University of Alberta

A Comparison of Competencies Between Problem-Based Learning and Non–Problem-Based Learning Program Nursing Graduates

by

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Abstract

Nursing-graduate competence is necessary to ensure safe, ethical, and legal practice. Methods such as problem-based learning (PBL) and non–problem-based learning (NPBL) are used in nursing education to bridge the gap between theory and practice and improve graduate competence. The objective of this research was to compare the differences in competence between graduates from a PBL nursing program and those from an NPBL nursing program. This study involved a convenience sample of 121 nursing graduates in Alberta, Canada, who had been practicing for at least six months in a graduate role and whose nursing program utilized a PBL or an NPBL curriculum. The data-collection instruments included self-reports, and the data analysis involved descriptive statistics (mean, mode, and median) and inferential statistical tests (*t*-tests and ANOVA) to determine the differences in the two groups' mean scores. There was no statistical significance in the mean scores between the two groups, which indicates no difference in entry-to-practice competency preparation after the completion of a four-year nursing program. The teaching method may be perceived as an important variable for change and support for the graduate's competence; however this study indicates no difference between PBL and NPBL course-delivery methods. The significant finding is that all four-year nursing programs in Alberta that use PBL or NPBL support CARNA's entry-to-practice competencies. The graduates were asked how their nursing program prepared them to meet the competencies listed in the questionnaire, and the following themes emerged from the data: PBL—critical thinking, evidence-based practice, competencies as evaluation tools, self-directedness, and teamwork; and NPBL—clinical practice, competencies as evaluation tools, and critical thinking. The graduates were also

asked to suggest improvements for nursing programs to better prepare graduates to meet the entry-to-practice competencies. The following themes emerged from the data: PBL—increased clinical time, and combined PBL and NPBL teaching and learning methods; and NPBL—more clinical time and discussion of more real-life scenarios in the classroom.

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CHAPTER 1:

INTRODUCTION

Nursing programs require a curriculum that supports the idea that foundational nursing knowledge is necessary to prepare competent graduates in practices who will enhance the public's safety and well-being. A predominant issue in developing such a curriculum is creating a learning environment that is supported by members of the educational institution, the community, and the nursing profession (Iwasiw, Goldenberg, & Andrusyszyn, 2005). To gain support for the development of a nursing curriculum, the teaching methods must be aligned with the teaching and learning principles of the adult population.

In the nursing education and health-related education fields, evaluation models can guide faculty in assessing competency of curriculum outcomes. Evaluation models focus on the student outcomes and learning experiences associated with the program outcomes (Keating, 2005). Outcome-based education uses a performance-based approach and is viewed as a way of reforming nursing education (Harden, Crosby, & Davis, 1999). In Alberta, Canada, a graduate must comply with the College and Association of Registered Nurses of Alberta's ([CARNA] 2007) practice standards for new graduates and a nursing program's outcomes for graduates.

Graduate competence is a measure of quality assurance that indicates that safe and competent care is assured in nursing practice to maintain public safety. The Canadian Nurses Association ([CNA] 2003) noted that provincial nursing organizations have the legislated mandate to ensure that all of its members provide safe, competent, and ethical care. Intrinsic to this ideal of public safety is the fostering of competent nursing graduates

through a nursing curriculum that provides effective methods to promote proficient and accountable nursing graduates. Although many nursing programs equate completion of the program with competency, an underlying issue is whether the degree of competency is measurable with respect to the professional standards of practice, such as those that CARNA (2007) published.

The underpinnings of graduate competency should be based upon current ethical and empirical published research. If a nursing curriculum supports graduate competence, it must follow a model for curriculum development (Iwasiw et al., 2005). Doing so requires that the teaching methods is an integral part of establishing competency in association with curriculum goals. Although nursing programs continue to revise and redevelop curricula to enhance nursing competence, insufficient published research exists to determine whether a problem-based learning (PBL) or non–problem-based learning (NPBL) curriculum best supports outcome competence for nursing students. Hence, this study examined whether teaching methods result in differences in terms of graduate' competence.

The purpose of this study was to add to nursing knowledge regarding the relationships among curriculum, teaching strategies, and program outcomes.

The Theoretical Model Underlying the Study

Donabedian's (1980) model distinguishes between the concepts of structure, process, and outcomes in the conceptualization of quality of care. The quality-of-care-measures focus on the structure (i.e., organizational factors, resources, standards, and policies), process (i.e., what caregivers do), and outcomes (i.e., health-related patient outcomes of care and their relationships; Donabedian, 1966, 1980).

The model reflects causality: Structure affects process, and process affects outcome (El-Jardali & Lagace, 2005). The premise of Donabedian's (1980) framework was adopted for this study, but it was modified to reflect curriculum outcome issues and differences. In this study *structure* refers to the interrelated elements that comprise a nursing curriculum, *process* refers to the way that the curriculum is implemented, and *outcome* refers to graduates' achievement of program outcome competence (Appendix A).

The conceptual definitions used in the study are as follows:

Structure refers to the interrelated elements that comprise a nursing curriculum. Structure includes factors such as the standards of the professional associations reflected in nursing educational curricula.

Process refers to the way the curriculum is implemented and includes approaches to teaching and learning.

Outcome refers to graduates' achievements of program outcome competence.

The operational definitions used in the study are as follows:

Graduate outcome competence refers to the competence required to practice as a graduate nurse. Graduates should be able to provide safe, competent, and ethical practice in all nursing settings. These competencies are organized under four nursing practice standards categories: (a) professional responsibility, (b) knowledge-based practice, (c) ethical practice, and (d) provision of service to the public (CARNA, 2007).

Problem-based learning (PBL) refers to learning that results from the process of working toward understanding a situation or resolving a problem. In this type of learning,

graduates encounter the situation or problem first, which stimulates their search for knowledge to gain a better understanding of the situation through the application of reasoning skills to seek a resolution or best outcome (Williams, 2001b).

Non–problem-based learning (NPBL) refers to a teaching methods that is generally characterized by a teacher-centered approach in that instruction is based upon individual course objectives that faculty have identified. It usually involves large-group lectures and structured laboratory exercises (Woodring, 2004).

Objective of the Study

The objective of this study was to compare the differences in graduate outcome competence between graduates of a PBL nursing program and those of an NPBL nursing program.

Research Questions

This study addressed the following research questions:

1. Is the structure of an NPBL curriculum associated with outcome competence of program graduates?
2. Is the structure of a PBL curriculum associated with outcome competence of program graduates?
3. Is the teaching-learning process in an NPBL curriculum associated with outcome competence of program graduates?
4. Is the teaching-learning process in a PBL curriculum associated with outcome competence of program graduates?
5. Is outcome competency achievement different in NPBL and PBL programs?

Significance of the Study

Outcome competence and teaching methods must be compared within a nursing context to determine whether any differences exist between the two in the education of nurses and the outcome competence of graduates. The debate about whether students better achieve competence from the learning facilitated through the use of one teaching methods or the other continues. To date, the only studies comparing the two methods have been in medicine, pharmacy, and nursing, with a focus on the perceptions of both curricula, which were reported shortly after the implementation of the curriculum. Only one empirical study in the nursing literature demonstrated validity and reliability inclusive of an established effect size in the research methods (Rideout et al., 2002). None of the nursing studies discussed the empirical soundness of outcomes or power analysis, both of which are essential markers of empirical evidence.

Nursing programs are constructed to prepare graduates, based on outcome competence, to meet the requirements set by the regulatory nursing body to safely care for the public. Therefore, nursing programs must determine which methods best meet the outcome measures that establish the graduate nurse as competent and skilled within a graduate's scope of practice. Intrinsic to the education of skilled graduate nurses is the process of learning how outcomes, which are stated objectives in the curriculum syllabi, become the measure of competency. Without a doubt, a vital link exists between outcome competence and the teaching and learning principles embedded within a curriculum.

This research study may prove significant in enhancing nursing knowledge, presenting data to show which methods would best support future nursing education, providing empirical evidence to support this claim, and developing recommendations for

the methods of future nursing programs that best supports nursing graduate outcome competence.

The dissertation is organized into five chapters: Introduction to the study (Chapter 1), Literature review (Chapter 2), Methods (Chapter 3), Findings (Chapter 4), and Discussion (Chapter 5).

CHAPTER 2:

LITERATURE REVIEW

Introduction

Outcome competence for nursing education programs are vital measurements established by professional associations and schools of nursing to ensure that qualified students graduate from four-year baccalaureate programs. Understanding the importance of nursing graduate outcomes in relation to teaching methods is necessary for educational sustainability and credibility. The objective of this study was to compare the differences in graduate outcome competence between graduates from a PBL nursing program and those from a traditional nursing program. The theoretical underpinnings that define structure, process, and outcome adapted from the Donabedian (1980) model are used throughout the literature review to highlight how structure affects process and process affects outcome.

Outcome Competence

In Alberta, the Nursing Education Program Approval Board (NEPAB) is responsible for developing and implementing the approval process for nursing education programs (CARNA, 2007). The entry-to-practice competencies for registered nurses in Alberta, Canada, are identified by the professional and regulatory body (CARNA). Through the Health Professions Act, the professional body has the legislated responsibility to ensure that all of its members provide safe, competent, and ethical care (CARNA, 2007). The entry-to-practice competencies identified by the association serve as a guide for curriculum development in entry-level nursing educational programs. The entry-level registered nurse who has graduated from a basic nursing education program

and is registered for the first time is expected to practice in accordance with the Professional Nursing Practice Standards, the CNA (2002a) Code of Ethics for Registered Nurses, the scope of practice defined in the Health Professions Act (CARNA, 2007), and provincial and federal legislation. Graduate outcome competencies established by the professional association include: a sense of professional responsibility, knowledge-based practice, ethical practice, and provision of service to the public. Graduates must accept accountability for their own decisions, actions, and practice and must take action on the questionable orders, decisions, or interventions of other health team members. Furthermore, graduates use standards of practice to continually assess their own competence and learning needs. They must also be able to recognize the limitations of their own competence, follow quality- and risk-management processes, and describe professional self-regulation (CARNA, 2007).

Knowledge-based competencies indicate that graduates will continually strive to acquire knowledge and skills to provide competent, evidence-based nursing practice. The competencies include (a) data collection, (b) collaboration with the client and the health care team, (c) anticipation of health problems, (d) rationales for proposed care, and (e) selection and implementation of nursing interventions that use critical skills in (a) practice, (b) evaluation, (c) modification, (d) use of technology, (e) maintenance of clear and accurate records, (f) effective time management, (g) direction to licensed practical nurses and unregulated care providers, (h) evaluation of responses to care, and (i) application of the principles of primary health care (CARNA, 2007).

Ethical practicies competence include the ability of graduates to identify their own values and assumptions, to be sensitive to client diversity, to respect confidentiality,

to advocate for clients, to address ethical dilemmas, to have a clear sense of professional boundaries, and to recognize and report potentially unsafe situations for the client (AARN, 2000).

Competency in the provision of service to the public suggests collaboration and communication with interdisciplinary teams to achieve client health outcomes, employment of communication skills, the exercising of accountability, and the ability to describe the overall organization of health care (AARN, 2000). Graduate outcomes of nursing programs in Alberta include the above entry-to-practice competencies for a program to be approved. These competencies are critical components of the professional responsibility of nursing education programs.

When nursing faculties are considering how competencies are developed, measured, and evaluated within the curriculum, the programs must investigate which methods will facilitate these graduate competence and ensure that those who graduate meet the standards for safe and competent care of the public. The question at the forefront of this study and the one that has not been clearly addressed in the nursing literature is: Do PBL or NPBL teaching methods differ in preparing students to meet the outcome competencies established by nursing professional bodies?

Competence

Professional accountability, knowledge-based and ethical practice, safe and effective patient care, a holistic approach to care, teamwork, and lifelong learning are commonly identified practice standards included in the definition of *competency* in nursing practice (CARNA, 2007). In the nursing literature, the concept of competency is unclear because of its varied interpretations and complexity (Bradshaw, 1998; Campbell

& Mackay, 2001; Watson, Stimpson, Topping, & Porock, 2002). Many definitions recognize knowledge, skills, and attitudes as key aspects of competence and identify quality, expectations, and skill as the context of being competent. Although competence and competency are interlinked, the meanings of competence and competency are distinctly different. Short (1984) asserted that competence is a normative concept, but that people perceive it as descriptive. Similarly, Short referred to it as "a thing or an activity," but it actually is "a quality or state of being" (p. 203), whereas a competency is a specified attribute "on which a person's adequacy or sufficiency may be judged" (p. 201).

DeBack and Mentkowski (1986) defined competence as a broad, generic ability or characteristic of a person that transfers across settings and situations and is not a set of discrete skills (p.276). In this context, competence is developmental, holistic, and comprised of integrated skills and individual attributes such as motivation and skill as outcomes of educational processes. Parry (1996) defined competence as "a cluster of related knowledge, attitudes, and skills that affects a major part of one's job; that correlates with the performance on the job; and that can be measured against well-accepted standards" (p. 97).

Alfaro-LeFevre (2002) identified three dimensions that reflect competence: knowledge and critical thinking, technical and interpersonal skills, and caring. Epstein and Hundert (2002) defined *competency* as reflective of seven dimensions: cognitive, technical, integrative, context, relationship, affective/moral, and habits of mind (p. 227). Competency may be achieved by having a number of components of competence, which are called competencies; however, a lack of consensus on whether competence equates

with potential or actual ability leads to the broad spectrum of ways in which competency is defined, operationalized, and, of course, assessed (Eraut, 1998).

Assessing competencies, like defining competence and competency, continues to be a key issue in the nursing literature. Assessment of competence involves some measurement by one person of another with a reliable and valid instrument. Reliability (the extent to which an instrument measures consistency) and validity (the extent to which an instrument measures the construct of interest) are fundamental issues in the use of measurement and should be rigorously established to measure clinical competence . (Watson et al., 2002). Watson et al.(2002)stated, "Even if reliable and valid instruments for the measurement of clinical competence are developed, there remains the issue of what level of performance indicates competence and therefore at what level a student can be deemed incompetent" (p. 5).

The methods used to assess competence in nursing practice include (a) questionnaire rating scales (Redfern, Norman, Calman, Watson, & Murrells, 2002); (b) ratings of observation (Neary, 2000; Piercey, 2006); (c) criterion-referenced rating scales and simulations, including objective structured clinical examinations ([OSCE] McGaughey, 2004); (d) case studies (Piercey, 2006), (e) reflection in and on practice (journaling; Clark, Owen, & Tholcken, 2004; Piercey, 2006); (f) self-assessment and evaluation (Piercey, 2006); (g) portfolios (McGaughey, 2004); and (h) multimethod approaches (Redfern et al., 2002).

Scholars have identified the limitations and strengths of some of these methods. Overall, the questionnaires have not been rigorously tested for reliability and validity, and observation ratings require better criterion-referenced scales such as the OSCE or its

variations. The OSCE appears to be a promising method because it provides a close simulation of real life and is grounded in an interpretative approach to skill acquisition (McGaughey, 2004). Reflection on practice by using portfolios is valid when it is based on a rigorous analysis of critical incidents and is grounded in real-life settings. Redfern et al. (2002) suggested that a multimethod approach enhances validity and ensures comprehensive assessment of the complex repertoire of skills required of students in nursing.

Skill acquisition in nursing practice has been a key contributor to a definition of competency (Alfaro-LeFevre, 2002; Bradshaw, 1997; Del Bueno; 1997; Girot, 1993; Taylor, 1995). In 1970 psychomotor skills were the main focus of nursing competence; a decade later critical thinking and decision making gained more recognition as generic skills for professionals. Bradshaw (2000) stated that, historically, "nursing system competence" meant "fitness for a specified functional outcome performance" (p. 319). Since 1979 the term *competence* has referred to the practitioner's psychological state of readiness or to the ability to be a knowledgeable doer. Nurse scholars recognize the holistic approach to conceptualizing competence, and the reality of nursing practice continues to demand task accomplishment (Bradshaw, 1997; Greenwood, 2000; Watson, 2002).

May, Edell, Butell, Doughty, and Langford (1999) noted that competency in nursing practice entails the cognitive, psychomotor, and affective skills acquired through a process of formal knowledge and clinical experience. Both clinical decision making and critical thinking are integral parts of the process. Day and Williams (2000) explained that critical thinking enables a nurse to process and analyze information that is required for

solving clinical problems and deciding upon concurrent actions. Nurses are expected to make rational decisions in caring for society; hence, critical thinking is a core competency in nursing practice (Alfaro-LeFevre, 2002; Day & Williams, 2000; Di Vito-Thomas, 2000).

Fearon (1998) referred to competency as "a performance capability needed by workers in a specific occupational area [that] may be cognitive, attitudinal, and or psychomotor" (p. 19). Khoza and Ehlers (1998) concurred and defined competency as the "cognitive, affective, and psychomotor abilities needed to perform specific tasks satisfactorily" (p. 68). Manley and Garbett (2000) saw competence and competency as job-related and involving a description of an action, behavior, or outcome that a person should demonstrate in his/her performance, whereas they considered competency and competence as person-orientated and as referring to the person's underlying characteristics and qualities that lead to effective and/or superior performance on a job. Zhang, Luk, Arthur, and Wong (2001) regarded competence as sets of knowledge, skills, traits, motives, and attitudes required for effective performance in a wide range of nursing jobs and various clinical settings. These authors contended that competencies are assumed to be present when a nurse accomplishes a given task, and thus they can be assessed by analyzing actual practice.

In light of the difficulty in defining, evaluating, and measuring competence, future research in nursing education must continue to reflect the perceptions of students and how their behaviors promote self-competence. Ramritu and Barnard (2001) studied the meaning of competence among new nursing graduates, who reported eight conceptions of competence: "safe practice; limited independence; utilization of resources; management

of time and workload; ethical practice; clinical skills; knowledge; and competence as evolving" (p. 47). Winson (1993) compared the nursing curriculum of four-year degree and diploma programs and concluded that the difference between the curricula is the former's emphasis on research and its implementation in nursing practice—a significant outcome for the 21st-century nurse.

Conceptualizing, measuring, and evaluating competence in nursing practice continues to be a challenging process.

NPBL Teaching

The psychology theory of behaviorism supports the NPBL methods, which can be described as a process of systematic and sequential building on previous learning. Faculty members are the primary decision makers with respect to the educational experience (Csokasy, 2005). The behaviorist school sees the mind as a "black box" in the sense that a response to a stimulus can be observed quantitatively, totally ignoring the effect of thought processes looks at observable and measurable behaviors as indicators of learning (Good & Brophy, 1990).

Behaviorism explains simple, observable, and predictable behaviors. This approach to learning was identified early in research: Watson (1924) defined behaviorism, Skinner (1953) identified operant conditioning, and Thorndike (1953) discussed connectionism, which considers learning as a change in behavior based on evidence governing the formation of relationships between stimuli and responses (Bradshaw, 2004; Klein, 1996; Overskeid, 1995; Vandeveer & Norton, 2005). Other behavioral theorists have subsequently formed complex theories, including Bandura's (1986) theory of social learning, which describes learning that comes from observation,

imitation, and reinforcement. Leonard (2002) noted that today, behaviorism is viewed as instruction guided by observable, measurable, and controllable objectives set by the instructor and met by the student.

Structure

Curriculum design in NPBL programs includes a curriculum comprised of a series of courses on distinct subjects considered necessary for preparation for professional practice (Biley & Smith, 1998b). The separate subjects in nursing curricula might include the growth and development of children and adults, healthy living, teaching and learning, medical-surgical nursing, pediatrics, obstetrics, mental health, and community nursing. Within the context of NPBL lectures, the acquisition of knowledge is organized around specific courses and curriculum objectives that support the expected learning outcomes. Faculty specify the content and skills to be mastered and identify the resources that the students will use to achieve mastery (Distlehorst & Robbs, 1998).

The education literature presents several definitions of *curriculum* that focus on curriculum as a course of study; teacher and student interactions; technical, theoretical, and practical learning; and teaching methods (Bevis, 2000; Iwasiw et al., 2005). Iwasiw et al. and Keating (2005) contended that in nursing education, a curriculum model for development is essential and should address preliminary considerations, practical considerations, faculty development and change, the gathering of contextual data, curriculum directions and outcomes, philosophical goals, curriculum design, and course design, planning, evaluation, and implementation. Csokasy (2005) reported that as early as 1949 and 1960, Tyler and Holmquist, respectively, identified specific goals and

objectives in nursing education based on behaviorist theory and that community and technical colleges continue to base them on behaviorist theory (p. 134).

NPBL learning objectives are constructed by facilitators, and large-group lectures are the norm, with some variations in laboratory instruction. Testing of knowledge usually includes the use of multiple-choice examinations to accommodate large groups most efficiently. The most noted advantage of the NPBL lecture format is that it enhances students' ability to master and retain a wide variety of knowledge with respect to the basic sciences such as anatomy, physiology, and pharmacology (Albanese & Mitchell 1993; Mennin, Freidman, Skipper, Kalisman, & Snyder, 1993; Sunbald, Sigrell, John, & Lindkvist, 2002; Vernon & Blake, 1993). However, some researchers observed no difference in retention between NPBL and PBL (Richards et al., 1996), and others have suggested that in NPBL programs students retain little of what they have previously learned (Biley & Smith, 1998a; Schmidt, 1983).

Gagne (1970) formulated methods of sequencing instruction, the conditions under which learning takes place, and the outcomes of learning or categories in which human learning occurs. These learning categories are based on a hierarchical arrangement of learning theories. They move from simple to complex learning and include intellectual and motor skills, verbal information, cognitive strategies, and attitudes (Bradshaw, 2004; Gagne, 1970). Gagne's theory was used in the 1970s and early 1980s to support the use of concrete, measurable, and specific behavioral objectives.

Process

The primary teaching methods used in most NPBL education programs is the didactic approach to lecturing. This teaching method is teacher centered and involves an

isolated technique for instruction (Engel, 1991). Many lecturers deliver a large amount of information to a large number of students, which allows very little time for student involvement or the stimulation of student inquisitiveness. A student's role in a lecture environment is passive, and the content is often limited to the lecturer's opinions or assumptions. The advantages of using lectures as a teaching strategy are that instructors are often able to enliven facts and ideas that seem tedious in a text, teachers know what has been taught, students are provided with a common core of content, and lectures produce better immediate recall of information than do other teaching methods. Conversely, the disadvantages are that instructors may attempt to cover too much material, 80% of lecture information is often forgotten one day later, and 80% of the remainder fades from memory in one month (Woodring, 2004). As well, lecturing may not be suited to higher-level learning, it creates passive learners and provides them with little feedback, and poorly delivered lectures may be a disincentive for learning (Lowenstein & Bradshaw, 2004). Despite these disadvantages, positive teaching and learning outcomes continue to be achieved by using the lecture method, especially when the lectures are well organized and prepared.

NPBL learning may also involve several teaching and learning methods in the delivery of the content. Discussions, demonstrations, simulations, forums, panels, symposiums, and computer instruction are teaching methods that support traditional learning (Galbraith, 1990). Discussion is the most widely preferred teaching method because of its collaborative, reflective, and democratic process. The success of the discussion method depends upon equality of the facilitators and learners in a democratic association. Brookfield (1991) suggested that discussions cluster at differing points along

a continuum, distinguished by the degree of control that the teacher exercises over discussion procedures and content. At one end of the continuum is the teacher, who can control the nature of the content, and at the other end is the student, who is subject to the teacher's willingness to allow open discussion and ability to create teachable moments. Brookfield further noted that discussions promote cognitive stimulus and change and should expose learners to diverse perspectives; externalize assumptions that underlie values, beliefs, and actions; help learners to take varied perspectives; and introduce complexity and ambiguity into learning issues.

A major component of NPBL teaching is the teacher's responsibility to influence the teaching and learning process. A teacher engages in this process to effect change and directs the learning process in the classroom. Because NPBL learning is teacher centered, the teacher assumes responsibility for making decisions about what is learned, how it will be learned, and when it is learned (Conner, 2005). With such control, teachers should continue to search for and reveal truth in the context of adult learning themes and issues. As well, to enhance learning, teachers must continue to question their own responsibilities in the teaching and learning process. In this context, Knowles (1970) suggested that teachers must understand the goals of courses, see that students' needs shape these goals, understand the students' attitudes, accept and respect people with diverse personalities, plan the environment, facilitate full participation, be versatile in choosing teaching methods and media, and be aware that learning should be satisfying and free of compulsion. Lecturers must reflect upon these suggestions and the objectives of the learner.

Outcomes

The NPBL method of measuring outcomes in most nursing programs focuses on academic achievement. Standard measures of knowledge acquisition—true-false questions, multiple-choice questions, essay questions, short-answer questions, national nursing exams, lab-performance exams, and clinical-practical evaluations—determine student and program success. However, as stated earlier, Woodring (2004) reported, "Research indicates that 80 percent of information gained by lecture alone is not recalled by students one day later, and that 80 percent of the remainder fades in a month" (p. 80). This finding suggests that the direct-lecture format limits knowledge retention and utilization in addition to short- and long-term recall.

Achievement of the course objectives and testing of the outcomes become the measures of knowledge acquisition. Related outcomes link factual recall and memory, as well as understanding and comprehension. Often the delivery of factual knowledge excludes application to practice. Lecturing is an easy teaching method, but a far less effective strategy for students' learning than other methods because it is not suited for higher levels of learning (Woodring, 2004).

Evaluation of the effectiveness of lectures involves reflection on the outcomes of the process and should focus on the issues that are paramount at the beginning of the learning process, during the transactions of the learning experience, and in the final phases of the learning experience (Beatty, Benefield, & Linhart, 1991). Without effective evaluation, the NPBL approach provides no way of evaluating outcomes to change behavior in practice settings. As Woolfolk, Winne, and Perry (2003) stated, "The

behavioral view generally assumes the outcome of learning is a change in behavior and emphasizes the effects of external events on the individual" (p. 197).

CARNA's (2007) entry-to-practice competencies identify specific practice standards that align with the outcomes specific to NPBL teaching. The creators of these standards assumed that NPBL teaching methods would facilitate graduates' achievement of entry-to-practice competencies by virtue of the teaching process. According to this assumption, some entry-to-practice competencies may be strongly achievable through NPBL teaching methods. Under the practice standard of *professional responsibilities*, CARNA's outcome competencies include graduates' accepting accountability for their own actions and decisions, questioning orders, recognizing the limitations of their own competence, and seeking assistance when necessary. Aligned with *knowledge-based practice* are the nursing competencies of the ability to use various collection approaches to complete client assessment, to anticipate potential health problems or issues and their resultant consequences for clients, and to provide a rationale for proposed client care. The traditional outcome of recall provides the means to retrieve information to achieve competency. *Ethical* competencies identify nurses' values and assumptions and demonstrate sensitivity to client diversity in nursing practice. Ethical practice is the sharing of information with team members while respecting confidentiality and legal requirements. The final CARNA practice standard of *provision of service to the public* aligns with knowledge and factual recall from traditional outcomes because achieving client health outcomes is based on the objectives for the current case. The greatest shortcoming of the lecture method is that opportunities for problem solving, critical thinking, decision making, research critique and analysis, and self-directed learning are

limited (Amos & White, 1998). With this realization, educators continue to investigate the theory of how adults learn and to provide hypotheses to explain why adult learning theory is significant to adult learning.

Adult Learning Theory

Adult learning incorporates the acquisition of information and knowledge, skills and habits, and attitudes and beliefs into the associated experiences of life. It may involve a change that is derived from the learner's experiences. Understanding the complexity of learning in the context of adult learners and how they learn requires an understanding of the theoretical underpinnings of learning. The adult education literature considered adults as self-directed, problem centered, and needing to learn useful information (Knowles, 1980; Vandeveer & Norton, 2005). Hence, educators need to understand how people learn and to intend to provide the theoretical assumptions that underlie the approaches to teaching (Vandeveer & Norton, 2005).

In adult education, the *adult* is the focus in defining the concepts that explain adult learning and associated theories of learning. Definitions of learning identify *change* as the main premise of the learning experience. The challenges for educators are not in the definition of learning, but in the interpretation and facts that associate learning and the adult experience. *Adult learning theory* is not clearly defined, but has evolved to differentiate and associate concepts in learning theories such as those that involve pedagogy and andragogy. The evolving theory of adult learning has historical significance dating back to the 1960s, beginning with Houle's seminal study in 1961 (as cited in Brookfield, 1980) in which he described adults as *learning oriented.* Houle's work became the catalyst for other adult educators across other disciplines to investigate

the theory of how adults learn. Clinical psychologists and psychiatrists investigated how to help people change their behavior (Maslow, 1962, , developmental psychologists found that the developmental stages are one of the chief triggers of the readiness to learn (Erikson, 1959) and social psychologists discovered how environmental issues such as color, social norms, and group process affect learning (David & Wright, 1975). This substantial body of research on adult learning was collected up to 1980 and became the organizational framework, assumptions, and conceptualizations that were developed into a new theory of how adults learn. NPBL learning, termed the *pedagogical model*, means the art and science of educating children and involves teacher-focused education (Conner, 2005). The assumptions of this model include (a) the learner submissively carries out the teacher's directions; (b) the learner's experience is limited to lectures, reading assignments, and audiovisual presentations; (c) readiness to learn means being told what to learn and depends on age; and (d) parents, competition, or the fear of failure motivate students to learn. In reaction to the conception of adult learning, Knowles popularized a new approach to learning known as the *andragogical model*. A German teacher, Alexander Kapp, coined this expression in 1833, but it became popular after 1970 when Knowles defined *andragogy* as "the art and science of helping adults learn" (Knowles & Associates, 1984, p. 6). "

Knowles's four fundamental assumptions that direct adult learning patterns in andragogy are (a) the self moves from being dependent towards being self-directed, (b) maturity brings an accumulating reservoir of experience that becomes an increasing resource for learning, (c) the readiness to learn is increasingly oriented toward a person's social roles, and (d) the orientation to learning becomes less subject centered and

increasingly problem centered (Happs, 1991; Knowles & Associates, 1984). Knowles's theory of andragogy was an attempt to develop a theory specifically for adult learners with its emphasis on adults as self-directed and expected to take responsibility for decisions. Knowles conceded that his four andragogical assumptions apply equally to adults and children. The sole difference is that children have fewer experiences and preestablished beliefs than adults do (Conner, 2005).

Adult learning theory continues to evolve as more research on adult learning continues in the 21st century. In our current information age, the implications of a greater movement to learner-centered education are staggering. Hence, any evolving adult theory should explain how new learning is evolving and how educators can better cope with the exchange of knowledge, synthesize the new concepts resulting from the development of new technologies, and continue to help the adult learner process this information. In supporting this evolutionary theory, De Kock, Sleegers, and Voeten (2004) presented new classification schemes that emphasize new forms of learning and are organized around the three main aspects of the learning environments that may be assumed to influence such learning. Change in adult learning continues to be inspired by new psychological and educational insights that stress a shift from learning environments based on a knowledge-transmission model toward learning environments based on knowledge-construction models (Lowyck & Ellen, 1993). De Kock et al.'s current definition of learning as "new learning" (p. 145) refers to new learning outcomes, new kinds of learning processes, and new instructional methods. This overview reflects an evolving view of adult learning theory from a perspective in which theory supports the definition of the changes evident in society. Analysis of the definitions of learning theory

continues to be necessary because they become the basis for future theories that explain why adults learn as they do, why the outcomes of their learning change, and, furthermore, why learning is a catalyst in building a stronger society.

The challenge for all educators is to understand that as our social, political, and economic systems evolve into greater technologically advanced systems, so must the teaching methods change to meet the demands of the adult learner. To support the idea of evolving adult theory, a theoretical and practical framework is needed to support the rationale for change in teaching methods and adult learning theory. Teaching methods and theory itself may be the catalysts that promote the choice of one teaching method over another to support adult learners. Questioning how adults learn is, ideally, the catalyst for an evolving adult learning theory. Many scholars such as Knowles (1980) have supported the pedagogical model in adult learning; conversely, others such as Happs (1991) suggested that effective adult learning depends upon the notion of andragogy rather than pedagogy.

In the educational and nursing literature on adult education and curriculum development, Kowalski (1988) and Keating (2005) concurred that adult education is very important in the growth, organization, and development of learning for adult learners. Their past learning experiences become a stimulus for future learning, so that adult and nursing education become a means of adapting to individual and societal needs (Jarvis, 1992; McEwen, 2002). The trend in nursing-curriculum development is to create an education framework that ensures access to care and high-quality outcomes for future health care professionals (Bellack & O'Neil, 2000; McEwen, 2002). Learning institutions must understand the organizational context, the theoretical underpinnings, and the

planning process when a curriculum change is needed for an educational program (Kowalski, 1988).

The education and nursing literature also supported the use of other learning methods in adult learning. Constructivism (De Kock et al., 2004; Peters, 2000) and humanism (Kramlinger & Huberty, 1990; Vandeveer & Norton, 2005) are two adult learning theories that support a change in teaching and learning methods and promote a philosophy of learning. Nursing programs continue to use understood theories of behaviorism and cognitivism, but have begun to use other adult education models and interpretative pedagogies to support adult theory and learning (Vandeveer & Norton, 2005).

Learning Styles

The theoretical foundations of adult learning theory clearly identify the context of the historical and current links in which adults acquire and use knowledge. In the literature, *learning styles* have been defined as strategies that can be attuned to particular types of tasks and situations (Messick, 1987; Squires, 1981) and to cognitive styles, which are relatively consistent predispositions to adopting particular learning strategies across tasks and domains (Schmeck, 1993). An important consideration in defining one's learning style is that individual learners differ with respect to learning preferences. Patterson, Crooks, and Lunyk-Child (2002) stressed that throughout the process of learning to assess knowledge acquisition, students are also learning to assess and develop their learning styles within the learning experience.

Analysis of the nursing literature revealed little support for the idea of linking student learning styles with nursing program curricula. Schafer and Zygmont (2003)

commented that the nursing literature has not dealt with the issue of how faculty teaching styles can be adapted to learning environments. The literature has also shown no clear evidence that students' learning styles affect their choice of a particular nursing program or curriculum design. However, the notion that learners have learning styles is a very significant aspect of learning theory (Cassidy, 2004; Desmedt & Valcke, 2004). Bradshaw (2004) argued that students who adhere to traditional forms of learning such as lectures and reading do not maximize their learning. This belief explains why clinical experiences are so significant in nursing education. Furthermore, Bradshaw contended that educators who are aware of and comprehend the existence of different learning styles can tailor the learning environment to assist learners to achieve optimal outcomes.

Learning styles have been addressed in educational research in an attempt to understand the differences in learning. Price (2004) stated that learning styles are often used as a metaphor for considering the range of individual differences in learning. Desmedt and Valcke (2004) pointed out that since the 1970s, many definitions, theoretical models, and learning-style instruments have been developed, which has created some confusion in the literature. For instance, one source of confusion is the equating of *learning style* with *cognitive style* (Cassidy, 2004; Rayner & Riding, 1997; Reynolds, 1997). To understand how learning styles may assist in developing curriculum and building competency for nursing students, the educator must be clear on how the concept is being defined in the curriculum framework.

One of the most widely used theories of learning styles is Kolb's (1985), which emerged from Dewey's (1938) seminal theory on experiential learning. Dewey pioneered educational thinking on the correlation between learning and experience. The relationship

between the learning environment and personal factors such as motivation and goals can lead the learner through a stream of experiences that, once connected, bring about meaningful learning (Bradshaw, 2004). Using these ideas, Kolb reflected on the kind of experience that is translated into concepts that, in turn, guide the choice of new experiences (Loo, 2004). Kolb's model reveals two independent perceiving and processing dimensions: the concrete experience–abstract conceptualization perceiving dimension and the active experimentation–reflective observation processing dimension. These two dimensions form four quadrants that reflect four learning styles: those of the accommodator, the diverger, the assimilator, and the converger (Bradshaw, 2004; Loo, 2004). Kolb described accommodators as people who learn primarily from hands-on experience and gut feelings rather than from logical analysis, divergers as viewing concrete situations from many different points of view, assimilators as understanding a wide range of information and putting it into a concise and logical form, and convergers as finding practical uses for ideas and theories. The effective learner uses all four styles effectively and does not depend upon one preferred style.

Svinicki and Dixon's (1987) research on nursing students' learning styles demonstrated that the usual learning styles for undergraduate nurses are mainly in the converger category, with a tendency toward the accommodator category. Among nursing faculty, the main learning style is that of a diverger. Hence, because students as convergers find practical uses for ideas and theories and faculty as divergers view concrete situations from many different points of view, the curriculum must integrate both styles to make learning progressive and meaningful.

In the nursing literature, Gregorc's (1984) theory is similar to Kolb's (1985). Gregorc believed that an individual's style is static even if the educational setting changes, and he categorized learning styles into (a) concrete sequential (defining dispositions are practical, step by step, and methodical); (b) concrete random (defining dispositions are feeling, multifaceted, and perceptive); (c) abstract sequential (defining dispositions are intellectual, logical, and analytical); and (d) abstract random (defining dispositions are intuitive, independent, and original; Wakefield, 1993). Wells and Higgs (1990) studied Gregorc's learning styles and concluded that the learning styles of first- and fourth-year nursing students were concrete sequential and abstract random. According to Wells and Higgs, both sets of students had the same learning style: abstract random and concrete sequential.

Isom (1997) examined the relationship between the learning styles depicted in Kolb's (1985) learning style inventory and teaching methods that use lectures and case studies in a nursing and found no significant relationship between learning styles as measured by Kolb's inventory and by students' achievements on objective tests in terms of grade point averages. Furthermore, Isom's regression analysis revealed that learning style variables cannot be used to predict achievement on objective tests. Isom found that a significant amount of learning occurred regardless of the teaching method. This finding supports the belief that varied teaching methods are necessary to complement individual student differences.

These studies imply that nursing students who are convergers are problem solvers and apply ideas in practice, whereas accommodators carry out a strategy or plan and like to adapt to new circumstances. The probability of strong linkages in effective learning

between learning styles, student outcomes, and the curriculum is evident. Whether a specific curriculum would accommodate or better promote a competent nursing student is not evident in the nursing literature. The implications of resolving these questions in terms of PBL or traditional curricula use indicate a great need for more research to answer the questions associated with effectiveness and outcomes and determine whether these include empirical differences in learning.

Problem-Based Learning

Barrows, Tamblyn, and Robyn (1976) introduced and defined PBL as the learning that results from the process of working towards the understanding or resolution of a problem. The problem is encountered first in the learning process and serves as a focus or stimulus for the application of problem solving or reasoning, as well as for the search for the information or knowledge needed to understand the mechanisms responsible for the problem and how it might be resolved. PBL emerged as an innovative solution to the challenges that contemporary medical education faced with respect to the quality of student outcomes and preparation for practice. Berkson (1993) stated," Traditional medical education was increasingly perceived as dehumanizing, de-motivating, inefficient, and even ineffective" (p. S79).

The change from a subject-based curriculum to a PBL curriculum in nursing education resulted mainly from adopting the paradigm of medical education. Barrows (1985) noted that McMaster University School of Medicine set a precedent as a leader in adopting PBL in the curriculum because of the school's excessive course content, teaching restricted to lecturing, and poor congruence between educational and evaluation objectives.

PBL, one of the most popular developments in health professional education in the later part of the 20th century, was developed by Howard Barrows at McMaster University in Canada (Barrows et al., 1976), and most medical educators have adopted PBL as the educational and philosophical basis of their curricula (Harden et al., 1999). A PBL curriculum consists of subject integration within the sphere of professional practice situations. Learners acquire a broad base of knowledge through the process of progressive inquiry related to real nursing practice situations (Lambie, Maclean, & McGuire, 1981).

PBL is centered on three main principles: (a) The PBL process begins with problems rather than with exposition or prior learning of disciplinary knowledge, (b) it is a way of combining teaching and learning experiences with courses and curricula by using problems as the stimulus and focus for student activity, and (c) it is a student-centered approach to learning (Barrows & Tamblyn, 1980; Charlin & Mann, 1998; Ross 1991). The theoretical underpinnings of PBL suggest that the closer the resemblance between the situation in which something is learned and the situation in which it will be applied, the more likely that a transfer of learning will occur. The elaboration of knowledge and provision of opportunities for elaboration are the main activities of PBL (Schmidt, 1983).

In nursing education, if outcomes are to be the qualifiers that define the curriculum design and ultimately the educational model for graduates, then the phase of defining outcomes within the curriculum is where the curriculum developers will ensure that the outcomes are clearly identified, defined, and integrated with the outcomes of the professional licensing body. Keating (2005) noted that this planning shapes the concepts

embedded in the outcomes and competencies, which can be used as evaluation criteria for the program (Boland, 2005).

PBL is an innovative teaching method that has led to advancement in curriculum design that promotes specific learning strategies (Engel, 1991). PBL has been substituted in many subject-based curricula in nursing programs and continues to be a significant teaching approach in other professional programs such as economics (Foster & Gilbert, 1991), continuing medical education (Premi et al., 1994), and engineering (Griffiths, 1992). PBL methods is supported by cognitive and constructivist educational theories, which can be described as dealing primarily with questions related to knowing—the perceptual aspects of learning, such as insights. Cognitivists see learning as an internal process involving memory, thinking, reflection, abstraction, motivation, and metacognition.

According to Anderson and Elloumi (2005), cognitive psychology looks at learning from an information-processing point of view, where the learner uses different types of memory during learning. Sensations are received through the senses into the sensory store before processing occurs. Kalat (2002) added that the information persists in the sensory store for less than one second; if it is not transferred to working memory immediately, it is lost (p. 8).

After the information is processed in working memory, it is stored in long-term memory. The amount transferred to long-term memory is determined by the quality and depth of the processing in working memory. The deeper the processing, the more associations the acquired new information forms in memory. Information transferred from short-term memory to long-term memory is either assimilated or accommodated in

long-term memory. During assimilation, the information is changed to fit into the existing cognitive structures. Accommodation occurs when an existing cognitive structure is changed to incorporate the new information. Cognitive psychology postulates that information is stored in long-term memory in the form of nodes that connect to form relationships.

Cognitivists are also concerned with how we develop a foundation of knowledge and notions of ourselves. They have attempted to facilitate an understanding of the nature of information: how learners acquire and organize it; how it can be recalled, modified, applied, and analyzed; and how the learner understands, evaluates, and controls the activities involved in cognition (Bradshaw, 2004; Lefrançois, 1991). Adult students develop an awareness of what they know as learners (Brookfield, 1980) and become increasingly aware of the strategies that they can use to acquire and process information, usually through personal experience (Simpson, 1980). Their ability to direct their efforts and evaluate their cognitive activities is an aspect of their meta-cognition (Rideout, 2001). Cognitive learning is essentially the conceptualization and categorization of knowledge that creates meaning in the learning process (Bradshaw, 2004). Leonard (2002) claimed that a weakness of the constructivist model lies in determining whose construction of reality, the student's or the teacher's, is an accurate depiction of reality (p. 35).

PBL is consistent with constructivism—the philosophical view that knowledge is not absolute but is constructed by learners based on their previous knowledge and worldview (Baker, 2000). The philosophy of PBL in nursing programs theoretically endorses student-centered learning, integration of curricula, relevance to clinical and

professional practice, and facilitation of a constructive approach to learning. These components are integrated into a curriculum designed to support and adapt to the changing health care system. According to Anderson and Elloumi (2005):

> Constructivists see learners as being active rather than passive. Knowledge is not received from the outside or from someone else; rather, it is the individual learner's interpretation and processing of what is received through the senses that creates knowledge. The learner is the center of the learning, with the instructor playing an advising and facilitating role. Learners should be allowed to construct knowledge rather than being given knowledge through instruction (Duffy & Cunningham, 1996). A major emphasis of constructivists is situated learning, which sees learning as contextual. Learning activities that allow learners to contextualize the information should be used in online instruction. If the information has to be applied in many contexts, then learning strategies that promote multi-contextual learning should be used to make sure that learners can indeed apply the information broadly. Learning is moving away from one-way instruction. (p. 18)

Mezirow's (1991) constructivist theory further supports PBL theory. He used both constructivism and cognitivism to explain how people learn and saw learning as "the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one's experience in order to guide future action" (p. 12). Transformative learning involves "reflectively transforming the beliefs, attitudes, opinions, and emotional reactions that constitute our meaning schemes or transforming our meaning perspectives" (p. 223). Mezirow claimed that learning involves five interacting contexts: the frame of reference or meaning perspective in which the learning is embedded, the conditions of communication, the line of action (process) in which the learning occurs, the self-image of the learner, and the situation encountered during the learning process (p. 13).

Structure

The scenarios in PBL curriculum are based on real client situations and are prepared by faculty in collaboration with practicing nurses to make them authentic to nursing practice. The scenario design for an appropriate problem ensures that the students will explore a predefined area of knowledge or learn a set of concepts, idea, or techniques (Davis & Harden, 1999). The scenario must be developed to stimulate the students' learning and to provide stimuli for learning within the program. Dolamns, Snellen-Balendong, Wolfhagen, and VanDerVleuten (1997) identified seven criteria for effective problem design that reflect the nature of learning: (a) The content of the scenario should adapt well to students' prior knowledge; (b) the problem scenarios should contain cues to guide the students in stimulating discussion; (c) with regard to relevance and motivation, the problem scenarios should present basic nursing concepts in the context of clinical problems to encourage integration of knowledge; (d) concerning the phase of the curriculum, the problem should be consistent with the phase of the curriculum and the stage of student learning; (e) the problem scenario should stimulate learning and not be so complete that it is difficult to sustain discussion or that they require no further research or explanation; (f) the problems should enhance active involvement and promote self-directed learning so that the students will research further to gain more information about the problems; and (g) with regard to the learning outcomes, students must identify the learning issues through studying the problem and ensuring that the outcomes are consistent with the faculty's objectives.

The role of the problem scenario is to act as a convenient peg on which to hang knowledge acquisition or as the focus of a growing web of understanding practice.

(Margetson, 1998). To establish a progressive and challenging learning environment, each year of the PBL nursing curriculum incorporates scenarios that span all age groups, all settings for nursing care (acute care and community), and various levels of acuity (health promotion to critical care). The major concepts of each scenario are identified for the particular year and outlined in concept maps for each course.

Structurally, each course is comprised of four or five scenarios prepared by faculty members with expertise in the context of a particular situation. Each scenario is prepared for the identified year, with added complexity in situations to accommodate the curriculum objectives. Each scenario depicts a real practice situation and highlights the key concepts to be learned, and each situation is inlaid with triggers to stimulate discussion. The concepts that evolve from the small-group tutorials are further linked to a concept map that supports the course objectives and guides the students in avoiding the omission of important concepts and data.

Process

PBL is a method of group learning that uses true-to-life problems as a stimulus for students to learn problem-based skills and acquire knowledge about basic and clinical sciences (Morales-Mann & Kaitell, 2001). PBL involves learner-centered teaching in which individuals are placed in small groups to discuss, clarify, and seek solutions to the problems identified in a case. PBL shifts the focus of education from a faculty member's delivery of instruction to the student's active participation in the learning process (Amos & White, 1998). Bruer (1995) believed that an educator should be as concerned with "how" he or she teaches as with "what" he or she teaches, and Cahill (1997) argued that

the objective of nursing education is the preparation of skilled, competent practitioners who are fit for practice.

Classes are generally organized into small groups of 5 to 14 nursing students. Each group has a facilitator who is a nursing instructor and whose primary responsibility is to stimulate the group in critical discussion and facilitate progressive analysis of the scenario studies. Barrows et al. (1976) noted that the facilitator serves as a monitor and a stimulus by asking questions, challenging thinking, and raising issues or points that need to be considered. Schmidt (1983) identified seven steps in the PBL process: (a) clarification of terms and concepts that are not readily comprehensible; (b) definition of the problem; (c) analysis of the problem, which generates ideas and suppositions; (d) compilation of a systematic inventory of explanations from step (c); (e) formulation of any learning objectives; (f) collection of additional information outside the group; and (g) synthesis and testing of newly acquired knowledge (p. 13).

The phases of PBL that facilitate the teaching and learning process and establish the theoretical links of PBL (Williams, 2001a) are as follows. In phase 1, nursing students reason aloud through discussion of the nursing situation, identify what they do and do not know, formulate hypotheses, clarify understanding through negotiation, critique classmates' comments, establish educational goals, and create an action plan to meet those goals and test their hypothesis. With tutor coaching, these activities assist students in developing the self-monitoring skills necessary to identify learning needs by revealing their internal thinking processes. The development of self-monitoring skills is an important part of developing the skills associated with metacognition. These skills contribute to nursing students' abilities to be continuing professional learners.

In phase 2, nursing students activate their plans by engaging in self-directed study. They determine how they will learn the knowledge and skills that they have identified that they need to support or refute their hypotheses and what resources they will use to assist them. This process assists students in developing the self-directed learning skills that are a critical component of continuous professional learning.

In phase 3, students apply the information acquired during self-study to the discussion of the nursing situation and reaffirm some hypotheses while rejecting others. Students critique not only the resources that they use during self-study, but also their personal research methods; that is, hypothesis generation, resource identification, strategies used to access resources, information acquired, and subsequent conclusions. The students continuously search the literature for the latest research relating to their topic to ensure that their practice is evidence based. By critiquing methods and resources, they gain insights into which research methods are productive and why, and what could be altered for the future. Continuous evaluation of research methods and resources is critical in the process of continuous learning. These activities support and develop the students' self-directed learning, research, and leadership skills.

During the final phase of the learning, nursing students summarize what they have learned in studying a specific nursing practice scenario and discuss how their knowledge and skills might be used in future nursing practice situations. Developing such evaluative and feedback skills also helps the students to develop leadership skills. They consciously recall and reflect on the learning that occurred, elaborate on the learning, and integrate it into their existing cognitive structures (Barrows, 1983, 1986).

Outcomes

PBL outcomes are achieved by using an instructional method in studying professional case situations as a catalyst for learning. The literature confirmed that nursing educators have adopted PBL mainly because of the PBL research in medical schools. In nursing, Biley and Smith (1998b) noted that several researchers who compared the performance of students in PBL with the performance of students who followed traditional curricula found a statistically significant increase with PBL. Newble and Clark (1986) concluded that PBL students eschew superficial surface learning in favor of in-depth critical analysis. In similar studies, researchers noted that PBL students demonstrated a more efficient and successful mode of both learning and studying skills, which creates independent and self-directed professionals (Coles, 1985; Schmidt, Dauphinee, & Patel, 1987). Further investigations revealed that PBL students were more likely than their traditional counterparts to adopt a deeper style of learning (Coles, 1985; Newble & Clark, 1986).

De Kock et al. (2004) noted that everyday learning and the personal construction of knowledge establish an active construction of knowledge and skills that develop competence (p. 145). Berkson (1993) explained that the literature has suggested that adopting a deep cognitive approach to study, engaging with a concrete problem prior to exploring relevant principles, and learning in a context that approximates the future situation in which the learned knowledge will be applied all favor comprehension and eventual successful application. However, the literature on PBL did not provide any strong evidence to support this theory. Advocates of PBL (Barrows, 1985; Gijselaers, 1996; Williams, 2001b) pointed out that PBL has positive educational outcomes in that

students acquire an essential body of retrievable and useable knowledge and skills. PBL students are able to transfer their knowledge and skills effectively to deal with a variety of situations, and develop continuous learning skills to extend or improve their knowledge base to remain professionally competent.

PBL strengthens clinical reasoning and critical thinking (Albanese & Mitchell, 1993; Day & Williams, 2000; Shuler & Fincham, 1998), promotes problem solving (Patel, Groen, & Norman, 1991), structures knowledge in a clinical context (Norman & Schmidt, 1992; Thomas, 1997), motivates learning and encourages teamwork and peer review, and increases self-directed learning (Norman & Schmidt, 1992; Shuler & Fincham, 1998). Biley and Smith (1998b) and Shin, Haynes, and Johnston (1993) maintained that PBL enhances lifelong learning behaviors that support future outcome competence. According to Albanese and Mitchell (1993), PBL decreases environment stress and increases student satisfaction, graduate satisfaction, and the professors' enjoyment of student contact, which enhances their teaching satisfaction.

CARNA's (2007) entry-to-practice competencies identify specific competence that align with outcomes specific to PBL. It is assumed that PBL will facilitate graduates' achievements on entry to practice based on research, critical thinking, and self-directed learning activities. This assumption is supported by virtue of the PBL methods, which involves students in continuous discussion, reflection and problem-solving activities supported by current nursing research. Under the p*rofessional responsibilities practice standard*, the competencies include the ability to take appropriate action on the questionable orders, decisions, or interventions of other health team members and the ability to use standards of practice to continually assess one's own competence, address

one's own learning needs, and support others in their continuing competence process. These competencies align with the PBL outcomes of self-directed learning, knowledge in the clinical setting, and problem solving, research, and critical reasoning or critical thinking. The competencies that support the ability to make decisions based on evidence-based rationale, apply critical thinking skills in all practice activities, and anticipate potential health problems or issues and their resultant consequences for clients are aligned with *knowledge-based practice standards*. These competencies, in turn, are aligned with the PBL outcomes of research utilization in clinical reasoning and critical thinking, problem solving, and structured knowledge in clinical context. *Ethical practice standards* competencies include the ability to advocate as a client's designate or to empower clients to advocate for themselves, the ability to share appropriate information with team members while respecting confidentiality and legal requirements, and the ability to identify one's own values and assumptions. These competencies align with self-directedness, clinical judgment, and teamwork as PBL outcomes. The final CARNA competencies related to the *provision of service to the public* align with teamwork and problem solving from the PBL outcomes, which involved collaboration among the interdisciplinary team members on care planning, implementation, and evaluation; employing communication skills appropriately with various clients and health team members, and to exercising accountability for the supervision of other health team members.

In light of the research findings, some of the outcomes identified in the PBL literature align well with CARNA's (2007) entry-to-practice competencies. However,

gaps in the nursing literature to support such alignments indicate the need for more research in this significant area.

Empirical Evidence

PBL and NPBL learning have been widely compared in the medical literature (Albanese & Mitchell, 1993; Barrows, 1985; Barrows & Tamblyn, 1980; Boud & Feletti, 1997), and the use of PBL has been supported by other health science professions—for example, pharmacy (Slack & McEwen, 1997), occupational health (Royeen & Salvatori, 1997), physical therapy (Urbina, Hess, Andrews, Hammond, & Hansbarger, 1997), and dentistry (Chaves, Chaves, & Lantz, 1998; Townsend, Winning, Wetherell, & Mullins, 1997).

Other health scientists have studied data specific to their discipline. In a controlled, randomized study, Antepohl and Herzig (1999) compared PBL to NPBL learning in a basic pharmacology course and found no significant differences between the study and the control group. Pharmacological concepts and drug-information recall are major barriers for students enrolled in a PBL curriculum. Over time, students with clinical expertise increase their pharmacological knowledge and apply it in a specific context with minimal difficulty. Norman and Schmidt (1992) concluded that PBL may initially reduce levels of learning, but over periods of up to several years, it will increase the retention of knowledge. Researchers in other disciplines such as psychiatry and medicine found no differences in knowledge or attitudes between PBL and NPBL methods (Alleyne et al., 2002; Sunbald et al., 2002). Biley and Smith (1998a) contended in their study in the United Kingdom that "PBL graduates perceived NPBL nurses as different from themselves, primarily as a result of their inability to conceive new ideas

and their acceptance of low status" (p. 1027). Studying data relevant to this time period is essential to accommodate a changing health care environment. The number of nursing professionals continues to escalate, as is evident in nursing-program enrolment, and therefore as researchers we must study the most valid data to be able to base decisions on nursing-program curricula on current research findings.

Published reports have been mainly descriptive rather than empirical and have focused on short periods of PBL implementation in nursing programs (Amos & White, 1998; Andrews & Jones, 1996; Heliker, 1994; Little & Ryan, 1998; Townsend, 1990). Duke, Forbes, Hunter, and Prosser (1998) explained the PBL process, and Rideout (1994, 2001) explored student satisfaction with PBL.

Nursing education has adopted the PBL method as a bridge between theory and practice (Frost, 1996). Biley and Smith (1998b) stated, "There are gaps in the literature due to a lack of evaluative work beyond the descriptive and the prescriptive" (p. 358). The literature indicated that the PBL paradigm is relevant and transferable to nursing education. Andrews and Jones (1996) argued that a change to PBL in nursing education would nurture high-quality nursing skills by integrating theory, practice, and research within the curricula. Moreover, many nursing programs are continuing to adopt PBL as the teaching paradigm of choice, specifically in the UK (Johnston & Tinning, 2001), Canada (Rideout, 1994; Woods, 1994), Australia (Creedy & Hand, 1994; Fisher, King, & Tague, 2001), Sweden (Foldevi, 1995), and Wales (Andrews & Jones, 1996).

PBL is an instructional method that supports the concept of lifelong learning and the ability to be critical of a problem's context. Amos and White (1998) piloted a study of PBL by using a group of 24 RN students. PBL was used as a teaching method to validate

their previous knowledge and experience in adult chronic and critical care, obstetrics, pediatrics, psychiatry, and gerontology. In an analysis of the student evaluations, seven outcomes of PBL emerged: critical thinking, learning how to learn, creativity in learning, a link to the community, teamwork, research skills, and personal growth. Williams (2001b) contended that PBL is an instructional methods that has been used in undergraduate nursing curricula as a way to facilitate the development of nursing students' abilities to become self-directed in learning. Biley and Smith (1998b) noted that early reports supported empirical evidence and thus PBL, but the findings were not based on empirical studies, and only the positive points were presented. Thus, gaps exist in the literature, and few opponents of PBL have critiqued current theories.

The nursing literature identified no sound empirical measures that would clearly quantify whether a PBL or an NPBL curriculum supports the outcome competence of new graduates. Most comparative studies of NPBL and PBL curricula in medicine have shown that, although there is a statistically significant increased benefit associated with PBL, the improvement is still small at less than 10% (de Boo, 1996; as cited in Biley & Smith, 1998a). The nursing studies, with the exception of that of Rideout et al. (2002), have not been rigorously conducted with a clear methods to address effect size or power, and they have investigated the short-term perceptions of PBL with small sample sizes that have not provided statistically significant results. The long-term effects of PBL on nursing have not been adequately addressed (Uys, Gwele, McInerney, van Rhyn, & Tanga, 2004).

The areas that have been described on the basis of outcomes are as follows. The perspectives on knowledge retention as a pivotal outcome of learning methods varied in

different studies. Several researchers saw some increased retention as an outcome (Blake, Hosokawa, & Riley, 2000; MacKinnon, 1999), and others observed decreased performance in the fundamental knowledge related to the basic sciences (Albanese & Mitchell, 1993; Mennin et al., 1993; Vernon & Blake, 1993). Still others found no significant differences (Alleyne et al., 2002; Antepohl & Herzig, 1999; Richards et al., 1996). Albanese and Mitchell further concluded that PBL may not develop students' cognitive scaffolding adequately. Berkson (1993) suggested that standard measures of knowledge acquisition such as true-false questions, multiple-choice exams, or qualifying or licensing exam questions do not demonstrate a significant advantage of either the NPBL or PBL curriculum over the other. Vernon and Blake (1993) reported that in academic achievement, the differences between PBL and NPBL learning were statistically significant in the National Board Medical Exams but not in other factual exams and that academics favored the traditional method.

The opinions on clinical performance varied. Students in PBL programs were generally thought to do better than students in NPBL programs (Albanese & Mitchell, 1993; Norman & Schmidt, 1992; Richards et al., 1996; Sunbald et al., 2002; Vernon & Blake, 1993), whereas others noted no difference in performance (Alleyne et al., 2002; Antepohl & Herzig, 1999; Schmidt et al., 1987). Vernon and Blake found that the differences between NPBL and PBL clinical performance and student program evaluations were statistically significant (p. 561).

Several researchers preferred PBL over the NPBL method because of other outcomes such as enhanced student attitudes, student motivation, class attendance, resource allocating, and self-directedness (Jeffries, Rew, & Cramer, 2002; MacKinnon,

1999; Norman & Schmidt, 1992; Sunbald et al., 2002; Vernon & Blake, 1993). Biley and Smith (1998a) found that the students in their study felt increased tensions while using PBL, and a very significant finding was the students' belief that they were not learning anything of real importance with the PBL process. Furthermore, in this study they did not view the PBL process as an emancipatory, critical pedagogy and believed that it might even have been disempowering. Uys et al. (2004) found no difference in the level of practice between graduates from a PBL program and those from a conventional program in terms of the lowest level of functioning as a novice nurse. They concluded that PBL programs produce nurses who cope as well as those from conventional programs (p. 361). In comparing these measurable-outcome methods in health science and nursing studies, Berkson (1993), Newman (1995), and Solomon, Binkley, and Stratford (1996) concluded that these measures do not support one curriculum over another based on standardized tests of knowledge.

Conclusion

The overall data collected in the literature review are specific to medical research. Little or minimal nursing research exists to support a trend toward or away from PBL or traditional methods. In the literature, there is no census to the definitions associated with competence or competency. The outcomes from either PBL or NPBL teaching methods in other health disciplines are similar to those in nursing. Albanese and Mitchell (1993) asserted that conventional instruction is just as ambiguous as PBL. Hence, further nursing research must be conducted in the domain of nursing education to decide in future nursing programs which curriculum methods best prepares graduating nurses to seek and obtain higher levels of knowledge.

CHAPTER 3:

METHODS

Design

A comparative-descriptive design was used to compare the competence of graduates of a problem-based learning nursing program with those of graduates of an NPBL nursing program. Two factors that could influence the achievement of graduate competence are the curriculum and the teaching method.

Sample

The sample consisted of all June 2006 graduates from baccalaureate nursing programs leading to entry to practice in Alberta, Canada, and was a nonprobability convenience sample. Cohen's (1997) power analysis was used to estimate the required sample size. Cohen stated that a strong effect size is equal to .80, a moderate effect size is .50, and a weak effect size is .25. The following parameters were established for the power test based on the work of Cohen (1992): alpha = 0.05, beta 1 = 0.80, and an effect size = 0.50. For a medium effect, a sample size of n = 128 graduate nurses was required (n = 64 for each group of PBL and NPBL graduates).

The delimitations of the study include the following: (a) The study focused on the discipline of nursing, (b) the sample included all graduates from the province of Alberta, (c) the data-collection phase consisted of a six-month period after graduation, and (d) the questionnaire was composed of open- and closed-ended questions.

University Learning Sites

NPBL

Within the context of NPBL lectures, the acquisition of knowledge is organized around specific courses and curriculum objectives that support the expected learning outcomes. A faculty member specifies the content and skills to be mastered and identifies the resources that the students will use to become successful in nursing practice. Nursing programs that use an NPBL teaching methods require the completion of individual courses as the means of progressing through the program. The regular course of study consists of three core nursing courses in each of the four years, plus science, research, statistics, and student-selected options to complete the program requirements for graduation. All courses support the constructs of knowledge, scholarship, culture and context, time and transitions, and personal and professional meaning.

The faculty construct the learning objectives, and large-group lectures are the norm, with some variations in laboratory instruction. Testing of knowledge usually includes multiple-choice examinations to accommodate large groups most efficiently. However, laboratory testing, scholarly paper writing, and some written exams are included in the evaluation process.

PBL

Within the PBL context, the term *problem* refers to the identified issue that is the beginning point for the learning process (Rideout, 2001). Faculties of nursing also use the term *context-based learning* to reflect the holistic nature of nursing (Williams, 2001a). The PBL curriculum in this nursing faculty integrates nursing content with support course content offered in the traditional lecture format. PBL emphasizes small-group learning,

which reflects nursing practice as systematic and is true to nursing situations encountered in practice. Small groups consist of 10 to 15 students and a facilitator. The course syllabi contain the objectives for the PBL course and the expectations of the students and facilitator in a PBL context. Learning packages accompany the syllabi and describe learning goals, the nursing situation, resources for problem solving, and concept maps to guide the PBL process.

The initial PBL process involves verbal discussion and exploration of the situation. The existing knowledge about the situation is discussed, and concurrent learning needs are disclosed. From these needs, the students begin to explore issues and share their findings with their classmates during the following tutorial. The research will be discussed and evaluated for quality, credibility, and relevance to nursing practice. A weekly resource session with an expert in the area addresses specific content from the tutorial to enhance the learning goals and promote further discussion of the topic with the PBL methods. The integration of known knowledge, researched inquiry, and discussion of the research findings supports the resolution or understanding of the problem.

Instruments

Self-Report: Competence

Graduate competence is difficult to evaluate objectively, reliably, and validly. Within the scope of this study, the outcome of competency to practice as a new graduate is of particular importance. The underlying question involves the extent to which students identify themselves as competent to practice after having completed a four-year nursing program.

The entry-to-practice document is a key document for CARNA (2007) and nursing programs in Alberta. The practice standards were developed under the AARN, which became CARNA in November 2005. The document was written to describe the competence expected of a new graduate and to serve as a guide to curriculum development in entry-level nursing education programs (CARNA, 2007). A consultant was initially hired to draft a list of competencies based on Alberta standards of practice, other Canadian nursing regulatory competencies, and a literature review of competence in practice. In the six health regions in Alberta, 14 focus groups critiqued and discussed the draft. The CEOs of each health region, nurse educators, the Mental Health Board of Alberta, and the Cancer Health Board of Alberta were all directly involved in refining the standards for entry-to-practice competencies. Policy experts then reviewed the document internally, and the respective CEOs of the health regions reviewed it again. The members of AARN provided feedback via the AARN Web site and the monthly journal. After a final review, the document was presented to the Provincial Council of CARNA and approved as the competencies document. Developing the competencies was both a rigorous and an extensive procedure of establishing criterion validity through the rigorous process of developing the competencies and face validity through consultation with and the expertise of nursing professionals who critiqued the competencies.

The Graduate Competence Questionnaire (Appendix B) used in the study, which consisted of 50 questions, reflected CARNA's (2007) entry-to-practice competencies and outcomes of both traditional and PBL curricula. Graduates from all of the nursing programs were asked to indicate their ability to meet the competencies using a 5-point

Likert scale response format (5 = *strongly agree*, 4 = *agree*, 3 = *disagree*, 2 = *strongly disagree*, and 1 = *need more experience*).

Procedures

This study was formulated as a comparative descriptive design and employed a postal-survey approach to guarantee the anonymity of the respondents. The researcher prepared study packages consisting of an information letter (Appendix C), the Graduate Competence Questionnaire (Appendix B), and a stamped return envelope addressed to the researcher. Each study package had a code number. Using their computerized membership files, CARNA was asked to mail the study package to all June 2006 baccalaureate nursing graduates who had indicated to CARNA at the time of registration that they were willing to take part in research projects. The survey took approximately 20 minutes to complete. After four weeks had passed, CARNA sent a reminder note to all potential respondents to thank them if they had returned their survey or to invite them to complete the survey if they had not yet had an opportunity to do so.

Approximately six months passed from the date of graduation to the date of data collection for the study. This six-month period is reflected in the literature as the time period during which new graduates begin to focus on the concept of graduate nurses' competency in nursing practice, as well as on learning the routines of practice and the organizational skills of experienced nurses (Casey, Fink, Krugman, & Propst, 2004; Cowin & Hengstberger-Sims, 2006). Del Bueno (1990) reported that, through self-report, new nurses achieved competence in clinical judgment after approximately eight months of practice. In contrast, Benner, Tanner, and Chesla (1996) explored the concept of

clinical judgment and suggested that most new nurses need two years of continuous practice to achieve the level of "competent."

Data Analysis

The Statistical Package for Social Sciences (SPSS) v. 11.5 was used for data entry and statistical analysis. Descriptive statistics (mean, median, and mode) were used to summarize the data; they were chosen based on the level of measurement of the particular study variables used. For instance, mean, median, range, and standard deviation were calculated for interval-ratio level data, and mode and relative frequencies were calculated for ordinal and nominal data. Inferential statistics including the *t*-test and one and two-way ANOVAs were used to test the difference between two or more independent group means (Evans, 1998).

Ethical Considerations

The request for ethical review was completed (Appendix D), and the University of Alberta (Health Research Ethics Board, Panel B) granted approval for the proposed study prior to the commencement of the research. The study packages were mailed to all June 2006 graduates in Alberta through CARNA's mail-out process. CARNA's sending out the study package was the only way to access graduates and ensured that the researcher did not know the names of the respondents. Implied consent was obtained based on the completion and receipt of the study package by the researcher. Withdrawal from the study was not an issue; it was implied if graduates chose not to return the completed documents to the researcher. Although the risk was minimal to nonexistent, the benefits for the individual participants were also minimal. All data collected in the study from the Graduate Competency Questionnaire (Appendix B) have been secured for

five years in a locked cabinet to which only the primary investigator and the co-supervisors has access.

CHAPTER 4:

FINDINGS

The purpose of this research was to add to the nursing knowledge on the relationships among curriculum, teaching strategies, and program outcomes. The way that graduates rate their confidence in their entry-to-practice competencies reflects the structure and process of their nursing program curriculum. The objective of the study was to assess confidence in competencies and compare competence between the graduates of a PBL nursing program and those of an NPBL nursing program. The study instrument was the Graduate Entry-to-Practice Competencies Questionnaire (Appendix B), which consisted of 50 statements and reflects CARNA's (2007) entry-to-practice competencies for both PBL and NPBL graduates. Graduates from all four-year baccalaureate nursing programs in Alberta were asked to indicate their ability to meet the competencies using a 5-point Likert scale response format (5 = *strongly agree*; 4 = *agree*; 3 = *disagree*; 2 = *strongly disagree*; and 1 = *need more experience*). In addition, the PBL and NPBL groups were asked about their preparation to meet the entry-to-practice competencies and for their suggestions for program improvement.

Demographics

A total of 591 questionnaires were mailed out to graduates through a CARNA postal survey, and CARNA sent out a reminder letter one month later. A total of 136 responses were collected, for a calculated 23% return. Although 136 questionnaires were returned, only 121 were eligible for inclusion in the study. Some questionnaires were excluded from the study because the handwriting was not legible (3), the graduates were from a diploma program (2), or the graduates were educated outside of Alberta (10). A

sample size of 128 graduate nurses was required for a medium effect size of 0.50, but the sample population calculated for the study was 121 graduates. The questionnaire returns were comparable to CARNA's (2007) mail-out returns of 15%-25%.

The sample consisted of 114 female and 7 male graduates who ranged in age from 21 to 55. The PBL program graduates were from one large urban and one small university, and the NPBL graduates were from two large universities. The PBL cohort had a mean age of 27.09 years (SD = 7.491), and the NPBL cohort had a mean age of 27.40 years (SD = 7.005). The PBL cohort included 64 graduates (52.9%)—61 females and 3 males; the NPBL cohort included 57 graduates (47.1%)—53 females and 4 males. The highest academic achievement before admission to nursing included (a) high school: PBL = 24 and NPBL = 13; (b) college-level courses: PBL = 10 and NPBL = 6; (c) university-level courses: PBL = 12 and NPBL = 5; (d) diploma or certificate: PBL = 5 and NPBL = 5; and (e) baccalaureate degree: PBL = 10 and NPBL = 18 (Table 1).

The main employment site for both the PBL and NPBL cohorts was the hospital setting. There were 45 responses from the PBL cohort and 48 from the NPBL, for a total of 93 (77% of the total sample population). The remaining 23% of the total sample worked in community health settings. There were 19 responses from the PBL group and 9 from the NPBL group. The current working status of the PBL graduates in both settings included 29 full-time, 21 part-time, 12 casual, and 2 combined part-time/casual. The NPBL graduates in both settings included 19 full-time, 27 part-time, 7 casual, and 4 combined part-time/casual (Table 2). Both the PBL and NPBL sample groups were statistically comparable.

Table 1

Graduates' Characteristics

Characteristic	Dimension	PBL n = 64 Freq.	PBL n = 64 %	NPBL n = 57 Freq.	NPBL n = 57 %
Gender	Female	61	95.00	53	93.00
	Male	3	5.00	4	7.00
Age	21-31	54	84.40	46	80.70
	32-41	4	6.25	8	14.00
	42-55	6	9.37	3	5.26
Highest academic achievement prior to entering nursing	High school diploma	24	37.50	13	22.81
	College-level courses	10	15.63	6	10.53
	University-level courses	12	18.75	5	8.77
	Diploma/certificate	3	4.69	10	17.54
	Baccalaureate degree	10	15.63	18	31.58
	Other university degree	1	1.56	3	5.26
	Other	4	6.25	2	3.51

Table 2

Graduates' Main Employment Site and Current Work Status

Characteristic	Dimension	PBL n = 64 Freq.	PBL n = 64 %	NPBL n = 57 Freq.	NPBL n = 57 %
Environment	Hospital	45	70.31	48	84.21
	Community	19	29.69	9	15.79
	Total		100.00		100.00
Status	Full-time	29	45.31	19	33.33
	Part-time	21	32.81	27	47.37
	Casual	12	18.75	7	12.28
	Part-time/casual	2	3.13	4	7.02
Total			100.00		100.00

In the past six months 33 of the PBL graduates had worked in one clinical area, 16 in at least two clinical areas, and 15 in more than two clinical areas (hospital and community settings combined). Thirty-four NPBL graduates had worked in only one area in the past six months, 17 in two areas, and 6 in more than two areas (hospital and community settings combined; see Table 3).

Table 3

Number of Clinical Areas Worked in the First Six Months

	PBL n = 64		NPBL n = 57	
Number of clinical areas	Freq.	%	Freq.	%
1	33	51.56	34	59.65
2	16	25.00	17	29.82
More than 2	15	23.44	6	10.53

Major Research Questions

The answers to five major research questions were sought in the study:

1. Is the structure of an NPBL curriculum associated with outcome competence of program graduates?
2. Is the structure of a PBL curriculum associated with outcome competence of program graduates?
3. Is the teaching-learning process in an NPBL curriculum associated with outcome competence of program graduates?
4. Is the teaching-learning process in a PBL curriculum associated with outcome competence of program graduates?

5. Is outcome competency achievement different in NPBL and PBL programs?

Reliability and Validity

In this study the reliability of the questionnaire determined by a Cronbach's-alpha for the four CARNA standards calculated indicates that the graduates all interpreted the statements the same way, for a value of .771 for the four standards. The threats to internal and external validity were investigated in the study, and experimenter bias may have existed in the discourse of the analysis as a threat to internal validity, but with minimal effect. No threats to external validity were apparent to this particular study as a result of the procedures adhered to in the study methods.

Entry-to-Practice Competencies

CARNA's (2007) entry-to-practice competencies were used to measure the outcome competence of the PBL and NPBL graduate groups. The competencies are grouped under four standards: professional responsibility, knowledge-based practice, ethical practice, and provision of service to the public. Statements 9-20 represent professional competence (12), statements 21-36 represent knowledge competence (16), statements 37-43 represent ethical competence (7), and statements 44-48 represent provision-of-service-to-the-public competence (5).

The statements related to professional competence asked the graduates to indicate how well they accepted accountability for their own decisions, actions, and practice in a manner consistent with CARNA's nursing practice standards, the CNA (2002) Code of Ethics for Registered Nurses, the legislated scope of practice, and provincial and federal legislation. The competencies include (a) questioning orders, (b) making decisions, and (c) recognizing the limitations of their own competence (CARNA, 2007).

The statements related to knowledge-based competence asked the graduates to indicate whether they continually strove to acquire knowledge and skills to provide competent, evidence-based nursing practice. The competencies include (a) data collection, (b) collaboration with the client and the health care team, (c) the anticipation of health problems, (d) the rationale for proposed care, and (e) the selection and implementation of nursing interventions that require critical skills in (a) practice, (b) evaluation, (c) modification, (d) the use of technology, (e) the maintenance of clear and accurate records, (f) effective time management, (g) direction to licensed practical nurses and unregulated care providers, (h) the evaluation of responses to care, and (i) the application of the principles of primary health care (CARNA, 2007).

The statements related to ethical-based competence asked the graduates to indicate their ability (a) to identify their own values and assumptions, (b) to be sensitive to client diversity, (c) to respect confidentiality, (d) to advocate for their clients, (e) to address ethical dilemmas, (f) to clearly recognize professional boundaries, and (g) to recognize and report potentially unsafe situations for the client (CARNA, 2007).

The statements related to provision-of-service-to-the-public competence asked the graduates to indicate how well they (a) collaborated and communicated with interdisciplinary teams to achieve client health outcomes, (b) employed communication skills, (c) exercised accountability, and (d) were able to describe the overall organization of health care (CARNA, 2007).

These four standards (professional, knowledge, ethics, and provision of service to the public) were the basis for the quantitative analysis. One variable was calculated to measure each of the four individual standards rather than 5-16 tests (representing the

statements in their respective standards) being calculated for one standard. This was significant in the statistical analysis because the greater number of tests meant that the error probability would increase, but in this respect, the error probability would be less with one variable calculation than with calculations of 5-16 variables. The sum of the statements compared to each individual question reflected the standards better than each question separately and established higher reliability of the study by decreasing Type II errors. Summarizing the variables and using the central limit theorem supports the notion that variables will be normally distributed.

Means and standard deviations were calculated for the PBL and NPBL groups relative to CARNA's (2007) entry-to-practice competencies within each standard. A *t*-test was used to determine whether any significant statistical differences existed between the means of the PBL or the NPBL cohorts, based on the four standards. An analysis of variance (two-way ANOVA) was calculated to determine whether prior education and curriculum were explanatory factors for any differences in perceived competency scores. A second analysis of variance (one-way ANOVA) was conducted using the workload status (full-time, part-time, casual, and part-time/casual) of the entire sample to determine any differences in the perceived entry-to-practice competency scores.

Qualitative data collected in the study were in the form of written responses to statements 49 and 50. Question 49 asked, "How did your nursing program prepare you to meet the competencies listed?" and Question 50 asked, "What suggestions would you give to your nursing program to better prepare you to meet the above competencies?" These responses were categorized into themes.

PBL Entry-to-Practice Competence

The professional responsibility standard contained 12 competency statements. The lowest possible score was 12 (12 statements x 1 point), and the highest was 60 (12 statements x 5 points). For the PBL graduates the lowest score was 35, and the highest was 60. The mean score was 50.58, and the standard deviation was 5.690 (Table 4).

Table 4

PBL Outcome Competence

Standards	X	SD	Lowest score	Highest score
Professional responsibility	50.58	5.690	35	60
Knowledge-based practice	61.37	10.135	30	79
Ethical practice	28.81	4.663	13	35
Provision of service	19.75	3.162	11	25

The knowledge-based practice standard contained 16 competency statements. The lowest possible score was 16 (16 statements x 1 point), and the highest was 80 (16 statements x 5 points). For the PBL graduates the lowest score was 30, and the highest was 79. The mean score was 61.37, and the standard deviation was 10.135.

The ethical-practice standard contained seven competency statements. The lowest possible score was 7 (7 statements x 1 point), and the highest was 35 (7 statements x 5 points). For the PBL graduates the lowest score was 13, and the highest was 30. The mean score was 28.81, and the standard deviation was 4.663.

The provision-of-service standard contained five competency statements. The lowest possible score was 5 (5 statements x 1 point), and the highest was 25 (5 statements

x 5 points). For the PBL graduates the lowest score was 11, and the highest was 20. The mean score was 19.75, and the standard deviation was 3.162.

NPBL Entry-to-Practice Competence

The professional responsibility standard contained 12 competency statements. The lowest possible score was 12 (12 statements x 1 point), and the highest was 60 (12 statements x 5 points). For the NPBL graduates the lowest score was 33, and the highest was 60. The mean score was 49.74, and the standard deviation was 6.087 (Table 5).

Table 5

NPBL Outcome Competence

Standards	X	SD	Min.	Max.
Professional responsibility	49.74	6.087	33	60
Knowledge-based practice	61.84	12.065	36	79
Ethical practice	29.46	4.089	19	35
Provision of service	20.47	3.328	11	25

The knowledge-based practice standard contained 16 competency statements. The lowest possible score was 16 (16 statements x 1 point), and the highest was 80 (16 statements x 5 points). For the NPBL graduates the lowest score was 36, and the highest was 79. The mean score was 61.84, and the standard deviation was 12.065.

The ethical-practice standard contained seven competency statements. The lowest possible score was 7 (7 statements x 1 point), and the highest was 35 (7 statements x 5 points). For the NPBL graduates the lowest score was 19, and the highest was 35. The mean score was 29.46, and the standard deviation was 4.089.

The provision-of-service standard contained five competency statements. The lowest possible score was 5 (5 statements x 1 point), and the highest was 25 (5 statements x 5 points). For the NPBL graduates the lowest score was 11, and the highest was 25. The mean score was 20.47, and the standard deviation was 3.328.

Comparison of PBL/NPBL Mean Scores on Entry-to-Practice Competence

In this study 64 PBL graduates and 57 NPBL graduates made up a combined total of 121 graduates for the sample population. The *t*-tests were used to compare the difference between the means of the PBL and NPBL groups for the four CARNA standards (Table 6). There was no statistical difference between the PBL and NPBL mean scores for the professional standard (p = .436), the knowledge standard (p = .819), the ethical standard (p = .420), and the provision-of-service standard (p = .224).

Table 6

Comparison of Mean Scores Between PBL and NPBL

	PBL n = 64		NPBL n = 57			
Standard	X	SD	X	SD	t	Significance p
Professional	50.58	5.690	49.74	6.087	.782	.436
Knowledge	61.38	10.135	61.84	12.065	-.229	.819
Ethical	28.81	4.663	29.46	4.089	-.809	.420
Provision of service	19.75	3.162	20.47	3.328	-1.222	.224

*p<.05; ** p<.01; *** p<.001

The Relationship Between Prior Education and Entry to Practice

An analysis of variance (one-way ANOVA) was completed to examine the relationship among three levels of prior education before nursing and CARNA's four standards. No statistical differences were found (Table 7).

Table 7

One-Way ANOVA Analysis for High School, College- and University-Level Courses, and University Degree

	Prior educational preparation							
Standard	X: High School	SD	X: University and college courses	SD	X: Degree	SD	F	Significance p
Professional	48.62	5.688	50.91	5.620	49.84	5.968	1.384	.255
Knowledge	62.03	10.024	61.82	11.301	58.50	12.407	1.027	.362
Ethical	28.65	4.105	29.61	5.105	28.53	4.024	.581	.561
Provision of service	20.22	2.770	19.82	3.264	19.81	3.440	.191	.827

* p<.05; ** p<.01; *** p<.001

An analysis of variance (two-way ANOVA) was completed to examine the relationship among three levels of education prior to nursing, the type of nursing curricula (PBL or NPBL), and the four CARNA standards. No statistical differences were found (Table 8).

An analysis of variance (one-way ANOVA) was also completed to test the mean differences among the entire sample on CARNA's four standards based on current work status (full-time, part-time, casual, and combined part-time/casual). The analysis indicates that differences in competence do not depend on work status, and no statistical differences were found (Table 9).

An analysis of variance (two-way ANOVA) was completed to examine the relationship among four levels of workload status, the type of nursing curricula (PBL or NPBL), and the four CARNA standards. No statistical differences were found (Table 10).

Table 8

Two-Way ANOVA Analysis for High School, College- and University-Level Courses, University Degrees and Curricula

	Prior educational preparation for nursing							
Standard	X: High school	SD	X: University & college courses	SD	X: Degree	SD	F	Significance p
PBL:								
Professional	48.87	5.736	51.14	5.992	51.36	3.443	6.942	.126
Knowledge	59.92	10.413	62.05	10.724	60.00	9.859	.861	.537
Ethical	27.92	4.149	29.23	5.665	28.64	4.589	1.193	.456
Provision of service	19.96	2.404	19.23	3.162	19.56	3.162	1.079	.481
NPBL:								
Professional	48.15	5.800	50.45	5.203	49.05	6.881	6.942	.126
Knowledge	65.92	8.261	61.36	12.917	57.71	13.715	.861	.537
Ethical	30.00	4.062	30.36	3.880	28.48	3.816	1.193	.456
Provision of service	20.69	3.401	21.00	2.408	20.47	3.042	1.079	.481

* p<.05; ** p<.01; *** p<.001

Table 9

One-Way ANOVA Analysis for Workload Status

	Workload status									
Standard	X: Full-time	SD	X: Part-Time	SD	X: Casual	SD	X: Part-time plus casual	SD	F	Significance p
Professional	51.38	5.205	48.71	6.428	51.26	5.237	49.00	6.693	2.015	.116
Knowledge	63.60	9.965	59.56	11.685	60.74	11.813	64.50	10.728	1.257	.293
Ethical	29.13	4.915	28.54	4.032	29.79	4.392	31.50	1.643	1.011	.391
Provision of service	20.21	3.320	20.29	1.946	18.95	3.822	21.27	2.927	1.089	.357

* p<.05; ** p<.01; *** p<.001

Table 10

Two-Way ANOVA Analysis for Workload Status and Curricula

	Workload status									
Standard	X: Full-time	SD	X: Part-time	SD	X: Casual	SD	X: Part-time and casual	SD	F	Significance p
PBL:										
Professional	50.72	5.824	49.95	6.054	52.25	4.048	45.00	8.485	1.245	.431
Knowledge	62.93	9.702	60.95	10.404	59.25	10.805	59.25	14.142	1.049	.485
Ethical	28.03	5.480	28.90	4.049	30.00	3.643	32.00	.000	.703	.611
Provision of service	19.72	3.326	20.43	3.075	18.92	3.088	18.00	1.414	.757	.588
NPBL:										
Professional	52.37	4.031	47.74	6.654	49.57	6.852	51.00	5.888	1.245	.431
Knowledge	64.63	10.537	58.48	12.681	63.29	13.877	68.75	7.274	1.049	.485
Ethical	30.79	3.392	28.26	4.072	29.43	5.769	31.25	2.062	.703	.611
Provision of service	20.95	3.257	20.19	2.896	19.00	5.132	22.75	1.893	.757	.588

* p<.05; ** p<.01; *** p<.001

Structure and Process Related to Entry-to-Practice Competence

Two open-ended statements were asked of the PBL and NPBL groups to determine their preparation to meet the entry-to-practice competencies and gather suggestions for program improvement. Question 49 asked the graduates how their nursing program prepared them to meet the competencies listed in the questionnaire, and question 50 asked them for suggestions for their nursing program to better prepare them to meet the entry-to-practice competencies. A total of 63 responses for the PBL graduates and 56 responses for the NPBL graduate were tabulated.

Program Preparation for Competence

PBL

Five main themes emerged from the 63 PBL graduates' descriptions of how the nursing programs prepare them to meet the entry-to-practice competencies (CARNA, 2007). The themes included critical thinking, evidence-based practice, competencies as evaluation tools, self-directedness, and teamwork.

Critical thinking. Sixteen (25%) PBL graduates affirmed that the PBL nursing program supported a critical perspective to problem-solve nursing issues. The graduates emphasized that their critical-thinking skills had been enhanced throughout the PBL learning process, which supports competence in their nursing practice: "PBL pushed us to be critical thinkers and to always question what we are doing" and "Promoted critical thinking—figure out our own solutions to our problems."

Evidence-based practice. Fourteen (22%) PBL graduates contended that supporting clinical practice, skill competency, and evidence-based practice with research findings is an essential component of a graduate nurse's competency. Their comments included, "Clinically, my PBL education focused strictly on evidence-based practice, which gave me the skills to keep informed and practice competently, and "Understanding of evidence based practice."

Competencies as evaluation tools. Eight (13%) PBL graduates noted that the programs used entry-to-practice competencies to varying degrees as evaluation tools in some aspects of the curriculum, but not consistently throughout the entire nursing program. The graduates commented, "Research and assignments based on competencies helped understand and implement them in real situations," "In clinical assignments we

were asked to describe how we practice elements of HPA, PHC and ethics," "Evaluations of practice standards were done after each course," and "I feel my education prepared me for the realities and challenges I have found in practice."

Self-directedness. Five (8%) PBL graduates supported the notion that integrating the competencies into nursing practice is facilitated in the graduate nurse's role through self-directed learning and self-directed communication skills. The graduates' comments included, "Taught you how to look up information or seek info if you did not know the answer" and "Self base teaches you to look for your own answers." Additional comments included, "Taught me where to find information" and "Through self-directed research."

Teamwork. Five (8%) PBL graduates recognized that teamwork within the program and an interdisciplinary perspective are components of the PBL learning process. The comments included, "Provided interdisciplinary experiences to ensure professional teamwork in clinical settings" and "Group work enhanced communication skills, team building skills, and the ability to collaborate with team members," "Practiced giving feedback-positive and negative to our class daily to help us learn to deal with others we work with effectively" and "Interdisciplinary learning (teamwork)."

Three (5%) graduates contended that the PBL program did not meet their learning needs and did not prepare them to meet the entry-to-practice competencies as graduate nurses. They suggested that tutors who engage in teaching contribute to learning more than do those who challenge by asking questions.

NPBL

Three main themes emerged from the 58 NPBL graduates' descriptions of how the nursing program prepared them to meet the entry-to-practice competencies (CARNA,

2007). The themes included enhanced competence through clinical practice, competence as evaluation tools, and critical thinking.

Clinical practice. Eighteen (31%) graduates reported that competencies are present in the clinical components of their nursing programs. Their comments included, "Exposure to acute care clinical settings enabled me to be exposed to various situations and learn hands-on nursing skills and assessments" and "My program allowed lots of clinical time and experience."

Competencies as evaluation tools. Six (10%) NPBL graduates also confirmed that the curriculum addressed entry-to-practice competencies in varying degrees. The graduates noted that they received "lots of education about CARNA nursing practice standards" and "reviewed competencies and entry-to-practice standards from speakers specializing in policy areas." Additional comments included, "Much of our clinical evaluations were based on similar competencies," "Basing clinical grades on CARNA Standards of Practice," and "All assignments and nursing work was based on CARNA competencies."

Critical thinking. Four graduates (7%) considered critical thinking important in the NPBL process. Two graduates believed that "critical thinking [is a] huge part of practice in the program" and "In all courses, assignments and class discussions promote critical thinking skills and learning about what nursing entails in the health care team."

A few graduates commented on teamwork (two—3%) and self-awareness (two—3%) as components of the program that helped to prepare them to meet entry-to-practice competencies . In addition, an equal number (two—3%) contended that the NPBL program did not prepare them to meet entry-to-practice competencies as graduates.

Suggestions for Program Improvement

The second open-ended statement asked the graduates to make suggestions for improvements to their nursing program. Question 50 in the questionnaire asked, "What suggestions would you give to your nursing program to better prepare you to meet the above competencies?"

PBL

Two main themes emerged from the PBL graduates' suggestions to improve nursing programs to better prepare graduates to meet the entry-to-practice competencies (CARNA, 2007): increased clinical time and combined PBL and NPBL teaching and learning methods.

Increased clinical time. Twenty-four (38%) PBL graduates suggested that increased clinical time was a significant factor in the achievement of entry-to-practice competencies. Their comments included, "Keeping clinical time a priority—this is where most learning occurs" and "Clinical research and preparation including patient, lab and diagnostic research are the most valuable experiences and education I gained from Nursing school." Additional comments included, "More hands on experience," "Through longer term clinical placements and having students assigned a Preceptor (for example, like traditional hospital based nursing schools)," and "More time in clinical settings."

Combined PBL and NPBL teaching and learning methods. The PBL graduates thought that different teaching strategies, a pharmacology course, and more nursing instruction would enhance the integration of the entry-to-practice competencies into a PBL curriculum. Fourteen (22%) PBL graduates asserted that a combination of PBL and NPBL teaching methods would foster a better understanding of the competence required

of graduate nurses from a curriculum and practice perspective. The differences in the two teaching methods might facilitate the learning of all students with varying learning styles and needs: "Use PBL with a combination of weekly lectures that help to assimilate knowledge and develop critical thinking" and "To have a lecture and a PBL component, having only PBL and group work can equate to missing important topics."

Nine PBL graduates (14%) recommended more lecture time in pharmacology to gain greater knowledge of medication and administration competence. The graduates preferred a concentrated pharmacology course over a four-year integration of pharmacology concepts: "A pharmacology course to ensure all grads have understood pharmacology" and "Less emphasis on nursing models and theory and more pharmacology and science courses."

Five graduates (8%) suggested that more nursing instruction is required to foster a greater understanding of practice competence. They reflected on the need for instructors to teach more nursing content rather than student-directed instruction: "Teachers need to be more congruent in PBL teaching methods," "More instructor oriented approach—where the instructor actually does some teaching," and "More instructor involvement in the learning process."

Two graduates (3%) perceived the four-year program as overly theoretical and suggested that it should be more skills based to direct the curriculum to support the competence required to practice: "More focus on patients and nursing skills rather than organizations and nursing models."

NPBL

Two main themes emerged from the NPBL graduates' suggestions for improvements to nursing programs to better prepare graduates to meet the entry-to-practice competencies (CARNA, 2007): more clinical time and discussion of more real-life scenarios in the classroom.

More clinical-based learning. Thirteen (22%) NPBL graduates suggested that one way to increase competence in practice is to enhance clinical learning by increasing the number of clinical experiences. They thought that competence could be better achieved by offering graduates more clinical practice prior to working as graduate nurses: "More practical experience in the last few months of school because we seem to have a lapse in clinical time, so a lot of 'catch up'—feels like we are thrown into the work force" and "Nursing program should be more condensed and more practical with more rotations and fewer courses such as English and statistics."

More real-life scenarios. Four (7%) NPBL graduates felt that the nursing curriculum did not prepare them to meet the required competencies and suggested that strategies such as small-group discussions that focus on real-life scenarios be implemented to support the teaching and learning process in an NPBL curriculum: "Case based learning should be part of the curriculum. (BUT based and guided by practicing nurse—not self-directed by the inexperienced student!)" and "To provide more opportunities for PBL in small group settings or assignments."

Three (5%) NPBL graduates indicated the need for a greater expectation of evidence-based practice. In addition, a few graduates (n = 2) recommended greater

integration of CARNA's (2007) entry-to-practice standards into the teaching and learning process.

An important finding in the analysis of questions 49 and 50 indicated that the PBL and NPBL graduates differ in how they elaborated and articulated their responses. The PBL responses were more descriptive, and the graduates articulated their ideas with greater focus and clarity. The NPBL responses were short, less descriptive, and presented as bulleted points rather than full sentences. Both groups presented their ideas on how their nursing programs prepared them to meet the entry-to-practice competencies and made suggestions for the nursing programs to better prepare students to meet the entry-to-practice competencies.

Typical PBL graduate statements included the following: "By emphasizing the importance of continuing learning and how to do so IE Confirming competency and why it is essential and important," "Self- directed learning provided me with the ability to seek and use appropriate learning materials," and "Interdisciplinary courses (with social work, rehab med, psych, education, etc.) to get theoretical perspectives and respect for other disciplines." Typical NPBL graduate statements included the following: "Clinical practice," "In class theory," and "Help develop leadership attitudes."

Summary of Findings

This study included nursing graduates who had been practicing for at least six months in a graduate role and whose nursing program utilized a PBL or an NPBL curriculum. The quantitative analysis indicated no statistical significance in the mean scores between the PBL and NPBL groups as indicated by the *t*-test. The one- and two-way ANOVA tests indicated no statistical difference between two or more study

variables that may have influenced how the graduates rated their entry-to-practice competencies such as educational preparation and work status.

The qualitative analysis of questions 49 and 50 was summarized as themes; the questions asked graduates how their nursing programs prepared them to meet the entry-to-practice competencies, and their suggestions for their nursing programs to better meet the entry-to-practice competencies were reported as themes.

From Question 49 the following themes emerged. The PBL themes included critical thinking, evidence-based practice, competencies as evaluation tools, self-directedness, and teamwork. The NPBL themes included enhanced competence through clinical practice, competencies as evaluation tools, and critical thinking.

From question 50 the following themes emerged. The PBL themes included increased clinical time and combined PBL and NPBL teaching and learning methods. The NPBL themes included more clinical time and discussion of more real-life scenarios in the classroom.

The quantitative and qualitative data analysis indicated that the graduates who had completed a four-year nursing program rated themselves as equally competent with respect to CARNA's (2007) entry-to-practice competencies.

CHAPTER 5:

DISCUSSION

The purpose of this study was to add to the nursing knowledge on the relationships among curriculum, teaching strategies, and program outcomes. All June 2006 graduates from all baccalaureate nursing programs in Alberta were approached through a postal survey approximately six months after completion of their four-year degree program. Data from 121 graduates were analyzed in the study. Discussion of the study findings is the focus of this chapter.

Donabedian's (1980) framework was used to examine curriculum outcomes. S*tructure* refers to the interrelated elements that comprise a nursing curriculum, *process* refers to the way that the curriculum is implemented, and *outcome* refers to graduates' achievement of program outcome competence. In Alberta, CARNA's (2007) entry-to-practice competencies for graduate nurses are used to guide curriculum development in entry-level nursing educational programs. The entry-level registered nurse who has graduated from a basic nursing education program regardless of the curriculum—PBL or NPBL—is accountable for meeting CARNA's four standards of practice and the associated competence.

An important aspect of the research methods of this study was the timing of the data collection. Graduates were surveyed six months after they had graduated from PBL or NPBL nursing programs. From the literature this time period was identified as the time when new graduates begin to focus on the concept of competency in nursing practice (Casey, Fink, Krugman, & Propst, 2004; Cowin & Hengstberger-Sims, 2006). This period of perceived competence is based on the completion of the four-year degree

nursing program, which includes a preceptored clinical experience, plus six months of working experience as graduate nurses. All nursing programs in the study included a preceptorship experience that consisted of up to 350 full-time clinical hours, as outlined in NEPAB's (2007) guidelines for approval of nursing educational programs in Alberta. It is important to note that this study differs from other nursing studies discussed in the literature in that it takes into account the period of the students' preceptorship experiences prior to working as new graduate nurses and six months of independent practice in the graduate role. This six-month period allows new graduates to reflect on their working experience and rate their competency from a more valid perspective.

Graduates' Characteristics

The findings of the study reveal a mean age of 27 for both the PBL and the NPBL graduates, which indicates that they were approximately 23 years of age when they started their nursing studies and that they were of mature-student status (greater than 18 years of age) on enrolment in their nursing programs. This correlates with their highest academic achievement prior to entering a nursing program, with 31% of the students having a high school diploma, 13% having college-level courses, 14% having university-level courses, 11% having a diploma or certification, and 31% having a baccalaureate or other university degree. This finding of 31% with degrees reflects a current trend that more nursing students already have a degree when they begin their nursing programs. (CIHI, 2005). Of note is the fact that 94% of the study participants were female and 6% were male. Although this 6% is slightly greater than the 5.5% of male nurses who worked in Canada in 2005, it suggests that the study sample reflected a normal representation based on gender (CNA, 2005).

Another interesting point from the study is that both PBL and NPBL graduates tend to work in a hospital setting (PBL = 70%; NPBL = 84.2%), work full time (PBL = 45%; NPBL = 33%), and work in one area of nursing (PBL = 52%; NPBL = 60%). Combining part-time, casual, and part-time/casual status reveals that 54.7% of the PBL graduates and 66.6% of the NPBL graduates were not working full time, which correlates with current hiring practices in the nursing workforce (CNA, 2005). The numbers of graduates who work as new graduates in community health settings are lower (PBL= 30%; NPBL 15.8%) partly because of their inexperience with independent nursing assessment in a diverse social setting, their lack of experience in handling multifaceted issues without direct supervision, and the fact that fewer jobs are available. However, it is of note that twice as many PBL graduates as NPBL graduates were working in community positions. The fact that 31 of the 64 PBL (48.4%) graduates and 23 of the 57 (40.4%) NPBL graduates had worked on two or more units in their first six months indicates a concerning trend in new graduate nurse work status in Alberta. This may indicate that graduates have to work in two or more part-time nursing positions to obtain full-time work status. It may pose even greater challenges for new graduates with respect to reduced opportunities to be socialized into one nursing setting and to be mentored by senior nurses on that unit.

Competency

Professional accountability, knowledge-based and ethical practice, safe and effective patient care, a holistic approach to care, teamwork, and lifelong learning are commonly identified practice standards that support the definition of *competency* in nursing practice (CARNA, 2007). In the nursing literature the concept of competency is

unclear because of its varied interpretations and complexity (Bradshaw, 1998; Campbell & Mackay, 2001; Watson et al., 2002). Many definitions recognize knowledge, skills, and attitudes as key aspects of competence and identify quality, expectations, and skill in the context of "being competent."

Competency from a graduate nurse perspective may simply be defined on the basis of perception and not the complex integration of entry-to-practice competencies that CARNA has used to define graduate entry-to-practice competency. Eraut (1998) defined *competency* as a socially situated concept, an individually situated concept, a personal capacity, or a characteristic. PBL and NPBL graduates' definitions of competency in this study may simply reveal a perspective of the concept and not the manner in which competency is defined in the literature. Competency from this perspective can be a reflection of reasonable judgments based on researchable outcomes and interventions (Doucet, Purdy, Kaufman, & Langille, 1998). Measuring competency continues to be a challenging task because variables associated with measuring competency are not always quantifiable. This study attempted to provide empirical evidence of the PBL and NPBL graduates' entry-to-practice competencies.

Outcomes

In this study measures of entry-to-practice competence have been quantified, and the statistical outcomes of the *t*-test indicate no differences in mean scores between the PBL and NPBL groups on the CARNA standards. It is evident that CARNA's four standards are well-established guidelines used in nursing programs in Alberta to evaluate the entry-to-practice competence of graduate nurses.

The PBL and the NPBL graduates had similar mean scores when they rated themselves on the entry-to-practice competencies. Their perception of competency ranged from very competent to less competent. In all cases the PBL and NPBL groups scored higher than the lowest possible score and often close to the highest possible scores for professional responsibility, knowledge, ethical practice, and provision of service. The significance of this trend is that both groups base their competency on their experience in the four years of nursing education, which may be influenced by the curriculum. Rideout et al. (2002) found similar results when they compared students in a PBL program with those in a conventional nursing program: the *t*-test revealed no significant differences based on students' preparation for practice.

An argument that might support this outcome is based on the idea that perceived graduate competency is not a direct result of the curriculum. Newman (1995) compared the knowledge of nursing students enrolled in PBL and NPBL programs and found no statistical significance to favor one curriculum approach over the other. Hence it is probable in this study that graduate competency is based on the individual's motivation, goals, and work ethic that are supported and nurtured by a specific curriculum. Solomon et al. (1996) and Kaufmann and Mann (1999) compared performance between PBL and conventional graduates and found no statistical differences in competency on graduation. Other researchers have found that there is no overall difference between PBL and NPBL groups, which indicates that both are effective course-delivery methods (Beers, 2005; Lewis & Tamblyn, 1987; Miller, 2003; Van Duijn & Bevins, 2005). Rideout et al. (2002) and Distlehorst and Robbs (1998) reported greater perceived confidence and clinical

performance in clerkships between PBL and NPBL students, but no statistical differences.

No differences in mean competency scores on CARNA's four standards were found between the PBL and NPBL graduates because they both reported that they are competent according to the entry-to-practice competencies. This is a significant outcome of this study and for all nursing programs in Alberta because it indicates that nursing students see themselves as competent to practice as graduate nurses regardless of the teaching methods. This also suggests that nursing curricula and nursing program structure are equally successful in preparing graduate nurses for independent practice. The results indicate no perceived differences between the two groups based on curriculum and personal or practice experiences. CARNA's four standards are indicators of competency as indicated in the curriculum, but from a graduate perspective they are simply guidelines and not substantive measures of self-competency because they are not consistently discussed as critical measures of competency to work as graduate nurses. Ramritu et al.and Barnard (2001) noted that nursing graduates describe competency in relation to independence, utilization of resources, time and workload, clinical skills, knowledge, ethical practice, and evolving competency. The PBL and NPBL graduates' overall perception of competency may relate to these concepts of competency; however, these graduates achieved competency on completion of the four-year nursing program.

Structure and Process

PBL and NPBL curricula, representative of the *structure* of the Donabedian (1980) model, both have distinct differences and respective advantages and disadvantages that support and ensure competency to practice as a graduate nurse. The differences in

curricula are advantages because they support choice of teaching methods and respective learning styles. This study supports the hypothesis that graduates will attain competency to practice regardless of a chosen curriculum based on many factors in the nursing education system and the fact that all four-year nursing programs in Alberta are in approved schools. As much as their self-report indicates, the graduates perceive themselves as competent, so perhaps all variables in the nursing education support competency.

PBL and NPBL are distinctly different teaching and learning methods, and students who study in either are unfortunately not pre-selected for either curriculum based on their learning styles and individual learning preferences. Students usually enroll in a nursing program not knowing whether the curriculum will meet their specified learning needs. In Alberta, geographical location and economics may determine students' choice of nursing program and curriculum. The learning outcomes then require that students adapt to the teaching and learning guidelines. This supports the finding in the study that structure and process in a curriculum do not have a direct effect on entry-to-practice competencies based on graduates' perceptions.

In this study *process* refers to the way that the curriculum is implemented and includes approaches to the interrelated elements of a nursing curriculum. The overall perception of competency is a reflection of the PBL and NPBL teaching and learning processes, which is representative of the *process* of the Donabedian (1980) model. The PBL process is an integrated and multidimensional type of learning that involves varied activities in supporting entry-to-practice competencies. These activities include brainstorming about real nursing practice scenarios, discussion and debate related to

nursing issues that contextualize competency, evidence-based research and progressive research investigations that establish current strategies to support competency, and varied group seminars that support teamwork.

According to Fyrenius, Bergdahl, and Siren (2005):

> The PBL involves a facilitated process that supports learning rather than transferring information. In the tutorial groups, the students discuss and defend their choices and standpoints. Using library resources, text books, databases, laboratory work, field studies, lectures and other forms of faculty resources, they are urged to find answers to and perspectives on their problem-processing skills, self-directed learning skills and group competence. (p. 61)

In the NPBL programs the faculty members likely directed the learning process, which supports the process of receiving information from an expert rather than seeking out information. Ramsden (1992) described the NPBL process as a passive form of learning that does not support higher level learning, but is merely a good way of transferring large amounts of information. The NPBL process does not generate individual and group research activities as does the PBL process.

Program Support of Competence

One open-ended question was asked at the end of the data-collection tool that addressed the achievement of entry-to-practice competencies in both the PBL and NPBL educational programs. The graduates were asked how their nursing program prepared them to meet the CARNA competencies. The main themes that emerged from the PBL and NPBL responses were critical thinking, self-directed learning, evidence-based practice, and teamwork. These themes support Alfaro-LeFevre's (2002) three dimensions of competence: knowledge and critical thinking, technical and interpersonal skills, and caring. Day and Williams (2000) explained that critical thinking enables a nurse to process and analyze information that is required to solve clinical problems and decide

upon concurrent actions. Because nurses are expected to make rational decisions in caring for society, critical thinking is a core competency in nursing practice (Alfaro-LeFevre, 2002; Day & Williams, 2000; Di Vito-Thomas, 2000). The number of responses and the quality of the comments from the PBL cohort suggest that these themes were a more valued outcome measure of competency than from a NPBL perspective. The PBL graduates' responses were long and detailed and included clear descriptors that resulted in rich data on the concept and theme compared to those of the NPBL cohort.

It is important to note that 25% or less of the responses were applicable in the analysis of the open-ended questions. In both questions the response rates were categorized as relating to or not relating to the theme, or the graduates gave no response. In question 49, 5 PBL graduates and 11 NPBL graduates made no comments. In question 50, 3 PBL graduates and 10 NPBL graduates made no comments.

Critical Thinking

The importance of critical thinking is a significant outcome of the study, and 25% (16 out of 64) of the PBL graduates commented on its significance in supporting entry-to-practice competencies. Day and Williams (2000) reported that students in a PBL curriculum defined critical thinking as learning "how to think" (p. 221). They identified such learning activities in the study as components of the PBL curriculum in the form of class seminars, research activities, and clinical practice. The PBL graduates in this study affirmed that their nursing program supports a critical perspective for entry-to-practice competency as a new graduate. Critical thinking and entry-to-practice competencies in a PBL curriculum are achieved through dialogue, discussion, analysis, and evaluation of thinking from a nursing perspective. These strategies are important in teaching and

assessing the critical thinking of undergraduate nursing students (Profetto-McGrath, 2003). Educational researchers continue to stress the importance of developing strategies to teach and assess critical thinking (Banning, 2006; Daly, 2001; Girot, 2000; Profetto-McGrath, 2003).The graduates in this study emphasized that the PBL learning process enhanced their critical-thinking skills through small-group discussions, dialogue on and debate of nursing issues, and the use of research skills such as finding and summarizing information to address a specific nursing issue.

Critical thinking and research skills for the PBL graduates call for PBL learning activities associated with classroom learning and clinical experience. The graduates from all four years of a nursing program reflect the integration of self-directed learning, problem solving, and critical thinking in the learning process. Profetto-McGrath (2003) added that nurse educators need to scrutinize curriculum frameworks and teaching strategies that may encourage or obstruct critical-thinking skills. Brookfield (1991) added that PBL activities may provide greater opportunity for analysis and reflection and can be termed *teachable moments*, which may facilitate critical thinking.

In this study the PBL graduates considered critical thinking a progressive learning experience throughout the nursing program, which reflects how graduate nurses think and supports the argument that critical-thinking skills increase in university nursing programs (Duchscher, 2003; Ward, 2006). PBL graduates saw clinical practice, skill competency, and evidence-based practice as essential components of a graduate nurse's competency. Barrows (1998) argued that PBL better prepares the practitioner for the challenges of clinical practice than does a traditional curriculum. Van Duijn and Bevins (2005) concluded that no differences in clinical performance were evident by comparing

physical therapy students who studied in a traditional, or mixed curriculum. In the NPBL group of graduates, only four out of 53 considered critical thinking important in the NPBL process. The graduates affirmed that critical thinking promotes and supports judgment in nursing competency. The NPBL cohort rated themselves as having met the entry-to-practice competencies, but did not reflect on the aspects of critical thinking such as evidence-based practice to support the reasons for attaining critical-thinking skills. Reasoning, observation, and relevance are valued components of critical thinking in the NPBL curriculum and are key characteristics of critical thinking (Banning, 2006; Profetto-McGrath, 2003).

The PBL graduates further suggested that critical thinking is a significant outcome of their program and that the concept of promoting critical-thinking skills and learning about what nursing entails was incorporated into assignments, papers, and exams. The NPBL graduates commented less on critical thinking as an outcome, possibly because the term is emphasized less in the curriculum philosophy and teaching activities. One could argue that an active learning environment can promote active participation of the graduates and thus enhance the development of critical-thinking skills. Tiwari, Lai, So, and Yuen (2006) noted that active participation is very important in developing critical thinking and that a passive learning environment such as the lecture format is not conducive to critical-thinking development. Day and Williams (2000) reported that some scholars who have measured critical thinking at the beginning and the end of a program found that some NPBL programs have increased students' critical-thinking skills, whereas some have argued that these skills have decreased and others that critical thinking remained the same. Miller (1992) and Pepa, Brown, and Alverson (1997)

compared diploma students with degree students and found that the scores of students who lacked critical-thinking skills on entry into the nursing program increased significantly over time, whereas students who scored high did not experience significance increases in their critical-thinking scores over time. The four NPBL students perceived critical thinking as an important aspect of the curriculum, but the concept is not a highlighted measure of the teaching methods as it is a measurable outcome of the PBL methods. The NPBL graduates considered clinical practice, skill acquisition, and assessment skills essential components of a graduate nurse's competency. They reported that the clinical components of their nursing programs include entry-to-practice competencies.

Nursing researchers have noted that there is no specified skill attached to the concept of critical thinking, such as in psychomotor skills, but described it as a process of effective teaching strategies that support nursing outcomes (Miller & Malcolm 1990; Simpson & Courtney, 2002). Ustun (2006) suggested that PBL nursing graduates learn critical-thinking skills by receiving feedback from others throughout the PBL process. In the context of PBL tutorial groups, students evaluate themselves, their peers, and their instructors to enhance the critical-thinking process. Byrne and Keefe (2002) advised building competence in nursing research through mentoring and evaluation between faculty and students.

Self-Directed Learning

PBL graduate nurses' increased self-directedness in learning activities and progressive communication in nursing education supports the integration of the entry-to-practice competencies in their nursing practice. They noted that entry-level nursing

competence are evident in a PBL curriculum as a result of group discussion, integrated dialogue, and a collaborative approach to problem solving. In an environment of dialogue, debate, and inquiry, nursing students become self-aware of the competence required in practice by learning to communicate effectively through the PBL process of discussion and presenting data in class and clinical practice (Williams, 2001b). Simpson and Courtney (2002) stated, "Techniques of instruction need to promote active modes of teaching students how to evaluate the depth of information imparted, develop analysis skills, communication and application of information in new and unique ways" (p. 94). Ustun (2006) explained that one of the goals of the PBL model is to provide nursing students with the communication skills that they need in the helping process. Group work enhances communication skills, team-building skills, and the ability to collaborate with team members throughout the four years of PBL teaching and learning process. The nursing literature supports the claim that PBL facilitates self-directed learning (Hewitt-Taylor, 2001; Margetson, 1994; Williams, 2001b). Amos and White (1998) revealed that PBL students considered creativity in learning research skills, learning skills, critical thinking, and personal growth as strengths of the methods.

This study suggests that the process of PBL supports the self-directed learner in achieving the entry-to-practice competencies. The PBL process allows graduates to develop their own learning goals, experiences, and strategies to report a level of competency that reflects the respective nursing curricula. Usher and Bryant's (1987) and Hewitt-Taylor's (2001) philosophy on self-directed learners reflects that of the PBL graduates in this study in that they reported that they utilized the PBL process to support

their learning needs, used their past experience to problem-solve, and learned how to think critically by taking risks within the learning process.

The NPBL graduates commented less on the significance of self-directed learning and communication in meeting the entry-to-practice competencies. They reported that they are self-aware and emphasized that accountability, responsibility, and professionalism are important to the curriculum. NPBL learning in the form of lectures is one of the most widely used and accepted teaching methods (Gulpinar & Yegen, 2005). Even though NPBL teaching methods (lectures) is used extensively, some researchers considered it ineffective as a teaching method. They noted that NPBL promotes a passive, information-receiving role in which students are exposed to information but are not given the opportunity to contextualize the information (Gulpinar & Yegen, 2005; Ebert-May, Brewer, & Allred, 1997). The data from the NPBL cohort in this study included short, nondescriptive statements about communication or self-directedness, and the graduates used single words to describe the use of such activities in the curriculum. This may imply a linear way of describing the teaching and learning activities that the curriculum utilizes to support entry-to-practice competencies. Parker (1993) noted that if the goal of the lecture is to support communication and critical thinking, then an alternative method of learning, such as discussion, is recommended.

Some researchers further suggested that lectures are not suited to higher orders of thinking or instructing skills or to influencing students' attitudes (Gulpinar & Yegen, 2005; Keyser, 2000; Kumar, 2003) This may suggest that the NPBL-curriculum mode of collecting and reporting information differs in depth, analysis, and the communication of concepts from other teaching methods. Parker (1993) contended that people who vilify

lectures are really denigrating bad lectures and that good lectures are still a legitimate and effective means of teaching. This contention may simply be a factor in how the NPBL graduates rated their competency. Lectures that are poorly focused and disorganized do not promote self-directed learning or communication. In contrast, lectures that are well organized, clearly structured, and designed to promote active learning may enhance self-directed learning and communication in the NPBL cohort (Parker, 1993).

In this study the NPBL graduates did not articulate their responses as clearly or in as much detail as did the PBL graduates. Historically, the NPBL method is described as a learning process in which the learner has minimal control; hence the data from the study reflect the passive notion of information transfer and communication. Students who are not empowered to question, examine, and debate issues are less directed to become advocates for their learning and lose their sense of self-directed learning for the sake of questioning. Rolfe (1993) noted that the exact degree of self-directed learning depends on the individual's learning style, preferences, and readiness for the self-directed learning. The NPBL graduates in this study did not make clear comments on their degree of self-directedness, which may reflect the lack of opportunity to engage in or even decide upon self-directed learning activities. The NPBL graduates did not describe the type of lecture as either active or passive and the learning as stimulating or not. Nevertheless, they perceived their learning process as acceptable in helping them to meet CARNA's (2007) entry-to-practice competencies.

The NPBL graduates did not disclose whether or not the lecture format differentiated one NPBL nursing program from the other. The literature distinguished lecture methods as traditional and interactive, whereas interactive lectures support a

teaching method that uses a variety of teaching methods and techniques such as co-operative learning, problem-solving exercises, speaking activities, and library assignments to support higher-learning assimilation of information (Gulpinar & Yegen, 2005). Interactive lectures are used as a means of achieving the goal of developing critical-thinking skills, problem-solving ability, and challenging attitudes (Nasmith & Steinert, 2001). Fyrenius et al. (2005) believed that "an interactive lecture is more in line with the notions of knowledge and learning in PBL" (p. 65) and added that this type of lecture illustrates how meaningful learning can be implemented in the lecture hall.

Steinert and Snell (1999) noted that interactive lectures promote active involvement and increased motivation, which lead to higher levels of learning. In this study the NPBL graduates' unclear rating of their self-directedness may be based on a traditional lecture format rather than an active lecture. The calendar descriptions of the varied NPBL nursing curriculum courses do not distinguish between the types of learning as either active or passive learning. Learning in an interactive learning environment involves teaching strategies such as problem solving to promote higher level learning, which enhances high-level thinking and assimilation of nursing knowledge. The NPBL nursing programs do not describe the type of lecture method used, and thus graduates may not be aware of the benefits of their lecture experience. The strength of this argument identifies the fact that an unknown variable such as a lecture type may be the key to supporting higher learning in NPBL nursing programs.

Evidence-Based Practice

The PBL graduates stressed that a PBL curriculum is an invaluable resource to support research and evidence-based practice. Having the ability to find, assess, and

decipher the data necessary to critically analyze patient and nursing outcomes is very important in meeting the entry-to-practice competencies. Callister, Matsumura, Lookinland, Mangum, and Loucks (2005) noted that teaching strategies that help students to gain critical-thinking skills related to inquiry and understanding the importance of evidence-based nursing practice need to be implemented in nursing programs. Evaluating findings is a significant learning activity in the curriculum for PBL students. Hence, recognizing the merit of the entry-to-practice competencies as evaluative measures in research, knowledge, and critical thinking supports the idea that competency is multifaceted and a significant strength within the PBL curriculum. Callister et al. (2005) concluded that the integration of inquiry throughout the curriculum, with an emphasis on evidence-based practice, is a stimulus for nursing students to pursue graduate studies in nursing. This outcome is significant in supporting nursing education from graduate to expert for continued competence and for the nursing profession. The entry-to-practice competencies were leveled in the four years of the PBL programs, with research and evidence-based practice as integrated concepts, as the study data reveal. The entry-to-practice competencies reflect the guiding standards of safety and practice based on current nursing research, which are significant for graduate nursing practice.

The NPBL graduates valued evidence-based practice as an attribute less than the PBL graduates did. Two of the NPBL graduates pointed out that evidence-based practice is a valued component of their curriculum. The remainder did not comment on the utilization of evidence-based research as an element of the nursing program that helped them to meet the entry-to-practice competencies.

Teamwork

The PBL graduates further recognized that teamwork within the nursing program and an interdisciplinary perspective are components of the PBL learning process. A teamwork outcome is essential in achieving competence in the nursing profession because it promotes a cohesive working environment in various clinical settings, enhances communication skills between nursing professionals, stresses team-building skills, and increases continued collaboration amongst all of the professionals on the health care team (Amos & White, 1998; Doucet et al., 1998). Teamwork in the PBL process is a focus of the curriculum that begins on the first day of the nursing program. Carey and Whitaker (2002) reported an increased understanding of multidisciplinary teams who work within a PBL context. Students are involved in many group-situational discussions that involve collaboration and team decision making. Teamwork outcomes are vital in a nursing environment and in understanding nursing competence as evolving. Ramritu et al.and Barnard (2001) reported that new graduates perceive competence as knowledge and as evolving. According to Schuler and Fincham (1998), competency involves interdisciplinary experiences that ensure professional teamwork in clinical settings. Group work enhances communication skills, team-building skills, and the ability to collaborate with team members.

The NPBL graduates saw teamwork and the goal of solving nursing problems as valued attributes of the NPBL curriculum. Two out of 53 of the NPBL graduates (3.7%) pointed out that they realized the advantage of having the necessary entry-to-practice competencies when they started practicing as graduate nurses and that the NPBL nursing program did not meet their needs from a competency perspective. The reasons for their

dislike of the NPBL curriculum were associated with the lack of knowledge and experience that they needed to gain in the nursing program compared to the rich learning that they gained from working as graduate nurses. NPBL nursing students may have differing views of what they consider knowledge and how they attain it. This may relate to the manner in which information is collected and not contextualized as it is in a clinical situation.

Program Improvements for Competence

Another open-ended question at the end of the data-collection tool was related to the achievement of competencies in both the PBL and NPBL educational programs. The area of discussion generated from the related questions included program improvements that support the entry-to-practice competencies. The graduates were asked for suggestions for their nursing program to better prepare new graduates to meet the competencies listed in the questionnaire. The main themes that emerged from the PBL and NPBL graduates' responses were increased clinical hours and additional recommendations from the PBL graduates to combine PBL and NPBL teaching methods and from the NPBL graduates to increase research opportunities in the curriculum.

Increasing Clinical Practice Hours

Equal numbers of PBL and NPBL graduates maintained that clinical practice rather than their nursing program in general prepared them to meet the competencies to practice as graduate nurses, even though the PBL and NPBL clinical practice hours are similar for all nursing programs as per CARNA's mandate under NEPAB (2007). PBL clinical hours range from 1,600 to 1,700 and the NPBL clinical hours range from 1,200 to 1,400. The PBL and NPBL graduates rated themselves as competent, but the PBL

graduates related their competency directly to their clinical practice. The graduates did not mention laboratory experience, which is an identified part of the nursing curriculum according to NEPAB requirements. The main difference in perception may be related to the skill acquisition that is critical to clinical competence. Zubaidah (2005) noted that PBL research has pointed towards the development of a well-rounded health practitioner. However, this ideal may conflict with some nursing graduates' philosophies and belief that the PBL process did not support the development of their competence.

PBL has been described throughout the nursing literature as a learning approach that seems to be challenging, critical, and motivating for learners (Colliver, 2000). In this study the PBL graduates suggested that longer times on nursing units, more hands-on nursing practice, more time spent on important nursing skills, and more opportunity to practice these skills are reasons to increase clinical practice hours. Two graduates noted that the four-year PBL program is overly theoretical. They suggested that it should be more skills based to direct the curriculum and support the competence required to practice and that less emphasis on academic goals such as using organizational and nursing models and more focus on patients and nursing skills are required.

Three PBL students further noted that the nursing curriculum did not prepare them to meet the necessary competence to practice as graduate nurses and recommended an alternative teaching method and enhanced clinical hours. They identified the need for more hands-on experience and more of an instructor-oriented approach in which the instructor actually does some teaching. In this study the graduates recommended a greater emphasis on the entry-to-practice competencies in all clinical components of the nursing

program. Ramritu et al.and Barnard (2001) asserted that safe practice is the most important element of competency from a graduate perspective.

The NPBL graduates also suggested that one way to increase entry-to-practice competencies is to enhance clinical learning by offering more clinical hours and experiences. The graduates made the following recommendation about clinical practice: more exposure to varied clinical placements, longer clinical placements, more time spent on the nursing units, and more time devoted to practicing clinical skills. They suggested that competence could be better achieved by increasing the clinical practice hours prior to students' working as graduate nurses. Etheridge (2007) noted that being in the clinical setting is the most helpful learning strategy to assist graduates in thinking like nurses and that new graduates are often unaware of the level of responsibility required of nurses and lack confidence in their ability to make clinical judgments.

There were no significant differences in the number of clinical hours between the PBL and NPBL nursing programs that would be large enough to influence a graduate's rated perception of competency. However, the clinical routines in the PBL and NPBL curricula do differ. Both the PBL and NPBL clinical routines are scheduled on consecutive and alternating days to achieve the required clinical hours per course that the nursing programs require. The difference in clinical scheduling per nursing course may suggest that clinical rotations that are consecutively scheduled enhance a graduate's perception of competency. The graduates in both groups identified clinical practice as significant in meeting the entry-to-practice competencies, but the *t*-test statistic confirms that there were no calculated differences. In this study clinical practice was a perceived contributing factor to meeting the entry-to-practice competencies. There is no substantive

evidence in the literature that indicates whether or not clinical scheduling affects graduates' perceptions of competency. Although there is no evidence, anecdotally, this study reveals some differences that suggest a possibility of scheduling having some influence on perceived competency. Ramritu and Barnard (2001) suggested that clinical competency is an efficient performance of clinical skills. Busari, Scherpbier, and Boshuizen (1997) found no differences between PBL and NPBL graduates in their ability to manage clinical situations.

Further research is needed on clinical education in the context of PBL and NPBL programs. Graduates from both PBL and NPBL programs assume that clinical hours will enhance their ability to meet the entry-to-practice competencies, but neither the PBL nor the NPBL graduates stated a reason for this assumption. This may suggest that they believe that nursing programs' clinical hours differ greatly or that additional clinical hours actually support their performance as graduate nurses.

Additional Recommendations

The PBL graduates proposed that a combination of PBL and NPBL teaching methods (from a curriculum and practice perspective) would foster a better understanding of the competence required of graduate nurses. The differences in the PBL and NPBL teaching methods might facilitate learning for all graduates irrespective of their learning styles and experiences. Integration of different teaching methods as a curriculum approach could fulfill the learning and organizational needs of all nursing graduates. With the integration of the principles and structure of PBL and NPBL, all students learn key components of both curricula, such as problem solving through group work and direct-lecture content, to ensure greater knowledge and professional competence at the

end of the nursing program. In conjunction with the integration of PBL and NPBL teaching activities, only three PBL graduates recommended incorporating more instructor-driven learning opportunities into a PBL nursing program to foster a greater understanding of practice competence. They reflected on the need for more nursing-content instruction rather than student-directed instruction. Biley and Smith (1998a and Young (1998) contended that in PBL the teacher functions as a facilitator rather than as an instructor.

The NPBL graduates called for more research opportunities in the curriculum to enable graduates to apply the research findings to practice because evidence and findings are significant aspects of nursing practice and competency. Biemans, Deel, and Robert-Jan Simons (2001) noted that the single most important factor that influences learning is prior knowledge. Graduates' existing knowledge further develops as a result of their gaining new knowledge based on experience and research. Gulpinar and Yegen (2005) reported that prior knowledge is a significant influence on students' learning process and outcomes. The study data support the claim that the NPBL curriculum is lacking in the further development of knowledge through active research and discussion of the research. The acquisition of knowledge through nursing research is a major outcome that is essential to meet the entry-to-practice competencies. A nursing program with a curriculum that includes a focus on nursing research can significantly enhance the outcome competence of graduates.

Summary

Graduates from both the PBL and the NPBL nursing programs perceived themselves as confident in meeting the entry-to-practice competencies in Alberta, as per

NEPAB's (2007) standards in relation to theoretical, clinical, and laboratory requirements for all nursing programs in Alberta. All programs in the study have been approved and meet standards and may have exceeded the standards required to support the entry-to-practice competencies. In this study the PBL graduates clearly indicated that the structure and process of the PBL program assisted them in meeting the entry-to-practice competencies as demonstrated in their skill and ability in critical thinking, self-directed learning, evidence-based learning, and teamwork. In contrast, the NPBL graduates did not clearly identify to what extent the structure and process of the NPBL nursing curricula contributed to their achieving the entry-to-practice competencies. If nursing education contemplates curriculum changes, then education needs to move to an interactive approach in the learning process. If the teaching method utilized is not PBL, then greater interactive activities in the classroom should be considered as they would perhaps have an impact on the ability of graduates to articulate how their education contributed to their achievement of entry-to-practice competencies.

Delimitations

Delimitations are aspects of a study design that the researcher was able to control. The use of a self-report survey was selected for two reasons. A self-report survey was an appropriate way to collect data from a large pool of potential subjects. The survey was also a way to gain information about the graduates' perceptions of their abilities to meet CARNA's Entry to Practice Competencies. Having the survey sent out by CARNA was the only way to access Alberta nursing graduates.

The decision to study all nursing graduates from baccalaureate programs in Alberta at six months post- graduation fit with the idea that the graduates' practice would

still be related to or be influenced by their nursing program. If a longer period had been chosen (e.g. one year), the results might have been more influenced by the work environment. The six month post-graduation timeframe also likely avoided any overlap with graduate follow-up by individual nursing programs which generally had been occurring at one year post-graduation. The use of the six month post-graduation period fit with a decision by the Nursing Education Program Approval Board (NEPAB) for nursing programs to change the timing of program evaluation by graduates to six months post-graduation.

Limitations

The assessment of competence continues to be a key issue in the nursing literature. Reliability (the extent to which an instrument measures consistency) and validity (the extent to which an instrument measures the construct of interest) are fundamental measurement issues and should be rigorously established to measure clinical competence (Watson et al., 2002). Watson et al. stated, "Even if reliable and valid instruments for the measurement of clinical competence are developed, there remains the issue of what level of performance indicates competence and therefore at what level a student can be deemed incompetent" (p. 5). In this study the reliability of the instrument as indicated by Cronbach's alpha for the four standards calculated indicates that the graduates all interpreted the questions the same way, for a value of .771. In light of the reliability, the instrument may not have been sensitive enough to detect differences.

The sample-size calculation was used to recruit a convenience sample from all nursing programs in Alberta that use either a PBL or an NPBL curriculum. A power test based on the work of Cohen (1992) includes $\alpha = 0.05$, $\beta = 0.80$, and ES = 0.50 (medium

effect size). Although a sample size of N = 128 graduate nurses was required to establish statistical significance (Cohen, 1992), N = 121 was still an adequate number to establish an overall moderate effect for the study. Although the sample was one of convenience, there is no clear indication of how the sample could have been biased. A limitation of using a postal survey is the small number of potential subjects who actually complete and return the survey. In this study, 24% of the potential subjects responded. However, it is not possible to know about the characteristics of the 76% who did not respond and if they were different in any way from those who did respond.

Error may have occurred in the data entry from the questionnaire into a computer file. To minimize and monitor potential transcription errors, the data were visually verified by comparing them to the original questionnaire responses twice after the final entry was processed. Only four errors were detected and then corrected.

A qualitative methods may have generated richer results in the data collection and analysis. As noted in the discussion, the PBL and NPBL graduates differed in how they articulated and elaborated on their responses to how their nursing programs prepared them to meet the entry-to-practice competencies and in their recommendations for nursing programs to better prepare them to meet the entry-to-practice competencies.

Implications

Implications for Nursing Education

This study supports the current nursing literature by providing empirical measures that quantify the perceived competency of PBL and NPBL nursing graduates in Alberta. Most comparative studies of NPBL and PBL curricula in medicine have shown that, although there is a statistically significant increased benefit associated with PBL, the

improvement is still small at less than 10% (de Boo, 1996; as cited in Biley & Smith, 1989a). This study provides a clear methods: a statistical process that allows empirical output and follow-through with a credible power analysis and reliability measure (Cronbach's alpha) for the measurement tool. With the exception of Ride out et al. (2002), other nursing researchers have not rigorously conducted studies with a clear method that address effect size or power. Nursing researchers have investigated only the short-term perceptions of PBL with sample sizes that were too small to perform statistical analysis adequately.

In this study the graduates considered clinical experience significant in supporting entry-to-practice competencies. Clinical experience supports all four nursing practice standards and reflects the statistical similarities in PBL and NPBL means for the knowledge standard. Graduates' reports on clinical performance vary in the literature. Some researchers have contended that students in PBL programs generally do better than students in NPBL programs (Albanese & Mitchell, 1993; Norman & Schmidt, 1992; Richards et al., 1996; Sun bald et al., 2002; Vernon & Blake, 1993), whereas others have noted no difference in performance (Allen et al., 2002; Antepohl & Herzig, 1999; Schmidt et al., 1996). Vernon and Blake found that the differences between NPBL and PBL clinical performance and student program evaluations were statistically significant (p. 561) and that PBL was rated significantly higher than NPBL on both accounts.

Some researchers supported the PBL over the NPBL method because of other outcomes such as enhanced student attitudes, student motivation, class attendance, resource allocation, and self-directedness (Jeffries, Rew, & Cramer, 2002; MacKinnon, 1999; Norman & Schmidt, 1992; Sunbald et al., 2002; Vernon & Blake, 1993). In this

study the majority of the graduates viewed PBL as a beneficial learning method, whereas a few graduates would have preferred another teaching method. The NPBL graduates supported their teaching method, and a few graduates suggested that some PBL case discussion would have been helpful. Biley and Smith (1998a) found that the students in their study felt increased tensions with PBL, and a very significant finding was the students' belief that they were not learning anything of real importance in the PBL process. Uys et al. (2004) found no difference in the level of practice between graduates from a PBL program and those from a conventional program in terms of the lowest level of functioning as novice nurses. They concluded that PBL programs produce nurses who cope as well as those from conventional programs (p. 361).

In comparing these measurable-outcome methods in health science and nursing studies, Berkson (1993), Newman (1995), and Solomon, Binkley, and Stratford (1996) concluded that these measures do not support one curriculum over another based on standardized tests of knowledge. This study incorporates research to support the decisions made for nursing education with respect to nursing curriculum. Empirical data and evidence suggest that no one curriculum is supported over another based on competency measures and the outcomes of graduates.

Implications for Research in Nursing

In light of the difficulty of defining, evaluating, and measuring competence, future research in nursing education must continue to reflect the perceptions of students and how their behaviors promote self-competence. Further replication of this study using the same research methods in another province in Canada and then comparing the results with those of this study would be beneficial to ensure a greater understanding of

competency across two separate curricula. Comparing the nursing curriculum of four-year nursing degree programs from a Canadian perspective may enhance future nursing practice. Conceptualizing, measuring, and evaluating competence in nursing practice continue to be a challenging process. In light of the existing and future nursing shortage, more research will be needed to address new competency concerns, continued competency measures, and resolutions to support future research in the area of nursing competency. The findings from questions 49 and 50 point to the need for more qualitative research on competence, which may further capture the ability of the graduate nurses to express their thoughts precisely and eloquently.

Conclusion

Baccalaureate nursing education programs must ensure a learning process that prepares nursing graduates to meet entry-to-practice competencies. The issue that continues to challenge nursing programs is which nursing curriculum and teaching methods best prepare graduates to meet the entry-to-practice competencies by the end of a four-year nursing program.

This study involved nursing graduates who had been practicing for at least six months in a graduate role and whose nursing program utilized either a PBL or an NPBL curriculum. Regardless of whether they are in a PBL or an NPBL program, graduates have the abilities to meet the entry-to-practice competencies of the professional association (CARNA). The PBL graduates contended that the structure and process of their nursing programs were instrumental in their being prepared to meet the entry-to-practice competencies. They identified the skills and abilities of critical thinking, self-directed learning, evidence-based practice, and teamwork as key in enabling them to meet

the entry-to-practice competencies. The NPBL graduates did not clearly identify the structure and process of their nursing programs as contributing factors to their meeting the entry-to-practice competencies. Graduates from both programs suggested that more clinical hours would further enhance their ability to meet the entry-to-practice competencies.

Additional studies that compare PBL and NPBL are required to support the findings in this study. The outcome of this current study is that students in both PBL and NPBL nursing programs in Alberta are appropriately prepared to meet the required competency levels for licensure and that they can identify aspects of the learning process that support their perceptions of competency.

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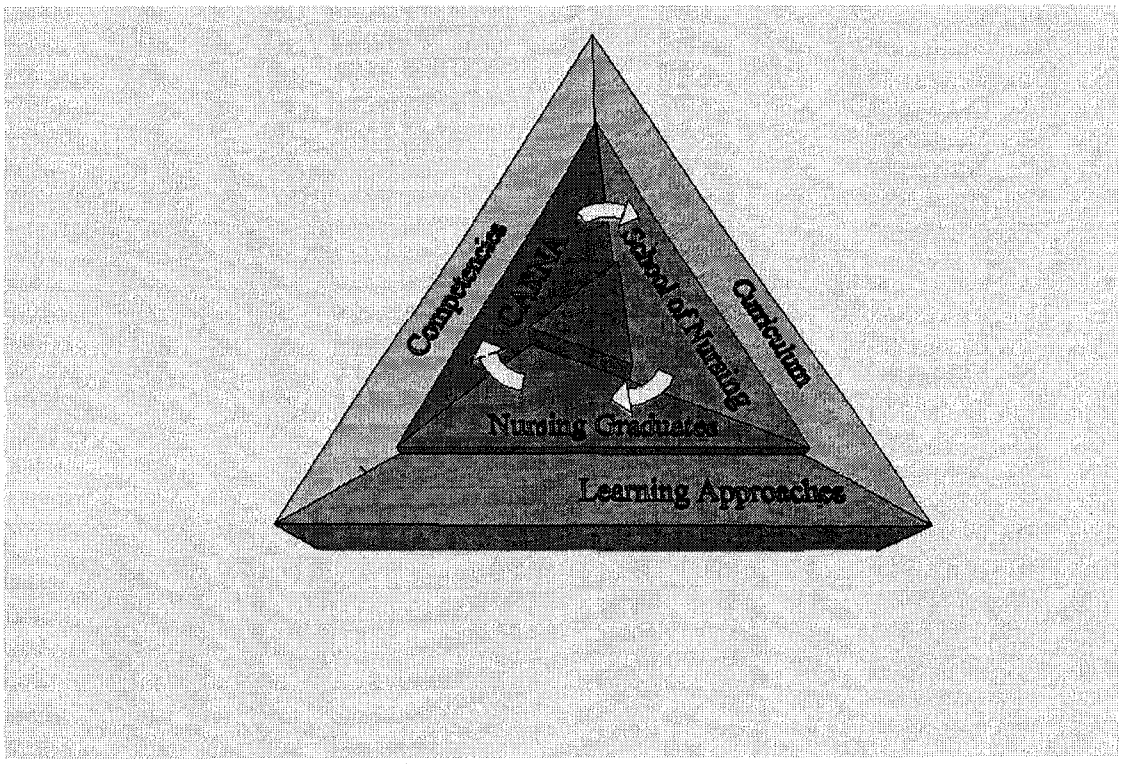
APPENDIX A:

CONCEPTUAL MODEL: AN ADAPTATION OF DONABEDIAN'S FRAMEWORK



(Donabedian, 1980)

APPENDIX B:

GRADUATE COMPETENCIES QUESTIONNAIRE

Demographic Data:

1. Age in Years _____

2. Gender: Female _____ Male _____

3. Highest Level of Academic Achievement *before* admission to Nursing

   _____ A. High school diploma or equivalent
   _____ B. Some college level courses
   _____ C. Some university level courses
   _____ D. Diploma or certificate
   _____ E. Baccalaureate degree
   _____ F. Other University degree _____

4. Which institution is your nursing degree from? _____

5. How long after program completion did you begin employment as a graduate nurse?

   A. 1-2 months _____
   B. 3-4 months _____
   C. 5-6 months _____

6. Which of the following areas describe where you work:

   A. Hospital
   B. Rehabilitation Center
   C. Mental health centre
   D. Nursing home, Long term care
   E. Home care agency
   F. Community health Agency
   G. Public health agency
   H. Other _____

7. At present, are you working:

   A. Full-Time _____
   B. Part-Time _____
   C. Casual _____

8. In the past SIX months how many clinical areas have you worked:

   A. 1 _____
   B. 2 _____
   C. More than 2 _____

Questionnaire

Instructions: The following is a list of competencies for new graduate nurses entering practice. Please indicate your ability to meet the following competence by identifying the extent to which the following statements describes your nursing practice. Please indicate only **ONE** response for each question.

Competency	5 Strongly agree	4 Agree	3 Disagree	2 Strongly disagree	*1 Need more experience*
9. Accepts accountability for own actions and decisions.					
10. Practices in a manner consistent with CARNA *Nursing Practice Standards.*					
11. Practices in a manner consistent with CNA *Code of Ethics for Registered Nurses.*					
12. Practices in a manner consistent with *Health Professions Act.*					
13. Practices in a manner consistent with provincial and federal legislation.					
14. Takes appropriate action on questionable orders, decisions or interventions of other health team members.					
15. Uses standards of practice to continually assess own competence and learning needs and take steps To meet own learning needs.					
16. Uses standards of practice to support others in their continuing competence process.					
17. Assumes primary responsibility for planning, implementing, and evaluating the learning process.					
18. Recognizes limitations of competence, seeking assistance when necessary.					
19. Follows quality and risk management processes To enhance nursing practice.					
20. Describes professional self-regulation including the role of CARNA.					

Competency	5 Strongly agree	4 Agree	3 Disagree	2 Strongly disagree	*1 Need more experience*
21. Uses various data collection approaches to the situation to complete client assessment.					
22. Collaborates with client and other health team members to develop a plan of care.					
23. Anticipates potential health problems or issues And their resultant consequences for clients.					
24. Provides rationale for proposed client care.					
25. Applies critical thinking skills in all practice activities.					
26. Selects and implement nursing interventions that support the plan of care mutually established with the client and other health team members.					
27. Competently performs restricted activities relevant to the area of practice.					
28. After evaluations, modifies plan of care in collaboration with client and other health team members.					
29. Uses information and other technology to support nursing practice.					
30. Maintains clear, concise, accurate and timely records of client's care.					
31. Supports, facilitates, or participates in research relevant to nursing practice.					
32. Supports decisions with evidence based rationale and current nursing research.					
33. Uses effective time management strategies to organize workload.					
34. Provides direction and/or consultation when supervising other health-care providers.					
35. Appropriately assigns nursing care to other members of the health-care team.					
36. Applies principles of primary health care to nursing practice.					
37. Identifies own values and assumptions.					
38. Demonstrates sensitivity to client diversity in nursing practice					
39. Shares appropriate information with team members, while respecting confidentiality and legal requirements.					

Competency	5 Strongly agree	4 Agree	3 Disagree	2 Strongly disagree	*1 Need more experience*
40. Advocates for clients or the client's designate or empowers these to advocate for themselves.					
41. Follows established processes to address ethical dilemmas.					
42. Practices within professional boundaries identified by CARNA.					
43. Recognizes and reports situations, which are potentially unsafe for clients or health team members (e.g., abusive clients or caregivers, faulty equipment, inappropriate staff/client ratios or skill mix).					
44. Collaborates as a member of an interdisciplinary health team to achieve client health outcomes.					
45. Employs communication skills appropriate to various clients, health team members and situations.					
46. Exercises accountability for supervision of other health team members.					
47. Communicates with health team members to ensure continuity of health services for clients.					
48. Describes the overall organization of health care.					

49. How did your nursing program prepare you to meet the competencies listed above?

1.
2.
3.

50. What suggestions would you give to your nursing program to better prepare you to meet the above competencies:

1.
2.
3.

APPENDIX C:

INFORMATION LETTER

Title of Project: A Comparison of Competencies between Problem-Based Learning (PBL) and Non–Problem-Based Learning (NPBL) Program Nursing Graduates
Principal Investigator: Dr. Beverly Williams, PhD
Phone: 492-8054 E-mail: beverly.williams@ualberta.ca
Dr. Rene Day, PhD
Phone: 492-6481 E-mail: rene.day@ualberta.ca

Sub-Investigator: Harrison Applin MEd, BScN, RN, PhD (Candidate)

Dear _____:

Background: As a nurse educator, I am asking your assistance in a study I am completing as part of my doctoral program. I am interested in how you rate your level of competency as a new graduate, and how your nursing curriculum supported your achievement of entry-to-practice competencies. Outcome competencies for new graduates are written concepts in your nursing program and are supported by a nursing curriculum and a teaching methods. This study will compare whether graduate competence differ across all four year baccalaureate nursing programs in Alberta, and whether a Problem based learning (PBL) or a non–problem-based learning (NPBL) teaching method influences your performance level as a new graduate.
Purpose: The purpose of this research is add to our nursing knowledge about the relationship of curriculum structure and the teaching strategy on the development of professional outcome competence of baccalaureate graduates.
Procedures: Participating in this study will involve you filling out a questionnaire, which will take you about 20 minutes. After completing the questionnaire, please place it in the self-addressed envelope provided for mailing.
Possible benefits: The benefits of this study of nursing graduates in a problem-based learning and non–problem-based learning nursing program may help determine whether any differences exist between the two in your education as a graduate nurse and the competence you possess as a graduate. The study may help nursing programs determine whether graduates better achieve competence from the learning facilitated through the use of a problem-based learning or a non–problem = based learning teaching methods. Lastly, the study may prove significant in presenting data and developing recommendations for future nursing programs whose teaching methods best supports nursing graduates' outcome competence.
Possible Risks: There are no known risks.

Competence Between PBL and NPBL Nursing Graduates

Confidentiality: CARNA has mailed you a coded study package because you have agreed to take part in nursing research .You cannot be identified in any way in the study, thus your status as a graduate nurse cannot be affected by your decision to participate or not. Results of the study will be made available through the Faculty of Nursing, University of Alberta. All data collected in the study will be secured for five years in a locked cabinet to which only I, as the researcher, will have access.

Voluntary Participation: You are free to fill in the questionnaire or not. By returning the questionnaire to me you are consenting to be a participant in the study. If you choose to not fill in the questionnaire you have chosen to not partake in the study.

Contact Names and Telephone Numbers:

If you have concerns about your rights as a study participant, please contact me at the above email address or telephone number. If you have any concerns about any aspect of this study, you may contact Dr. Christine Newburn-Cook, Associate Dean, Research at 492-6764.

Please contact any of the individuals identified below if you have any questions or concerns:

Phone : 780-492-8054 *Name:* Dr. Beverly Williams, PhD (Principal Investigator)
Phone: 780-497-4240 *Name:* Harrison Applin MEd, BScN, RN, PhD (Candidate).

Thank you for your assistance in contributing to research which may benefit nursing graduates in the future.

Harrison Applin MEd, BScN, RN, PhD (Candidate)

APPENDIX D: HEALTH RESEARCH ETHICS APPROVAL FORM

Health Research Ethics Board

213 Heritage Medical Research Centre
University of Alberta, Edmonton, Alberta T6G 2S2
p.780.492.9724 (Biomedical Panel)
p.780.492.0302 (Health Panel)
p.780.492.0459
p.780.492.0839
f.780.492.7808

HEALTH RESEARCH ETHICS APPROVAL FORM

Date:	October 2006
Name of Applicant:	**Dr. Beverly Williams**
Organization:	**U of A**
Department:	**Faculty of Nursing**
Project Title:	**Comparison of Competencies Between Problem-Based and Non Problem-Based Learning Program Nursing Graduates**

The Health Research Ethics Board (HREB) has reviewed the protocol for this project and found it to be acceptable within the limitations of human experimentation. The HREB has also reviewed and approved the subject information letter and consent form.

The approval for the study as presented is valid for one year. It may be extended following completion of the yearly report form. Any proposed changes to the study must be submitted to the Health Research Ethics Board for approval. Written notification must be sent to the HREB when the project is complete or terminated.

Special Comments:

Dr. Glenn Griener, PhD
Chair of the Health Research Ethics Board
(B: Health Research)

NOV 0 8 2006
Date of Approval Release

File Number: B-291006

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