Qualitative

QUAN: Quantitative

Introduction to the Dissertation

This paper-based dissertation represents the output of a doctoral research project on the research utilization and critical thinking of undergraduate nursing students. The overall aim of this research was to identify the relationship between critical thinking dispositions (CTDs) and research utilization (RU) of nursing students enrolled in undergraduate nursing programs at a major university in western Canada. It was also the purpose of this study to identify nursing students' perceptions about CT and its relationship to RU.

A mixed method sequential explanatory design was used to answer the research questions. This paper-based dissertation comprises 6 chapters: one introductory chapter, three scholarly manuscripts, discussion and concluding chapter. In Chapter 1, I locate the origin of my curiosity and interest in CT and RU of nursing students and practicing nurses when beginning my work as a nursing faculty member at a major university in Pakistan. This interest propelled me to begin my doctoral studies in Canada. In the chapter 2, I provide a comprehensive literature review on CT and RU. Chapters 3, 4 and 5 are the three manuscripts for publication. The manuscripts have been formatted to the specification of the journals to which they have been submitted. The first manuscript detailed the results of quantitative analysis of critical thinking dispositions (CTDs) and RU. The results of this study indicated that the majority of baccalaureate nursing students who participated in the study had adequate levels of CTDs and RU. These results also reinforced the need for students' continued development in some of these areas. In the second paper, I reported the findings of qualitative study related to RU by nursing students. Promoting Action on Research Implementation in Health Services (PARIHS)

framework (Kitson, Harvey, & McCormack, 1998; Rycroft-Malone, 2004), guided the analysis and establishment of the relationship between critical elements identified in the PARIHS framework and required for successful RU and implementation. In the third paper, I discussed the significance of a mixed methodology, philosophical assumptions associated with mixed methods research, briefly discuss how nursing research would benefit from using mixed methods design and finally outline the challenges/issues pertaining to mixed methods research using an example of this doctoral research project. Chapter 6 presents the integrated results of the quantitative and qualitative phases during the discussion of the outcomes of the entire study. I conclude the dissertation by presenting limitations, recommendations and implications for nursing education and nurse faculty.

Chapter 1

Introduction and Overview

In the nursing profession, the concept of critical thinking (CT) has increasingly been the focus of investigation for the past several years. CT is a “purposeful, self-regulatory judgement which results in interpretation, analysis, evaluation and inference” (Facione, 1990, p. 2). 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 interest (Ku, 2009) and has been identified as an important attribute/skill to be assessed and nurtured in higher education and professional programs in order to improve practice standards (Ku, 2009; Mundy & Denham, 2008; Profetto-McGrath, 2005; Spencer, 2008).

CT is a valuable skill in nursing practice. Nurses need complex thinking skills to manage effectively the fast-paced and constantly changing health care environments in which they work. Many organizations recognize and support this need by identifying CT as an important part of the nursing role (Mundy & Denham, 2008; Simpson & Courtney, 2002; Twibell, Ryan & Hermiz, 2005). Several authors asserted that CT skills reduce the research-practice gap and foster/support evidence-based nursing practice (e.g. Profetto-McGrath, 2005; Seymour, Kinn & Sutherland, 2003). Currently, the number of nursing-based research studies continues to grow; however, translating research findings into clinical practice is an ongoing pursuit and the implementation of evidence-based practice

remains a challenge (Kajermo et al., 2010). Several studies have identified barriers and facilitators to research utilization (RU) in clinical practice. Based on these studies, healthcare providers have identified numerous individual, organizational, and contextual factors as influencing the use of research. The individual determinants of RU identified in different studies include age, attitude, clinical setting, education level, prior knowledge about research, employment status, experience, motivation, time, and work load (Butler, 1995; Rodgers, 2000; Tranmer, Lochhaus-Gerlach, Lam, 2002; Tsai, 2000;). Recently, critical thinking dispositions (CTDs) have also been identified as an important determinant of (RU), but few research studies have been undertaken to further support this link (Profetto-McGrath, Hesketh, Lang, Estabrooks, 2003). CTDs are “consistent internal motivations to act toward or respond to persons, events or circumstances in habitual, yet potentially malleable ways” (Facione, 2000, p. 64). Studies in this area reported a modest positive correlation between CT and RU (Cobban & Profetto-McGrath 2008, Profetto-McGrath et al. 2003; Profetto-McGrath, Smith, Hugo, Patel, & Dussault, 2009).

My Motivation

CT is significant in a practice discipline such as nursing. A nurse’s ability to think critically affects areas of the profession such as education, practice, and research and theory development. Therefore, knowledge and understanding of nursing students’ CTDs and RU are crucial. Another impetus for this research is my experience as a nursing faculty member. As a faculty member, I was exposed to research and believed in the benefits of using it as a foundation for clinical decision-making. While working as faculty member I recognized that CT and RU are complex activities that require education,

ongoing development, time, and commitment. When I started working at a nursing faculty at a major university in Pakistan, I realized that the undergraduate nursing curriculum did not integrate CT and RU within theory and clinical practice. However, no studies had been conducted to explore the CT and RU of undergraduate nursing students. I became intrigued about investigating the CTDs and RU of undergraduate nursing students enrolled in a baccalaureate program at a university in western Canada. These experiences taught me that the onus for fostering CT and RU rest on the nursing faculty. I needed to renew my commitment to CT and RU as an educational ideal and this ideal must be continually pursued because it is integral for nurses working in complex health care environment.

In this section, I state the purpose and identify the research questions for the study, and provide a brief overview of methodology.

Purpose of the Study

Baccalaureate nursing programs often identify CT and RU as expected graduate outcomes. The purpose of this study was to identify the relationship between the CTD and RU of nursing students enrolled in undergraduate nursing programs at a major university in western Canada. It was also the purpose of this study to identify nursing students' perceptions about CT and its relationship to RU. Specifically, the study answered the following questions:

- What are the CTDs and RU of baccalaureate nursing students?
- Do the CTDs and RU differ among collaborative and after-degree nursing students?

- Is there a relationship between the CTDs and RU of baccalaureate nursing students?
- To what extent do baccalaureate nursing students use research findings in practice?
- How do nursing students describe the impact of CTDs and whether it is helping them to use research in their nursing practice?

Significance of the Study

Many authors have stressed the importance of CTDs and RU, yet limited empirical evidence has linked CTDs with RU. Only a few published studies have detailed the relationship between RU and some aspects of CTDs. However none of the studies have been conducted to explore the relationship between the CT and RU of undergraduate nursing students. It is hoped that the findings of this study will be valuable and useful in determining the relationship between the CTDs and RU of nursing students enrolled in baccalaureate nursing programs at one of Canada's leading universities. I envisage that the information acquired through this study will be useful not only for nursing students, but also for the nurse educators. The nurse educators can use the information to scrutinize curriculum plans, course structures, course assignments, and teaching strategies to ascertain that they foster a culture of reasoned thinking and evidence-based inquiry. Finally, this study generated baseline information for future research with the goal of contributing to the development of CTD and RU among undergraduate nursing students for better patient outcomes.

METHODS

Research Design: Mixed Methods

The methodology used in this study was a mixed-method sequential explanatory research design. This type of design indicates integration, relation, or mixing of the data at some stage in the research process (Creswell & Plano Clark, 2011). When used in combination, both types (quantitative and qualitative) of data yield a more complete analysis, and complement each other (Creswell & Plano Clark, 2011), which is why they were chosen. Furthermore, “a mixed methodology design specifically analyzes and reports data based on a priority, concurrent, or sequence of information” (Creswell & Plano Clark, 2011, p. 67). Researchers have found that both quantitative and qualitative research methods are necessary to develop nursing knowledge. This design is also most useful when the researcher wants to assess trends and relationships with quantitative data as well as explain the mechanism or reasons behind the resultant trends, which is one of the main purposes of this study.

In quantitative (QUAN) research, investigators rely on numerical data (Leech & Onwegbuzie, 2009). They use positivist claims for developing knowledge, such as cause-and-effect thinking, reduction to specific variables, hypotheses and questions, measurements and observations, and testing of theories. Researchers isolate variables and causally relate them to determine the magnitude and frequency of relationships. In addition, they determine which variables need to be investigated and choose instruments that will yield reliable and valid data. Historically, the approach in health care research was nearly exclusively in the QUAN or positivist tradition, predicated on the necessity for researchers to be objective and unbiased: many consider it the “gold standard.”

Positivism contends that there is a single reality and seeks to identify causal relationships through objective measurement and quantitative analysis (Clark, 1998). In the positivist paradigm, researchers are considered independent and objective and use larger samples to test carefully constructed hypotheses. The prevailing wisdom is that researchers who ascribe to the positivist tradition can put aside their values to avoid bias in a process of inquiry. Constructivism or qualitative (QUAL) research emerged as an alternative to the positivist form of inquiry as researchers sought to examine the context of human experience (Monti & Tingen, 2002; Polkinghorne, 1983). The QUAL paradigm has received greater attention in recent years and is at times described as the naturalistic-inquiry, postpositive, constructivist, or interpretative approach (Creswell, 2003).

Constructivism proposes that multiple realities and different interpretations are possible from any research endeavor (Appleton & King, 2002). These interpretations are shaped by particular circumstances that exist as a study unfolds. Researchers who work within the constructivist paradigm seek to illuminate the reality of others through the process of describing their experiences in detail (Appleton & King, 2002). In the interpretative paradigm, researchers are subjective and their focus is directed at gaining a deeper understanding of what is happening, often with the use of a smaller sample. The positivist viewpoint is that research outcomes are not biased by the values of detached positivist researchers. This contrasts with the viewpoint of the constructivist paradigm, in which researchers are immersed in the research (Clark, 1998). Clark (1998) argued strongly that no research endeavor is free of value judgments and that an “attempt to bracket values” (p. 12) produces only more insidious bias. One of the key distinctions between QUAL and QUAN research is induction and deduction (Morgan, 2007). The simplistic view of

QUAN research is that it is an objective process of deduction, whereas QUAL research is a subjective process of induction that can be viewed only in context (Morgan, 2007).

Traditionally, researchers align themselves with one paradigm or the other. The QUAN paradigm is linked with certain philosophical assumptions and the QUAL paradigm with other assumptions, and a combination of the two is not possible (Sandelowski, 2001). Considerable debate exists in the literature regarding whether it is possible for QUAL and QUAN methods to co-exist in the same study (Bryman, 2007; Morgan, 2007). QUAN versus QUAL debates have resulted in an impression that the two approaches are mutually exclusive, incompatible, and parallel to each other (Sandelowski, 2001). Some researchers are concerned with “methodological acrobatics” (Sandelowski, 2003, p. 335) and believe that rivalry between paradigms is not helpful. Thus, mixed methods have been proposed as the third paradigm, which is capable of bridging the gap between the QUAN and QUAL positions (Creswell & Plano Clark, 2007, 2011; Johnson and Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998). The mixed methods paradigm is guided by philosophical assumptions that make it possible to mix QUAL and QUAN approaches. It suggests that the most important question is whether the research helps to answer the research question(s) and enhances the understanding of the phenomena being studied (Hanson, Creswell, Plano Clark, Petska, & Creswell, 2005).

In studies using a mixed methods approach, researchers build knowledge on pragmatic grounds (Creswell, & Plano Clark, 2007; Maxcy, 2003). They choose approaches, as well as variables and units of analysis, which are most appropriate for finding answers to their research question (Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 2010). A major tenet of pragmatism is that quantitative and qualitative methods

are compatible. Thus, both numerical and text data, collected sequentially or concurrently, can facilitate understanding of research problems of interest and answer related questions.

While designing a mixed methods study, Creswell and Plano Clark (2011) identified three aspects that need consideration: priority, implementation, and integration. Priority refers to which method, either quantitative or qualitative, is given more emphasis in the study. Implementation refers to whether the quantitative and qualitative data collection and analysis are done in sequence or in chronological stages, one following the other, in parallel, or concurrently. Integration refers to the research phase when mixing or connecting quantitative and qualitative data occurs.

During the first phase of this study, quantitative data were collected using the California critical thinking disposition inventory (CCTDI) and RU survey instruments, and analyzed using Pearson's r correlation. In the second phase, specific quantitative results that need additional exploration were used to guide the development of the qualitative phase. Specifically, the qualitative research questions were refined, purposeful sampling procedures were developed, and data collection protocols were established to extend the quantitative results. As such, the qualitative phase depends on the quantitative results. In the third phase, the qualitative data were collected and analyzed. In the final phase of the study, both quantitative and qualitative data were integrated. Chapter 5 of this dissertation includes a detailed description of methodology.

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Chapter 2

Literature Review

This chapter provides a comprehensive review of critical thinking (CT) and research utilization (RU) literature. The review is limited to the disciplines of nursing, medicine, and education. The chapter begins with the search process utilized to identify and retrieve CT and RU literature. The components of the review are the historical origin of CT and the diversities related to CT definitions, the importance of CT and Critical Thinking Dispositions (CTDs) in nursing, the concept and types of RU, the importance of RU in the nursing profession, and why nurses appear resistant to using research. There is also a discussion of the relationship between CT and RU concepts.

Search History

A systematic and comprehensive review was undertaken to explore the current body of knowledge relevant to CT and RU in the fields of nursing, medicine, and education. The CINHALL, PUBMED, and EBSCO (specifically Medline and ERIC) databases were searched to identify relevant articles from the last 40 years. The keywords used were critical thinking in nursing/licensed practical nursing, medicine, education; research utilization in nursing/licensed practical nursing; relationship between CT and RU; and barriers to RU in nursing. The search located more than 13,000 articles written in the English language and covered the time period of 1960-2015; however, only full texts of 445 articles were retrieved based on the relevance to the study. The search was further narrowed by screening all the titles and abstracts to include the articles focused on CT and RU in nursing practice and education, and medicine and education; and those detailing the relationship between CT and RU. Narrowing the focus to CT and RU

resulted in 145 articles that were kept for the literature review. The search revealed an extensive body of CT and RU literature in nursing, focusing mainly on registered nurses (RN). Given a lack of information and research studies relevant to or focused on undergraduate nursing students' CT and RU, this chapter focuses on the CT and RU of other groups that have been studied and for which published literature is available (i.e., nurse educators, RNs, clinical nurse specialists, dental hygienists).

History of Critical Thinking

The term *critical thinking* first appeared in the literature in 1989 (Ku, 2009), but its origin can be “traced back through the eighteenth century Enlightenment, the Renaissance, the medieval focus on logical argumentation, . . . the Aristotelian and Socratic concern for logic, rhetoric, and warranted assert ability” (Facione, Sanchez, Facione, & Gainen, 1995, p. 2). Socrates, 2400 years ago, was famous for his method of deep questioning and probing in his search for the rationality of knowledge. Socrates emphasized deep questioning of ideas that were accepted as fact, but which may simply have been beliefs (Rubenfeld & Scheffer, 2006). Later, Socrates' student, Plato, and Aristotle extended Socrates's ideas to emphasize that things are not always what they seem and that sound reasoning takes into account objections to accepted ideas. Plato believed that education should enable students to question, examine, and reflect upon ideas and values (Daly, 1998). Daly asserted that CT is a combination of logical and abstract thinking and is linked to moral reasoning.

In 1916, Dewey linked thinking and learning to action and viewed thinking as a subset of the inquiry and reflective process (Daly, 1998; Rubenfeld & Scheffer, 2006). He took CT into the 20th century with his pragmatic view of thought as part of human

behavior. Dewey's ideas have particular relevance for teaching and learning in health care (Rubenfeld & Scheffer, 2006), and underpin the problem-based learning (PBL) movement, which is used worldwide and was made popular by McMaster University in Ontario, Canada (Rideout, 2001).

In the early 1980s, the teaching of CT was implemented in kindergarten through postsecondary education. Later, because of the emphasis that the Higher Learning Commission in the United States placed on “fostering and supporting inquiry, creativity, practice, and social responsibility” (Rubenfeld & Scheffer, 2006, p. 13), CT gained additional importance in higher education. During the 1990s, CT became popular in nursing education in the US when the National League for Nursing Accrediting Commission cited it as an expected program outcome for baccalaureate nursing education (Adams, Whitlow, Stover & Johnson, 1996; Staib, 2003).

The measurement of critical thinking began nearly four decades ago with the Watson-Glaser (1980) Critical Thinking Appraisal (WGCTA) tool. This tool was developed in the 1940s, and revised in 1980 and again in 1994. Miller (1992) reported that the first major research aimed at measuring critical thinking at the post-secondary educational level was carried out in 1954 through the Cooperative Study of Evaluation in General Education. This group also developed an instrument to measure critical thinking and sought to establish the instrument's validity by correlating it with the WGCTA. In 1956, using the WGCTA, Beckman studied the extent to which courses in argumentation and discussion improved critical thinking. The study found that students who spent more time taking classes and were fully engaged in the university experience also had greater gains in critical thinking. Later, several other instruments were developed to measure

critical thinking. According to Facione (1990, p. 36-49), several commercially available critical thinking tools exist. They include but are not limited to the Deductive Reasoning Test (1972-73), Basic Skills Assessment (1977-1981), Test of Inquiry Skills (1979), WGCTA (1980), Test of Cognitive Skills (1981), New Jersey Test of Reasoning Skills (1983), Test on Appraising Observations (1983), Cornell Test of Critical Thinking Ability (1985), Educational Testing Service Academic Profile Test, Ennis-Weir Critical Thinking Essay Test (1985), Collegiate Assessment of Academic Proficiency (1988), California Critical Thinking Skills Test (CCTST) and California Critical Thinking Disposition Inventory (CCTDI) (1992).

These commercially developed instruments are appealing for several reasons: they have often been developed by experts in the area of critical thinking with input from those with expertise in test construction; they have usually undergone validity and reliability testing over time; and they save the testers extensive and valuable time, which would otherwise be required to develop such assessment tools (Rane-Szostak & Fisher Robertson, 1996). Although an extensive discussion of measurement in critical thinking is not the focus of this literature review, it is a subject worthy of some attention. Five of the most widely utilized tools available to measure CT are discussed briefly in the following section. They are the WGCTA, Cornell Test of Critical Thinking Ability, The Ennis-Weir Critical Thinking Essay Test, California Critical Thinking Skills Test (CCTST), and California Critical Thinking Disposition Inventory (CCTDI).

Watson Glaser Critical Thinking Appraisal (WGCTA)

Grimard, Wilson and Wagner (1981) reported that the WGCTA has been recognized as a test that “pioneered the measurement of CT” (p. 1319). This instrument

measures CT as a general ability. It focuses on the individual's ability to recognize inferences and to evaluate arguments and conclusions (Watson & Glaser, 1980). The 80 item standardized instrument is structured in two formats (A and B). Each format comprises five subsets (16 questions per subset); the addition of the five subsets produces one total score. The instrument is designed to estimate how well the student is able to reason analytically and logically in five subsets including inference, identification of assumptions, deductions, interpretation and evaluation of arguments (Brooks & Shepherd, 1990; Saucier, 1995; Watson & Glaser, 1980). A major criticism associated with the WGCTA has been the ambiguous research results generated with its use. Because the WGCTA was originally designed to measure CT ability in everyday life situations, it may not be an appropriate tool for measuring changes within the context of teaching situations in nursing and nursing practice. Other potential limitations include its somewhat narrow scope/content and the fact that it is highly dependent upon the CT definition set forth by Watson and Glaser (1980), and thus it may be unsuitable when other CT definitions are used (Rane-Szostak & Fisher Robertson, 1996).

The Cornell Test of Critical Thinking Ability

This test was developed in 1985, by Ennis, Millman and Tomko based on Ennis' conceptualization of CT. The instrument consists of 52 multiple-choice items to be completed over a 50-minute period. The story format utilized in this instrument is predisposed to maintain the examinee's interest. While this instrument is designed to measure CT, evaluate reasoning, and assess the ability to recognize assumptions, definition, fallacies and predictions, it has not been widely used in nursing education. In a nursing literature search, only two dissertations have used the Cornell test in the last 23

years. One study assessed the effect of teaching CT in an introductory nursing course (Isaacs, 1992), while the other investigated the CT ability of faculty and students in a baccalaureate nursing program (Jones & Brown, 1990).

The Ennis-Weir Critical Thinking Essay Test

The Ennis-Weir Critical Thinking Essay Test (Ennis & Weir, 1985) was one of the first tests developed to measure CT. It is an essay test of CT ability. It takes the form of a letter to the editor of a fictional newspaper. In the letter, the writer makes a proposal and offers a variety of arguments in support of it. Each argument appears in a separate numbered paragraph. There are eight paragraphs in all; each paragraph exemplifies at least one of the errors or types of reasoning listed in the previous section. Two of the paragraphs give probable support to the writer's proposal. Examinees read the letter and then write an essay evaluating the argument of each paragraph and the letter as a whole. The test takes about 10-40 minutes to read and think about the letter, and 30 minutes to write the nine paragraphs evaluating the arguments of the letter ((Ennis & Weir, 1985). It should be scored by individual examiners who have at least one college level course in CT, logic, or the equivalent. Inter-rater reliability is a major concern because the individual examiners assign scores. Over the years, a number of authors have asserted that this instrument may be better as a teaching tool rather than a measure of critical thinking ability (Rane-Szostak & Fisher Rosbertson, 1996; Tompkins, 1989).

California Critical Thinking Skills test (CCTST) and California Critical Thinking Disposition Inventory (CCTDI)

The newest instruments available to measure CT and CTDs are the CCTST and CCTDI. The six cognitive skills identified by the Delphi panel as central to the concept of

CT are: interpretation, analysis, evaluation, inference, explanation and self-regulation. These six skills are reflected in the items included in the CCTST. The CCTDI represents the first tool intended to measure CT dispositions (Facione, Facione, & Sanchez, 1994). Both the CCTST and CCTDI were developed by Facione and Facione in 1992. They are based on the APA (1990) Delphi Report's consensus definition of CT and the ideal critical thinker.

Diversity of Critical Thinking Definitions

Scholars from various disciplines have created a plethora of CT definitions that are fairly divergent because they are based on their own understandings and thus emphasize different perspectives (Alazzi, 2008; Mundy & Denham, 2008; Riddell, 2007; Twibell, Ryan, & Hermiz, 2005; Walsh & Seldomridge, 2006). Researchers have defined CT as reasonable reflective thinking skills that focus on deciding what to believe or do (Ennis, 1989, p.4); purposeful, self-regulatory judgment (Facione et al., 1995, p. 2); an abstract skill (Adams et al., 1996, p.24); a multidimensional meta-cognitive activity that challenges previous assumptions (Beeken, Dale, Enos, & Yarbrough, 1997, p.37); a composite of knowledge, attitudes, and the application of skills (Staib, 2003, p.498); an interactive reflective reasoning process (Turner, 2005); higher-order reasoning to reach professional judgment (Seldomridge & Walsh, 2006); a thinking process (Choy & Cheah, 2009); and a teaching/learning process to achieve an outcome (Alfaro-Le Fevre, 1995; Ball & Garton, 2005; Staib, 2003).

Mason (2007) summarized the apparent differences among the CT definitions developed by five educational scholars; namely, Ennis (1992), Paul (1982), McPeck (1981), Siegel (1990), and Martin (1992). Ennis and Paul both defined CT in terms of

subject-specific skills that are generalizable across disciplines; whereas, McPeck suggested that CT is specific to a particular discipline. Mason (2007) stressed the need for an integrated multi-perspective description of CT that encompasses all of its components the skills of critical reasoning, a critical attitude, a moral orientation, knowledge of the concepts of critical reasoning, and knowledge of a particular discipline because they are all required for CT. Mason raised the issue of the difference between CT and rationality, questioned whether people think differently in various disciplines or cultures, and proposed that there may be East-West differences in CT and rationality. Alagozlu and Suzer (2010) described an existing bond between Eastern people's thinking modes and their language, socio-cultural norms of respect, and humbleness that affect their cognitive expression, rationalization, and argumentation ability, all attributes of CT. Philosopher Richard Paul and educational psychologists Linda Elder have written extensively on the subject of critical thinking. Paul and Elder (2006) define critical thinking as: "Critical thinking is, self-directed, self-disciplined, self-monitored, and self-corrective thinking. It requires rigorous standards of excellence and mindful command of their use. CT entails effective communication and problem solving abilities and a commitment to overcome our native egocentrism and socio-centrism" (p. 4).

The variety of CT definitions in the literature reflects its multidimensional nature (Simpson & Courtney, 2002). Some researchers have argued that the abundance of multifaceted definitions results in lack of clarity, which leads to poor communication and confusion among practitioners in understanding CT (Mundy & Denham, 2008; Scheffer & Rubenfeld, 2000; Simpson & Courtney, 2002; Turner, 2005). Others value the multiplicity of this term (Daly, 1998). Despite the numerous articles, books, reports, and

research conferences devoted to CT worldwide, educators from various academic disciplines do not 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 various disciplines. The panel of men and women 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). The consensus statement resulting from the study emphasized the human cognitive component of CT and the six skills required: analysis, evaluation, interpretation, inference, explanation, and self-regulation. Based on the APA’s definition, Facione et al. (1995); Facione, Facione and Giancarlo (1996) and Facione (2006) identified seven CT attitudes or dispositions—truth seeking, maturity, self-confidence, systematicity, open-mindedness, inquisitiveness, and analyticity—that highlight the motivational and mental aspects of CT that need to be nurtured (Daly, 1998; Facione et al., 1995; O’Sullivan, Blevins-Stephens, Smith, & Vaughan-Wrobel, 1997; Stone, Davidson, Evans, & Hansen, 2001). To achieve a more comprehensive understanding of CT in nursing and a definition reflecting the views of a diverse group of nurse experts, Scheffer and Rubenfeld (2000) consulted a heterogeneous group of 55 international nurse educators, clinicians, and managers to develop a consensus statement of CT that is relevant to the nursing profession. To obtain diverse input from nurses, they also selected the Delphi technique. This method generates discussion and judgments on a topic, using experts who do not directly interact. It is particularly useful when seeking agreement on a complex

phenomenon from a geographically dispersed, heterogeneous group. To implement the Delphi method, Scheffer and Rubenfeld used specific guidelines developed by Waltz, Strickland, and Lentz (1991) and Talbot (1995). Scheffer and Rubenfeld described the use of several rounds of input from the expert panel in response to a sequence of questions. Each round of responses was analyzed by the researchers to determine patterns and outliers, which are summarized and returned to the panel with an additional set of questions for the next round. They used five rounds in their study to arrive at the following consensus statement:

“Critical thinking in nursing is an essential component of professional accountability and quality nursing care. Critical thinkers in nursing exhibit these habits of the mind: confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance, and reflection. Critical thinkers in nursing practice the cognitive skills of analyzing, applying standards, discriminating, information seeking, logical reasoning, predicting and transforming knowledge” (p. 357).

Although the two Delphi reports by Facione, (1990) and Scheffer & Rubenfeld, (2000) led to a consensus definition of CT, some controversies remain in terms of whether or not CT is a cognitive ability, a reflective judgment, a skill, a mental attitude, a process, an outcome, a tool, or a meta-cognitive phenomenon that includes both the cognitive and affective domains of reasoning. Therefore, several scholars have emphasized the need for all higher educational programs to use a definition of CT that best guides and/or fits their curricula to ensure a unified and clear operational meaning for their faculty and students (Lewis & Smith, 1993; Thayer-Bacon, 2000).

Terms Associated With Critical Thinking

Just as the literature contains many definitions of CT, several terms are used as synonyms. These include *critical reasoning*, *critical reflection*, *critical decision making*, *critical analysis*, and *critical awareness*. Moreover, the term CT is also used interchangeably with other terms such as *problem solving*, *decision making*, *creative thinking*, *logical reasoning*, and *evidence-based practice*. It is important to clarify CT and distinguish how it differs from these terms while identifying its relationship to the above processes (Simpson & Courtney, 2002; Turner, 2005; Worrell & Profetto-McGrath, 2007). For example, problem solving usually begins with a problem and concludes with solutions, whereas CT is a requirement for effective problem solving that entails analysis, interpretation, and evaluation (Gul et al., 2010). Though it is not necessary to have a problem or a solution to engage in CT, its use concludes with a greater understanding of the problem and a need to tolerate ambiguity (Daly, 1998; Worrell & Profetto-McGrath, 2007).

Likewise, CT and creative thinking are different. Both form the basis of reasoning and are required by professionals. The differentiation between the two is that CT is analytic, convergent, vertical, focused, objective, verbal, and linear; whereas creative thinking is generative, divergent, lateral, diffusive, subjective, visual, and associative (Glassner & Schwartz, 2007; Seymour et al., 2003). Similarly, clinical decision making and evidence-based practice are not the same as CT; however both are best served by the use of CT. Decision making is mostly intuitive and inductive and is acquired through experience; whereas CT is a slower, rational, deductive, analytical approach and the conscience or superego of decision making (Croskerry, 2006). Clinical decision making

deals with issues that draw on both cognitive and experiential knowledge, whereas CT requires a wider range of skills and attributes. The use of CT would lead a person to a comprehensive understanding of the subject matter and consequently the best and informed decisions. Decision making is the result of the process of CT (Oermann, 2000). Although it is generally acknowledged that confidence in decision-making is governed by effective critical thinking skills, research to date is not definitive on this point. Studies that measured CT and confidence in decision making among nurses found a weak, negative or no relationship between CT and decision making (Beeken et al., 1997; Girot, 2000; Hoffman & Elwin, 2004; Shin, 1998).

Likewise, CT skills and dispositions are required for evidence-based practice (EBP), but these are not synonymous (Profetto-McGrath, 2005). EPB is not simple; it's a set of complex tasks and CT (habits of mind, attitudes, and traits) is paramount in developing the skills and processes needed to support it (Profetto- McGrath et al., 2003; Profetto-McGrath, 2005; Rubenfeld & Scheffer, 2006; Tanner, 1999). According to Estabrooks et al (2008) EBP is the use of all evidence, including research studies, pathophysiology knowledge, expert opinion, clinical experience, patient input, quality assurance, data, and case reports, to inform best practices. EPB is all about using the best available knowledge for practice and that knowledge cannot simply be passed down, it must be sought actively. Recognizing when we need it, accessing it, evaluating it, using it, and determining its usefulness is an ongoing cycle requiring CT.

Dimensions of Critical Thinking

Facione, et al. (1995) suggested that the dimensions of CT comprise both cognitive skills and a set of personal attitudes or dispositions that can be used to describe an individual who is inclined to use CT.

Cognitive Skills

Cognitive skills which include interpretation, analysis, evaluation, inference, explanation, and self-regulation are at the very core of critical thinking (Facione, 1990). Based on the consensus statement of the national panel of experts these are defined as follows:

- a. Interpretations is to comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria” (p. 8).
- b. Analysis is “to identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgment, experiences, reasons, information, or opinions” (p. 9).
- c. Evaluation as meaning “to assess the credibility of statements or other representations which are accounts or descriptions of a person’s perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions or other forms of representation” (p. 9).
- d. Inference means “to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to deduce the consequences flowing from data, statements, principles, evidence, judgments,

beliefs, opinions, concepts, descriptions, questions, or other forms of representation”
(p.10).

e. Explanation as being able to present in a cogent and coherent way the results of one’s reasoning. This means to be able to give someone a full look at the big picture: both “to state and to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological, and contextual considerations upon which one’s results were based; and to present one’s reasoning in the form of cogent arguments” (p. 11).

f. Self-regulation to mean “self-consciously to monitor one’s cognitive activities, the elements used in those activities, and the results educed, particularly by applying skills in analysis, and evaluation to one’s own inferential judgments with a view toward questioning, confirming, validating, or correcting either one’s reasoning or one’s results”
(p. 12).

Cognitive skills are used to: (a) interpret problems accurately by using both objective and subjective data from common information sources; (b) analyze ideas and arguments about the problem; (c) infer or assess arguments and draw conclusions; (d) explain the decision; I evaluate the information to ascertain its trustworthiness; and (f) self-regulate, or constantly monitor one’s own thinking for clarity, precision, accuracy, consistency, logicalness, and significance (Simpson & Courtney, 2002). Hence, in thinking critically one not only tries to determine thoughtfully what to do or what to believe, but also applies the core CT skills to one another. In other words, one analyzes one’s own inferences, explains one’s own interpretation, or evaluates one’s own analysis. According to Paul and Elder (2006) CT is the use of those cognitive skills or strategies that increase the probability of a positive outcome. It is used to describe thinking that is

purposeful, reasoned, and goal directed. CT is the kind of thinking involved in problem solving, formulating inferences, calculating likelihoods, and making decisions when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task. Critical thinking also involves evaluating the thinking process – the reasoning that goes into the conclusion one arrives at and the kinds of factors considered in making a decision. CT is sometimes called directed thinking because it focuses on a desired outcome (Paul & Elder, 2006). In short CT is self-directed, self-disciplined, self-monitored, and self-corrective thinking. It required rigorous standards of excellence and entails effective communication and problem solving abilities (Paul & Elder, 2007).

Critical Thinking Dispositions

Most researchers assert that in addition to cognitive skills, CT also involves dispositions, although empirical evidence confirms the notion that critical thinking abilities and dispositions are, in fact, separate but related entities (Facione, 2000). Critical thinking dispositions (CTDs) are attributes or habits of mind that are integrated into individuals' beliefs or actions conducive to critical thinking (Profetto-McGrath et al., 2003). Facione (1990) described dispositions as follows:

- (a) open-mindedness: appreciating alternative perspectives and willing to respect differences of 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-confidence: trusting one's own reasoning and inclination to utilize these skills (Facione, 1990, p. 5-6).

CTDs are “consistent internal motivations to act toward or respond to persons, events, or circumstances in habitual, yet potentially malleable ways” (Facione, 2000, p. 64). Facione et al. (1995) argued that CTDs are as important as CT abilities and proposed that learners with CTDs dispositions can be educated to develop CT skills, but those who lack the attitude and dispositions are more at risk of failure. Likewise, Seigel (1990) valued both the skills and the attitudinal components of the CT domain, whereas Martin (1992) stressed the motivational dispositions and values associated with CT. It is evident that the earlier definitions of CT emphasized the cognitive component and terms such as *CT skills, mental procedure, and thinking logic*. In recent years, however, a holistic and broader perspective of CT has emerged, and terms such as *reflective attitude, habits of mind, motivation, and dispositions* are included to capture the holistic nature of CT (Facione et al. 1995, Facione, 2006).

Facione et al. (1995) and Chenoweth (1998) stated that these dispositions or attributes can be considered the elements of a process of reasoning in an individual's character that propels or stimulates that person towards the use of CT. Without these dispositions, CT will not be realized. All of these factors contribute to a process of purposeful, reasoned interaction between a person and his or her interaction with a situation or surrounding circumstances. Bittner and Tobin (1998) explained that the CTDs process is multifaceted and “similar to an umbrella under which many types of thinking flow, depending on the situation” (p. 269).

Importance of Critical Thinking in Nursing Practice

CTDs are needed and valuable in nursing education and practice. Nurses need complex thinking skills and dispositions to effectively manage the fast-paced and constantly changing health care environments in which they work. Many professional organizations recognize and support CT's importance as part of the nursing role (Mundy & Denham, 2008; Searing & Kooker, 2016; Simpson & Courtney, 2002; Twibell et al., 2005). More specifically, in Canada most provincial nursing associations and/or colleges consider CT a standard of practice and necessary for practice competency. For example, the College and Association of Registered Nurses of Alberta (2005) requires that "the registered nurse demonstrates CT in collecting and interpreting data, planning, implementing and evaluating all aspects of nursing care" (p. 3). As well, the Association of Registered Nurses of Newfoundland and Labrador (2007) states that it is important that each registered nurse "searches for, interprets, and uses information from a variety of sources; [and] uses comprehensive assessment [and] critical thinking . . . to provide competent nursing services relevant to the area of practice" (p. 10). CT and decision-making skills enable nurses to contribute positively in all phases of the continuum of care from prevention to acute treatment, to long term and palliative care. Every day, nurses must examine an abundance of data and information to assimilate and adapt knowledge for problem clarification and solutions. Moreover, nurses are constantly involved in making decisions in their practice (Benner, Hughes, & Sutphen, 2008; Fero, Witsberger, Wesmiller, Zullo, Hoffman, 2009, Morrall & Goodman, 2013).

CT facilitates the necessary broader outlook, creative solutions, and multiple pathways needed for successful quality-improvement initiatives. The current climate of

short staffing, cost containment, and high expectations for quality nursing care requires nurses to think critically, reflect upon their actions, and identify effective solutions to problems faced by organizations (Chang, Chang, Kuo, Yang, & Chou, 2011). Failure to deal with these problems can result in inequitable, poor quality, or even dangerous nursing care (Fero et al., 2009). CT enables nurses to maintain standards of practice leading to positive patient outcomes, increased patient satisfaction, and/or prevention of adverse outcomes. With the ever-changing healthcare delivery systems, economic streamlining of hospitals, and maintenance of safe and high quality patient care, it is imperative that nurses develop CT skills. Additionally, CT skills give nurses the tools they need to provide the most appropriate intervention which will enhance the quality of care. Interestingly, a study by Smith and Godfrey (2002), which set out to determine what it means to nursing students to become a good nurse, revealed that one of the characteristics of becoming a good nurse is having CT skills. The authors contend that by having these skills, nurses are more likely to judge situations critically and thus provide the most suitable interventions for their patients.

As an essential component to clinical nursing practice, CT enables nurses to analyze complex data about patients, make decisions about patients' problems and identify alternate possibilities, and evaluate each possibility and decide on the most appropriate interventions for the situation (Oermann, 1999, p. 40C). Having CT skills is important to providing competent nursing care as it is foundational to practicing sound clinical judgment (Alfaro-LeFevre, 2004; Chan, 2012; Facione & Facione, 1994; Locsin, 2001). Sound judgment is critical, as nurses in clinical practice make decisions that affect patient outcomes. According to Beckie, Lowry and Barnette (2001), "CT is the cognitive

engine that drives the process of knowledge development and critical judgment in nursing. The skills and dispositional attributes of critical thinking are central to nursing in that they embody a search for best knowledge in a given context” (p.19). Nurses are expected to engage in lifelong learning, and the nursing profession is recognizing graduates who can think critically and identify complex clinical phenomena (Chang et al., 2011; Distler, 2007; Fero et al., 2009; Mundy & Denham, 2008; Simpson & Courtney, 2002; Twibell et al., 2005; Worrell & Profetto-McGrath, 2007).

The concept of CT has been implemented as a requirement in nursing education in North America and in the United Kingdom (Alfaro-LeFevre 1995, Morrall & Goodman, 2013; Profetto-McGrath, Hesketh, Lang & Estabrooks, 2003, Scheffer & Rubenfeld 2000). Bevis and Watson (2000) have argued for a curricula design that will provide nursing students with an opportunity to develop a process by which they can use critical thinking skills, and thus improve the health care system to benefit all stakeholders.

Teaching and Learning Strategies for the Development of Critical Thinking in Nursing

Many researchers have studied the application of CT teaching strategies, but there is no consensus as to which strategies are successful. (Oliveira, Püschel, Díaz, & Cruz, 2015). According to Paul, Brinker, Martin and Adamson (1995):

To teach for critical thinking is, first of all, to create an environment in the class and in the school that is conducive to critical thinking. It is to help make the classroom and school environment a mini-critical society, a place where the values of critical thinking (truth, open-mindedness, empathy, autonomy,

rationality, and self-criticism) are encouraged and rewarded. In such an environment, students learn to believe in the power of their own minds to identify and solve problems. They learn to believe in the efficacy of their own thinking. Thinking for themselves is not something they fear. Authorities are not those who tell them the “right” answers, but those who encourage and help them figure out answers for themselves, who encourage them to discover the powerful resources of their own minds. (p. 21)

Many studies have sought to determine how a nursing curriculum affects the way in which nursing students develop CT skills. The results of such studies have been inconsistent regarding the assessment and development of CT skills (Chan, 2013). The studies have examined a variety of curricular approaches within different types of programs: associate degree, nursing diploma, and baccalaureate degree, as well as at all program levels. All studies indicate the need for further research in the area of the assessment of CT and nursing education.

Chan (2013) conducted a systematic review to explore how CT is perceived and which strategies and obstacles are potentially involved in teaching and learning CT. The author reviewed 17 studies published between 2002 and 2011. The results showed that the concept of CT has undergone several changes over time, and there remains a lack of explanation among teachers and students in the field. The frequently discussed teaching strategies for promoting CT were questioning, reflective writing, simulation, PBL, and other teaching innovations. Chan identified a need to conduct a systematic review that assesses the effectiveness of new teaching strategies and interventions for improving

educators' competence to teach CT. He also identified a need to promote CT development among nursing students.

The use of questioning as a teaching tool to reinforce learning can be traced back to Socrates. Socratic questioning examines basic concepts or points, explores deeper into these concepts, and attends to problem areas of one's thinking (Bradshaw & Lowenstein, 2007, p. 64). Socratic questioning is at the heart of CT and requires more than a one-word response (Thoms, 1999). It develops CT by requiring the students to make assumptions and distinguish between relevant and irrelevant points. Phillips and Duke (2001) used a comparative descriptive design to explore, describe, and compare the levels of questions that clinical instructors and preceptors asked. The level of questions was categorized as low (knowledge, comprehension, and application) or high (analysis, synthesis, and evaluation). Results indicated that both groups asked a much higher proportion of lower level questions. In the clinical instructor group, 65.1 percent of questions were low level, knowledge, and comprehension questions. In comparison, 87.4 percent of the preceptors' questions were lower level, and most were knowledge questions.

Profetto-McGrath, Smith, Day, and Young (2004) conducted a quantitative descriptive study to compare the types and levels of questions asked by nurse educators in context-based learning tutorial seminars in a baccalaureate nursing program. To capture both types and levels of questions, a comprehensive framework was developed based on the work of previous research scholars (Bloom, 1956; Craig and Page, 1981; Dexter et al., 1997; House, Chassie & Bowling Spohn, 1990; Sellappah, Hussey, Blackmore & McMurry, 1998; Wink, 1993a and Wink, 1993b). The results of this study indicate that the majority of questions asked by tutors and students in the first three years

of the program were framed at the low level (knowledge, comprehension, and application) and were more often aimed at seeking yes/no responses and factual information; they were not designed to be probing. The authors recommended that in order to activate and facilitate CT, students and tutors be taught how to frame the questions that require analysis, synthesis, and evaluation as well as questions that involve probing, exploration, and explanation.

Reflective writing was also identified as a useful strategy to enhance CT in nursing students (Callister, Luthy, Thompson, & Memmott, 2009; Jenkins, 2011; Kaya, Sen & Kececi, 2011; LaMartina & Ward-Smith, 2014; Mun, 2010; Twibell et al., 2005). Having student's journal or write narratives with appropriate guidelines and questions were shown to have a positive influence on CT skills. Mun (2010) identified that through writing narrative, the students examined and analyzed their own experiences including their feelings and reactions. Also, for educators, student's clinical narratives could provide insight to understand how students are thinking and helps them to develop appropriate strategies to develop students CT skills.

Simulation is another teaching and learning strategy that holds promise for preparing learners for the complexities of clinical practice (LaMartina & Ward-Smith, 2014). According to Jeffries (2009), clinical simulations will continue to increase. Based on evidence and quality outcomes from the use of this pedagogy, simulation could eventually be used for the majority of clinical time in nursing education (Jeffries, 2009, p. 71). A study to evaluate clinical simulation as a teaching and learning method was undertaken by Bambini, Washburn, and Perkins in 2009. Their study showed that students found simulations to be a valuable learning experience that increased their

confidence, because they had a better idea of what to expect in the clinical setting. Three themes emerged from the study: first, communication with patient and family; second, confidence in psychomotor skills; and third, clinical judgment, in which the students learned the importance of prioritizing assessment skills and how to intervene. According to Bambini et al. (2009), health care systems are changing so quickly that education must find new models of content delivery, as the traditional methods are no longer effective.

Many researchers have validated the effectiveness of PBL, also known as context-based learning (CBL), as a nursing educational strategy (Baker, 2000; Beers, 2005; Chan, 2013; Choi, 2003; Kong, Qin, Zhou, Mou & Gao, 2014; LaMartina & Ward-Smith, 2014; Papastrat & Wallace, 2003; Tang, & Sung, 2012; Yuan, Willians & Fan, 2008). Kong et al. (2014) conducted a systematic review and meta-analysis to determine how effective it was to use PBL to teach CT skills to undergraduate nursing students compared to using traditional lectures. Nine articles were included in the meta-analysis. Despite the moderate heterogeneity ($I^2 = 45\%$), the result of the meta-analysis indicated that nursing students who underwent PBL, as compared to those who attended lectures, had significantly higher CT levels ($SMD = 0.33$; $95\%IC = 0.13-0.52$; $p = 0.0009$). This shows that using active learning strategies can facilitate the acquisition of knowledge and development of CT in the nursing profession. Obviously there are barriers as well as benefits when these strategies are employed. Additional research should explore what other strategies can be utilized to facilitate the acquisition of new knowledge and development of CT skills. Results of a global study conducted by Brown, Kirkpatrick, Greer, Matthias, and Swanson (2009) to explore the types of innovative pedagogies used in nursing education worldwide indicate that the conventional teacher-centered approach

remains the most prevalent. Little agreement was found as to which strategies were most helpful in facilitating student CT skills, indicating that multiple strategies are used to meet learner needs relative to the educational setting (Brown et al., 2009; Tedesco-Schneck, 2013).

Relationship of Critical Thinking to Clinical Decision Making

Decision-making in nursing has long been recognized as essential to nursing practice and as a cornerstone of the nursing profession (Kataoka-Yahiro and Saylor, 1994; Tanner, 1997). It is defined as the selection of an intervention or action from one or more possible alternative actions (Pesut & Herman, 1999). Cioffi and Markhan (1998) described decision-making as discriminative thinking that is used to choose a particular course of action. Clark (1996) defined decision-making as a process that nurses use to gather information about patients, evaluate it, and make judgments that result in the provision of nursing care. In the clinical setting, nurses are continually faced with demands to make decisions of care, a process that is viewed as complex (Lauri & Salantera, 2002). O'Neill, Dluhy, and Chin (2005) suggest that the complexity of clinical decision-making (CDM) requires a broad knowledge base and access to reliable sources of information, as well as CT skills. The decisions that nurses make while performing nursing care demonstrate their competency and affect their patients' lives and outcomes (Pesut & Herman 1999; LaMartina & Ward-Smith, 2014; Sedwick, Awosoga, Gigg & Durnin, 2016).

Ideally, nurses entering the profession are competent practitioners who are able to make sound decisions about many aspects related to patient care, reason morally and ethically about key questions and issues facing the profession and society, and embody

those qualities and skills considered as core to each professional. Many authors believe CT optimizes these aspects of professional nursing practice (Gillmore, 1993; Jones & Brown 1990; Owen, 1997; Snyder 1993). Studies exploring CT's relationship to clinical decision-making, clinical judgment, and professional nursing competence have been carried out by Shin, (1998); Girot, (2000); Hoffman and Elwin, (2004); Salehi, Bahrini, Hosseini, and Akhondzadeh, (2007); Noohi, Karimi-Noghondar, and Haghdoost (2012). Shin (1998) compared Korean senior nursing students enrolled in associate degree program and baccalaureate programs on measures of CT ability and CDM skills. She used the WGCTA to measure critical thinking and found a weak but significant relationship between CT and CDM within the total sample. However, when comparing the associate degree group and baccalaureate group on the CT measures and on CDM, the baccalaureate group scored significantly higher than the associate degree group. Shin commented that further research studies are required to determine whether coursework unique to baccalaureate programs actually results in improved CT and decision-making skills. Girot (2000) evaluated the difference in the development of critical thinking across four groups of nursing students at different stages of the academic process, and their perception of their decision-making ability in practice. He used WGCTA as a measure for CT and the Jenkins Clinical Decision-Making in Nursing Scale was used to determine the differences in decision-making ability in practice across the three groups with varied amounts of clinical experience. The study found no relationship between the development of CT and decision-making in practice, using the two scales in any of the four groups. However, in the total scores, using the Jenkins' Clinical Decision-Making in Nursing Scale, a highly significant difference was found between nurses who were still in nursing

education programs, and those who had already graduated. The results suggest that those who have already graduated are more effective decision-makers than those still enrolled in educational programs.

Hoffman and Elwin (2004) used the WGCTA and the CDMNS (Confidence in Decision-Making Nursing scale) to investigate the relationship between CT and confidence in decision-making. This study had an unexpected finding of a negative correlation. As scores on CT increased, scores on confidence in decision-making decreased. Those with higher CT ability were less confident in decision-making. Halpern (1996), cited in Van der Wal (2000), supported these findings when he stated that good critical thinkers are motivated and willing to check for accuracy, gather information, and persist when a solution is not obvious. A good critical thinker takes more time to consider a problem, ask questions, and carefully gather information; hence, hesitation may be prominent as this process is accomplished. Ruggiero (1998), cited in Van der Wal (2000), also echoes this when he states that critical thinkers review ideas, make tentative decisions, and then evaluate and refine a situation or belief, a process that would inevitably result in hesitation.

Salehi et al. (2007) used the California Critical Thinking Skills Test and Clinical Decision Making questionnaire to conduct a descriptive cross-sectional study to compare the CT and CDM of Iranian nurses working in critical and general units. They found no statistically significant difference between the two groups of nurses. According to Salehi et al. this could be the result of various factors such as the educational system, occupational environments, and nursing shortages. Moreover, the circumstances under which the questionnaires were completed could affect the results; completing the

questionnaire required attention and concentration, and nurses on duty in hospitals are often too busy with their jobs to pay attention to anything else. In addition, in a country like Iran, the nursing educational system is largely based on memorizing facts and does not encourage CT skills. Salehi and his colleagues believe that there are no suitable tools to measure the correlation between CT and CDM, and until such tools are developed, it will not be possible to draw any correlation. They recommended that further studies are needed to evaluate the validity and practicality of existing tools to compare CT and CDM.

Noohi, Karimi-Noghondar, and Haghdoost (2012) conducted a descriptive comparative study to examine the relationship between the CT and CDM ability of nursing students in southeast Iran. CT skills were measured with the translated California Critical Thinking Skills Test (CCTST). A translated Lauri and Salanter (2002) questionnaire was used to examine the participants' CDM ability. The study did not find a relationship between the mean score of CT and CDM. The study findings are consistent with several studies in which CT skills were found to be unrelated to CDM skills (Hicks, Merritt, & Elstein, 2003; Salehi et al., 2007; Bowles, 2000). The authors argued that they could not find a correlation between CDM and CT abilities because there are no suitable tools to measure such a correlation, not because there is no correlation.

Although studies did not find any significant relationships between CT and CDM, experts assert that these skills are important to nurses because nurses are required to make decisions about patient care and solve problems using their own judgment (Staib, 2003; Zygmunt & Schaeffer, 2006).

Relationship Between Different Types of Nursing Programs and Critical Thinking

Some of the nursing research studies published in the nursing literature have focused on the level of education or type of program [Diploma, Bachelor of Science in Nursing (BSN)], Masters of Science in Nursing (MSN) and their relationship to the development and/or level of CT skills. One of the first studies in nursing to test this type of relationship was completed by Matthews and Gaul (1979), who hypothesized that the level of education might contribute to the development of CT. Using the WGCTA to measure the CT skills of a purposive sample of 22 BSN and 26 graduate students (as part of a correlative, comparative design), they found no statistically significant difference ($u=224$, $p=0.2$) between the two groups' CT abilities. The authors attributed the similarity to several factors, including educational level, which they suggested might contribute to the development of CT. One of the other factors they believe contributed to the lack of correlation was that the WGCTA was not able to capture the graduates' CT skills.

Pardue (1987) also used the WGCTA to measure CT of nursing graduates from four different programs. The graduate sample ($n=121$) drawn from two large health care agencies comprised 24 nurses prepared at the diploma level, 27 at the Associate Degree Nursing (ADN) level, 33 at the BSN level and 37 at the MSN level. Significant differences were found among the four groups of nurses. In addition, the WGCTA scores of nurses prepared at the BSN and MSN levels were significantly higher than those of the nurses who had completed a diploma or ADN program.

A comparative study of graduating BSN and ADN students from private and public educational institutions was initiated by Lynch (1988) to determine whether

differences in CT ability existed between these two levels of students. The WGCTA (Form A) was employed to measure the CT skills of 87 ADN and 74 BSN students. Using ANOVA, Lynch discovered that the BSN students' CT scores were significantly higher than those of the ADN students.

In 1992, Brooks and Shepherd replicated their original study (1990). Both studies were descriptive, correlational, and comparative, and used the WGCTA instrument and a convenience sample of 50 students each from diploma, ADN, BSN, and Post-RN programs. The researchers obtained similar results in both studies. They found that the CT abilities of BSN and Post-RN BSN students were significantly higher than those of diploma and ADN students. No significant difference was found between the CT levels of BSN and Post-RN students.

Employing a non-experimental, correlational approach, Hicks, Merritt, and Elstein (2003) conducted a pilot study using CCTDI, CCTST and the Decision Analytic Questionnaire (DAQ) to examine the relationship between education level, years of nursing experience, and CT and consistency in CDM among critical care nurses. CDM consistency for this study was defined as "the degree to which nurse's intuitive rankings of nursing interventions coincided with rankings produced by an analytical model using the nurse's formal estimation of probabilities and utilities and represents the congruence of the nurse's beliefs and values with actions taken across tasks with varying complexity" (p. 170). Critical care nurses ($n = 54$) from adult critical care units in three private teaching hospitals were selected for this study. The majority of the nurses held a BSN or MSN and had an average of nine years of direct clinical experience caring for the critically ill. They found that education and experience were not related to CT, nor was

CT related to decision-making consistency. Only greater years of nursing experience increased the likelihood of decision-making consistency. This may be because experienced nurses tend to use intuitive processes more in complex situations, relying heavily on heuristics (rules of thumb or cognitive short cuts) to help reduce cognitive strain in complex clinical tasks. Cioffi and Markhan (1998), for example, found that experienced nurse midwives increasingly depended on heuristics as task complexity increased. Although the results of their study suggest heuristics may have been employed with these nurses, more investigation is needed to elucidate heuristics and their use across decision processes.

Profetto-McGrath (2003) conducted a cross-sectional study to evaluate critical thinking disposition (CTD) and CT skills focusing on higher order thinking skills and an individual's disposition to CT within a BSN program. The study, which included 228 nursing students, found statistical significance in the degree of improvement of CT skills over a longer period of education accrument, citing the four-year BSN program. The results indicated that a student's cognitive ability was tied to his/her experience and how many years he/she had been studying in the program

Fero and his colleagues (2009) also found that nurses with more experience and who were prepared at the baccalaureate or associate degree level fared better on the Performance Based Development System assessment than experienced nurses with diploma-level preparation. A consecutive sample of 2144 newly hired nurses in a university-affiliated healthcare system completed the Performance Based Development System Assessment consisting of 10 videotaped vignettes depicting change in patient status. Results were reported by a trained nurse rater as meeting or not meeting

expectations. Fero et al. reported that approximately 25 percent of the newly hired nurses had deficiencies in CT ability, including problem recognition, reporting essential clinical data, initiating independent nursing interventions, and providing relevant rationales to support decisions. The major limitation of this study was that the assessment was based on simulated vignettes, and it is possible that actual clinical decision-making may have differed from the stated actions. As well, there was no mention in the article of how the vignettes were developed and tested prior to their use in the study.

Chang et al. (2011) conducted a cross-sectional and correlation research study to examine the relationships between CT ability and clinical nurses' competence. A total of 570 clinical nurses employed at a medical centre in southern Taiwan were recruited into this study. Two self-reporting questionnaires, the WGCTA and the Nursing Competence Scale (NCS), were used to collect data. Chang et al. found that the CT of clinical nurses with a master's degree was significantly better than that of those with a bachelor's degree or a diploma; nurses with more than five years of working experience had significantly higher CT and competency scores than those with fewer than five years of experience.

The Concept of Research Utilization

It is apparent in the literature that the term *research utilization (RU)* entails more than a single literal concept. Definitions of RU vary and can confuse the process of operationalizing this concept in practice (Estabrooks, 1999a). Larsen (1980) considered knowledge utilization "a complex process involving political, organizational, socioeconomic, and attitudinal components in addition to the specific information or knowledge" (p. 424). Early definitions ranged from the literal translation of using research findings to descriptions of RU as a process and a research product (Backer,

1991). The concept of RU is complex and involves many factors that influence the implementation of research products into clinical practice (Backer, 1991; Estabrooks et al., 2008; Thompson, Estabrooks, Scott-Findlay, Moore, & Wallin 2007; Weiss, 1979). According to Estabrooks (1999a), RU is a specific kind of knowledge utilization; it is a complex process in which knowledge is in the form of research and is transformed from the findings of one or more studies into possible nursing interventions, the ultimate goal of which is use in practice and the improvement of patient health related outcomes.

Rogers' (1995) work on the theory of diffusion of innovations has been used as the theoretical framework in much of the nursing literature on RU. Rogers originally described the innovation diffusion process as a linear, five-stage process that begins with knowledge of an innovation. However, it was not helpful in identifying a potential conceptual structure for research utilization (Estabrooks, 1999a; Estabrooks et al., 2008). Rogers defined innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 11). Innovation diffusion in classical diffusion theory does not imply that the idea, practice, or object necessarily resulted from a research study, whereas with RU, that is specifically the implication (Estabrooks, 1999a; Thompson et al. 2007). Stetler and Caramanica (2007) defined research utilization as "the systematic process of transferring research knowledge into practice for the purpose of understanding, validating, enhancing, or changing practice" (p. 189).

Evidence Based Practice (EBP)

Most recently, the term *evidence-based practice* has become a part of the nursing jargon and has been used interchangeably with RU; however, the terms are not synonymous (Estabrooks et al., 2008). Evidence-based practice (EBP) is defined as the

use of all evidence, including research studies, pathophysiology knowledge, expert opinion, clinical experience, patient input, quality assurance, data, and case reports, to inform best practices (Estabrooks et al., 2008). EBP is the more general term which encompasses RU. The RU process begins with an empirically based innovation or new idea that gets scrutinized for possible adoption in practice settings. EPB, by contrast, begins with a search for information about how to best solve specific problems. Findings from rigorous research are considered the best source of information, but EBP also draws on other sources of evidence. When nurses use the EBP approach, they go beyond the expertise of clinicians and researchers, and consider the patient's preferences and values to guide patient care and/or solve problems.

Types of Research Utilization

RU is a complex process that involves individual's behavioral and organizational change (Profetto-McGrath et al. 2009). Broadly defined in the nursing context, it is "the use of research findings in any and all aspects of one's work as a registered nurse" (Estabrooks, 1998, p. 19). The three types of RU identified in the literature are instrumental (also termed direct), conceptual (also termed indirect), and symbolic (also termed persuasive) (Amara, 2001; Johnson, 1998; Landry, Lamari, & Rich, 1979, 1991; Stetler, 1985; Weiss, 1979).

Instrumental Research Utilization

Instrumental utilization applies research concretely, and the research is normally translated into a material and useable form (e.g., protocol). The research is used to guide specific decisions or design specific interventions (Estabrooks, 1997, 1999a, 1999b).

Conceptual Research Utilization

In conceptual RU the research might change one's thinking but not necessarily one's particular action. The research informs and enlightens the decision maker (Estabrooks, 1997, 1999a, 1999b; Hasenfeld & Patti, 1992).

Persuasive Research Utilization

Persuasive utilization involves the use of research findings to persuade others (typically those in decision making positions) to make changes in policies and practices relevant to nursing care (Estabrooks, 1997, 1999a, 1999b).

Overall research utilization

The use of any kind of research findings, in any kind of way, in any aspect of your work as a professional in your role (this is inclusive of the three kinds of research use described above) is known as overall research utilization. It refers to the use of research knowledge in any way in one's practice (Estabrook et al., 2008).

Research Utilization in Nursing

The nursing literature is replete with calls to make the practice of nursing research-based. In the last 54 years, nurse scholars have called for the profession to bridge the gap between research and practice (Amanda, 2016; Duffy et al., 2015; Estabrooks, 1999a). The use of the best available knowledge in nursing care can substantially enhance care quality and alleviate the pain and suffering of patients (Amanda, 2016; Duffy et al., 2015; Estabrooks, 1998, 1999 a & b; Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gushta, 2003; Mulhal, 1997; Retsas, 2000; Seymour et al. 2003; Squires, Estabrooks, Gustavsson, & Wallin, 2011; Thompson et al. 2007).

Translating research findings into clinical use is of considerable importance to the health of the population worldwide (Athanasakis, 2013; Madon, Hofman, Kupfer, & Glass, 2007; Mutisya, KagureKarani & Kigondu, 2015; Sanders & Haines, 2006; Wang, Jiang, Wang, Wang, & Bai, 2013). Authors assert that RU promotes critical thinking, enhances professional self-concept, ensures safe and reflective practice, and enriches nurses' self-confidence, promotes safe patient care and a better understanding of applied nursing care (Bucknall, 2004; Dopson & Fitzgerald, 2005; Estabrooks, 1998, 2004; Kitson, 2004; Lee May, Mulhal & Alexander, 1998; Marita, 2007; Melynk, Gallagher-Ford, Long, & Fineout-Overholt, 2014; Sanders & Haines, 2006; Squires et al., 2011; Wallin & Ehrenberg, 2004). A current persistent and prevailing philosophy in nursing and healthcare is that healthcare professionals should use research evidence when making decisions related to client care (Kajermo et al., 2010; Squires et al., 2011a; Squires, Hutchinson, Bostrom, Cobban & Estabrooks, 2011b; Thompson, Estabrooks, Scott-Findlay, Moore, & Wallin, 2007).

In most western countries, nurses constitute the largest group of healthcare providers, and their care influences patient outcomes (Thompson et al., 2007; Wallin, 2009). Thus, their use of research is paramount. However, nurses, like other professionals, often fail to incorporate current research findings into practice (Chai, Bai, Wong, Wang, & Lu, 2013; Kajermo et al., 2010; Wallin, 2009). In a widely cited report based on data from the United States and the Netherlands, Grol and Grimshaw (2003) stated that 30% to 40% of all patients receive health care that is not based on current, relevant knowledge and that as many as 20 to 25 percent of all patients receive harmful or unnecessary care. According to the World Health Organization (2004), "Stronger

emphasis should be placed on translating knowledge and research into action to improve public health by bridging the gap of what is known and what is actually done” (p. V).

Nurses’ RU has been extensively investigated in diverse nursing samples, in various contexts and using different measurement instruments (Kajermo et al., 2010). Several studies have identified barriers to RU in clinical practice (Athanasakis, 2013; Mutisya, KagureKarani & Kigonde, 2015; Wang, Jiang, Wang, Wang, & Bai, 2013). Based on these studies, numerous individual, organizational, and contextual factors have been identified as influencing healthcare providers’ use of research (Forsman, Wallin, Gustavsson & Rudman, 2012a; Forsman, Rudman, Gustavsson, Ehrenberg & Wallin, 2012b; Halabi & Hamdan-Mansour, 2010; Wangensteen, Johansson, Bjorkstrom, & Nordstrom, 2011). However, both individual and organizational factors have been insufficiently studied (Meijers, Janssen, Cummings, Wallin, Estabrooks, & Halfens, 2006; Squires et al., 2011a). One of the possible reasons that nurses are reluctant to use research is their perception that emphasizing scientific knowledge as the main justification for practice diminishes the validity of the art of caring (Seymour, Kinn, & Sutherland 2003). It is vital that nurses perceive research as useful to patients. If research-based practice is perceived as beyond the experience of patients, it will remain beyond nursing practice (Closs & Cheater, 1999; Lenz & Barnard 2009). If research is presented solely as a scientific pursuit, then nurses will consider it incongruent with their practice.

Using research in practice requires not only the development of higher-order cognitive skills, but also the recognition that the priorities embedded in practice may well conflict with those of research and that personal attributes such as confidence and professional judgment are influential in how nurses use research to inform their practice.

A cultural disjuncture between research and practice leads to chaos and makes it difficult to narrow the gap between research and practice. According to Mulhall (1997), “In reality there is a fundamental disjuncture between the world of research and the world of practice” (p. 970) that is evident in researchers’ and nurse practitioners’ different knowledge, beliefs, and values. Change within the cultural contexts of healthcare is inevitable with the introduction of the new technologies and process-improvement interventions to standardize care. Such introductions occur frequently and contribute to contextual uncertainty and unpredictability (Scott, Estabrooks, Allen, & Pollack, 2008).

This climate of uncertainty can prompt questions about the ownership of knowledge and the distinct roles of nurses. In addition, confining and orderly contexts also conversely affect individual latitude and negatively influence research utilization behaviors, because a degree of individual latitude and organizational leeway is required for research utilization behaviors to occur. A restricting environment diminishes the amount of freedom that nurses have when practicing. Culture is socially influenced and constructed and is also influenced by numerous elements (e.g., leadership, staff empowerment, communication) that can, within a given context, have unanticipated impacts on the behaviors of individual members, including research utilization behaviors (Scott et al., 2008). We must not underestimate how difficult it is for nurse practitioners to move between research and practice in the quest for research-based practice. Lee May, Mulhall, and Alexander (1998) suggested that a constraint on using research by nurse practitioners is that most of the time they were unable to take part in the research because of everyday working commitments or organizational factors which constrained them to undertake research. The belief that individual nurses rather than the clinical team with

whom they work if take part in research together will have a significant impact on the implementation of findings and improve practice. Lee May et al. also identified a culture of constant change as detrimental and destabilizing for most nurse practitioners and managers. Significantly, they also raised the issue that research can be perceived as fostering a competitive spirit among staff, thereby having a detrimental effect on collegial relations. To challenge the professional community of which nurses are a part might cost them their positional authority as team members and, perhaps more significantly, their sense of belonging. When examining why nurses might be reluctant to incorporate research into their working practice, it is important to consider the cost that pursuing individual values has on their emotional well-being. Le May et al. made the point that “even a cursory knowledge of the ways in which individuals and groups act would indicate that many considerations will come between the provision of the best available evidence and the willingness or ability of practitioners to institute changes in their practice” (p. 429).

Another reason for the poor uptake of research in practice is that many nurses who are now in senior clinical positions have no preparation in using research and therefore have limited experience finding and evaluating research that can positively influence their practice (Camiah, 1997; Dunn, Crichton, Roe, Seers, & Williams, 1998; Squires et al., 2011b; Wallin, Bostrom, Wikblad, & Ewald, 2003). As a result, they find it difficult to support and guide less experienced nurses who, although their educational preparation likely included conducting or at least using research, are less likely to change their practice because their clinical experience is limited and their seniority much lower. It is important to recognize that not all nursing knowledge is research-based and that

nurses take pride in all of their work, not only the work that could be described as informed by research. Although nurses might support the view that research-based practice is a good thing, they are also deeply skeptical about whether research can change practice for the better. For example, a study conducted by Lee May et al. (1998) illustrates the belief that research-based practice might be harmful to patient care in that some practitioners fear that a philosophy of research-based care might lead to ritualized care. Therefore, rather than undermining the clinical expertise of experienced nurses, research is best viewed as an adjunct to clinical skills and as a nursing tool to deliver optimal patient care (McCaughan, 1999). In addition, the lack of time and resources, difficulty in understanding statistical analysis, inadequate access to information technology (IT), limited IT skills, and a lack of information searching skills interfere with nurses' ability to use research in their practice (Butler, 1995; Oranta, Routasalo, & Hupli, 2002; Parahoo, 2000; Retsas, & Nolan, 1999; Rodgers, 2000; Shifaza, Evans, & Bradley, 2014; Tranmer, et al., 2002; Tsai, 2003; Wallin et al., 2003; Wang et al., 2013). This more encompassing view recognizes that practitioners require support from those who have research skills; that they should receive that support as a means of assisting, rather than threatening, their clinical expertise; and that expert nursing care has a moral dimension that requires attention to the particular context and relationship and not just the abstract and theoretical (Hicks & Hennessy, 1997). Some of the evidence also suggests that nurses who have been exposed to basic research training in their initial nursing education perceive fewer barriers to research utilization, compared to nurses without such training (Giallonardo, 2011; Nilsson Kajermo, Nordstroëm, Krusebrant, & BjoÈrvell, 1998; Shoulders, Follet & Eason, 2014; Squires et al., 2011a). However, Parahoo (2000)

found no difference in the use of research between nurses who did or did not receive basic research training as a part of their nursing education. One explanation that Parahoo put forward is that the nurses with research preparation in their initial education were educated later and thus had a more junior position and less influence in the hierarchy. Rodgers (2000) found a positive correlation between research utilization in nursing, and nurses' attendance at research courses. Other studies have shown that research education promotes knowledge of and positive attitudes toward research (Lacey, 1994, 1996; Dyson, 1997) and research utilization activities (Hundley, Milne, Leighton-Beck, Graham, & Fitzmaurice, 2000; Lacey, 1994, 1996). Squires, et al. (2011a) identified no significant relationship in RU between nurses prepared at the baccalaureate and those prepared at the diploma level. They did determine that a positive association existed for RU among nurses with graduate degrees. Squires et al. found that participation in ongoing education, which include attendance at in-services and conferences were positively associated with nursing RU in general.

A major goal of baccalaureate nursing education is to develop competencies required for research-based practice (Schmidt & Brown, 2007). The demand for safe, competent and quality healthcare has increased the demand for knowledge translation and the requirement of including RU competencies in the nursing curricula. However, nursing education and practice have been slow in accelerating the paradigm shift to RU and EBP. This is attributed to several aforementioned factors. In addition, specifically in nursing education, one major barrier is that educators in many institutions in North America continue to use a traditional approach when teaching research courses in baccalaureate programs. This approach focuses on research process rather than its use and application

in practical settings, and results in students acquiring negative attitudes toward research. Traditional approaches to teaching nurses about research include laborious critiques that have no clinical relevance, focusing on doing research versus using research, and teaching research methods without content on clinical relevance (Burns & Foley, 2005; Fineout-Overholt & Johnston, 2006). Students leave their professional programs with little desire to continue to read, critique, use, and apply evidence from research (Melnyk in Levin & Feldman, 2006). Foster (2004) discussed that a lack of clarity about EBP content, process, and outcomes is a main reason that instructors continue to use research textbooks to teach traditional nursing research courses. Another barrier to teaching EBP is that academic and clinical faculty members lack critical appraisal skills. (Beasley & Woolley, 2002). Singleton and Levin (2008) posited that curriculum revision to incorporate an EBP approach to teaching and learning in nursing at all levels is crucial to prepare nursing students in the current and constantly changing clinical practice environment. Schmidt and Brown (2007) suggested that students' abilities are developed as they collaborate on an EBP assignment that could affect actual change in patient care. However, the process of integrating EBP and research concepts into any curriculum is ill-defined, and causes many challenges in nursing academia.

A systematic review conducted by Squires et al (2011b) to investigate the extent of nurses' RU in clinical practice, reported a moderate-high RU in majority of the included studies. It was also concluded that included studies on this review suffer from methodological weaknesses, lack of standard measures for RU, making it difficult to synthesize, interpret and compare findings across studies (Squires et al., 2011b). Few research studies also reported low research use by nursing students and newly graduated

nurses (Forsman, Rudman, Gustavsson, Ehrenberg, & Wallin, 2010; Forsman et al., 2012a; Wangenstein et al., 2011). These reports on low use of research findings by nursing students and newly graduated nurses in clinical practice give reason to question nurses' preparation from undergraduate nursing programs. Although educational reforms moving nursing programs into higher university level education and strongly emphasized RU in nursing education (Florin, Ehrenberg, Wallin & Gustavsson, 2012; Forsman et al., 2012a; Spitzer & Perrenoud, 2006a, b). However, the content of nursing education and the transition from education into working life (e.g., the integration of education and practice as well as the ability of students to access and interpret and analyze research) remains a challenges (Florin et al., 2012; Hegarty, Walsh, Condon, & Sweeney, 2009; Hofler, 2008). Little is known about the use of research findings among undergraduate nursing students, despite the increased academic focus of using research in nursing education and practice. Florin and his colleagues (2012) investigated nursing student's experience of educational support for RU at 26 universities in Sweden. The study found major differences in students' experience of the extent to which their academic education provide support for RU depending on what university they attended. The study also found the educational support for RU during classroom education was rated higher than the support given during clinical education. In broader perspective the study found a gap between theory and practice. To our knowledge, nursing students' perceptions about research utilization in clinical practice have been scarcely studied. Nursing students are expected to be prepared to provide research-based care. This implies that they should possess the necessary knowledge and skills required for using research in clinical practice. Previous studies have reported relatively low use among practicing registered

nurses, which leads to questions regarding undergraduate nursing students' preparation on using research in practice.

In summary, applying research is a complex social process that involves individuals and organizations and is a subset of the equally complex process of KT. Knowledge application involves multiple levels, including elements of the individual, organization, and environment, as well as the characteristics of the knowledge. Examining the KT innovation processes of adoption, replication, adaption, and retention in light of Rogers' (1995) characteristics of innovations can help us to understand how knowledge flows throughout organizations. The complexities of the transfer of research findings and their application within an organization are in part related to properties of the transfer process itself (e.g., channel, recipient) and are understood as iterative processes of knowledge deconstruction, reconstruction, and generation. The difficulties of knowledge transfer or research utilization within organizations should be regarded as characteristic of transfer processes. Various subunits or communities of practice within organizations differ in their capacity to integrate, assimilate, and maintain particular practices, which results in the "stickiness" of knowledge within organizations. The pre-existing degree of institutionalized knowledge and existing embeddedness of practices influence the degree of knowledge deconstruction or dismantling that must occur before knowledge can be integrated into practice. To reduce ambiguity, leadership can facilitate this process. However, some factors such as complexity, centralization of authority, and the organization's size are not modifiable and contribute to the variability in individual's behaviors regarding research utilization. A positive organizational culture is required if individuals are to demonstrate research utilization behaviors and can influence their

individual absorptive capacity (Berta et al., 2010; Estabrooks et al., 2003; Nicolini & Meznar, 1995; Szulanski, 2000).

Critical Thinking Dispositions and Research Utilization

Recently critical thinking dispositions (CTDs) have also been identified as one of the determinants of RU but few studies have been conducted confirming this relationship (Profetto-McGrath, et al., 2003). CTD is a central notion for nurses who work as scientific practitioners, and using research as 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 likely to be 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 more suitable and applicable in given context (Profetto-McGrath et al., 2003). There is a lack of clarity within the literature in the conceptualization and use of the term context. This term has been used interchangeably with social environment, social context, job environment, job context, nursing practice environment, clinical practice environment, organizational environment, organizational climate, organizational culture, and organizational context (Meijers et al., 2006; Sleutel, 2000). Research utilization scholars have consistently identified context as important factors that influence research use (e.g., Brett, 1987; Stetler, 2003); CTDs help the nurses to assess the situation by considering the context, recognizing the patient's individuality, abandoning non-productive interventions, and

considering multiple approaches in their problem solving and decision making (Profetto-McGrath et al., 2003).

Several nurse researchers have referred to the importance of critical thinking in nurses' utilization of research (e.g., Profetto-McGrath, 2005; Profetto-McGrath et al. 2003, 2009; Schidt & Brown, 2015; Sullivan, 2012; Tajvidi, Ghiyasvandian & Salsi, 2014). Authors have also stressed that critical thinking is integral to research use (Birx, 1993; Omery & Williams, 1999; Tanner, 1999; Schidt & Brown, 2015; Amanda, 2016). Critical thinking helps to understand how to use research by reading journal articles and critically appraising research findings (Amanda, 2016; Beyea & Nicoll, 1997; Schmidt & Brown, 2015) and to make clinical decisions based on individual cultural contexts (Scott et al., 2008). The Stetler (2001) model specifically addresses the importance of critical thinking in research utilization. Her model emphasizes that nurses must integrate research findings into personal and situational variables to arrive at decisions through a series of "internal throughputs" (Stetler, 1994, p. 18). Stetler acknowledges that nurses positive attitude, belief and personal research competencies facilitate research use in practice. Knowledge and competency in the area of research utilization are important internal factors that facilitates research use by nurses in practice setting. The steps of the model "are designed to facilitate critical thinking and the pragmatic application of research findings" (p. 25) in nursing practice.

As stated earlier, although many authors have stressed the importance of CT to RU, limited empirical evidence has linked CTDs with research utilization. Only a few published studies have detailed the relationship between RU and aspects of CTDs among experienced registered nurses (May, Edell, Butell, Doughty, & Langford, 1999; Profetto-

McGrath et al., 2003), nurse educators (Profetto-McGrath et al. 2009) and dental hygienists (Cobban & Profetto-McGrath 2008). I found no published studies detailing the CTDs and RU of undergraduate nursing students, which is also an important nursing group in health care.

May et al., (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 behaviors of practicing nurses on seven hospital units across hospitals in Canada and found a statistically significant relationship between RU and overall CTDs. Their findings support the belief that nurses with attributes consistent with the ideal critical thinker (e.g., open minded, inquisitive, and systematic) are more likely to use research findings in their practice Those whose critical thinking abilities and dispositions are well developed are in a better position to promote critical thinking and research utilization through a variety of strategies.

In another study, Profetto-McGrath et al. (2009) conducted a cross-sectional survey that examined the CTDs of nurse educators and their research utilization. A shortened version of the Research Utilization Survey by Estabrooks, (1997), and the California Critical Thinking Disposition Inventory (CCTDI) were used to measure RU and CTDs. Almost all nurse educators (n=287) who participated in the study scored above the target score of 280 on the CCTDI. The majority of nurse educators (82.1%) scored 280–350, with 15.4% of them scoring above 350, indicating high CTDs. Nurse educators scored quite high on overall research utilization (mean = 4.4/5). They believe that research makes a positive difference in practice and reported using various sources of information. The study found a statistically significant correlation between nurse

educators' total CTDs and all measures of RU. Profetto-McGrath et al. (2009) reported that nurse educators who are disposed to think critically and have research utilization skills are invaluable in educating a workforce of registered nurses, who can make a significant contribution in improving the overall patient and systems outcomes.

Cobban and Profetto-McGrath (2008) conducted a pilot study to determine if protocols used to study RU behaviors and CTDs in nursing could also be applied to dental hygiene. A cross-sectional survey design was used with a random sample of 640 practicing dental hygienists in Alberta, Canada. Three questionnaires were included: one to capture measures of RU including direct, indirect and symbolic RU; the CCTDI and a demographics questionnaire. The study found RU behaviors and CTDs are valuable attributes for healthcare practitioners in a climate that values evidence-based practice and in which the evidence is continually evolving. Healthcare providers need to be informed and able to make clinical judgments about good practice for their patients and the families based on research evidence. They must have the ability to evaluate information and situations critically by using their critical thinking skills and disposition.

Summary

In summary, the available research evidence highlights that CT skills and CTDs are necessary not only in the clinical practice for decision making, but have great influence on nurses' use of research in practice. To practice evidence-based nursing, nurses need to develop the attributes of CTDs in order to use research evidence in their clinical decision making which improve patient outcomes. Literature also highlighted that nurses with dispositions towards critical thinking are motivated to utilize research in their practice. Cultivating dispositions toward critical thinking is therefore an important

element for research utilization. Nursing education today places great emphasis on developing techniques and designing learning experiences that foster the development of students' CT in the academic and clinical pursuits (Morrall & Goodman, 2013). Nursing education must prepare nurses with disposition towards critical thinking who are capable of exploring all aspects of complex clinical situations. To do this, each program must carefully determine what CT and CTDs means within its curriculum and use instructional methods and assessment strategies consistent with the definitions. Moreover, in order to explicitly clarify the relationship between CTDs and RU there is a need to conduct additional research in this area.

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Chapter 3

Paper 1: Nursing Students Critical Thinking and Research Utilization

Abstract

Background: In the nursing profession critical thinking (CT) has increasingly been the focus of investigation for the past several years. CT dispositions and skills are valuable in nursing practice. Nurses need complex thinking skills to effectively manage the fast-paced and constantly changing health care environments in which they work. CT is also vital in developing evidence-based nursing practice. Nurses who are disposed to think critically are more likely to critically interpret the available evidence, and able to make high quality judgments and draw valid inferences. Currently, no published studies could be located that specifically examined the relationship between Critical Thinking Dispositions (CTDs) and research utilization (RU) of undergraduate nursing students.

Aim: The aim of the study was to investigate the critical thinking dispositions (CTDs) and Research Utilization (RU) of undergraduate nursing students enrolled in a baccalaureate program at a university in Western Canada.

Methods: The study used a sequential mixed method approach. In this paper only quantitative analysis will be reported. A convenient sample of 180 students from a 4 year BScN program for high school graduates, and a 24 months after degree BScN program for individuals admitted with a degree in another discipline completed a background/demographic questionnaire, the California Critical Thinking Disposition Inventory and a modified (shortened) Research Utilization Survey form developed by Estabrooks (1997).

Results: The majority of participants (69%) scored below the target score of 280 on the California Critical Thinking Dispositions Inventory. This indicates an overall deficiency in critical thinking dispositions (CTDs). However, participants scored high on overall RU (mean = 3.4/5). Over all critical thinking dispositions were not statistically significantly correlated with all forms of research utilization, with the exception of persuasive research utilization.

Conclusions: Approximately 30% of the students in the current study had adequate levels of CTDs. Results indicate a need for students' continued development in these areas. Dispositions are crucial to critical thinking; without them CT and RU does not happen or may be substandard.

Keywords: critical thinking, critical thinking dispositions, habits of mind, nursing education, undergraduate baccalaureate nursing students.

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 CTDs 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 were 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 truthseeking (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 was detected between the two groups.

Discussion

Critical Thinking Dispositions

The aim of the study was to investigate the CTD and RU behaviors 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 (Ip et al., 2000; May et al., 1999; Profetto-McGrath, 2003). However, studies conducted with nurses in practice have reported a positive disposition towards CT (Profetto-McGrath et al., 2003; Profetto-McGrath et al., 2009; Smith-Blair & Neighbors, 2000; Wangenstein, Johansson, Bjorkstrom, & Nordstrom, 2011). 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 (Ip et al., 2000; Kim et al., 2014; May et al., 1999; Pai & Eng, 2013; Profetto-McGrath, 1999, 2003; Smith-Blair & Neighbors 2000; Tiwari, Avery, & Lai, 2003; Wangensteen et al., 2011) 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; Wangensteen 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; Profetto-McGrath et al., 2003; Walsh & Hardy, 1999; Wangensteen 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 (Dehkordi & Heydarbejad, 2008; Jones, 2008; Ozturk, Muslu, & Dicle, 2008; Tiwari, Lai, So, & Yuen, 2006; Worrell & Profetto-McGrath, 2007; 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' (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, b) 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 CTDs 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' CTDs 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 behaviors 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 dispositions 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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Table 1.1

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).

Chapter 4

Paper 2: Use of Research by Undergraduate Nursing Students: A Qualitative

Descriptive Study

Abstract

Research utilization (RU) is crucial to preparing the next generation of registered nurses, since they are expected to stay abreast of research, read and use existing research to improve their ability to solve problems, and make decisions independently in clinical settings. Also, baccalaureate nursing programs often identify RU as an expected curricular outcome. The purpose of this study was to identify nursing students' perceptions about RU. The study used a sequential mixed methods approach. In this paper, only qualitative analysis related to RU is reported. A qualitative descriptive design was used to address the study questions. A purposive sample of 20 undergraduate students enrolled in their final year of study in BScN programs (four-year basic, honors, and accelerated programs) was recruited via e-mail to participate in the study. The study findings were categorized into the components of the Promoting Action on Research Implementation in Health Services (PARIHS) framework, which comprises evidence, context, and facilitation. Findings disclosed some key themes that nursing students perceive as facilitating or restricting their use of research. These themes include level of education preparedness, clinical experience and expertise, lack of time, theory practice gap, and clinical evaluation criteria, nursing faculty support for using research, and faculty's competency in research. The majority of students stated that they did not utilize the research findings in clinical practice. Insufficient knowledge about RU was the most

prominent reason. These results suggest that students should be encouraged and supported to utilize research findings in their practice settings.

Key Words: nursing, students, nursing research, research utilization, evidence-based practice.

Introduction

Translating research findings for practice is of considerable importance to the health of individuals worldwide (Madon, Hofman, Kupfer, & Glass, 2007; Sanders & Haines, 2006). Internationally, there is a strong emphasis on evidence-based or research-based nursing practice (Bucknall, 2004; Dopson & Fitzgerald, 2005; Estabrooks, 1998, 2004; Kitson, 2004; LeeMay, Mulhal & Alexander, 1998; Sanders & Haines, 2006; Wallin & Ehrenberg, 2004). Learning to critically appraise and use research evidence is now an important nursing education objective. The term *evidence-based practice* has recently become part of nursing jargon and has been used interchangeably with research utilization (RU); however, the terms are not synonymous (Estabrooks et al., 2008). Evidence-based practice is defined as using all evidence (including research studies, pathophysiology knowledge, expert opinion, clinical experience, patient input, quality assurance, data, and case reports) to inform best practices (Estabrooks et al., 2008). Evidence-based practice is a more general term and encompasses RU. While evidence constitutes more than research findings, the word *research* in RU denotes only the findings of (usually scientific) research (Estabrooks et al., 2008). Many faculties and schools of nursing in North America, Europe, and Asia use evidence-based knowledge in clinical practice to ensure quality patient care, which is one of the hallmarks of nursing education.

RU is crucial to preparing the next generation of registered nurses, since they are expected to stay abreast of research, read and use existing research to improve their ability to solve problems, and make evidence-informed decisions independently in clinical and multidisciplinary clinical settings. Undergraduate nursing students need to be

well prepared to use research. This preparation is a key element in improving the use of research in clinical practice (Halabi, Hamdan-Mansour, 2010). The Canadian Association of Schools of Nursing (CASN) National Nursing Education Framework (2014) outlines guiding principles and essential components for undergraduate nursing education.

Domain two of the Association's framework states that "baccalaureate nursing programs foster the development of critical thinking and research abilities to use evidence to inform nursing practice" (2014, p. 10). The College and Association of Registered Nurses of Alberta (CARNA)'s entry to practice competencies also emphasize the importance of evidence-informed care, specifying that graduates are expected to "incorporate knowledge of current theory, best practice clinical guidelines, and research in carrying out decisions and implementing care" (CARNA, 2013. p. 19). In keeping with these expectations, the purpose of this study was to identify nursing students' perceptions of RU. This study answers the following questions:

- To what extent do undergraduate nursing students use research findings in practice?
- What barriers did nursing students experience that prevented them from using research findings in practice?

Literature Review

RU is complex and involves many factors that influence the implementation of research into clinical practice (Backer, 1991; Estabrooks et al., 2008; Thompson, Estabrooks, Scott-Findlay, Moore, & Wallin 2007; Weiss, 1979). According to Estabrooks (1999a), RU is a specific kind of knowledge utilization; it is a complex process in which knowledge is in the form of research and is transformed from the

findings of one or more studies into possible nursing interventions, the ultimate goal of which is its use in practice for the improvement of patient health-related outcomes. In recent years, the literature has paid increased attention to RU by nurses. We typically find four types of RU in the literature: instrumental (also termed direct), conceptual (also termed indirect), symbolic (also termed persuasive), and overall (Squires, Estabrooks, Gustavson & Wallin, 2011a). Instrumental RU refers to the concrete application of research findings in clinical practice. Conceptual RU refers to the cognitive use of research where the research may be used to change one's thinking about a specific practice, but won't necessarily result in a change in action. Persuasive or symbolic RU is the use of research as a persuasive or political tool to legitimate a position or influence the practice of others. Overall RU is an omnibus construct and refers to the use of any kind of research in any way (Estabrooks, 1997, 1999a, 1999b).

A current, persistent and prevailing philosophy in nursing and healthcare is that healthcare professionals should use research evidence when making decisions related to client care (Kajermo et al., 2010; Squires et al., 2011a; Squires, Hutchinson, Bostrom, Cobban & Estabrooks, 2011b; Thompson, Estabrooks, Scott-Findlay, Moore, & Wallin, 2007). Using research in practice improves the quality of care and is therefore considered an irrefutable value of the nursing profession. Nurses must use research to inform their practice and are encouraged to adopt this philosophy by using a variety of strategies (Squires et al., 2011a; Squires et al., 2011b) that include expanding electronic databases, increasing the emphasis on research in nursing curricula, and critically appraising published research in order to adequately evaluate evidence for nursing practice. In addition, practitioners are exposed to standards, clinical guidelines, and auditing as part

of the quality assurance process, all of which are intended to incorporate/utilize research findings to some extent. Using pertinent research findings in clinical practice (and evaluating the effectiveness of the changes) closes the gap between research and practice (Wangensteen, 2010). Using the best available research evidence in nursing care can substantially enhance the quality of care and alleviate patients' pain and suffering. For example, studies have shown that implementing evidence-based clinical guidelines has the potential to improve nursing interventions, positive patient outcomes, and quality of care (Estabrooks, 1998, 1999b; Kajermo et al., 2010; Profetto-McGrath, 2005; Retsas, 2000; Seymour, Kinn & Sutherland, 2003; Squires et al., 2011a; Thompson et al., 2007; Wallin, 2009; Wallin & Ehrenberg, 2004).

However, RU scholars continuously express concern about whether nurses use the best available scientific (i.e., research) evidence to guide their clinical practice (Alp-Yilmaz & Tel, 2010; Estabrooks, Kenny, Adewale, Cummings, & Mallidou, 2007; Forsman, Wallin, Gustavsson, & Rudman, 2012a; Wangenstein, Johansson, Bjorkstrom, & Nordstrom, 2011). In a widely cited report based on data from the US and the Netherlands, Grol and Grimshaw (2003) stated that 30% to 40% of all patients do not receive healthcare based on current relevant knowledge and that as many as 20% to 25% of all patients receive harmful or unnecessary care. According to the World Health Organization (2004), "Stronger emphasis should be placed on translating knowledge and research into action to improve public health by bridging the gap of what is known and what is actually done" (p. v).

Nurses' RU has been extensively investigated by drawing on diverse nursing samples in various contexts and using different measurement instruments (Kajermo et al.,

2010). A systematic review conducted by Squires et al. (2011b) to investigate the extent of nurses' RU in clinical practice reported a moderate-high RU in the majority of the included studies. Squires also concluded that the studies used in this review suffer from methodological weaknesses, including a lack of standard measures for RU, making it difficult to synthesize, interpret and compare findings across studies (Squires et al., 2011b). A Few studies also reported low research use by nursing students and newly graduated nurses (Forsman, Rudman, Gustavsson, Ehrenberg, & Wallin, 2010; Forsman et al., 2012a; Wangenstein et al., 2011). Such results lead to questions about how well undergraduate nursing programs are preparing their students to use research. Educational reforms have moved nursing programs into university level education and strongly emphasized RU in nursing curricula (Spitzer and Perrenoud, 2006a, b; Forsman et al., 2012a; Florin, Ehrenberg, Wallin & Gustavsson, 2012). However, the content of nursing education and the transition from education into working life (e.g., the integration of education and practice as well as the ability of students to access and interpret and analyze research) remains a challenge (Hofler, 2008; Hegarty, Walsh, Condon, & Sweeney, 2009; Florin et al., 2012).

Several studies have identified the barriers that prevent registered nurses' RU in practice settings. Based on these studies, numerous individual, organizational, and contextual factors have been identified as influencing healthcare providers' use of research in practice (Halabi & Hamdan-Mansour, 2010; Wangenstein et al., 2011; Forsman et al., 2012a,; Forsman et al., 2012b). However, both individual and organizational factors have been insufficiently studied (Squires et al., 2011a; Meijers, Janssen, Cummings, Wallin, Estabrooks, & Halfens, 2006). Furthermore little is known

about how or whether undergraduate nursing students use research findings, despite the increased academic focus on using research in nursing education and practice. Florin and his colleagues (2012) investigated nursing students' experience of educational support for RU at 26 universities in Sweden. The study found major differences in students' experiences; the extent to which their academic education provided support for RU depended on what university they attended. The study also found that educational support for RU during classroom teaching time was rated higher than the support given during clinical time. The study also found a gap between theory and practice. To our knowledge, nursing students' perceptions about RU in clinical practice have scarcely been studied. Nursing students are expected to be prepared to provide evidence-based care. This implies that they should possess the necessary knowledge and skills required to use research in clinical practice. Previous studies have reported relatively low use among practicing registered nurses, which leads to questions regarding undergraduate nursing students' preparation for using research in practice.

Theoretical Framework

Several conceptual frameworks published in the literature suggest that RU is a complex phenomenon that should be examined from multiple perspectives (Mitchell, Fisher, Hastings, Silverman, & Wallen, 2010; Sudaswad, 2007). Selecting a framework that is compatible with a researcher's perceptions and that incorporates the key elements of interest in a study contributes to an understanding of the phenomena by grounding the research plan at the theoretical level and facilitating the interpretation of a study's findings (Pedhazur & Schmelkin, 1991). The theoretical framework chosen for this study was the (PARIHS) framework (Kitson, Harvey, & McCormack, 1998; Rycroft-Malone,

2004). Figure 1 depicts the organization and relationships of components within the framework.

The PARIHS framework, which was developed by Kitson et al. (1998), has undergone several revisions and continues to evolve based on emerging evidence (Harvey et al., 2002; Kitson, 2009; Kitson et al., 2008; Rycroft-Malone, et al., 2002; Rycroft-Malone et al., 2004; Harvey & Kitson, 2016). According to this framework, three elements (evidence, context, and facilitation) are considered necessary to implement research into practice successfully (McCormack et al., 2002; Rycroft-Malone, et al., 2002; Rycroft-Malone, 2004). Successful research implementation, which is synonymous with research utilization, is a function of evidence, context, and facilitation and the interrelationships among these three elements (Helfrich et al., 2010). The PARIHS model has been used as the conceptual framework in a variety of health care settings (e.g., acute care, pediatric/neonatal, psychiatric, rural hospital) in several recent studies, including studies with Canadian populations (Cummings, Estabrooks, Midodzi, Wallin, & Hayduk, 2007; Cummings, Hutchinson, Scott, Norton, & Estabrooks, 2010; Estabrooks, Midodzi, Cummings & Wallin, 2007; Jansson, Bahtsevani, Pilhammar-Andersson, & Forsberg, 2010; Wright, McCormack, Coffey, & McCarthy, 2006).

Evidence

Evidence from research is considered knowledge when it is derived from a variety of sources, has been subjected to testing, and is considered credible (Rycroft-Malone et al., 2004). Moreover, research evidence can be translated and adapted if it is applicable to the local context and it makes sense (Rycroft-Malone et al., 2004). The PARIHS framework (Kitson et al., 1998) posits that successful implementation is more likely to

occur when research, clinical and patient experience are located in the high range of the model, which includes, for example, research (qualitative or quantitative) that is well conceived and conducted and has achieved consensus (Stetler et al., 2011).

Context

In the PARIHS framework (Kitson et al., 1998), the term context refers to the environment or setting in which people receive healthcare services or the incorporation of research evidence into practice. (McCormack et al., 2002). In the framework the contextual factors that promote the successful implementation of evidence into practice are listed under three broad themes: culture, leadership, and evaluation (Stetler et al., 2011). Cultural context can be described as learning organizations that are more conducive to facilitating change because they create learning cultures that focus on individuals, group processes, organizational leadership and systems. In the PARIHS framework, Stetler et al. proposed that the characteristics of context are key to ensuring a more conducive environment to incorporate evidence into practice. More specifically, a strong context that includes, for example, clarity of roles, decentralized decision making, the valuing of staff, and transformational leaders who are capable in evaluating the aspects of the Context, increases the chances of successful implementation.

Facilitation

The third element, *facilitation*, is defined as “providing help and support to achieve a specific goal to enable individuals and teams to analyze, reflect, and change their own attitudes, behaviors and ways of working” (Harvey et al., 2002, p. 580). Stetler et al., (2006) add that facilitation is “a deliberate and valued process of interactive problem solving and support that occurs in the context of a recognized need for

improvement and a supportive interpersonal relationship” (p. 6). There are three components of facilitation: the *purpose*, *role* and *skills and attributes* that contribute to successful implementation (McCormack et al., 2002; Rycroft-Malone et al., 2002; Rycroft-Malone, 2004). *Purpose* is considered a continuum ranging from task-oriented (specific goal attainment) to holistic-oriented (enabling individuals and teams to change their ways of working and attitudes through reflection). Within these two purposes, *role* and *skills and attributes* are described. For example, a facilitator’s role would be to do for others using technical, marketing, or project management skills within the task-oriented side of the continuum and to enable others on the holistic-oriented side using critical reflection and co-counseling skills (Helfrich et al., 2010; Stetler et al., 2011). More recently, facilitation has been viewed as both an individual role and a process that involves both individuals and groups (Dogherty, Harrison, & Graham, 2010). Facilitation is growing as a method for encouraging RU in clinical practice, particularly in nursing (Dogherty, Harrison, Baker, & Graham, 2012). However, there is an increasing need to evaluate the outcomes of facilitation with respect to actions taken (Dogherty et al., 2010).

Each of these elements can be assessed based on whether they have a weak (low rating) or strong (high rating) effect on successful implementation (Rycroft-Malone, 2008). Given the nature and interconnection of these three elements, the effect of implementing an intervention may differ in various settings (Helfrich et al., 2010).

In this study, the PARIHS framework guided the establishment of the relationship between critical elements that are identified as key for successful RU and implementation. The questions for the interview were based on a broad conceptualization of the PARIHS framework. The framework guided the formulation of questions posed

during the focus group interview, promote completeness of data collection by helping the researcher to examine/explore the factors that influence RU in practice. For the data analysis, the conceptual domains from the framework were used to derive common attributes that study participants identified as barriers to or facilitators of RU in their practice setting.

Role of the Researchers

The first author, Salima Meherali (SM), is a PhD Candidate. Her dissertation focuses on research utilization and critical thinking in undergraduate nursing students. Her study used a sequential mixed methods approach. This design consists of two distinct phases beginning with a quantitative phase followed by a qualitative phase for the purpose of exploring and extending the initial results in more depth. In the first phase of our study, quantitative, numeric data was collected using the California Critical Thinking Disposition Inventory (CCTDI), the latest version of Research Utilization (RU) Survey, and a background/demographic data questionnaire. The qualitative phase of the study focused on further exploring the results of the statistical tests, obtained in the first, quantitative phase. As the authors wanted to explore and understand the stated phenomenon of RU by undergraduate nursing students in its entirety, a qualitative descriptive design was used to address the study questions. In this paper, only the qualitative analysis related to research utilization is reported. The quantitative findings have been published elsewhere (Meherali, Profetto-McGrath & Paul, 2015). The second and third authors, Drs. Joanne Profetto-McGrath and Pauline Paul, are professors in the Faculty where the study was conducted. They co-supervised and guided the first author during her entire doctoral research and guided her in the conduct of the study. Both have

expertise in qualitative research. In qualitative research, the researcher is the instrument and unique researcher attributes have the potential to influence the collection of empirical materials (Pezalla, Pettigrew & Miller-Day, 2012). The first author (SM), who conducted focus groups and individual interviews, is trained in qualitative research and various data collections strategies including semi-structured individual and focus group interviews.

In addition to ethics approval, administrative approval was obtained from the Faculty of Nursing to be able to invite undergraduate nursing students to participate in this study. Participation was voluntary and no incentives were provided, enabling the participating students to express their views freely during the interviews. Each student was informed about the background of the study and its purpose, was assured of confidentiality, and signed a consent form prior to being interviewed.

Methods

A qualitative descriptive design (Sandelowski, 2000, 2010) was used to address the study questions. According to Sandelowski (2000), qualitative descriptive studies belong to the “general tenets of naturalistic inquiry” (p. 337). However, unlike other categorical qualitative designs, such as phenomenology or ethnography, these tenets are “least encumbered by preexisting theoretical and philosophical commitments” (p. 337). At the outset of our research, in line with assumptions about naturalistic inquiry (Lincoln & Guba, 1985; Loiselle, Profetto-McGrath, Polit, & Beck, 2010), we believed that the students’ behaviors toward and attitudes about using research in the learning context might be influenced by multiple factors, which could be understood from their comprehensive subjective accounts.

Sample

A purposive sample of 20 undergraduate nursing students enrolled in their final year of three BScN programs (four year basic program, honors and after degree program) were recruited to participate in the study. Students from the four-year basic program enter the program having completed high school or some postsecondary courses. Concepts from nursing, physical sciences, medical sciences, social sciences and humanities are introduced and integrated throughout the curriculum. Nursing practice occurs in various settings. The students in the honors program are high achieving students drawn from the four year basic program. In this program they acquire more advanced preparation in scholarly and research work to enrich their undergraduate program experience. Students in the after degree program are admitted on the basis of having completed a university degree in a field other than nursing which in many cases include completion of research courses from their respective prior programs. The curriculum of this program is designed to be completed over 23 months. A purposive sampling technique was adopted for this study because it involved selecting those individuals whom the researchers believed were 'information rich' (Patton, 1990, p.169) and could provide in-depth information about the phenomenon of interest (Creswell, 2013). Nursing students in the last year of their nursing program, who gave their consent, were able to reflect on their education, clinical experiences, and were willing to talk at length with the researchers, were selected.

Data Collection

Semi-structured focus groups and individual interviews were conducted with a total 20 participants. Individual interviews were conducted when a participant was not

able to attend a focus group due to conflicts with clinical rotations. Three focus group interviews with 5-7 participants in each group and three individual interviews were conducted. During the interviews and focus groups, we used a semi-structured interview guide comprised of open-ended questions guided by the PARIHS framework and aimed at eliciting the participants' perceptions of RU (Appendix A Interview guide). We developed a biographic questionnaire to gather background and demographic data. Each focus group lasted 60 to 75 minutes whereas individual interviews lasted 45-60 minutes; these were audiotaped with the participants' permission. Immediately after each interview (focus group or individual), field notes were recorded to capture the participants' nonverbal behaviors and our perceptions about their emotions. In addition, a reflective journal was also maintained to record the overall process of data collection. The transcribed data were shared with five participants (1 participant from each focus group and 2 participants from individual interviews) to ascertain whether the transcribed data accurately reflected their contribution.

Ethical Considerations

The study received ethics approval from the Ethics Review Board of the participating university and administrative approval from the nursing faculty to access the student population. Students were informed that participation in the study was completely voluntary. Those who participated were advised that they could leave the interviews at any time. Confidentiality was ensured through the use of code numbers and no names were used. Written informed consent was obtained from all participants. All data have remained anonymous. Students were apprised that the findings would be used in publications and presentations.

Data Analysis

The data collection and analysis occurred concurrently. The lead researcher transcribed verbatim each focus group and individual interview immediately after they were conducted. Thorne (2008) suggested that directly moving into the coding scheme might not be useful for an overall discovery of superficial findings; rather, he/she advised that researchers should deeply immerse themselves in the data by listening to the recordings of the participants' interviews to gain insight (p. 14). For data analysis, SM first listened to the interview recordings to become fully immersed in the data. Second, I read and reread each transcript to gain an in-depth understanding of the overall picture of the phenomenon and to gain insight. Finally, a coding scheme was applied to the transcribed interviews to reveal categories, themes, and patterns. Subsequently, the categories with similar meanings were grouped into themes. Categories and themes were discussed with the two supervisors to increase the likelihood that they best reflected the data. Themes and sub-themes were derived inductively, and then connected with the PARIHS framework elements to present the barriers and facilitators of RU identified by the study participants in their practice settings. We used NVivo 10 software to manage the data.

Measures for trustworthiness

We used Lincoln and Guba's (1985) method of establishing trustworthiness to enhance credibility, dependability, confirmability and transferability. To increase the credibility of the study, the first author was deeply involved with the data (e.g., transcribing, reading, and rereading the transcripts; conducting an inductive analysis) and maintained transparency while analyzing the data and fulfilling her role as researcher.

The participants were interviewed to the point of data saturation (prolonged engagement) as per Lincoln and Guba (1985). Dependability was achieved through a dense description of the methodology used to conduct the study and gather the data. Such dense descriptions provide information that can be used for study replication and highlight its unique features so that they will be clear to readers (Krefting, 1991). Confirmability was promoted by an audit trail of the verbatim descriptions, categories and subcategories. The audit trail with field notes documented the research activities and thinking processes to provide evidence to support the confirmability of the findings. For this research study, the results may be transferable to other pre-licensure nursing programs. Demographic data about study participants, specific details about the RU, and reflective journal questions are provided so that readers may determine if the results are transferable to their respective settings.

Findings

A total of 20 baccalaureate nursing students participated in the study (four year basic program =5, honors program = 2 and final year of the after degree program = 13). The majority of students were female (n = 17 or 85%), ranging in age between 22 and 30 years. All participants had completed a required nursing research course. Thirty percent of students indicated involvement in research projects; however, the majority (66.6%) of these participants indicated that their involvement in research had been as research participants. Only two participants reported that they had been engaged in actual research projects as research assistants (Table 1.2). The study findings have been categorized into the PARIHS framework's components of evidence, context and facilitation as follows.

Evidence

Participants agreed that nursing students in general tend to view evidence as equivalent to research. However, they also acknowledged that there is a difference between evidence and research. In their view, evidence is more than research findings and data: it can include patient feedback, and clinical observations and experiences. The major themes identified in this category were: level of educational preparedness to understand the evidence, clinical experience, and expertise to use research evidence.

Level of educational preparedness.

The best-articulated definition of RU came from participant 1 in focus group 1. This participant defined RU as “the idea of the evidence informed decision making. It’s kind of using the most current and new and proven information to guide the decisions”. The majority (17/20) of participants said that they didn't have the necessary knowledge and skills for RU. The “Nursing Research” course is mandatory in the baccalaureate nursing curricula. Yet, after completing the research course, students felt ill-prepared to critique research studies skillfully or to determine their potential use in professional practice. The following explanation was offered by a student in the after degree program: “It is not as easy for us to base our practice on research findings; we need the appropriate education to recognize the necessary research process. A single course on research will not prepare us to understand and use research in practice” (Participant 4 in Focus group 1). The participants expressed the belief that RU requires more intensive and extensive research skills. However, according to one participant, undergraduate programs don’t help students to develop these skills. “The problem with research utilization for a student

is that most students don't understand how complex this is, because it's just really not taught" (Participant 3 in Focus group 3).

In contrast to the above belief, a participant in the honors program stated: "I am very fortunate ... to have had a lot of experience in research, and as a result I am able to discern what is quality research, what is research that should be incorporated into clinical practice." (Participant in Individual Interview). Another participant from the same honors program shared: "I'm in the honors program, so research is a part of who we are and what we do ... it's the amount of exposure to research that is much more important. I see how research makes change and it makes people's lives better" (Participant 5 in Focus group 3). These statements point to the importance of how immersion into research impacts attitudes towards it. In general all the focus group participants concluded that RU education is one of the basic and important principles for providing *research-based care*. They also believe that effective research education leads to research-based practice.

Clinical experience and expertise.

Educators who teach undergraduate nursing courses need to share with their students what to expect in a clinical setting and connect that to research-based knowledge. Participants in this study valued their accumulated practice experiences as nursing students. They viewed clinical practice experience as necessary to enable RU and a vital source of evidence for decision-making. As participant 4 in focus group 2 reported: "Experience is the best teacher and no matter what I read, the level of experience that I've had determines how much faith I put into what I read, how critical I am of what I read, and how comfortable I am applying that."

The participants also noted that lack of clinical experience during nursing education, lack of focus on continuing education in RU during the undergraduate nursing program and poor access to expert nurse educators leads to insufficient research use in clinical practice. As one focus group participant stated: “I think in general the more experience you have on a unit the more you have the opportunity to see things and then you can bring those experiences to seminars and lectures and link it to evidence based literature”(Participant 3 in Focus group 2).

Participants in this study valued their clinical experiences with expert clinical teachers. They commented that their clinical experiences gave them a critical lens from which to determine the utility of the research evidence to their particular patient or practice area. However, the majority of participants felt that they lacked confidence as to how to use research in practice. As one participant reflected, “students feel like they don’t have the foundational knowledge to do that” (Individual Interview participant).

Participants also regarded clinical nursing instructors as a source of support and guidance to understand evidence-based practice. However, some of the participants in the focus groups and individual interviews reported that some of the clinical nursing instructors lack research skills and they are not supportive, particularly “because [they] lack expert knowledge ... so if tutors [nursing instructors] are intimidating at all in the clinical setting we just shut up and try to do our best” (Participant 6 in Focus Group 1)

Context

The four sub-themes identified from the data analysis about context are organizational culture, lack of time, theory practice gap and evaluation of students’ performance.

Cultural context.

The structure and culture of the health care system were identified as important factors affecting students' utilization of research in clinical practice. Students considered "authority" as a pre-requisite in using research in clinical settings and as a critical factor in utilizing research to provide quality care and improve patient outcomes. One student said: "Hospitals have an impact on research use. There are units where you find lots of encouragement and there are units where you just keep quiet, don't get in their way and do not question what they are doing" (Participant 5 in Focus group 3).

Group dynamics were also identified as an important factor affecting whether nursing students embraced RU. As one participant said: "Hospital units where multidisciplinary healthcare teams work closely and have open communication foster RU among all health care providers. On the other hand, a lot of other units where lots of nursing research been done and we might even get a chance to get that information because of the dynamic of that group" (Participant 3 in Focus group 1). Participants reported that discussions with peers helped them express their views in a formal way, clarifying in their own minds how they had interpreted the research evidence and understood its potential application in practice. Consulting with peers or multidisciplinary team members required participants to be explicit about their decision-making. It also provided opportunities for students to evaluate the integration of new research evidence with respect to their personal practice theories, and to receive feedback on their proposed approaches. In summary, discussing clinical cases with others helped participants' and enhanced their abilities to integrate research into practice.

Lack of time.

In many studies, lack of time is cited as a significant hindrance to using research findings; therefore, findings about the lack of time in this study are not surprising. The participants mentioned that while in clinical practice, there is no time allowed to go to the library to search and read relevant research papers. Participants also said that even if research papers were readily available in the clinical area, there was not enough time during working hours to access and read them. Two participants stated that because of the heavy workload, they felt too mentally exhausted to do any reading after the end of their clinical practice time. As one participant shared: “If I am tired, I don’t bother to read up or think of work anymore. I go home and [I] just want to go to bed” (Participant 1 in Focus group 3). The majority of participants agreed that there should be protected time for students to search for and evaluate relevant research papers as well as discuss these during clinical pre/post conferences.

Theory practice gap.

Participants believed that the root of many problems in nursing is the wide gap between theory and practice. Participants in this study claimed that this gap leads to a lack of research use in practice settings. Participants believe that the gap between education and clinical practice affects RU. One participant stated that: “our academic education gives medical-centered theoretical knowledge from texts that are sometime not applicable in practice. I just feel like we do not actually apply all that we learn in theory classes” (Participant 3 in focus group 1). They highlighted what they saw as a lack of a professional relationship between the clinical nurse educator, clinical nurse specialist, and nurse researcher and identified this lack of relationship as one of the major reasons for

the theory-practice gap. One participant suggested a solution: “It is necessary for the nurse clinicians and the faculties of nursing [nurse educators] at the various nursing schools to have some sort of communication as the relationship between the two is important.” Participants engaged in a lively dialogue about poor professional relationships among nurse-researchers and clinical nurse educators. One participant stated that: “In nursing education, the most recent up-to-date research findings are available to students. However, when they enter the clinical setting, sometime the up-to-date research information (clinical practice guidelines) are not available or not used by the practicing nurses. It is for this reason that it is difficult for us (students) to use updated evidence (research) learned in school into the clinical setting” (Participant 7 in Focus Group 1).

Clinical evaluation criteria.

In this program, students are evaluated using a standardized form that reflects the entry to practice professional competencies of registered nurses in this province. A student’s overall performance is assessed based on categories drawn from graduate competencies of the RN and academic year-end outcomes. Evaluation items fall under five categories: 1) professional responsibility and accountability, 2) knowledge based practice, 3) ethical practice, 4) service to public, and 5) self-regulation.

Clinical nurse educators who are responsible to evaluate nursing students’ clinical performance don’t take into consideration whether or how the students used research in their clinical postings. Therefore, students see little value in using research; if they’re not being evaluated on it, it seems that it is not valued, even if it is one of the major components of the evaluation document. One participant stated: “research utilization is included in the nursing evaluation checklist. However, clinical educator[s] are not

including it in their evaluation. I am assessed only in my patient notes (routine work), rather than in my research-based care plans for the patients I developed” (Participant 4 in Focus Group 2). The focus group participants also agreed that if RU is not incorporated in the evaluation guidelines forms, students' motivation to use research would decrease. Participant 6 in Focus group 1 summed it up best when he said "if the clinical evaluation doesn't include research; the message is that it doesn't matter whether or not students use it".

Facilitation

The participants reported that educators' support is a key facilitator of RU in the clinical setting. Educators' support for research and their competency in research are the sub-themes identified from our analysis.

Educators support to use research.

Participants thought that being mentored impacted their abilities to integrate research into their practices. Mentoring serves as a catalyst for students to update their knowledge of current research and its impact on practice. As one participant stated; “[Nurse educators from the university] are expected to be very familiar with the literature that the students are reading so you are able to challenge them to critically appraise the literature and synthesize and apply the information to the case” (Participant in individual interview). Mentoring students demands articulation of knowledge, providing opportunities for students to acquire research evidence, and provides a forum to students to discuss the impact of research on practice. Nurse educators also facilitate reflective learning through questioning students' existing practices and inquiring about their clinical decision-making. Overall, the study participants valued mentorship because they believed

that it enhanced their own learning by challenging them to explicate and defend their practice theories, and by providing opportunities to model research retrieval and discuss using it in practice.

Educators' competency in research.

The majority of participants said that some nurse educators lacked the skills and knowledge necessary to facilitate students' use of the evidence in clinical settings and in providing patient care. As one focus group participant stated: I've never had a seminar where the educator shared research-based knowledge in the seminar discussion. As facilitator[s] they are not knowledge[able] translator [s]; they were just leading the group but research isn't translated over" (Participant 1 in Focus Group 3). Participants also mentioned that nurse educators, particularly those in the clinical setting who work with students to increase research use, help them become more confident, interested and motivated. However, students reported that few nurse educators seem interested in guiding them in this area. As another focus group participant reported: "Our nurse educator in our medical/surgical clinical rotation almost refused to guide us. Even when we had questions related to client interventions she always said, "well you have to figure it out" (Participant 5 in Focus group 2). Participants also believed that nurse educators should be trained to use evidence/research in teaching because nurse educators "who have strong research backing are more likely to bring it forward" (Participant 1 in Focus Group 2). Participants felt very strongly that the best way for them to gain RU knowledge was to be taught by nurse educators who are competent in the area.

Discussion

RU is essential in developing evidence-based practices (Polit and Beck, 2012). This study used the PARIHS framework elements of evidence, context and facilitation as the underlying theoretical structure (Stetler et al., 2011). Findings revealed that a range of different and multifaceted barriers negatively affect the RU process. Implementing research evidence involves many aspects and is often challenging (Helfrich et al., 2010). The findings from this study are similar to those of other studies regarding the extent to which nurses use research findings in practice as well as some of the barriers and facilitators relevant to RU. None of the study participants reported using research findings all the time to inform their practice, which was expected, although they were able to articulate a number of areas where they had based their practice on research. This result parallels that of Heikkila (2005) who found that RU was fair or poor among most nurses and nursing students, and that students' RU skills seemed to depend on the amount of RU instruction they had received. Participants in the current study also recognized that they lacked the skills and knowledge to use research evidence. Generally, the participants viewed their research skills as basic. Many believed that they lacked knowledge of the research process, which also hinders RU. From the participants' perspectives, having research knowledge plays an important role in enhancing their skills to evaluate and use research. These findings are supported by previous studies (Patiraki, Karlou, & Papadopoulou, 2004; Rodgers, 2000). To build their professional portfolios and be recognized as science-based providers, nurses need knowledge and skill in how to use research. With this knowledge and these skills come the power to change practice and benefit patient care (LaPierre, Ritchey, & Newhouse, 2004). Other authors have also

found that students received inadequate educational preparation in research (Halabi & Hamdan-Mansour, 2010; Salsali & Mehrdad, 2009; Wangenstein, 2010). The participants in our study acknowledged that they needed further support to improve the quality of nursing care they were expected to deliver. Previous studies also identified that education is one of the main factors underpinning changes and that research training is a key for academic departments to increase research capability and capacity (Ellis, Howard, Larson & Robertson, 2005; Wangenstein, 2010). Study participants also indicated that nursing students do not value nursing research, and are more task-oriented, which leads them to focus more on routine-based care. However, participants also said that they valued research and believed that research-mindedness creates innovation in nursing practice; they also claimed that constructing a research-friendly culture through appropriate infrastructure promotes the use of research in practice. Meijers, Janssen, Cummings, Wallin, Estabrooks, and Halfens (2006) reported a statistically significant relationship between RU and the research climate (i.e., the environment in which research use is encouraged and recognized).

Exploring the concept of context is challenging because the amount of time students spend in clinical settings and their scope of practice are limited. They are placed in clinical environments where they are not in a position to make many independent decisions, to challenge the status quo, and/or ask questions in situations in which they feel the practice is inappropriate. An environment or context in which research findings are available and their implementation supported was found to be a significant predictor for research use (Wallin, 2009; Wangenstein, 2010). Nurses working in contexts marked by a positive culture, strong leadership, positive evaluation and/or performance feedback

have reported significantly higher research use compared to those working in contexts lacking these elements (Cummings et al., 2007). Furthermore, Fink, Thompson and Bonnes (2005) concluded that creating environments that value research use is important for organizational success. It is well documented that in the nursing profession, environmental factors play an important role in research use.

Participants reported that a lack of time is a barrier to RU, a factor also cited in the literature (Andersson, Cederfjäll, Jylli, Nilsson Kajermo, & Klang, 2007, Gerrish & Clayton 2004, Hutchinson & Johnston 2004). Hutchinson and Johnston (2006) reported that nurses lack support from physicians, nurse colleagues, and other health-care staff, and that nurse leaders must take the initiative to create a culture of research use. Nurse educators play an important role in helping students to develop a positive attitude towards research and in creating situations in which students can use research findings in their practice.

In addition to the importance of a supportive cultural context, our study participants agreed that nurse educators should find a way to close the research practice gap. Cooperation between academic and clinical staff is one of the main drivers of the movement for research-based care. Some researchers confirm that collaborative exchanges between service and academia are essential and that there is obviously a real need for increased collaboration between researchers and clinical nurse educators willing to promote and support the use of research among nurses and students (Ajani & Moez 2011; Engelke, & Marshburn, 2006; Florin et al., 2012; Salsi & Meherdad, 2009).

There are still significant challenges in assisting students to overcome barriers and enhance their confidence and ability to read and use research in practice (Dobratz, 2003;

Johnson et al., 2010; Meeker, Jones, & Flanagan, 2008). Developing nursing students is a key role of nurse educators who should not only provide support and encouragement in the clinical setting, but should also strive to implement research findings and/or support research-based practice. Rycroft-Malone et al. (2004) contend that a supportive context or environment and adequate facilitation are needed to achieve research-based practice. In contrast, Rogers (1995) found that perceived support, in general, was not associated with RU, but that actual support was significantly correlated with RU.

Numerous studies have highlighted nurse educators' support or lack thereof when it comes to using research results (Florin et al., 2012; Halabi & Hamdan-Mansour, 2010; Wangensteen, 2010). Nurse educators should find creative and innovative teaching/learning strategies that stimulate and motivate students to understand how research relates to the real world of nursing (Mansour & Porter, 2008; Phillips & Bonsteel, 2010). The more interactive and experiential learning strategies nurse educators use to teach research, the more likely that students will be motivated to learn about research (Spires, Paul, Jennings & Weaver, 2012). McCurry and Martins (2010) found that small group work and collaboration with clinical courses are perceived as more effective ways to teach research courses than traditional assignments, such as critiquing research articles, library orientations on nursing databases and reading the textbook or listening to lectures by either faculty or clinical nurse researchers. Students need to be engaged in those very foundational activities that expose them to research language and structure in order to help, stimulate and inspire nursing students to continue to explore research (Irvine et al., 2008). These strategies help to engage students and foster their active participation in their own learning. Nurse educators could act as change agents and

facilitate nursing research by helping students and staff nurses to develop ways of implementing research findings, a strategy previously confirmed by Engelke and Marshburn (2006).

In addition, nursing research courses and concepts should be introduced into the curriculum as early as possible, since such courses and concepts improve students' positive attitudes toward nursing research. Early and extensive introduction to research can help to promote and encourage an appreciation for the discovery of new knowledge and its applications to practice. It is also recommended that students receive support and encouragement to use research findings, and read and critique scientific publications recommended by their educators. The nursing curriculum might need to be restructured to emphasize the importance of RU and incorporate content specific to RU theories (Spires, Paul, Jennings & Weaver, 2012).

Undergraduate honors nursing programs offered by some universities expose students to research throughout the duration of the program (Honors Program, 2016). Such programs give outstanding students the opportunity to create scholarly work and help them to use research in practice. This early and in-depth research exposure is more extensive than what occurs in traditional baccalaureate programs, and thus may better prepare students to use research during their nursing careers and foster readiness for graduate study. Faculties and schools of nursing should facilitate such programs, as these are essential to the growth of the profession. Moreover, a useful strategy would be to develop specific education programs that target the skills needed for facilitation as outlined by the PARIHS framework. Such a strategy would enhance a clinical nurse educator's ability to use research effectively in clinical teaching. Collaborative

mentorship programs between researchers and clinical nurse educators need to be established to enhance awareness of the research process and involvement in research activities. In addition, preceptorship education should also incorporate RU content for registered nurses mentoring students in the clinical setting. It may also be important to examine further the extent to which clinical educators pay or do not pay attention to RU when evaluating students. If RU is not often evaluated it will be critical to provide support to clinical faculty to ensure that they are prepared to undertake such evaluation and provide mentoring to students in this area.

Conclusion

Nursing students are expected to use research in their clinical practice and thus it is important to foster RU skills among nursing students not only in nursing research theory courses, but also in practice settings where RU's impact can be observed. This study adds to existing knowledge by exploring students' perceptions about RU. The findings of this study helped us to reach a better understanding of the factors influencing nursing students' RU. Our findings suggest that it is possible to modify several of those factors, thus improving the situation. Our study also provides new knowledge about the factors associated with nursing students' low RU. The transition from nursing student to a professional nursing role requires in part that students be well-equipped with research-based knowledge and skills. An increased focus on curriculum is necessary to improve the likelihood of early interventions aimed at increasing nursing students' RU and optimizing research-based care in health care facilities.

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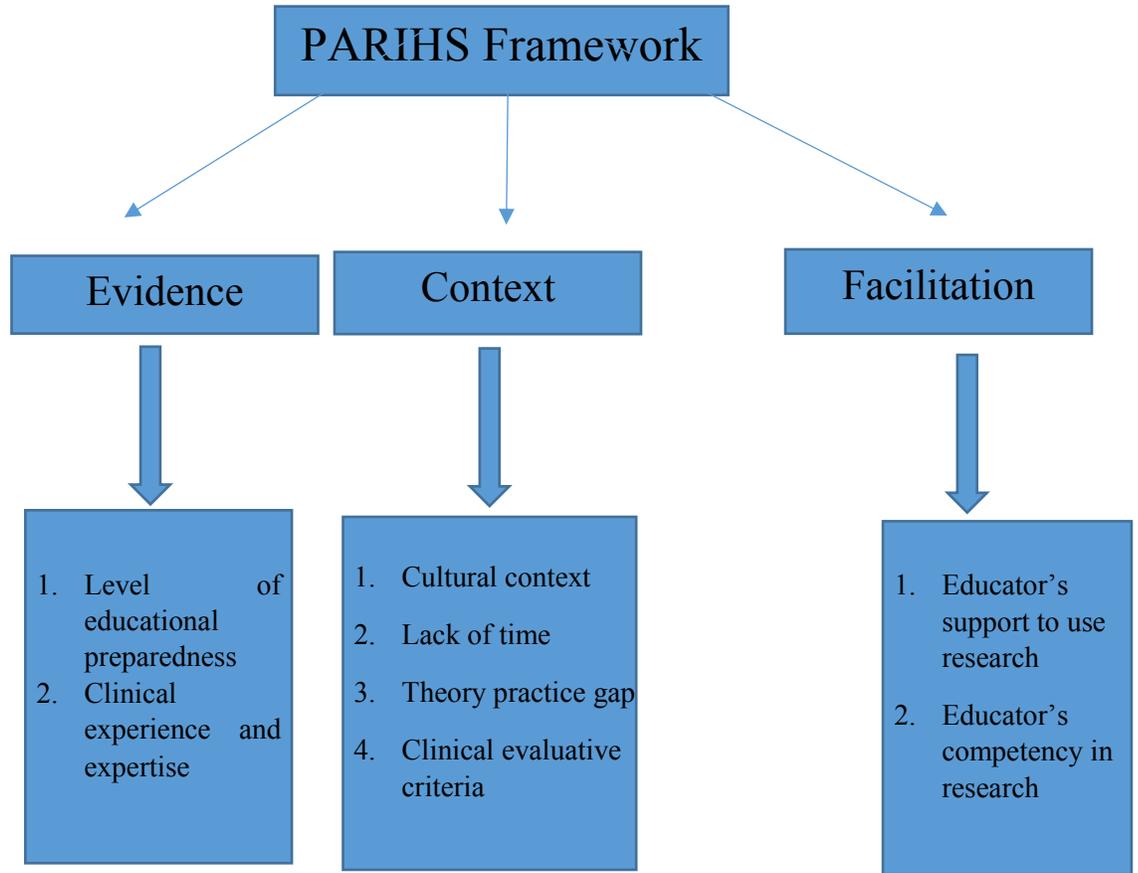


Figure 1: PARIHS Framework (Kitson, Harvey & McCormack, 1998; Rycroft-Malone, 2004).

Appendix A: Interview Guide

- What is your understanding of RU?
- Do you think RU is important in nursing?
- To what extent do you use research findings in practice?
- What are some examples where you have used research to inform your practice?
- What barriers did you experience that have prevented you and your colleagues from using research findings further in order to inform their practice?
- What are some strategies that would have enabled you and your colleagues to increase the use of research findings in practice?

Demographic Variables	Number of Participants (N =20)
Total Number of Participants in Focus Group	17
Total Number of Participants in Individual Interview	3
Number of Participants from four year basic program	5
Number of Participants from honors program	2
Number of Participants from accelerated program	13
Participants Age Range	20-30 years
Participants Completed required Nursing research Course	20 (100%)
Number of Participants Involved in Research Projects	6 (30%)
Number of Participants involvement in research as research participants	4 (66.66%)
Number of Participants engaged in actual research projects as research assistants	2 (33.33%)

Table 1.2: Demographic Data

Chapter 5

Paper 3: Methodological Challenges in Sequential Explanatory Mixed Methods

Research

Abstract

There is increasing interest in the field of mixed methods research and the diverse ways in which quantitative and qualitative methodologies can be systematically combined. In this paper, we discuss some of the challenges the lead researcher faced in undertaking a mixed methods research project. There are few examples of sequential explanatory mixed method designs in the literature. Based on those that have been studied, there is ambiguity in using and applying such methods. The fact that so few examples exist poses challenges to researchers who want to apply this methodology to research practice. The purpose of this paper is to discuss and clarify the design, procedures, rationale, strengths and challenges of using the sequential explanatory mixed methods approach. A specific example of the application of this model is provided for other researchers by reporting on a mixed methods sequential explanatory study of critical thinking and research utilization of undergraduate nursing students.

Keywords: mixed methods, quantitative, qualitative, methodology, sequential design

Introduction

Over the last couple of decades, pluralism in health care research has increased significantly, attracting a lot of attention not only from those who study health care, but also from decision-makers in the field. Championed by writers such as John Creswell, Abbas Tashakkori, Burke Johnson, Anthony Onwuegbuzie, Jennifer Greene, Charles Teddlie, and David Morgan, mixed-methods approach has emerged as a research design with a recognised name and identity (Denscombe, 2008). Mixed methods have evolved to the point that they are “increasingly articulated, attached to research practice, and recognized as the third major research approach or research paradigm” (Johnson, Onwuegbuzie, and Turner, 2007, p. 112). By definition, mixed methods is a procedure for collecting, analyzing, and “mixing” or integrating quantitative and qualitative data at some stage of the research process within a single study for the purpose of gaining a better understanding of the problem (Creswell, 2005; Tashakkori & Teddlie, 2003). The mixed methods approach incorporates a distinct set of ideas and practices that separate it from the other main research paradigms. It involves methods of inquiry as well as philosophical assumptions that guide the way in which data are collected and analysed, and the way in which QUAN and QUAL approaches are mixed in many phases of the research process (Creswell & Plano Clark, 2011).

In this paper, we discuss the significance of a mixed methodology and philosophical assumptions associated with mixed methods research, and briefly discuss how nursing research benefits from using a mixed methods design. Finally, to illustrate the methodological discussion, we outline the challenges/issues pertaining to mixed

methods research using the example of a doctoral project, “Relationship between Critical Thinking and Research Utilization of Baccalaureate Nursing Students.”

Paradigm Debate

Many researchers believe that research studies need to be situated in a selected paradigm. Morgan (2007) defined a paradigm as “the shared beliefs among members of a specialty area” (p. 50); it can be used to summarize researchers’ beliefs. In other words, a paradigm reflects researchers’ values, beliefs, and interpretation of reality. A paradigm influences the questions that researchers pose and the methods they employ to answer them (Morgan, 2007). On contrary Teddlie and Tashakkori (2006) claimed that a paradigm consists of stances that are defined by distinct elements, including epistemology (how we know what we know), ontology (nature of reality), axiology (values), and methodology (the process of research) Traditionally, researchers’ worldviews have been greatly influenced by the positivist paradigm (linked with QUAN methodologies) because that was the first research paradigm that incorporated ontological, epistemological, axiological, and methodological assumptions and principles. Many consider it to be the “gold standard” (Leech & Onwegbuzie, 2009). Positivism contends that truth is achieved by verifying and replicating observable findings. It subscribes to objective, observable, and measurable phenomena that can be readily generalized to other similar situations (Monti & Tingen, 2002). Later, researchers who refuted the quantitative paradigm’s assumptions and principles turned to the constructivist research paradigm (linked with QUAL methodologies). In contrast with positivism, the constructivism paradigm focuses less on observation and more on subjective ideas and experiences. (Monti & Tingen, 2002; Polkinghorne, 1983).

Traditionally, researchers have aligned themselves with either of these two paradigms because they argue that these paradigms present the only viable views of reality for research purposes. The QUAN research is linked to certain philosophical assumptions that differ from those linked to the QUAL research. This means that philosophically, it is not possible to combine them (Sandelowski, 2001a). Considerable debate exists in the literature about the issue of compatibility of combining QUAL and QUAN methods (Bryman, 2007; Morgan, 2007), leading to a generally accepted conclusion that the two approaches are mutually exclusive, incompatible, and parallel to each other (Sandelowski, 2001a). Some researchers are concerned with “methodological acrobatics” (Sandelowski, 2003, p. 335) and believe that rivalry between paradigms is not helpful, and that plurality of philosophical thought is desirable. Those who subscribe to this position propose mixed methods research as a third methodological movement over the past twenty years, complementing the existing traditions of quantitative and qualitative movements (Tashakkori & Teddlie, 2003). Mixed methods is guided by pragmatic philosophical assumptions that make it possible to mix the QUAL and QUAN approaches and suggesting that the most important question is whether the research has helped to answer the question and enhanced the understanding of the phenomena under study (Hanson, Creswell, Plano Clark, Petska, & Creswell, 2005).

Mixed Methods Research

Sociologists and cultural anthropologists were the first to start using mixed methods in their fields of study, early in the 20th century (Creswell, 1999; Johnson, et al., 2007). Since then mixed methods research has become more popular in many disciplines, including education (Johnson & Onwuegbuzie 2004; Onwuegbuzie & Johnson, 2004;

Rocco, Bliss, Gallagher & Perez-Prado, 2003), nursing (Morse 1991; Dzurec & Abraham 1993; Sandelowski, 2001b; Twinn, 2003) and other health sciences (Morgan 1998; Forthofer 2003), and program evaluation (Greene, Caracelli, & Graham, 1989; Rallis & Rossman, 2003), to name a few. The complexity of research questions/problems calls for answers beyond simple numbers (as is the focus of QUAN research) or words (as is the focus of QUAL research). Combining both forms of data makes it possible to analyse the problems more completely. This is the reason why mixed methods, as a research paradigm, is establishing itself alongside the positivist and constructive paradigms so that “we currently are in a three research methodological world, with quantitative, qualitative, and mixed methods research all thriving and coexisting” (Johnson et al., 2007, p. 117). The concept of mixing the paradigms was first observed in the work of Campbell and Fiske (1959) followed by Campbell and Fisk’s original work, Webb, Campbell, Schwartz, and Sechrest (1966), Denzin (1978) and Jick (1979). Other researchers recognized as mixed methods pioneers include Cook and Reichardt (1979) and Green et al., (1989) have generally been acknowledged for their consideration of the compatibility of QUAN and QUAL research, with their seminal typology of mixed methods use. Building on these foundations, “mixed methods research has evolved to the point where it is a separate methodological orientation with its own worldview, vocabulary, and techniques” (Tashakkori & Teddlie, 2003, p. x).

As a methodology, mixed methods is so popular that leading researchers Creswell and Plano Clark (2007) predict that soon it will be the leading paradigm in the world of research (Leech & Onwegbuzie, 2009). A number of researchers, including Creswell and Plano Clark (2007) and Tashakkori and Teddlie (1998, 2003), have contrasted mixed

methods with QUAN and QUAL methodologies, and argue that its defining characteristics involve using (a) QUAN and QUAL methods within the same research study; (b) a research design that clearly specifies sequencing the QUAN and QUAL elements of data collection and analysis; (c) an explicit explanation of the QUAN and QUAL aspects of the research with greater emphasis on the approach in which triangulation is used; and (d) using pragmatism as the philosophical underpinning for the research. Hunter (1989) called it as a more conventional research style which is distinctive in several ways. It can be positioned between the extremes of quantitative research and qualitative research, in attempting respectfully to the wisdom of both of these viewpoints while also seeking a workable middle solution for many research problems of interest. Both QUAN and QUAL research are important and useful. The goal of mixed methods research is not to replace either of these approaches but rather to draw on the strengths of both and minimize their weaknesses in single research studies and across studies.

Philosophical Assumptions in Mixed Methods Research

Philosophical assumptions in mixed methods research include acknowledging the worldviews that create the study's foundation, describing their elements, and relating these elements to specific procedures in the research (Creswell & Plano Clark, 2011). Creswell and Plano Clark used the term *worldview* (paradigm is used as a synonym) to describe these assumptions and stated that mixed methods researchers bring to their inquiry a worldview comprised of beliefs and assumptions about knowledge. These beliefs and assumptions inform the researchers' work.

Pragmatism is generally regarded as the philosophical partner of the mixed methods approach. According to Morgan (2007) the pragmatic approach is based on the version of abductive reasoning process where the researcher moves back and forth between deductive and inductive reasoning to explore the kinds of knowledge a research produced under the separate banners of QUAN and QUAL research. It offers the chance to produce a “properly integrated methodology for the social sciences” (Morgan, 2007, p. 73) and acknowledge the value of both quantitative and qualitative research methods and the knowledge produced by such research in furthering our understanding. Moreover, Pragmatism distinguishes the methodological approach from purely QUAN approaches that are based on a philosophy of positivism and purely QUAL approaches that are based on a philosophy of interpretivism or constructivism (Johnson & Onwuegbuzie, 2004; Maxcy, 2003; Rallis & Rossman, 2003). Pragmatists are “anti-dualists” (Rorty, 1999, p. ix), questioning the dichotomy of positivism and constructivism and calling for a union of quantitative and qualitative methods, emphasizing that they are not different at an epistemological or ontological level and that they share many commonalities in their approaches to inquiry (Hanson, 2008; Johnson & Onwuegbuzie, 2004). Taking a pragmatic and balanced or pluralist position will help improve communication among researchers from different paradigms as they attempt to advance knowledge (Maxcy, 2003; Watson, 1990). Pragmatism also helps to shed light on how research approaches can be mixed fruitfully (Hoshmand, 2003); the bottom line is that research approaches should be mixed in ways that offer the best opportunities for answering important research questions.

Based on the same philosophical assumption, we position ourselves as pragmatic researchers who view research as a “holistic endeavor that requires prolonged engagement, persistent observation, and triangulation” (Onwuegbuzie & Leech, 2005, p. 383). The philosophy of pragmatism has advanced the notion that the consequences are more important than the process and therefore “the end justifies the means” (Johnson and Onwuegbuzie, 2004, p. 17). When QUAN and QUAL research methods are used together, they produce more complete knowledge necessary to inform theory and practice. The pragmatic approach involves using the method that appears best suited to the research problem. Thus, pragmatism is pluralistic and oriented towards what works and appropriate to answer the research question.

Mixed Methods Design in Nursing Research

Nurses are increasingly encouraged to use research in their practice and education. Traditionally, the dominant research paradigm in nursing research was positivist (linked with QUAN methodologies). More recently, the constructivist research paradigm (linked with QUAL) has taken precedence (Johnson et al., 2007). The majority of nursing research is based on these two paradigms. However, nursing researchers have started to pursue knowledge creation and development using the mixed methods paradigm, as its use in nursing practice and education is undeniable. In its various forms, mixed methods research offers a versatile approach to understanding complex phenomena central to nursing practice and education. Using mixed methods to answer nursing questions may broaden the evidence base and enhance its applicability for both practice and education (Flemming, 2007). Mixed methods offers nurse researchers a methodology to address complex issues, which is more comprehensive than could be

achieved by either qualitative or quantitative research methods alone (Simons & Lathlean 2010, Andrew & Halcomb 2012). When deciding whether to use mixed methods, it is important to consider what additional value it would provide over using simply QUAL or QUAN methods of data collection, and whether mixed methods will do a better job at answering the research question (Creswell & Plano Clark 2011).

As described below, using both QUAL and QUAN data in our study produced a more comprehensive understanding about the relationship between critical thinking and research utilization (RU) and enhanced the clarity of the results we obtained using both methods. Connelly (2009) asserted that a mixed methods design is based on a pragmatic philosophy that a researcher ought to use an approach or combination of approaches that can appropriately address research questions. Furthermore, a mixed methods approach for our specific study helped us to achieve triangulation, complementarity, development, initiation, and expansion (Rocco, Bliss, Gallagher & Perez-Prado, 2003). *Triangulation* of data sources in mixed methods research creates a means for seeking convergence across quantitative and qualitative methods. Denzin (1989) advised, “By combining multiple observers, theories, methods, and data sources, [researchers] can hope to overcome the intrinsic bias that comes from single-methods, single-observer, and single theory studies” (p. 307). In our study, we achieved triangulation by using a QUAL qualitative interview and a quantitative questionnaire to assess students’ perceptions about critical thinking (CT) and RU. *Complementarity* increases a study’s validity and interpretability by effectively managing the overlap of different aspects of a phenomenon. An example of complementarity is the use of a qualitative interview to further explore nursing students’ views about the relationship between CT and RU, and to identify the

barriers and facilitators of RU in a practice setting. *Development*, on the other hand, uses results from one method to develop the other method. For example, quantitative surveys, California Critical Thinking Dispositions Inventory (CCTDI) and Research utilization (RU), were used to identify a purposive sample for more in-depth interviews to further explore the students' perceptions about CT and RU. To add depth and breadth to inquiry, mixed methods uses *initiation* to deal with inconsistent results from qualitative and quantitative research findings. *Expansion* is useful to "extend the breadth and range of the study" (Rocco et al., 2003, p. 259). Above all, using a mixed methods approach enriched our study findings in that it promoted clarity, produced more complete information, improved accuracy, and helped us to avoid biases.

Mixed Methods Research Design

To clearly identify the mixed methods research design, many authors have developed typologies or classification systems (Creswell & Plano Clark, 2007; Creswell, Tashakkori, Jensen & Shapley, 2003; Greene & Caracelli, 2003; Leech & Onwuegbuzie, 2009; Tashakkori & Creswell, 2007; Teddlie & Tashakkori, 2006). Tashakkori and Teddlie (1998) stated that the determination of a typology is "among the most complex and controversial issues in mixed methodology" (p. 680). There are about 40 mixed methods research designs reported in the literature (Tashakkori and Teddlie 2003). Creswell and Plano Clark (2011) recommend six major mixed methods designs that provide a useful framework for researchers. These include four basic mixed methods designs (convergent parallel, sequential design explanatory, sequential design exploratory, and embedded designs) and two designs that bring multiple design elements together (transformative design and multiphase design).

The mixed methods sequential explanatory design consists of two phases: the quantitative (QUAN) and qualitative (QUAL). The QUAL phase explains the initial results in more depth and/or enhances the QUAN results (Creswell & Plano Clark, 2011). The second, qualitative, phase builds on the first, quantitative, phase, and the two are connected in the intermediate stage of the study. The rationale for this approach is that the quantitative data and their subsequent analysis provide a general understanding of the research problem. In the follow-up explanatory model, using QUAL methodology, researchers identify specific QUAN findings, such as unexpected results, outliers, or differences between groups that need further exploration or vice versa. The qualitative data and their analysis allow researchers to refine and explain those statistical results by exploring participants' views in greater depth (Rossman & Wilson 1985; Tashakkori & Teddlie 1998; Creswell & Plano Clark, 2011). The strengths and weaknesses of this mixed methods design have been widely discussed in the literature (Creswell 2003, 2005; Creswell, Goodchild, & Turner 1996; Green and Caracelli 1997; Moghaddam, Walker, and Harre 2003). Advantages include straightforwardness and opportunities to explore the quantitative results in more detail. However, mixed methods research has some drawbacks and challenges, and therefore it is essential that researchers anticipate questions and/or criticisms for their chosen approach and are able to design and defend appropriate studies when required.

Mixed-Methods Sequential Explanatory Study

The study reported in this article investigated the relationship between the critical thinking dispositions (CTDs) and RU of nursing students enrolled in undergraduate nursing programs at a major university in western Canada. CT is a valuable skill in

nursing practice. Nurses need complex thinking skills to effectively manage the fast-paced and constantly changing health care environments in which they work. Many organizations recognize and support this need by identifying CT as an important part of the nursing role (Mundy & Denham, 2008; Simpson & Courtney, 2002; Twibell, Ryan & Hermiz, 2005). Several authors assert that CT skills reduce the research-practice gap and foster/support evidence-based nursing practice (e.g., Profetto-McGrath, 2005; Seymour, Kinn & Sutherland, 2003). Currently, the number of nursing-based research studies continues to grow; however, translating research findings into clinical practice is an ongoing pursuit and implementing evidence-based practice remains a challenge (Kajermo et al., 2010). Recently, CTDs have been identified as an important determinant of RU, but few research studies have been undertaken to support this link (Profetto-McGrath, Hesketh, Lang, & Estabrooks, 2003). Studies in this area report a modest positive correlation between CT and RU (Cobban & Profetto-McGrath 2008, Profetto-McGrath et al. 2003; Profetto-McGrath, Smith, Hugo, Patel, & Dussault, 2009).

In the first phase of our study, quantitative, numeric data was collected using the CCTDI (Facione, Facione & Giancarlo, 2001), the (2008) latest version of an RU survey initially developed by Estabrooks (1997), and a background/demographic data questionnaire. The second (qualitative) phase of the study focused on further exploring the results of the statistical tests obtained in the first, quantitative phase. As the authors wanted to explore and understand the stated phenomenon in its entirety, a qualitative descriptive design (Creswell & Plano Clark, 2011) was used to address the study questions. Below is brief description of the quantitative and qualitative phases of the study.

Quantitative Phase

As stated earlier, the goal of the quantitative phase was to investigate the CTDs and RU of students enrolled in baccalaureate nursing programs at a university in western Canada. For the quantitative data collection, a non-experimental cross-sectional design was used, which made it possible to collect and examine data simultaneously from two student cohorts enrolled in two baccalaureate nursing programs (collaborative and accelerated) at one point in time. Data were collected using the CCTDI, the (2008) latest version of an RU survey initially developed by Estabrooks (1997), and a background/demographic data questionnaire, developed to gather such data from study participants. Numerous studies have offered detailed explanations about the CCTDI and RU surveys (Estabrooks, 1997, 1999a, 1999b; Facione, Facione & Giancarlo, 2001; Meherali, Profetto-McGrath & Paul, 2015; Profetto-McGrath, 1999; Profetto-McGrath, Smith, Hugo, Patel & Dassault, 2009; Smith-Blair & Neighbors, 2000).

The population of interest for this study included undergraduate students enrolled in their final year of two baccalaureate nursing programs (Year 4 collaborative BScN and Year 2 accelerated BScN)). Descriptive statistics were completed using the RU and CTD scores. Parametric (Pearson's r) correlations were conducted to determine the relationship between RU and CTDs. A significance level of p value of .05 or less was set for all analyses *a priori*. A total of 180 (51%) nursing students participated in the study (Year 4 BScN = 82 and Year 2 After Degree students = 98). Overall there was no significant correlation between total CTD and overall RU ($r = .055$). A few studies reported a modest but significant correlation between CT and RU among newly graduated and experienced nurses (Profetto-McGrath et al., 2003; Wangenstein et al., 2011), 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' CTDs and RU. The most frequent type of research use reported by nursing students was conceptual. Open-mindedness, analyticity, self-confidence, and inquisitiveness were also significantly correlated with conceptual RU, suggesting that open-mindedness and traits including curiosity and an affinity for seeking out new information have obvious links to the behaviors required to sustain evidence-based practice standards. Meherali, Profetto Mc-Grath and Paul (2015) presented a detailed report of the quantitative results, highlighting the separate CCTDI and RU scores.

Qualitative Phase

In the second phase, a qualitative descriptive design (Sandelowski, 2000, 2010) was used to address the study questions, to further explore the nursing students' views about the relationship between CT and RU, and to identify the barriers and facilitators of RU in their practice settings. For this phase, we purposefully selected participants from those who had completed the survey. Semi-structured focus groups and individual interviews were conducted with 20 participants. A semi-structured interview guide was used to conduct the interviews. The guide was composed of open-ended questions shaped in part by the Promoting Action on Research Implementation in Health Services (PARIHS) framework and findings from the quantitative analysis. The questions were designed to collect information about the participants' perception of CT and RU. The interview guide was developed after the analysis of the quantitative data to understand the initial results in more depth. The following questions guided the study:

- To what extent do baccalaureate nursing students use research findings in practice?
- How do nursing students describe the impact of CT on their research use in their nursing practice?
- What barriers did you experience that have prevented you and your colleagues from using research findings further in order to inform your practice?
- What are some strategies which would have enabled you and your colleagues to increase the use of research findings in practice?

We audiotaped and transcribed verbatim each interview (Creswell, 2005). The data collection and analysis occurred concurrently. Soon after each focus group and individual interview the lead researcher transcribed the verbatim, and then coded the transcript to reveal broad or initial categories or themes. Field notes were also recorded immediately after each interview. These notes included reflections on the interview process, the participants' nonverbal behaviors, and initial themes that emerge from the interviews. We analyzed data inductively in search of themes, patterns, meanings, and understanding, but the overall PARIHS framework was imposed to derive themes that study participants identified as barriers or facilitators of RU in their practice setting. We used NVivo 10 software for the data management.

The first set of findings answered research questions that focused on the relationship between CTDs and RU. The two major themes identified were curriculum design and integrative teaching/learning activities that foster CT and RU among nursing students. Curriculum design was further defined as acquiring foundational concepts of nursing, progressing from simple to complex, and applying learning and research

evidence in the clinical area. Integrative teaching/learning activities included context-based learning, tests, case studies, simulations, and concept maps that foster CT and RU. The results showed that the majority of the students identified a positive change in CT skills over the course of the nursing program, suggesting that the curriculum design and integrative learning activities, in particular context-based learning, simulations, and clinical practice, may have had a positive impact on the development of CT skills and positive attitudes towards RU. The study also explored the factors that facilitate or obstruct RU in practice. The qualitative data were categorized using the PARIHS framework components of evidence, context, and facilitation. This categorization showed that the majority of students who participated in the focus groups did not engage in research activities and did not utilize research findings in their clinical practice. The participants recognized that they lacked the skills and knowledge necessary to use research; they said that they hadn't learned how. As one stated, "The problem with research utilization for a student is that most students don't understand how complex this is, because it's just really not taught." Participants also reported that educators' support is a key facilitator of RU, particularly in the clinical setting. One participant summed it up this way: "[University tutors] are expected to be very familiar with the literature that the students are reading so you are able to challenge them to critically appraise the literature and synthesize and apply the information to the case." In general, the participants viewed their research skills as being basic. Many said that they believe they lack knowledge about the research process, which in turn hinders RU. A detailed description of QUAL study findings focusing on RU by undergraduate nursing students has been reported elsewhere (Meherali, Paul & Profetto-McGrath, 2016, In Press).

Challenges in the Mixed Methods Sequential Explanatory Design

Despite its value, mixed methods research is not easy to conduct. It takes time and resources to collect and analyze quantitative and qualitative data. It complicates the research process and requires clear presentation so that readers are able to sort out the different procedures. Enough detail should be provided so that readers understand what was done and why. As Bartlett, Kotrlik, and Higgins (2001, p. 49) pointed out, “the procedures used ... should always be reported, allowing the reader to make his or her own judgments as to whether they accept the researcher’s assumptions and procedures.” This not only strengthens a study’s discussion and findings, but also contributes to the growth of a field (Rocco et al., 2003). Investigators are often trained in only one form of inquiry (quantitative or qualitative), and mixed methods requires that they know both forms (Creswell & Plano Clark, 2011). When designing and carrying out a mixed methods approach, it is crucial to consider priority, implementation, sampling, integration of the quantitative and qualitative approaches, and proficiency (Cameron, 2011; Ivankova, Creswell & Stick, 2006).

Priority

In the sequential explanatory design, priority is typically given to the quantitative approach because the quantitative data collection comes first in the sequence and often represents the major aspect of the mixed-methods data collection process. The smaller qualitative component is part of second phase of the study (Creswell & Plano Clark, 2011). In the study we completed, we gave priority to the quantitative data collection and analysis. Our decision was influenced by the study’s purpose: to identify the relationship between undergraduate nursing students’ CTDs and RU. CT and RU were the key

variables and we had access to quantitative measurement tools (CCTDI and the RU survey). Moreover, the quantitative results helped to identify whether a nursing student's CT was an important predictor of RU. The goal of the qualitative phase was to explore and interpret the statistical results obtained in the first, quantitative phase. In this phase, specific quantitative questions that needed additional exploration were used to guide the development of the qualitative phase. These qualitative questions included: why did students score low on CCTDI, were students' perception about the CT and RU different than the quantitative scores, what barriers did students experience that prevented them from using research findings further in order to inform their practice, and what were some educational strategies that would have enhanced their CT and RU? Specifically, the qualitative research questions were refined, purposeful sampling procedures were developed, and data collection protocols were established to extend our understanding of the quantitative results. As such, the focus of the qualitative phase was contingent on the quantitative results.

Implementation

Implementation refers to data collection and analysis procedures. In sequential explanatory designs, the researcher first collects quantitative data, analyzes the data, and uses the results to inform the qualitative data collection phase (Creswell & Plano Clark, 2011). The decision to follow the quantitative-qualitative data collection and analysis sequence in this design depends on the study purpose and the research questions seeking explanation of the statistical results (Green and Caracelli 1997; Creswell 1999). In addition, the researcher has to determine sampling for both phases. In sequential explanatory designs, the sampling occurs at two points: the quantitative phase and the

qualitative phase (Creswell & Plano Clark). Since the explanatory design aims to explain the quantitative results from the first phase, the qualitative phase participants should be the same as those in the initial, quantitative data collection (Creswell & Plano Clark).

In our study, we first collected the quantitative data using CCTDI and RU tools. The goal of this phase was to identify the CTDs and RU of undergraduate nursing students, and also establish the relationship between CTDs and RU. We then collected and analyzed the qualitative data to further explore the nursing students' views about the relationship between CTDs and RU, to identify the barriers and facilitators of RU in their practice setting, and to explore certain external and internal factors that hinder or foster CT and RU. Thus, the quantitative data and statistical results provided a general understanding of nursing students' CTDs and RU and the relationship between the two factors. The qualitative data and analysis secured the needed explanation on certain factors that either significantly or do not significantly affect participants' CTDs and RU.

Sampling

Sampling approaches that comprise decision-making about the sampling schemes and sample size are a pivotal aspect of any study. The samples selected for the qualitative and quantitative components should (a) generate adequate data pertaining to the phenomenon of interest under study (Maxwell, 1992); (b) help the researcher to obtain data saturation (Flick, 2009; Lincoln & Guba, 1985; Morse, 1995); and (c) allow the researcher to make statistical and/or analytical generalizations. In our study, it was somewhat challenging to recruit students as research participants for both the quantitative and qualitative phases. The major problem was that the many competing demands on students' time meant that we had to deal with non-participation and study dropout.

Recruiting students for the qualitative phase of the study was especially challenging and complex, because as per the sampling protocol, we wanted participants who had been involved in the quantitative phase. In addition, gaining participants was not the only goal for the qualitative phase: we needed participants who represented the student population and could express their thoughts and views on the phenomenon of interest explicitly, and provide the rich description that increases descriptive and interpretive validity (Maxwell, 1992). To address this challenge, the information about the study was communicated very clearly to students. The lead author visited all the classes and explained the study purpose to students face-to-face. She invited participants to fill out the survey forms in the class to avoid having them procrastinate. Using a direct approach to provide project details and recruitment information to the population of interest are more effective rather than passive approaches such as posting signs or flyers (Goldenberg, Owens, Pickar, 2007). Recruiting participants for the qualitative phase started simultaneously. When students filled out the survey tools, they were also asked to indicate if they were interested in participating in the second phase, and if so, to provide contact information so that the researcher could reach them once the quantitative phase was completed. Timing is an important factor when recruiting students for research projects. Given the many demands on their time, participating in research projects may need to be coordinated with schoolwork, family responsibilities, and other extracurricular commitments. Keeping this in mind, we started to recruit students for both the quantitative and qualitative phases at the beginning of a term. Starting early gave us time to recover from any response delays, low response rates, and scheduling conflicts. Because of time limitations, we were not able to recruit the maximum number of participants, but were able to recruit 50% of the

participants for the quantitative phase. However, because the sample was one of convenience sampling, bias may have existed, which limits the generalizability to other populations of baccalaureate nursing students. For the qualitative phase, we interviewed 20 participants, which was a sufficient sample to provide us with meaningful responses to the proposed research questions and achieve data saturation.

Integration

The basic purpose of mixed methods research is to integrate the quantitative and qualitative data to draw on the strengths of each. This requires the technical skill of knowing how to integrate numeric information with text or image information (Creswell et al., 2011). In mixed methods sequential designs, the quantitative and qualitative phases are connected (Hanson et al. 2005) in the intermediate stage when the results of the data analysis in the first phase inform or guide the data collection in the second. Another connecting point is the development of the qualitative data collection protocols, grounded in the results from the first, quantitative, phase. The results that required more depth and further explanation, were explored during qualitative phase of the study. In our study, we connected the quantitative and qualitative phases first at the intermediate stage, when we selected the participants for the qualitative interviews. Participants who participated in the quantitative phase of the study were invited to participate in the qualitative phase of the study. The second integration point was when we developed the interview questions for the second (qualitative) phase, using information we had gathered from the first (quantitative) phase (Creswell & Plano Clark, 2011). The quantitative analysis did not show a significant relationship between CT and RU. The qualitative phase was designed to allow us to better understand the participants' perceptions about CT and RU, whether

nursing students think that CT skills are important for RU, what barriers the nursing students experienced that prevented them from using research findings further to inform their practice, and what strategies would foster CT and RU? The majority of the participants agreed that CT is important for RU. The following explanation was offered by an accelerated program nursing student: “CT skills [are] important to look at and see what I am choosing (research or evidence) to guide my decisions.” Another participant said, “I think we use research more intelligently if we critically think about research. We critically analyse and [do] not take all information (research evidence) on its face value.” In general, all the focus group participants concluded that CT skills are basic and important principles for providing research-based care. They also said that students who are exposed to CT will be able to make clinical judgments based on research evidence. As one of the participants said, “CT skills give (sic) us a sense to differentiate between what we would consider good and significant research and guide me to make my clinical decisions based on credible research evidence.”

The participants revealed that a range of different and multifaceted barriers keep them from using research, thus negatively affecting the RU process. The majority of participants said that they didn't have the necessary knowledge and skills for RU. The following explanation was offered by an accelerated program nursing student: “It is not an easy for us to base our practice on research findings; we need the appropriate education to recognize the necessary research process. A single course on research will not prepare us to understand and use research in practice.” The participants expressed the belief that RU requires more intensive and extensive research skills. However, according to one participant undergraduate programs don't help students to develop these skills.

They listed the following as reasons for insufficient research use in clinical practice: a lack of clinical experience, lack of focus on continuing and in-service education in RU, and poor access to expert colleagues. As one of the participant in the focus group said, “I think in general the more experience you have on a unit the more you have the opportunity to see things and then you can bring those experiences to seminars and lectures and link [them] to evidence-based literature.”

Participants said that their clinical experiences gave them a critical lens from which to determine how useful research evidence was to their specific client or practice area. As one participant stated, “Clinical experience provide[s] more confidence and help[s] us to develop the CT skills needed to make decisions based on research.”

Participants also listed some teaching and learning strategies that influence the development of CT skills and RU, in particular clinical pre- and post-conference time to discuss different cases, faculty support and facilitation specifically in the clinical setting, reflection on clinical experience, context based learning, skills lab simulation learning and faculty competency in CT and RU. According to participants the above listed teaching/learning strategies helps in developing a positive attitude towards CT and research and creating possibilities to use research findings in their practice.

According to Ivankova, Creswell, and Stick (2006), it is difficult to comprehend the multi-staging design of mixed methods research, which normally includes two or more stages. A graphical representation of mixed methods procedures helps researchers visualize the sequence of the data collection, the priority of either method, and the connecting and mixing points of the two approaches within a study. In addition, the graphical illustration also helps the readers to understand the process by which the results

of both the quantitative and qualitative phases are integrated. The value of providing a visual model or table of the procedures has long been expressed in mixed methods literature (Creswell et al. 2003; Creswell, 2005; Creswell et al., 2011; Ivankova, Creswell & Stick, 2006; Morse, 1991; Tashakkori and Teddlie 1998;). In accordance with Creswell et al., (2011) and Ivankova, Creswell, and Stick (2006), we developed a table representing the mixed-methods sequential explanatory design procedures used for the illustrative study (Figure 2).

Summary of the design

Phase	Procedure	Product
Quantitative Data Collection	A non-experimental cross-sectional design, CCTDI and RU survey instruments (n=180)	Numeric data
Quantitative Data Analysis	SPSS software Descriptive Analysis Pearson's r correlations to determine the relationship between RU and CTD One-way analysis of variance and Kruskal-Wallis)-tests, to analyse the difference between the two cohort of students with regard to CT and RU.	Descriptive statistics for the CTDs and RU. The correlations between CTDs, RU and other demographic variables calculated using Pearson's r correlation. Parametric and nonparametric tests (one-way analysis of variance and Kruskal-Wallis) were performed to analyze the differences between the two cohorts of students with regards to CT and RU.
Connecting Quantitative and Qualitative	Purposeful sampling (participants participated in Quantitative survey) Developing interview questions guided by PARIHS framework and quantitative analysis	A purposive sample of 20 undergraduate students A semi-structured interview guide
Qualitative Data Collection	Focus group and individual interviews Field notes	Text data (transcripts)
Qualitative Data Analysis	Immersing and familiarizing self with data Making sense of data Questioning "What is happening here?" "What am I learning about this?" and "Why is this here?" Identifying codes and categories and linkages Grouping similar categories Identifying themes and pattern formation	Codes and themes Similarities and differences in themes and patterns Exploring relationships and patterns between data sources, concept mapping.
Integration of Quantitative and Qualitative Results	Interpretation and explanation of the quantitative and qualitative results	Discussion Implications Future research

Figure 2: CT and RU of Undergraduate Nursing Students: Mixed Methods Sequential Explanatory Design

Proficiency

The researcher's competency and proficiency can be challenged when utilizing mixed methods. A researcher who employs mixed methods needs to be competent in both QUAL and QUAN methods, and must also be informed and experienced in mixed methodologies. According to Teddlie and Tashakkori (2006), mixed methods researchers need to be methodologically bilingual and skilled in both QUAN and QUAL research methods. Cameron (2011) emphasized that mixed methods researchers need to be strongly grounded in their chosen QUAN and QUAL methodologies and associated paradigms, as well as mindful, knowledgeable, and fluent in the theoretical foundations of mixed methods. They must be cognisant of research designs and typologies, mixed methods sampling, data priority, implementation and integration, and the quality frameworks that have been developed for mixed methods. Bryman (2008) analysed studies in which the researchers utilised mixed methods and found that just under half did so by presenting the QUAL and QUAN data in parallel, and only very few (18%) genuinely integrated the two sets of findings. Hurmerinta-Peltomaki and Nummela (2006) and Cameron (2011) reported similar findings: that the majority (60%) of researchers used both QUAL and QUAN data-collection methods but analysed them within their own traditions (i.e., they analysed QUAN data using QUAN methods and QUAL data using QUAL methods). To enhance the competency in both QUAN and QUAL research, the first author completed graduate level courses in both QUAN and QUAL research. In addition, the other two authors (JPM and PP) are expert in conducting QUAN, QUAL, and mixed methods research. As mentioned above, to present the

findings comprehensively, we integrated the results from both phases and grouped them to fit the corresponding QUAN and QUAL research sub-questions

Conclusion

Mixed methods research is now viewed as the third methodological approach and an approach that has much to offer for the development of knowledge in health and social science research. The purpose of mixing methodological approaches is to provide researchers with the opportunity to gain a more complete understanding of research problems. Mixed methods approaches offer greater possibilities than a single method approach for responding to decision-makers and other stakeholders. In this paper, we discussed some procedural issues related to the mixed-methods sequential explanatory design. This design involves collecting and analyzing quantitative and then qualitative data in two consecutive phases within one study. Researchers who choose to conduct a mixed methods sequential explanatory study have to consider certain methodological issues, including the priority or emphasis given to the quantitative and qualitative data collection and analysis in the study, the sequence of the data collection and analysis, and the stage/stages in the research process at which the quantitative and qualitative phases are connected and results integrated (Creswell & Plano Clark, 2011). Although these issues have been discussed in the methodology literature and the procedural steps for conducting a mixed-methods sequential explanatory study have been outlined (Creswell 2003, 2005; Creswell & Plano Clark, 2011), some methodological aspects of this design procedure still require clarification. For example, how researchers decide on which method to assign priority in this design, how to consider implementation issues, how and when to connect the quantitative and qualitative phases during the research process, and

how to integrate the results of both phases of the study to answer the research questions. This article has provided an example of how the quantitative and qualitative components of a mixed methods study can be linked at all stages of the project, beginning with its design, continuing through its execution, and culminating in its presentation.

There is growing acceptance that mixed methods designs provide an appropriate way to address complex research problems. By building on the strengths and acknowledging and limiting the weaknesses of mixed methods, researchers can address complex problems in depth, and with creativity.

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Chapter 6

Discussion

Thus far in this dissertation, the importance of and need for critical thinking dispositions (CTDs) and research utilization (RU) in nursing and the rationale behind my interest in studying such important concepts have been introduced. The extensive literature review, presented in Chapter 2, has contributed significantly to my understanding of CTDs and RU. As well it provided me with additional ideas to articulate recommendations and areas for further research, all of which are presented later in this chapter. In this final chapter, I present an integration of quantitative and qualitative findings pertinent to the study questions within the context of the relevant literature, the study limitations, recommendations for nursing education/nursing faculty members, and suggestions for future research that will serve as part of a blueprint for my program of research.

The purpose of this mixed method sequential explanatory study was to identify the relationship between undergraduate nursing students' CT and RU and answer the following questions: What are the CTD and RU of baccalaureate nursing students? Is there a relationship between the CTD and RU of baccalaureate nursing students? How do nursing students conceptualize CT and RU in context? How do nursing students describe the impact of CT on their research use in their practicum courses? The quantitative survey questionnaire and focus group and individual interviews highlight the importance of undergraduate nursing students' CT and RU.

Critical Thinking of Undergraduate Nursing Students

The majority of the nursing students who participated in the quantitative 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 that include baccalaureate nursing students (Ip et al., 2000; May, Edell, Butell, Doughty, & Langford, 1999; Profetto-McGrath, 2003) (see Chapter 3 for detailed quantitative findings). However, the majority of participants in the qualitative study believed that CT skills and being logical were extremely important. The qualitative results also showed that a majority of the students who participated in the focus groups identified a positive change in their CT skills over the course of the nursing program. Martin (2002) reported that as people develop clinical nursing expertise and move from novice to expert by acquiring knowledge and experience (Benner, 1984), they also develop CT and use it consistently to make objective and appropriate clinical decisions. This suggests that CTDs can develop as nursing students advance through their school years (Agbedia, & Ogbe, 2014; Oh et al., 2011).

When asked for their definitions of critical thinking, participants mentioned “being able to look at the whole picture and reason through a situation and the possible causes of that situation (interpretation); analyzing the information by breaking it down into its pieces and bringing it back together to determine what needs to be done (analysis); going beyond the obvious, using all their knowledge to evaluate the situation and the possible solutions, and being able to foresee what the outcome would be for each action and then select[ing] the best one (evaluation, inference, and explanation); and the

ability to make corrections to their judgment and to learn from their mistakes (self-regulation).” A consistent finding from the interviews was that several aspects of the nursing curriculum did influence the development of the participants’ CT skills, in particular testing, case studies in context-based learning, skills lab simulations learning, and clinical experience. This finding is consistent with those studies that identified a positive change in critical thinking skills over the course of a nursing program, suggesting that curriculum design has a positive impact on the development of nursing students’ CT skills (Baker, 2002; Carter, Creedy & Sidebotham, 2016; Facione, 1997; Klunklin, Viseskul, Sripusanapan & Turale, 2010; Kong, Qin, Zhou, Mou, Gao, 2014; LaMartina & Ward-Smith, 2014; Lee, Lee & Wong, 2010; McCarthy, Schuster, Zehr & Mcdougal, 1999; Miller, 1992; Thompson & Rebeschi, 1999).

The most consistent strategies that foster CT mentioned by the participants in the study were case studies in context based learning, skills lab simulation learning, and clinical experience. The participants in the study demonstrated a link between context based learning (CBL) and CT by actively searching for information, expressing their views in discussions and presentations, and being able to retain their lessons in their long-term memory. This is congruent with a previous study revealing that CBL engages students in activities that facilitate the development of several skills essential for future practice in nursing, including decision-making, CT, leadership, communication, giving and receiving feedback, and information processing (Dochy, Segers, Van den Bossche, & Gijbels, 2003; Kaddoura, 2011; Khoiriyah, Roberts, Jorm, Van der Vleuten, 2015; Lowenstein & Bradshaw, 2004; Shahin & Tork, 2013; Young & Paterson, 2007; Zhang, 2014). The study participants also mentioned that case studies used in CBL are important

in the development of their CT skills and the integration of research and evidence based practice. The goal in developing case studies like a story is for others to feel connected to persons in the story and to use thinking similar to that used in real situations when considering how to provide nursing care. Lunney (2008) maintained that the benefit of case studies is that they provide students with extra practice in clinical decision-making (CDM) outside the clinical environment. Several participants in my study reported that the case study that they presented to their peers in seminars helped them to pull together in one package everything that they had been taught during the nursing program. This gave them an opportunity to develop a plan of care based on current research and evidence for the patient that evolved from the various pieces of information gathered while caring for the client.

Another factor the study participants attributed in the development of CT is the use of simulation in the skills lab to learn clinical skills. According to Jeffries (2008) simulation experiences are needed in nursing education to accommodate the lack of clinical site availability, low patient census in some clinical areas, and nursing faculty shortage. Medley and Horne (2005) agreed that simulation experiences enhance the learning environment by providing students with an opportunity to develop similar skills, knowledge, and practice. Brannon, White, and Bezanson (2008) suggested that the human patient simulation method, as compared to lecture, resulted in a gain in knowledge of content for students but found no indication of significant differences between the two instructional methods. However Shin, Ma, Park, Ji, & Kim (2015) study findings showed a significant increase in nursing students CT in terms of prudence, systematicity, healthy skepticism and intellectual eagerness who attended simulation sessions using the

courseware. Study participants of current study also reported the benefits of experiencing different patient care situations in an environment where they had time to think and reflect about what was going on, what knowledge and skills they brought to the situation, and different options available to them in clinical decision-making, all in a safe, controlled environment.

The major factor in developing CT and RU that the participants in this study expounded upon was applying learning in the clinical area or clinical experience. Since a significant amount of the student's time is spent in the clinical area or preparing for the clinical area, this was not a surprising finding. Most students reported that they did not really learn until they had hands-on experience. The clinical practice helped the students to pull the "puzzle" together because they applied what they learned in the academic setting to a real-life situation. Learning to think critically about one's work is a large part of nursing. Critical thinking occurs continuously, expands with experience, and eventually becomes second nature. Etheridge (2007) examined how recent nursing graduates perceive the way they were taught how to make clinical judgments. These graduates identified that the most helpful strategy for learning to think like a nurse was being in a clinical setting with patients and having a variety of experiences. It was in the clinical setting that the correlation between classroom learning and actual practice occurred.

Participants also mentioned that reflective activity during clinical post-conference time was an essential aspect of clinical practice. The students agreed that meeting at the end of the day to discuss the real-life situations that occurred during an acute-care clinical rotation was a valuable CT activity (Alphonso, 2007). The reflective activity helped them

to explore their actions and feelings and examine evidence-based literature, thus bridging the gap between theory and practice (LaMartina, & Ward-Smith, 2014). Participants agreed that reflective activity during the clinical post-conference also provided the opportunity for them to change their way of thinking or practicing, because “when we reflect on an incident we can learn valuable lessons from what did and did not work.” In this way, students developed self-awareness and skills in CT and problem solving (Alphonso, 2007; LaMartina, & Ward-Smith, 2014).

Research Utilization of Undergraduate Nursing Students

The quantitative results indicate that on average, nursing students use 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, Hesketh, Lang, and Estabrooks’s (2003) studies that investigated practicing nurses (see paper 3 for detailed quantitative findings). The qualitative findings also revealed that the majority of the students who participated in the focus groups did not participate in research activities and did not utilize research findings in clinical practice. Very few students are motivated to read research-based articles and use that information in nursing care. The findings also indicate that insufficient knowledge about RU was the most prominent reason that students did not use research findings (see Chapter 4 for detailed qualitative findings).

Relationship Between Critical Thinking Dispositions and Research Utilization.

In the quantitative analysis, we did not find a significant correlation between overall CTD and RU scores (see Paper 3 for detailed quantitative findings). However, the participants in the qualitative study revealed that CT and RU are both incredibly important for nurses. Participants also agreed that intellectual curiosity is important,

especially in professional areas where the knowledge base is constantly expanding. They said that as healthcare providers they need to be informed and able to make clinical judgments, based on research evidence, about good practice for their patients and their patients' families. They must have the ability to evaluate information and situations critically by using their CT skills and disposition (see Chapter 5 for quotations). Several nurse theorists have referred to the importance of CT in nurses' utilization of research (e.g., Amanda, 2016; Profetto-McGrath, 2003; Profetto-McGrath et al., 2005; Profetto-McGrath, Smith, Hugo, Patel, & Dussault, 2009; Schmidt & Brown, 2015; Sullivan, 2012; Tajvidi, Ghiyasvandian & Salsali, 2014). CTD is a central notion for nurses who work as scientific practitioners, and using research is an essential element of their practice. Nurses who think critically are more likely to better interpret the available evidence and, based on that, make high quality judgments and draw valid inferences (Profetto-McGrath et al., 2003; Melynk, Gallagher-Ford, Long, & Fineout-Overholt, 2014). Moreover, nurses who think critically remain open-minded, are proficient in critiquing the available evidence and the practice based on that evidence, interpret and evaluate the effectiveness of practice, and search for the evidence that is more suitable and applicable in a given context (Profetto-McGrath et al., 2003). The qualitative findings also revealed that a range of different and multifaceted barriers negatively affect the nursing students' RU process. Implementing research evidence involves many factors and is often challenging (Helfrich et al., 2010). To the extent to which nurses use research findings in practice, as well as some of the barriers to and facilitators of research utilization, the findings from this study are similar to those of other studies. None of the study participants said that they use research findings all the time to inform their practice,

which was expected, although they were able to articulate a number of areas where they had based their practice on research. This result is parallel to that of Heikkila's (2005) study on RU. Heikkila found that RU was fair or poor among most nurses and nursing students, and that students' research utilization skills seemed to depend on the amount of instruction. Heikkila's participants also recognized that they lacked the skills and knowledge necessary to use the evidence. In general, the participants viewed their research skills as basic. Many believed that they lacked knowledge of the research process, which also hindered their RU. From the participants' perspectives, having research knowledge could have helped them to enhance their skills to evaluate and use research. These findings are supported by previous studies (Halabi & Hamdan-Mansour, 2010; Patiraki, Karlou, & Papadopoulou, 2004; Rodgers, 2000; Ryan, 2016; Salsali & Mehrdad, 2009; Wangenstein, 2010). Knowledge about and skill in research use is needed to build nurses' professional portfolios and recognition as science-based providers. With this knowledge and these skills come the power to change practice and benefit patient care (LaPierre, Ritchey, & Newhouse, 2004).

Study Limitations

Limitations Affecting Internal and External Validity

There are limitations to be considered in interpreting the data in this study. First, the quantitative sample was one of convenience and the number of students who chose to participate was only 51% of the total population; therefore, a sampling bias may have existed, which limits the generalizability to other populations of baccalaureate nursing students. Those who chose to participate may have been similar to or quite different from the non-participants in the areas of CTDs, RU, and some of the background/demographic

variables. Except for a few variables such as gender and age, which were available for the total population, there was no way to ascertain how participants differed from non-participants.

Secondly, testing bias may have been a factor in this study. Daily fluctuations in the mood of the students and their attitude toward completing the questionnaire, inventory, and test may have affected their performance on the California Critical Thinking Disposition Inventory (CCTDI) and the RU and the accurate completion of their background and demographic data. Although these factors were beyond my control, it is assumed that the participants responded to all the items in a truthful manner, and to the best of their abilities.

Thirdly, the conditions of testing may have varied slightly from group to group in relation to directions given, as well as environmental factors such as noise. Data collection was completed in different classrooms across campus, and sometimes was done at the beginning of the class. The students who did not participate in the study were also present, which made the physical environment noisy for the study participants who were filling out the survey forms. These diverse conditions may have influenced participants' ability to concentrate and accurately respond to questions on any of the three instruments.

Fourthly, the quantitative phase of this study used a cross-sectional design and thus did not permit the assessment of CTDs and RU with the same students over a period of time (i.e., one academic year), nor did it permit specific entry and exit periods. The participants' scores may have increased or decreased significantly or remained unchanged from one year to the next and/or from entry to exit.

Lastly, although an extensive range of participants' views and experiences were studied in qualitative phase of this study, data were only collected from the student nurses who were in the final year of study, required them to reflect on their past experiences. The qualitative findings have indicted some potential influencing factors that may be worth exploring with a larger, more representative group of nursing students.

Recommendations

Implications/Recommendations for Nursing Education and Nurse Educators.

Nurse educators must initiate dialogue and create functional structures that allow them to share with one another their individual conceptualization of CT and RU. They must consider the role of CT and RU in their courses and clinical practice, and how they assess and measure it. Nurse educators should initiate seminars that focus on CT and RU, structure classes to promote CT and RU, and construct effective written and other types of assignments and critically analyze how much emphasis they place on how to think (process) versus what to think (content). They also need to scrutinize curriculum plans, course structures, course assignments, and teaching strategies to ascertain how CT and RU are defined and operationalized, and how their progression as part of curriculum structures is nourished or obstructed.

The undergraduate honors nursing program offered by some universities exposes students to research throughout the duration of the program. It gives outstanding students the opportunity to create a scholarly work and helps them to use that research in practice. This early and in-depth research exposure to research better prepare students to utilize research during their nursing career and foster readiness for graduate study. Faculties and

schools of nursing should facilitate such programs that are essential to the future growth of the profession.

Some authors have suggested that there is a strong association between role modelling, mentorship, and the students' level of CT and RU (Halabi & Hamdan-Mansour, 2010; Profetto-McGrath et al., 2009; Shim & Walczak, 2012; Wangenstein, 2010). I also agree that nurse educators need to explore this relationship and consider how they role model CT and RU both in the classroom and in the practice setting. Nurse educators need to foster a culture of reasoned thinking and evidence-based inquiry in classroom and clinical setting. This can be achieved through exemplary practice in program design, course design, and teaching assessments for CT and RU. In addition, nurse educators should evaluate processes as well as results. Although completed papers or projects can be evaluated for grades, the process must also be appraised, to cultivate CT and reinforce RU. Nurse educators should also foster cognitive virtues such as inquisitiveness, open-mindedness and systematicity. To sustain high caliber work rather than substandard or minimal performance, rewards, reinforcements, and support need to flow to individuals who are capable and who aspire to think (Facione, Facione & Giancarlo, 1996).

Nursing faculty members should be given professional development opportunities on how to teach the research process in the classroom and clinical setting, and also how to be research mentors. Faculty who have benefited from this type of continuing education are more likely to champion research utilization in the clinical settings where they teach students. (Foss, Kvigne, Larsson & Athlin, 2014). In turn, this would probably increase students' understanding of the value of research utilization.

Collaboration between the University (academia) and hospital (nursing practice) also improve nurses' and nursing students' use of research findings in clinical practice (Foss et al., 2014; McCormack 2011). The professional relationship between the clinical nurse educator, clinical nurse specialist, and nurse researcher will provide more opportunities to nursing students to practise the use of research findings together with clinical nurses. This would probably help to close the research practice gap. Universities the health care sector should develop strategies to strengthen this collaboration to support students' learning and increase research utilization by students and health care staff.

Recommendations for Future Research

Based on this study, recommendations for future research include the following areas/topics:

1. Replication studies need to be conducted with groups of randomly selected baccalaureate nursing students from various programs across Canada using CCTDI, RU, and background/demographic instruments.
2. Longitudinal studies, including the same cohort of baccalaureate nursing students from years 1 through 4, should be carried out to ascertain whether there is a change in students' CTD and RU upon completing a program.
3. Investigations should be undertaken to compare the CTDs and RU of baccalaureate nursing students who complete accelerated programs and those enrolled in standard four-year (regular and honors) baccalaureate programs.
4. Correlational studies should be initiated to determine the relationship between students' CTDs and RU based on the completion of available instruments, and their behaviour in various settings such as small group activities and clinical practice.

5. A mixed methods study should be initiated to investigate the CTDs and RU of nursing students compared to the CTDs and RU of students enrolled in other health disciplines. The study should look at the students when they enter and complete their respective programs.
6. Investigations should be undertaken to assess the impact of nurses' CT and RU abilities on quality of care and also on patient outcomes such as shorter length of stay in acute care facilities, decreased rates of re-hospitalization, and decline in the number of adverse events such as development of infections and incidence of falls.

Conclusion

The results of this study indicate that the vast majority of nursing students who participated had low levels of CTDs and RU. The results also reinforce the need for students' continued development in 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 to education and practice is indisputable. Nurse educators are an untapped resource in educational organizations. They can foster a culture of evidence-based practice by using a variety of teaching and learning strategies. Reconfiguring their role and providing education and support to enhance their CT and research knowledge and skills are important strategies for the pursuit of an evidence based nursing practice in organization.

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APPENDICES

Appendix A : Permission Letter

April 17, 2014
Dr. Wendy Duggleby
Nursing Research Chair Aging and Quality of Life
Faculty of Nursing
Edmonton Clinic Health Academy

Dear Dr. Duggleby

I am Salima Meherali, a doctoral candidate at University of Alberta Faculty of Nursing, Edmonton, Canada. I am conducting a study entitled *Research utilization and critical thinking of Undergraduate nursing students* under the supervision of Dr. Joanne Profetto-McGrath (Professor) and Dr. Pauline Paul (Associate Professor) at UOA

This study aims to identify the critical thinking dispositions and research utilization of undergraduate nursing students, identify the relationship of Critical thinking Dispositions (CTDs) with Research utilization (RU) of undergraduate nursing students, and to describe the impact of critical thinking on research utilization of undergraduate nursing students. The study will be conducted in two phases; a quantitative data collection phase followed by a qualitative data collection phase (focus group and individual interviews whichever is most convenient).

I would like your permission to collect data from undergraduate nursing students enrolled in the last year of their baccalaureate nursing programs. Findings from the study will determine the relationship of CTDs and RU and impact of CT on RU among baccalaureate nursing students. Informed consent will be obtained from all study participants. The questionnaire is completely anonymous and participation in the study is voluntary. The quantitative phase will take 30-40 minutes to complete while the focus group interviews will take 45-75 minutes. The data from this study will be treated as confidential and kept in a locked filing cabinet inside a locked office, while the soft data will be in password protected throughout the completion and publication process of the research. Access to the questionnaire is restricted to only me and my supervisors. The identity of the participants will be kept confidential during and after the completion of the study. If permission is granted, the data collection will be during September 15- November 30, 2014 after the ERC approval.

The salient features of the study are outlined in this request. For complete information pertaining to the study, please refer to the enclosed full proposal, and ethics application. Please find below an executive summary of the proposed study.

Purpose

The purpose of this study will be to identify the relationship between CTD and RU of nursing students enrolled in collaborative, bilingual and after degree baccalaureate

nursing program at the University of Alberta. It is also the purpose of this study to identify nursing students' perceptions about CT and its relationship to RU.

Research questions

What are the CTD and RU of collaborative, bilingual and after degree nursing students in last year of their nursing program?

Do the CTD and RU differ among collaborative, bilingual and after degree nursing students?

What is the relationship between CTD and RU of undergraduate nursing students?

How do nursing students conceptualize CT and RU in their context?

How nursing students describe the impact of CT on their research use in their practice setting?

Overview of method:

This study will use one of the most popular mixed methods research designs: sequential explanatory. This design consists of two distinct phases beginning with a quantitative phase followed by a qualitative phase for the purpose of exploring and extending the initial results in more depth.

Sample Size

Data will be collected from all final year baccalaureate nursing students

Dissemination of findings:

Local and provincial conferences

Manuscripts submitted for publication in peer reviewed, high impact nursing, and interdisciplinary health education journals.

Thank you for considering this request. Should you have any further questions or require additional documentation please do not hesitate to contact me at meherali@ualberta.ca or my supervisors Dr. Joanne Profetto-McGrath at joanne.profetto-mcgrath@ualberta.ca or Dr. Pauline Paul at ppaul@ualberta.ca.

I look forward for your support in this regard.

Sincerely,

Salima Meherali
PhD Candidate
University of Alberta
Faculty of Nursing

Appendix B: Introductory Letter/Email to Study Participants

Study title: Research utilization and critical thinking of undergraduate nursing students

Co-Investigator: Salima Meherali RN, MSN, PhD Candidate

Co-Supervisors:

Dr. Joanne Profetto-McGrath PhD, RN Professor and Acting Dean Faculty of Nursing
Level 3, Edmonton Clinic Health Academy
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pauline.paul@ualberta.ca

Dear _____

I am a doctoral candidate in my fourth year of the PhD in nursing program at the Faculty of Nursing, University of Alberta. As part of my program I am investigating the critical thinking dispositions and research utilization of undergraduate nursing students. This information will be useful to you for your own assessment, to nurse educators and to the Faculty of Nursing. The study will be conducted in two phases. In phase one quantitative data will be collected using three forms: The Background/Demographic Data Questionnaire, The California Critical Thinking Disposition Inventory (CCTDI), and The Research Utilization (RU) survey. In phase two qualitative data will be collected using focus group or individual interviews to gain in-depth understanding of critical thinking and research utilization.

It will take approximately 30-40 minutes to complete the three forms which include: A background/demographic questionnaire, The California Critical Thinking Disposition Inventory (CCTDI) and the Research Utilization survey questionnaire.

It is important for you to know that you can choose not to take part in the study. Choosing not to participate in this study will not affect your grades or your status as a student. You may refuse to answer any questions you do not want to answer and still

remain in the study. You may withdraw at any time. You have the option of removing your survey answers from the study. The researchers will withdraw you from this study if you contact either of them with this request.

You are not required to sign consent for phase one of the study. Your consent to participate is implied if you complete and return the survey forms. By completing the survey forms, you are indicating that you have read the information in this information letter and have had a chance to ask any questions you have about the study. If you want to participate in phase two please let me know by email me at meherali@ualberta.ca with your choice to participate in focus group or individual interview.

All information collected will be kept confidential. Your name will not appear on any of the three forms therefore your name will not be associated with any information obtained and used. All the materials related to this research study will be kept in a locked and secure location. Group results of the study will be used for educational purposes and may be shared with others verbally (ex. presentations) and in writing (ex. article).

The information collected for this study may be used for future study to answer other questions and/or for teaching purposes. If this happens, the new study will be submitted to the ethics board. Your name will not be used in any of these situations. If you have any questions about the study, feel free to contact any time. You may ask questions to Salima Meherali, Tel: (780) 217-2836 or e-mail at meherali@ualberta.ca or Dr. Joanne Profetto-McGrath, Tel: (780)492-1597 or Dr Pauline Paul Tel: (780)492-2551. If you have any concerns about your rights as a study participant, you may contact Health Research Ethics board at the University of Alberta at (780) 492- 0459. This office has no direct affiliation with the study investigators.

Appendix C: Demographic Data Sheet

Title of Study: Research utilization and critical thinking of undergraduate nursing students

Please provide me with some of your personal information.

It will take about five minutes to complete this data sheet. I will handle all information provided in a confidential manner.

Thank you in advance for completing this data sheet.

Code # _____ Gender: Female _____ Male _____

Age range in years: 20-30 31-40 41-50 51-60

Mother Tongue: English other Specify _____

You are enrolled in which undergraduate nursing program?

BScN Collaborative Program BScN Honors Program BScN Bilingual Program

BScN After Degree Program

Have you ever attended a course specifically designed to teach you to think logically, to improve your reasoning, or to sharpen your critical thinking skills: Yes No

Have you had the opportunity to be involved in any research project: Yes No

If you answered yes to the above question, what was your role in the research project(s)?

Any additional information you wish to share?

For After Degree Students only:

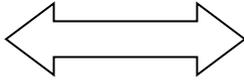
Your previous undergraduate degree was: _____

Appendix D: The California Critical Thinking Disposition Inventory

CRITICAL THINKING DISPOSITION INVENTORY

CODE

We would like to know what you think about the following statements. Please mark the circle that most closely corresponds to the way you feel about the statements, ranging from “strongly disagree” to “strongly agree”. Please do not read ahead, just read each statement and mark in the circle. **Either pen or pencil is fine.**

	Strongly Disagree				Strongly Agree	
Considering all the alternatives is a luxury I can't afford.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Studying new things all my life would be wonderful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The best argument for an idea is how you feel about it at the moment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My trouble is that I'm easily distracted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It's never easy to decide between competing points of view.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It bothers me when people rely on weak arguments to defend good ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The truth always depends on your point of view.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It concerns me that I might have biases of which I'm not aware.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I always focus the question before I attempt to answer it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm proud that I can think with great precision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We can never really learn the truth about most things.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If there are four reasons in favor and one against, I'd go with the four.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Men and women are equally logical.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice is worth exactly what you pay for it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most college courses are uninteresting and not worth taking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Tests that require thinking, not just memorization, are better for me.	<input type="radio"/>					
I can talk about my problems for hours and hours without solving anything.	<input type="radio"/>					
Others admire my intellectual curiosity and inquisitiveness.	<input type="radio"/>					
Even if the evidence is against me, I'll hold firm to my beliefs.	<input type="radio"/>					
You are not entitled to your opinion if you are obviously mistaken.	<input type="radio"/>					
I pretend to be logical, but I'm not.	<input type="radio"/>					
It's easy for me to organize my thoughts.	<input type="radio"/>					
Everyone always argues from their own self interest, including me.	<input type="radio"/>					
Open-mindedness has limits when it comes to right and wrong.	<input type="radio"/>					
It's important to me to keep careful records of my personal finances.	<input type="radio"/>					
When faced with a big decision, I first seek all the information I can.	<input type="radio"/>					
My peers call on me to make judgments because I decide things fairly.	<input type="radio"/>					
Being open-minded means you don't know what's true and what's not.	<input type="radio"/>					
Banks should make checking accounts a lot easier to understand.	<input type="radio"/>					
It's important to me to understand what other people think about things.	<input type="radio"/>					
I must have grounds for all my beliefs.	<input type="radio"/>					

Reading is something I avoid, if possible.	<input type="radio"/>					
People say I rush into decisions too quickly.	<input type="radio"/>					
Required subjects in college waste time.	<input type="radio"/>					
When I have to deal with something really complex, it's panic time.	<input type="radio"/>					
Foreigners should study our culture instead of us always trying to understand theirs.	<input type="radio"/>					
People think I procrastinate about making decisions.	<input type="radio"/>					
People need reasons if they are going to disagree with another's opinions.	<input type="radio"/>					
Being impartial is impossible when I'm discussing my own opinions.	<input type="radio"/>					
I pride myself on coming up with creative alternatives.	<input type="radio"/>					
Frankly, I am trying to be less judgmental.	<input type="radio"/>					
Frequently I find myself evaluating other people's arguments.	<input type="radio"/>					
I believe what I want to believe.	<input type="radio"/>					
It's just not that important to keep trying to solve difficult problems.	<input type="radio"/>					
I shouldn't be forced to defend my own opinions.	<input type="radio"/>					
Others look to me to establish reasonable standards to apply to decisions.	<input type="radio"/>					
I look forward to learning challenging things.	<input type="radio"/>					
It makes a lot of sense to study what foreigners think.	<input type="radio"/>					
Being inquisitive is one of my strong points.	<input type="radio"/>					
I look for facts that support my views, not facts that disagree.	<input type="radio"/>					

Complex problems are fun to try to figure out.	<input type="radio"/>					
I take pride in my ability to understand the opinions of others.	<input type="radio"/>					
Analogies are about as useful as a sailboat on a freeway.	<input type="radio"/>					
You could describe me as logical.	<input type="radio"/>					
I really enjoy trying to figure out how things work.	<input type="radio"/>					
Others look to me to keep working on a problem when the going gets tough.	<input type="radio"/>					
Getting a clear idea about the problem at hand is the first priority.	<input type="radio"/>					
My opinion about controversial topics depends a lot on who I talk to last.	<input type="radio"/>					
No matter what the topic, I am eager to know more about it.	<input type="radio"/>					
There is no way to know whether one solution is better than another.	<input type="radio"/>					
The best way to solve problems is to ask someone else for the answers.	<input type="radio"/>					
Many questions are just too frightening to ask.	<input type="radio"/>					
I'm known for approaching complex problems in an orderly way.	<input type="radio"/>					
Being open-minded about different world views is less important than people think.	<input type="radio"/>					
Learn everything you can, you never know when it could come in handy.	<input type="radio"/>					
Life has taught me not to be too logical.	<input type="radio"/>					
Things are as they appear to be.	<input type="radio"/>					

- If I have to work on a problem, I can put other things out of my mind.
- Others look to me to decide when the problem is solved.
- I know what I think, so why should I pretend to ponder my choices.
- Powerful people determine the right answer.
- It's impossible to know what standards to apply to most questions.
- Others are entitled to their opinions, but I don't need to hear them.
- I'm good at developing orderly plans to address complex problems.
- To get people to agree with me I would give any reason that worked.

Appendix E: Research Utilization Questionnaire

Carole Estabrooks RU Measure (2008) Adult Acute Care – Professional Nurses

USING RESEARCH

While healthcare providers strive to provide quality patient care based on the best research evidence available this may not always be possible due to various job, resource, organizational or other constraints. In this section we are asking you to think of **your last typical work day**. We have defined and provided examples of several types of research use. Use your best **estimates** to answer the questions.

Instrumental Research Use

Definition: Using observable research-based practices when caring for patients. By this we mean that practice may be guided by guidelines, protocols, routines, care plans or procedures that are based on research. This would include following evidence based protocols or guidelines such as:

Pain management guidelines
Central line dressing protocol
Catheter care
Delirium prevention and/or management
Skin/wound care
Suctioning

On your LAST typical work day how often did you use research in this way?

- 1 10% or less
- 2 About 25%
- 3 About 50%
- 4 About 75%
- 5 Almost 100%

Conceptual Research Use

Definition: Thinking about research-based knowledge and then using it to inform your clinical decision-making.

Examples would be:

Using knowledge of death and dying stages to plan care
Using knowledge of behaviors characteristic delirium to assess and plan care for patients exhibiting difficult behaviors

On your LAST typical work day how often did you use research in this way?

- 1 10% or less
- 2 About 25%

- 3 About 50%
- 4 About 75%
- 5 Almost 100%

Persuasive Research Use

Definition: Using research findings to *win* an argument or *make a case* to someone regardless of whether you have made a thorough assessment of the research.

On your LAST typical work day how often did you use research in this way?

- 1 10% or less
- 2 About 25%
- 3 About 50%
- 4 About 75%
- 5 Almost 100%

Overall/General Research Use

Some organizational investigators have argued that research use is much more general and have suggested the following definition:

Definition: The use of any kind of research findings, in any kind of way, in any aspect of your work as a professional in your role (this is inclusive of the three kinds of research use described above).

On your LAST typical work day how often did you use research in this way?

- 1 10% or less
- 2 About 25%
- 3 About 50%
- 4 About 75%
- 5 Almost 100%

Appendix F: Information Letter for Focus Group Interviews

Title of Project: Research utilization and critical thinking of undergraduate nursing
Co- Investigator: Salima Meherali Phone Number: (780) 217-2836
Co-Supervisors: Dr. Joanne Profetto-McGrath Phone Number: (780) 492-1597
Dr. Pauline Paul Phone Number: (780) 492-2551

The study:

The purpose of this study is to identify the relationship between Critical Thinking Disposition (CTD) and Research Utilization (RU) of undergraduate nursing students. It is also the purpose of this study to identify nursing students' perceptions about critical thinking and its relationship to research utilization.

The aim of this session is to further explore your views about the CTD and RU. The group conversation will be audio-taped and will likely last 45 to 75 minutes. You may refuse to answer any of the questions. You are free to withdraw from the focus group or the study at any time. Participating or not participating in the focus group session will not affect your grades or status as student. There are no benefits for you in participating in this group other than having a chance to discuss about CTD and RU. There are no known risks in participating in this focus group.

The focus group session will take place in Edmonton Clinic Health Academy (ECHA) at a time convenient for participants. Your name will not appear on the audio-tape, and it will not be linked with the information you provide. All findings will be reported as group results and all efforts will be taken to ensure the identity of participants is not revealed. Your name will never be used in any presentation or publication. Only the research team will have access to the data. The information you provide will be kept in a locked cabinet for five years.

All information will be held confidential by the research team. Although we cannot entirely guarantee confidentiality because we will be doing a group interview we will ask participants to keep the group conversation within the group. The researchers may want to use the data for further analysis in the future. If so they will seek further ethical approval first.

If you have any questions about this project please feel free to contact me Tel: (780) 217-2836 or email me at meherali@ualberta.ca. Or any of thesis supervisors Dr. Profetto-McGrath. Tel: (780) 492-1597 or email jprofett@ualberta.ca, Dr Pauline Paul Tel: (780) 492-2551 or email ppaul@ualberta.ca

If you have any concerns about your rights as a study participant, you may contact Health Research Ethics board at the University of Alberta at (780) 492- 2615. This office has no direct affiliation with the study investigators.
Please keep a copy of this letter for reference.

Appendix G: Information Letter for Individual Interviews

Title of Project: Research utilization and critical thinking of undergraduate nursing
Co- Investigator: Salima Meherali Phone Number: (780) 217-2836
Co-Supervisors: Dr. Joanne Profetto-McGrath Phone Number: (780) 492-1597
Dr. Pauline Paul Phone Number: (780) 492-2551

The study:

The purpose of this study is to identify the relationship between Critical Thinking Disposition (CTD) and research Utilization (RU) of undergraduate nursing students. It is also the purpose of this study to identify nursing students' perceptions about critical thinking and its relationship to research utilization.

The aim of the interviews is to further explore your views about CTD and RU. The conversation will be audio-taped and will likely last 45 to 75 minutes. You may refuse to answer any of the questions or can request that the audio recorder be shut off at any time. You are free to withdraw from the study at any time. Whether you choose to participating or not in the individual interview will not affect your grades or status as a student. There are no benefits for participating in this study other than having a chance to discuss and learn more about CTD and RU. There are no known risks in participating in the interview.

The interview will take place at Edmonton Clinic Health Academy (ECHA) at a time convenient for you. Your name will not appear on the audio-tape, and it will not be linked with the information you provide. All findings will be reported as group results and all efforts will be taken to ensure the identity of participants is not revealed. Your name will never be used in any presentation or publication. Only the research team will have access to the data. The information you provide will be kept in a locked cabinet for five years.

All information will be held confidential by the research team. The researchers may want to use the data for further analysis in the future. If so they will seek further ethical approval first.

If you have any questions about this project please feel free to contact me Tel: (780) 217-2836 or email me at meherali@ualberta.ca or either of my thesis supervisors Dr. Profetto-McGrath at (780) 492-1597 or jprofett@ualberta.ca or Dr Pauline Paul at (780) 492-2551 or ppaul@ualberta.ca

If you have any concerns about your rights as a study participant, you may contact Health Research Ethics board at the University of Alberta at (780) 492- 2615. This office has no direct affiliation with the study investigators.

Please keep a copy of this letter for reference.

Appendix H: Consent Form (For Focus Group/Individual Interview)

Title of Project: Research utilization and critical thinking of undergraduate nursing students

Co- Investigator: Salima Meherali Phone Number: (780) 217-2836

Co-Supervisors: Dr. Joanne Profetto-McGrath Phone Number: (780) 492-1597
 Dr. Pauline Paul Phone Number: (780) 492-2551

Part 2 (to be completed by the research Participants):	<u>Yes</u>	<u>No</u>
Do you understand that you have been asked to be in a research study?	<input type="checkbox"/>	<input type="checkbox"/>
Have you read and received a copy of the attached Information Sheet?	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand the benefits and risks involved in taking part in this research study?	<input type="checkbox"/>	<input type="checkbox"/>
Have you had an opportunity to ask questions and discuss this study?	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand that you are free to withdraw from the study at any time, without having to give a reason and without affecting your academic standing?	<input type="checkbox"/>	<input type="checkbox"/>
Has the issue of confidentiality been explained to you?	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand who will have access to the research information?	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree to have the interview audio-taped?	<input type="checkbox"/>	<input type="checkbox"/>
Who explained this study to you? _____		
I agree to take part in this study.	<input type="checkbox"/>	<input type="checkbox"/>
Signature of Research Participant _____		
(Printed Name) _____ Telephone Number _____		
Date _____		
I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.		
Signature of Investigator _____ Date _____		

Appendix I: Confidentiality Agreement for Focus Group Participants

This form is intended to further ensure confidentiality of data obtained during the research study on the Research utilization and critical thinking of undergraduate nursing students Do you understand that this focus group interview will be recorded on audiotape?

Yes No

Do you agree not to talk about information relating to this study or interview with anyone outside of your fellow focus group members and the researcher? Yes No

This study was explained to me by:

I agree to take part in this study.

Signature of Research Participant

Date

Witness

Print Name

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

Signature of Researcher or Designee

Date

Appendix J: Permission Email



Salima Meherali <meherali@ualberta.ca>

knowledge utilization tool

Squires, Janet <jasquires@ohri.ca>

Wed, Jan 23, 2013 at 11:41 AM

To: meherali@ualberta.ca

Cc: carole.estabrooks@ualberta.ca, aadachi@ualberta.ca, joanne.profetto-mcgrath@ualberta.ca

Dear Salima

Dr Estabrooks is currently away. We work together closely on research utilization measurement and I am therefore responding to your request. In your email below you indicate you would like to use the "Knowledge Utilization" tool. We have several research utilization tools as well as tools that measure factors related to research utilization. I am assuming (from your topic) that you are interested in obtaining the measures of kinds of research utilization (i.e., instrumental, conceptual, persuasive, overall). **Please note** that each of these 'kinds' of research utilization are a separate measure of research utilization and cannot be combined to form an overall measure. We measure each kind of research utilization with a single item (exception: conceptual research utilization where we also have a five item scale that we developed a few years ago in addition to a single item). I have provided brief definitions next in case you are not familiar with the 4 kinds of research utilization. Instrumental research utilization refers to the concrete application of specific research knowledge to practice. Conceptual research utilization refers to a change in thinking, but not necessarily behaviour, in response to research findings. Persuasive research utilization refers to the use of certain research knowledge to persuade others regarding a predetermined position. Overall research utilization refers to the use of research knowledge in any way in one's practice

Anne Marie will send you the measure(s) that you want after you provide the following information:

- 1) The kind of research utilization you plan to measure (instrumental, conceptual, persuasive, overall)
 - 2) Your setting (we have different wording for some of the measures depending on whether the nurse is in adult hospital, pediatric hospital, nursing home, or home care)
- For reliability and validity information (and settings where the instrument has been used) please see: <http://www.implementationscience.com/content/pdf/1748-5908-6-83.pdf>

If you decide to use any of these measures of kinds of research utilization, I ask that you: (1) let Anne Marie know that you are using them and that (2) you acknowledge

the source of the items (both on your survey and in any presentations and publications)

All the best with your research,

Janet

Janet E Squires inf./RN, PhD

Professeure adjointe/Assistant Professor

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