

The Effect of Team-Based Learning as an Instructional Strategy
on Baccalaureate Nursing Students

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Dedication

This dissertation is dedicated to my parents, Lawrence and Jean Beyer, without their unselfish love, enduring patience, and constant encouragement when I needed it the most I would not have been able to believe in the beauty of my dreams and none of this endeavor would have been possible. You both were the wind beneath my wings. I love and miss you both!

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Sometimes our light goes out but is blown into flame by another human being. Each of us owes deepest thanks to those who have rekindled this light." Albert Schweitzer

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Table of Contents

	Page
ABSTRACT.....	11
CHAPTER I: INTRODUCTION	12
Background.....	12
Statement of the Problem.....	18
Purpose Statement.....	19
Significance of the Study	19
Definitions of Terminology	20
Conceptual Framework.....	22
Research Questions.....	26
Hypothesis.....	27
Methods.....	28
Assumptions.....	29
Delimitations.....	30
Limitations	30
CHAPTER II: LITERATURE REVIEW	32
Team-Based Learning Methodology	32
Essential Elements in TBL.....	34
Advantages of TBL.....	36
Disadvantages of TBL	38
Effectiveness of TBL	39

TBL and Student Learning.....	39
TBL and Student Performance.....	41
TBL and Student Engagement.....	44
Student Perception of TBL.....	46
TBL in Undergraduate Nursing Education.....	48
Summary.....	53
Conclusion.....	54
CHAPTER III: METHODS.....	56
Research design.....	56
Instrument Description.....	58
Operational Definitions.....	60
Population and Sample.....	62
Ethical Considerations.....	65
Data Collection Procedure.....	66
Data Analysis Procedure.....	70
Threats to Internal Validity.....	74
CHAPTER IV: RESULTS.....	75
Analysis of Data.....	75
Demographic Information.....	75
Statistical Analysis of Research Questions.....	79
Student Comments: Team-Based Learning Student Assessment Instrument [®]	100

CHAPTER IV: DISCUSSION AND SUMMARY 104

 Retrospective Component..... 104

 Student Survey Component 109

 Implications for Nurse Educators 113

 Limitations 115

 Recommendations for Future Research 116

 Summary117

REFERENCES 119

APPENDICES 128

LIST OF TABLES

Table 1: Demographic Information for Student Survey Component.....	78
Table 2: Test Items Score Comparisons between Lecture and TBL.....	81
Table3: Test Item Score Comparisons of Content taught in Senior Nursing Courses.....	83
Table 4: Comparison of Upper and Lower Quartiles taught with Lecture and TBL.....	84
Table 5: Comparison of Content Areas of the Senior Upper and Lower Quartiles.....	86
Table 6: Comparison of Cognitive Level Test Items.....	88
Table 7: Comparison of Cognitive Level Test Items in Upper and Lower Quartiles.....	89
Table 8: Total Instrument and Subscale Scores per Academic Level.....	95
Table 9: Difference between Academic levels on Total Instrument Score.....	97
Table 10: Difference between Academic levels on Preference Subscale Scores.....	98
Table 11: Difference between Academic levels on Satisfaction Subscale Scores.....	99

LIST OF FIGURES

Figure 1: Model of Kolb's Experiential Learning Theory.....	24
Figure 2: Learning Styles in Kolb's Experiential Learning Theory.....	25
Figure 3: Total Team-Based Learning Student Assessment Instrument Score.....	91
Figure 4: Total Accountability Subscale Score.....	92
Figure 5: Total Preference for TBL or Lecture Subscale Score.....	93
Figure 6: Total Satisfaction with TBL Subscale Score.....	94

Abstract

National bodies of nursing have identified that nurse educators in undergraduate nursing education need to incorporate student-centered and evidenced-based instructional strategies to promote application of nursing concepts. Team-based learning (TBL) has been identified as an effective method of fostering a deeper understanding of content and facilitating application of concepts in complex situations in other professions. The purpose of this study was to describe the effect of TBL on baccalaureate nursing students. This study included two components: 1) a causal-comparative descriptive design for retrospective analysis of test items of students taught with lecture or TBL, and 2) a descriptive survey design for the analysis of a student survey. Comparisons of test items from 638 nursing students enrolled in sophomore and senior nursing courses taught with lecture or TBL and comparisons of students from upper and lower quartiles were conducted. Results indicated there was no overall significant difference between test items scores of nursing students taught with lecture or TBL. Further comparisons on the cognitive level of the 45 test items indicated no difference for students taught with lecture or TBL. An evaluation of nursing student responses on the Team-Based Learning Student Assessment Instrument[®] was performed. Students perceived higher levels of accountability with TBL than lecture but had a slight preference for lecture with a wide range of satisfaction scores with TBL. This study did corroborate with previous studies that TBL was at minimum equally effective as lecture for nursing students with high levels of student accountability for learning.

Keywords: team-based learning, nursing education, instructional strategies

Chapter I: Introduction

The purpose of this chapter is to provide the motive and rationale for conducting a research study in nursing education. The background for an identified problem with the purpose and significance of a proposed study is provided. Research questions and hypotheses that arose are presented; including the conceptual framework to support the study and a brief description of the research methods intended to be used in the study.

Background

Nursing is the largest health care profession in the United States and comprises the greatest percentage of hospital staff (American Association of Colleges of Nursing, 2010; Bureau of Labor Statistics, 2010; Institute of Medicine, 2010). Nurses are the health care consumer's last line of defense in receiving effective, safe health care (Benner, Sutphen, Leonard, & Day, 2010). Changes in the healthcare environment and the nursing shortage have had a significant impact on the professional nursing role. Knowledge and innovation are increasing at a fast rate. Globalization, heightened consumerism, the aging population, increased complexity of healthcare, and advances in technology have changed the healthcare environment in which nurses practice (Benner et al., 2010; Dalley, Candela, & Benzel-Lindley, 2008; Forbes & Hickey 2009; Hegarty, Walsh, Condon, & Sweeney, 2009; Institute of Medicine, 2010). The nursing shortage has been detrimental to the healthcare environment with a reduction in positive patient outcomes (Flynn & McKeown, 2009). Evidence has shown that patient outcomes are improved when the nurse has had a baccalaureate nursing (B.S.N.) education, although the greatest percentage of graduating nurses are from an associate degree program (Aiken, Clarke, Cheung, Sloane & Silber, 2003). As nursing practice has evolved to meet the needs of society, it is important for nursing education to evolve to meet the educational needs of future nurses.

The American Association of Colleges of Nursing (AACN), the National League for Nursing (NLN), and the Institute of Medicine (IOM) have identified a need for undergraduate nursing education to be re-evaluated and revised to reflect current educational practices to meet the changing nursing practice environment (American Association of Colleges of Nursing, 1997; National League for Nursing, 2003; National League for Nursing, 2005; Institute of Medicine, 2010). The AACN (1997) issued a position statement on the vision of nursing education for the next decade, which advocated for nursing curricula to be focused on educating nurses who can respond to the changing health care environment. Effective undergraduate nursing education should prepare students to be innovative and flexible, foster interdisciplinary collaboration, acquire the attitude of lifelong learning, and develop critical thinking and clinical judgment skills (Benner et al., 2010; Institute of Medicine, 2010).

Since the late 1980's, the NLN has called for a curriculum revolution to transform undergraduate nursing educational programs from the content-laden and teacher-centered curriculum to innovative pedagogies that facilitate student learning (National League for Nursing, 1988). Curricular structures were re-examined in 2003 and in a position statement the NLN described the "innovations" initiated in nursing curricula had focused on adding or re-arranging content within the curriculum (National League for Nursing, 2003). In this position statement, the NLN also concluded that nurse educators were continuing to teach as they were taught, using lectures overloaded with a vast amount of insignificant content. In addition, the NLN identified two assumptions from which most nursing curricula were based: (1) it is possible to learn all nursing content in a nursing curriculum, and (2) nursing education is accountable for teaching all nursing content within a curriculum. These findings led to a call to action focusing on reforming undergraduate nursing education to include new pedagogies that will help students

learn to practice in the ever-changing health care environment. The NLN also encouraged that nursing education design evidenced-based curricula that are flexible, student-oriented, collaborative, and integrate current technology.

In a 2005 position statement, the NLN provided several recommendations to improve nursing education (National League for Nursing, 2005). Among those recommendations, nursing programs were directed to involve students as active participants in the educational process and to base curricular decisions, teaching practices, and evaluation methods on evidence derived from current research (National League for Nursing, 2005).

In February 2010, the IOM and the Robert Wood Johnson Foundation held a forum on the challenges and future of nursing education (Institute of Medicine, 2010). This forum consisted of nursing education experts and examined several general topics including “what to teach” in the ideal curriculum in nursing education. The “what to teach” examined the question of what knowledge is required to prepare nursing students to practice as safe and effective caregivers. The forum panel recommended that nurse educators improve the link between knowledge, practice, and clinical reasoning skills in courses and incorporate learner-centered strategies. They concluded that undergraduate nursing education also needs to provide a strong foundation with a scientific background, practice-based knowledge, and clinical reasoning skills. In addition, as the complexity of health care increases, skills in interprofessional teamwork and collaboration were also deemed essential.

In the Carnegie National Nursing Education Study, Benner and colleagues revealed there are many current educational practices that do not promote critical thinking and clinical judgment (Benner et al., 2010). Frequently, classroom education in undergraduate nursing programs primarily consists of a lecture format with many PowerPoint® slides (Benner et al.,

2010; Dalley et al., 2008; Di Leonardi, 2007; Moellenberg & Aldridge, 2010; Rowles & Brigham, 2005). Lectures are given in a prescribed static environment and are generally not interactive. Lectures may be augmented with the addition of learner-centered activities such as games and case studies (Rowles & Brigham, 2005). Content is divided into various taxonomies, such as disease processes, body systems, or specific steps of the nursing process (Benner et al., 2010; Forbes & Hickey, 2009; Stokowski, 2011). Students are required to memorize large quantities of factual information but are not taught how to learn, think independently, problem-solve, or prioritize in a clinical situation (Benner et al., 2010; Giddens & Brady, 2007; Stokowski, 2011). Memorization of content does not mean the student understands the information (Benner et al., 2010; Stokowski, 2011).

As these professional organizations and studies have identified the need to transform undergraduate nursing education, they challenge undergraduate nursing programs to produce nurses who can competently and confidently practice in a changing health care environment. (American Association of Colleges of Nursing, 1997; Benner et al., 2010; Institute of Medicine, 2010, National League of Nurses, 1988, 2003, 2005). Although nursing programs were asked to re-evaluate and reform nursing curricula and include innovative teaching strategies to engage students in meaningful learning of essential concepts, many nurse educators continue to teach as they were taught – using lecture as a primary teaching strategy (Benner et al, 2010; Dalley et al., 2008; Giddens & Brady, 2007).

Several researchers have suggested that nursing curricula are overburdened with more content than is possible to teach (Benner et al., 2010; Dalley et al., 2008; Diekelmann, 2002; Forbes & Hickey, 2009). The phenomenon of content saturation has been credited to the

evolving information age, changes in health care delivery, ongoing teacher-centered pedagogy, content repetition, and the academic-practice gap (Giddens & Brady, 2007).

Nursing students are overwhelmed with the extensive amounts of content to be learned, excessive reading assignments, and memorization of large quantities of information (Diekelmann, 2002; Giddens & Brady, 2007; Ironside, 2005). As the amount of content to be “covered” in lectures continues to rise, students are becoming disengaged from the learning process and relying more on rote memorization (Benner et al., 2010; Giddens & Brady, 2007; Ironside, 2005). Rote memorization does not translate to understanding or application of the essential concepts of nursing knowledge. It has become evident that knowledge comprised of a large amount of disconnected facts is not adequate in preparing nursing students to practice as safe and effective health care professionals (Benner et al., 2010, Institute of Medicine, 2010)

Undergraduate nursing students have been traditionally taught in both the classroom and clinical setting. The clinical setting provides a good methodology through experiential learning for students to learn the professional nursing role. The classroom has been devoted to providing content and concepts in which to base clinical practice. Oermann (2004) affirmed that the extensive knowledge of content taught in the classroom in undergraduate nursing education does not allow the depth and experience which students need for professional nursing practice. A recent major study on undergraduate nursing education determined there is a fragmentation of learning occurring between the classroom and clinical setting (Benner et al., 2010). The researchers state this fragmentation affects the ability of students to learn how to use knowledge effectively and make decisions in practice, an important facet of the nursing role. The demands of the nursing role require life-long learning and integration of knowledge, skills, and ethics into

daily practice. Nurses must be able to use critical thinking and clinical judgment skills in problem-solving within a variety of clinical situations.

Often, students are not actively engaged in the learning process or neglect to understand the importance of attending all of the classes (Benner et al., 2010; Giddens & Brady, 2007). Some nurse educators use a “call and response” format attempting to get students engaged in class. In this format, the instructor poses questions intermittently during lecture and students are asked to respond with the correct answer. This format is entirely based on factual information with the purpose of reviewing or reinforcing previously learned content. Games and case studies are also incorporated during lecture to review and reinforce factual content. Students may have more interaction with this teaching strategy, but it does not ensure they are engaged in learning or can apply the knowledge gained into nursing practice (Benner et al., 2010).

Clinical experiences in undergraduate nursing education are based on experiential learning theories and provide the opportunity for nursing students to incorporate classroom content into practice. Frequently the student expectation of the clinical experience is directed towards performing tasks and skills, not to correlating aspects of patient care to classroom content (Benner et al., 2010). Clinical experiences, in themselves, are self-limiting in facilitating this process due to limitations in patient assignments and the availability of an appropriate clinical setting. In addition, the clinical experience may not provide a patient population consisting of disease processes or conditions currently being studied in the classroom. Clinical experiences can add considerable stress to students as a result of the fear of not having sufficient knowledge and skill to care for the patient (Oermann, 2004). Student stress in the clinical setting can be associated with the fragmentation of classroom and clinical learning (Benner et al., 2010).

Statement of the Problem

The nursing practice environment is constantly changing and nurses need to be able to adapt to the changes. Today's nurse must be able to use critical thinking and have good clinical judgment skills in order to work in unpredictable health care environments. They should also possess the ability to work collaboratively with other members of the health care team. Critical thinking, clinical judgment, and collaboration are skills that do not arise from learning nursing content. In addition, there is not enough time to teach all of the content available (Dalley et al., 2008). This is compounded by the increasing amounts of medical knowledge in health care. Nursing curricula are saturated with content, some of which is outdated (Forbes & Hickey, 2009.) Oversaturation of content may decrease the likelihood that nursing students will acquire meaningful learning of concepts or develop lifelong learning skills. For effective learning to occur, a shift from teacher-centered curricula (trying to impart massive amounts of content) to a learner-centered curriculum that focuses on learning essential concepts must take place.

A learner-centered approach concentrates on creating an environment in which the emphasis is on learning rather than teaching (Dalley et al., 2008). Learner-centered education fosters a higher level of thinking and enhances students' engagement in learning. In order for undergraduate nursing education to transform from the content-laden, teacher-focused methodology to a learner-centered approach, the nurse educator must utilize a different instructional strategy. Team-based learning is an instructional strategy that is learner-centered and utilizes high performance teams to enhance the quality of student learning (Michaelsen, 2004). Team-based learning has been successfully incorporated into other health care professions educational programs and has demonstrated effectiveness in promoting student learning, student engagement, and student application of knowledge (Dunaway, 2005; Haidet,

O'Malley, & Richards, 2002; Hunt, Haidet, Coverdale, & Richards, 2003; Michaelsen, Parmelee, McMahon, & Levine, 2008). It is important to evaluate the effect of team-based learning as an instructional strategy in undergraduate nursing education.

Purpose Statement

Team-based learning (TBL) has been shown to be an effective teaching strategy to promote student learning, student engagement, and student application of knowledge but there is limited research on the effect of TBL as an instructional strategy on student learning in undergraduate nursing students. The purpose of this study is to describe the effect of TBL as an instructional strategy on baccalaureate nursing students.

Significance of the Study

The transformation of the undergraduate nursing curricula should include new pedagogies which facilitate the development of a nurse who can translate and apply evidence into practice, problem-solve, value the patient's perspective, collaborate with other members of the health care team, and be able to adapt to change (Hegarty et al., 2009). The traditional lecture methodology is ineffective in helping students apply the nursing knowledge needed to practice in the rapidly changing healthcare environment (Benner et al., 2010; Forbes & Hickey, 2009; Hegarty et al., 2009). Just as nurses base their practice on the best available evidence, it is important for nurse educators to base their teaching methodologies on evidence-based teaching strategies that are effective and promote student learning. TBL is one instructional strategy that research has shown to be effective in promoting student engagement, fostering a deeper understanding of content, and facilitating the application of concepts in complex situations (Michaelsen, 2004; Michaelsen et al., 2008; Michaelsen & Sweet, 2008b). TBL uses small

groups to increase learner-to-learner engagement and collaboration, which can promote interprofessional teamwork.

There is a need to explore and describe the effect of TBL as an instructional strategy on nursing students in a baccalaureate nursing program. Utilizing an instructional strategy that promotes application of nursing concepts to clinical situations in undergraduate nursing education can benefit students in their transition from nursing student to practicing nurse. Ultimately, nursing graduates who have the ability to meet the challenges of today's health care environment will benefit the consumers in obtaining safe and effective health care.

Definitions of Terminology

For the purpose of clarifying terms associated with the research problem and questions, the following definitions of terminology are presented:

Undergraduate nursing education: For the purposes of this study, undergraduate nursing education will refer to an education in a baccalaureate nursing program.

Student learning: For the purposes of this study, student learning will be defined by the student's success on multiple-choice examinations as evidenced by test item scores.

Team-based learning: A learner-centered teaching strategy which utilizes teams in the classroom and uses consistent components of a readiness assessment test process, a group application problem, and peer evaluation (Michaelsen, 2004).

Lecture: A teacher centered teaching strategy that employs a teacher presentation of content to students with or without additional visual aids, handouts, or engagement techniques.

Classroom content: A unit of knowledge covering specific disease processes and /or specific nursing practices; and is acquisition of knowledge as assessed through multiple-choice examinations.

Cohort: A group of nursing students who progress through an undergraduate nursing program taking the same core nursing courses together.

TBL module: a classroom session using team-based learning as the instructional strategy to facilitate student knowledge of essential concepts and content.

Readiness Assessment Process: the basic method to ensure that students are exposed to course content; includes reading assignments, individual test, group test, appeals process, and instructor feedback (Michaelsen & Sweet, 2008a).

Individual Readiness Assessment Test (IRAT): A multiple choice quiz taken individually at the beginning of a classroom session (Michaelsen & Sweet, 2008a).

Group Readiness Assessment Test (GRAT): The same multiple choice quiz taken as an individual readiness assessment test, but taken in prescribed groups (Michaelsen & Sweet, 2008a).

Group Application Problem (GAP): An instructional activity that “provides students the “opportunity to deepen their understanding by having groups use the concepts to solve a problem” (Michaelsen & Sweet, 2008a, p.20).

Upper quartile: For purposes of this study, students who score in the top 25th percentile on all examinations in a nursing course.

Lower quartile: For purposes of this study, students who score in the lowest 25th percentile on all examinations in a nursing course.

Academically at-risk student: For the purposes of this study, a student who is in the lower quartile.

Performance: For the purposes of this study, student achievement of an assigned score.

Test Item: For the purposes of this study, a multiple-choice examination question.

Examination Score: The score achieved on an entire examination.

Test Item Score: The percentage score achieved on specific test items in an examination that was taught with both TBL and Lecture.

Conceptual Framework

The ability to use critical thinking, problem-solving and application of concepts or knowledge to a variety of situations are essential components of nursing practice and are learned in a nursing education curricula. In the assessment of the effectiveness of an instructional strategy on learning and achievement of those skills, it is important to understand the learning process through a theoretical or conceptual framework. It is also important to understand various learner styles to enhance the learning environment and meet the needs of all types of learners. The learning process to achieve the skills of critical thinking and problem-solving can be explained by the Experiential Learning Theory proposed by David A. Kolb (Kolb, 1984). Kolb's theory conceptualizes experiential learning as a process in which knowledge is acquired through the transformation of experience. The learner uses their past experiences to build new knowledge. Kolb's theory focuses on the cognitive mental process of learning and emphasizes the need for learner engagement and involvement in the educational activity (Akella, 2010). The model of experiential learning includes a four-phase cycle of learning in which students learn via concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE) (see Figure 1). To be an effective learner, the learner must apply

skills from each of the learning phases. The four phases reflect two dimensions of learning: perceiving and processing. Learners perceive information through concrete experience or abstract conceptualization and process information through reflective observation and active experimentation.

The learning cycle typically begins with an actual experience that provides a basis for learning (CE) in which a task is assigned and carried out. The learner then reflects on the experience from various perspectives to process the information (RO). This is followed by the learner interpreting aspects of the experience, drawing conclusions and relating them to theories or concepts (AC). The learner then takes action and applies new learning to different situations (AE). Each of these phases can be correlated to different aspects of a TBL module. In TBL the student is expected to have a specific reading assignment completed prior to class. This aspect of the readiness assurance process correlates well with the elements of the concrete experience (CE) phase. In carrying out the individual and group readiness assessment tests of a TBL module, the student is completing the reflective observation (RO) and abstract conceptualization (AC) phases of the learning cycle. There is a group application problem utilized in a TBL module that reflects the active experimentation (AE) phase of the learning cycle.

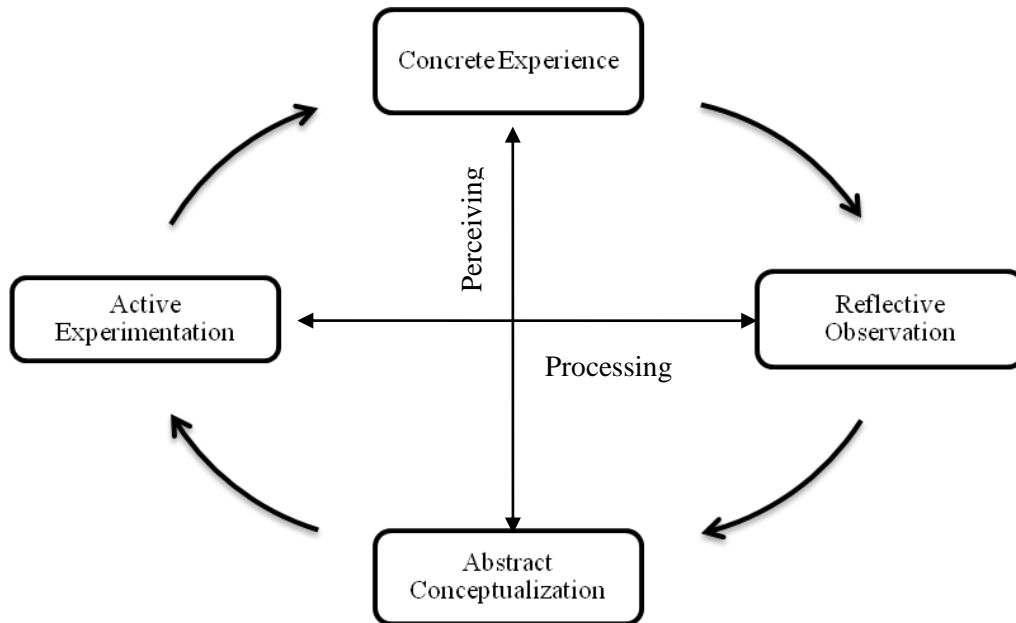


Figure 1. Model of Kolb's Experiential Learning Theory.

Kolb's theory also depicts that learners have preferred ways of perceiving and processing information. The pairing of each phase of the learning cycle produces four basic learning styles (see figure 2). These four learning styles are the accommodator, assimilator, diverger, and converger (Kitchie, 2008). It is important to consider the different learning styles when instituting new teaching strategies. The learner with the preferred learning style of the accommodator combines the phases of CE and AE. Learners who are primarily accommodators use trial and error in problem-solving and are good at adapting to changing circumstances. They learn best with hands-on experiences and thrive on learning new and challenging experiences. Implementing a new teaching strategy, such as TBL, can help meet the learning needs of learners with this type of learning style. The various activities utilized in TBL modules provide the hands-on experiences to problem-solve that accommodators thrive on.

The learning style of the assimilator arises from the combination of reflective observation (RO) and abstract conceptualization (AC). The assimilator learns through taking large amounts of information and putting it into concise and logical form. Assimilators like to reason inductively and learn through conversations that take a logical and thoughtful approach. The group activities in a TBL module incorporate group discussions that require problem-solving and reasoning skills to determine a correct response. The activities used in this instructional strategy will appeal to this type of learner.

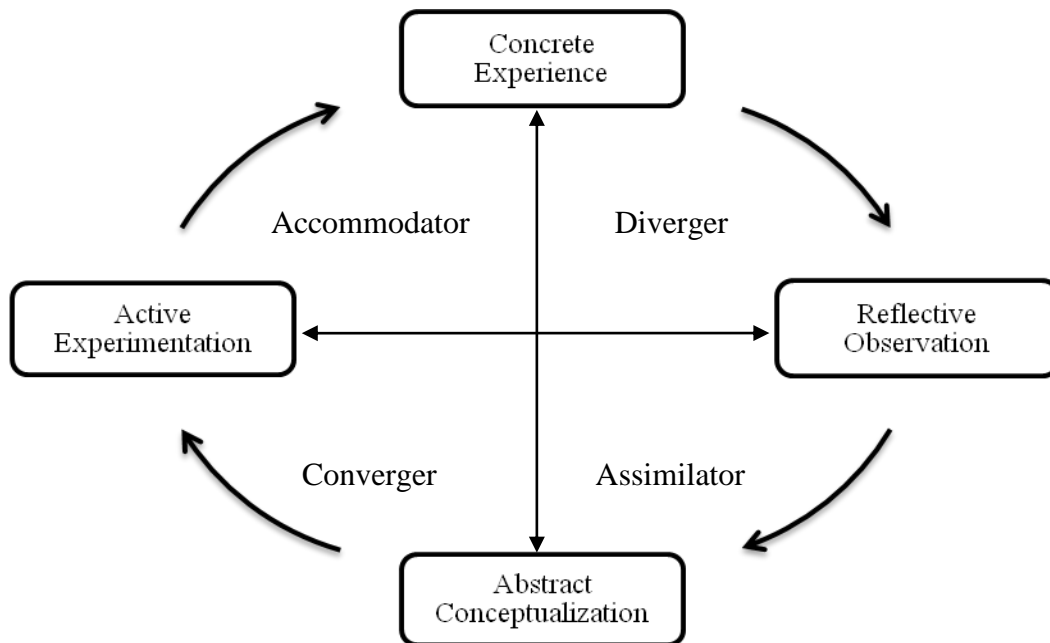


Figure 2. Learning Styles in Kolb's Experiential Learning theory.

The combination of concrete experience (CE) and reflective observation (RO) formulate the learning style of the diverger. The diverger is good at innovation and takes an imaginative approach to learning. Divergers view concrete situations from many perspectives and enjoy brainstorming. Divergers are open-minded and prefer group activities. Major components in a

TBL module include the incorporation of teams in assessment testing and application problems and will enhance the learning experience for the diverger.

The converger, arising with the combining of abstract conceptualization (AC) and active experimentation (AE), uses deductive reasoning in problem-solving to find a practical application for new knowledge. Convergents tend to like structure and factual information, so they prefer technical tasks, like simulation, included as part of their learning. Convergents are less interested in interpersonal issues, so they would facilitate the group process by keeping members on task. As convergers like decision-making, problem-solving, and the practical application of ideas, the group application problem used in TBL would be a positive learning environment for this learning style.

Research Questions

It is important for undergraduate nursing students to learn how to perform safe and effective nursing care in a rapidly-changing health care environment. Undergraduate nursing education needs to include teaching strategies to facilitate student learning. To assure students have mastered essential concepts needed in professional nursing practice, nurse educators need to evaluate student learning. Understanding the effectiveness of a teaching strategy on student learning can assist educators in determining learning needs. Measurement of student learning may involve assigning numbers to describe achievement of student learning (Oermann & Gaberson, 2006). The two forms of measurement used for this study were test item scores and survey scores. This study explored team-based learning as a strategy to facilitate student learning with the following questions:

1. Is there a difference in performance on examination test items of baccalaureate nursing students on classroom content taught with TBL as compared to lecture?

2. Is there a difference in performance on examination test items of sophomore and senior level baccalaureate nursing students on classroom content taught with TBL as compared to lecture?
3. Is there a difference between upper quartile and lower quartile baccalaureate nursing students in performance on examination test items on classroom content taught with TBL as compared to lecture?
4. Is there a difference in performance on cognitive- level test items of baccalaureate nursing students on classroom content taught with TBL as compared to lecture?
5. What are baccalaureate nursing students' perceptions regarding accountability, preference for TBL or lecture, and satisfaction with TBL as an instructional strategy?

Hypotheses

The overarching hypothesis for this study was that baccalaureate nursing students will have increased student learning as evidenced by higher test item scores on classroom content with TBL as the instructional strategy as compared to baccalaureate nursing students taught with lecture. There are several additional hypotheses that were tested by this study, including:

1. Baccalaureate nursing students taught with TBL will achieve higher scores on examination test items than baccalaureate nursing students taught with lecture.
2. Senior baccalaureate nursing students taught with TBL will have a greater increase in test item scores than sophomore nursing students taught with TBL as compared to the same academic levels taught with lecture.
3. Lower quartile baccalaureate nursing students taught with TBL will have a greater increase in test item scores than upper quartile nursing students taught with TBL as compared to the same quartiles taught with lecture.

4. Baccalaureate nursing students taught with TBL will achieve higher test item scores with higher cognitive-level test items than baccalaureate nursing students taught with lecture.
5. Baccalaureate nursing students will perceive having a favorable experience with TBL as evidenced by high total instrument scores and high subscale scores of accountability, preference for TBL or lecture, and satisfaction with TBL on the Team-Based Learning Student Assessment Instrument[®].
6. Higher academic levels of baccalaureate nursing students will have higher total instrument scores and higher subscale scores of accountability, preference for TBL or lecture, and satisfaction with TBL on the Team-Based Learning Student Assessment Instrument[®] than lower academic levels.
7. There will be no significant differences in examination test item scores between TBL and lecture as the instructional strategy for baccalaureate nursing students.

Methods

The major approach to this study was quantitative and included two components: 1) a causal-comparative descriptive design for the retrospective analysis of archived data, and 2) a descriptive survey design for the analysis of student surveys.

A causal-comparative descriptive design examines differences in two or more groups in which “the dependent variable already has been affected by the independent variable” (LoBiondo-Wood, 2010, p. 204). An outcome of interest is measured between groups and any differences in outcomes are attributed to the differences in the groups being compared. The retrospective comparison was made of archived examinations evaluating test item scores on classroom content taught using TBL to test item scores on the same content of previous cohorts taught by the traditional lecture. The archival data was obtained from faculty and included

examinations from student who were previously enrolled in two sophomore and two senior level nursing courses in a baccalaureate nursing program from 2009 to 2011. One to three semesters of test item scores of students taught with lecture and two to three semesters of test item scores of students taught the same content using TBL were compared for each of the four courses. An independent samples *t*-test was performed to compare test item scores of students taught with TBL or lecture for each course. As the overall topic of the content differs between courses and within courses, only comparisons between TBL and lecture of test items for each content area within each course was performed.

Descriptive research is designed to “observe, describe, and document aspects of a situation as it naturally occurs” (Polit & Beck, 2008, p. 274). A questionnaire on the students’ perceptions of the effect of TBL as an instructional strategy on their learning was used to gain additional data. The Team-Based Learning Student Assessment Instrument[®] was administered to current baccalaureate nursing students during the spring semester of 2012 (see Appendix A). Additional demographic data was also obtained. Descriptive analysis of the total instrument scores and total subscale scores from the Team-Based Learning Student Assessment Instrument[®] was used to evaluate student perceptions of team-based learning. Additional data obtained from general comments from students regarding their experiences with TBL and exploratory data analysis on those comments provided further description of student perceptions (Burns & Grove, 2009).

Assumptions

The underlying assumptions of this study are that learning is based on instructional strategy and that test item scores indicate learning has occurred. There are many other factors that can influence examination scores such as good or poor test taking skills, hours of study, and

test anxiety. Another assumption is that all cohorts in a nursing program have the same distribution of educational and life experiences, intelligent quotient (IQ), grade point average (GPA), and motivation. All of these factors can influence test item scores and the students' responses to new instructional strategies. This leads to the assumption that the undergraduate nursing students were receptive to learning from a different instructional strategy and that they were thoroughly oriented to the TBL strategy. Careful selection of instructional strategies is one component of creating a positive learning environment. If the use of TBL as an instructional strategy is new to undergraduate nursing students, it is important to provide a detailed explanation of the process and grading procedures. It is unknown how much orientation the students in each class received about TBL.

Delimitations

A delimitation to this study is that it was confined to one baccalaureate nursing program in the Midwest; therefore results could not be generalized to all undergraduate nursing programs. The study also used a homogenous sample of undergraduate nursing students, therefore restricting generalization to the population. A true randomized sample was not obtained and the sample was recruited from a pre-selected group who fit the defined characteristics. A final delimitation was that the study was descriptive in nature and did not provide information on other factors influencing student learning, examination scores, or student perception of learning with the TBL instructional strategy.

Limitations

A limitation to this study was the limited number of TBL modules incorporated into nursing courses in the baccalaureate nursing program at the time of the study. Previous studies have compared examination scores from courses using entirely TBL to other instructional

strategies. Students that were exposed to TBL also had some content taught with lecture during the same semester.

Another limitation was the number of test items used for the content TBL module that can be used for comparison to previous cohorts taught by the traditional lecture method. A final limitation was that the researcher is a faculty member working at the college with students in one of the nursing courses and uses TBL as an instructional strategy. Students may have responded in a different way to the Team-Based Learning Student Assessment Instrument[©] because of this relationship.

Chapter II: Literature Review

The profession of nursing practice has undergone a tremendous transformation in recent years as the result of an ever-changing healthcare environment, increased consumer activism, advances in technology, and the expanded range of diverse practice settings. The consumer and accrediting bodies' demand for quality, safe, and cost-effective healthcare has also had an impact on nursing practice. The changes in nursing practice have prompted the need for transformation in undergraduate nursing education to produce graduates who can perform in the ever-changing healthcare environment.

Undergraduate nursing education needs an effective approach to teaching the foundations, concepts, and knowledge needed for nursing practice. A method is needed to assist students in applying that knowledge in decision-making, problem-solving, and prioritization of nursing care. Nurse educators should also focus on teaching essential content/concepts that are relevant to nursing practice while helping students learn how use that knowledge effectively in a variety of situations. One teaching strategy that can facilitate the understanding of concepts for application in practice situations is TBL. TBL is a theoretically-based and empirically-grounded strategy that uses small group learning to promote application of concepts to situations. The purpose of this chapter is to provide an evaluative report of studies found in the literature related to TBL, including studies performed on the use of TBL in nursing education.

Team-Based Learning Methodology

Team-based learning was initiated in the 1970's at the University of Oklahoma by Larry Michaelsen in response to a tripled enrollment in his course (Michaelsen et al., 2008).

Michaelsen adapted group activities and assignments used in smaller classes to large class

environments. The group activities were effective in helping students apply concepts to various situations.

The focus of TBL in student learning is to increase understanding of course content and facilitate utilization of course content in problem-solving and decision-making. An additional premise of TBL is the development of team skills and exposure of students to the valuable experience of teams (Dana, 2007). One important aspect of a TBL class is that it can be conducted in both small and very large class sizes with no additional changes in methodology. Since its conception, TBL has helped students' master content and provide a means to use content in problem-solving. The majority of classroom time is spent in applying course content to problematic situations students are likely to encounter.

In a course using TBL, students are assigned to permanent small groups of 5-7 students, identified as teams. Students are provided the class content to review as preparation for in-class learning activities. Students are tested individually at the beginning of class with an Individual Readiness Assessment Test (IRAT). The IRAT is in a multiple choice format with several options for a "best" answer. Upon completion of the IRAT, students assemble into their assigned groups or teams to take the Group Readiness Assessment Test (GRAT). The GRAT is the same test as the IRAT. Each team discusses the questions with the possible answers and then must come to a consensus on one answer for each question. Each team's answers are then presented to the class simultaneously. This can be accomplished with an automated response technology like the Classroom Performance System (CPS), online web-enhanced systems, Immediate Feedback-Assessment Forms (IF-AT), or simple cards with different answer letters/numbers (Cotner, Baepler, & Kellerman, 2008; Gomez, Wu, & Passerini, 2010; Robinson & Walker, 2008). The questions and answers are then reviewed in the classroom so the

instructor can correct any wrong assumptions and stress important concepts. The students then return to their teams and work on a group application problem (GAP) using the content learned to solve problems and make decisions in a variety of situations. The IRAT, GRAT, and GAP exercise have assigned points towards the course grade.

Periodically throughout the course, students are required to evaluate their peers on participation and contribution to the group process. The peer evaluation process should be completed 2-3 times over the duration of the course. The peer evaluation should be formative in nature during the course with a summative evaluation at the end of the course. The peer assessments have point values assigned that can be determined by the students. Peer evaluation is often difficult for students to perform and instructions on how to complete them should be provided. The peer evaluation should be constructed so that students must distribute the points differently between team members according to the level of contribution in group activities. This may be difficult for students at first but with practice and time, it becomes easier to complete.

Essential Elements in TBL

Michaelsen and Sweet (2008a) identified four essential elements for the successful implementation of TBL in the classroom. These elements are crucial as the educator's role changes from "sage on the stage" to facilitator of the overall learning process. The four elements incorporate specific aspects related to groups, accountability, feedback, and assignment design leading to the effective corporation of TBL as a teaching strategy.

The first essential element in successful implementation of TBL pertains to the groups (Michaelsen & Sweet, 2008a). Groups should be formed and managed to assure the activities and resources are distributed equally among groups. Students should remain in the same group

during the entire course. This will facilitate group cohesiveness and minimize disruptions to the group process. Groups can then transform into learning teams. It is important that the faculty member determine the group composition, not the students. This will allow for the formation of learning teams with diverse perspectives in the problem-solving discussions.

The second essential element for TBL success is focused on accountability and includes individual and group accountability from each student (Michaelsen & Sweet, 2008a). Students demonstrate accountability to the instructor and the other team members through the quality and quantity of individual work. This is evidenced by comprehensive individual class preparation and significant contributions to the group activities. Individual preparation, reliable class attendance, and significant contributions to group discussions are all assessed with the peer assessment. Peer assessment provides formative information to students to facilitate improvement in individual performance and can be used by educators for summative evaluation data in ensuring fairness of student contributions in group activities (Cestone, Levine, & Lane, 2008). Students who contribute substantially to group activities receive more points than students who are not prepared and offer minimal contributions. Group accountability for quality performance should also be ensured with application activities in which each group submits an assignment that can be compared with each of the other group's work (Michaelsen & Sweet, 2008a).

Providing immediate feedback to students is the third essential element in TBL success (Michaelsen & Sweet, 2008a). Feedback is important to the learning and retention of content and can have an impact on the process of group development. Feedback should be done in a timely and ongoing manner. Individual feedback on IRAT scores can be more easily accomplished with the use of automated computer-based modalities or by using Instant

Feedback-Assessment Technique (IF-AT) forms (Cotner et al., 2008; Gomez, et al., 2010; Robinson & Walker, 2008). These modalities reduce the amount of time needed to grade IRATs by hand. Feedback should be provided to the individual student and to the teams to facilitate the development of confidence in their knowledge-base and problem-solving ability.

The fourth element in successful implementation of TBL is development of the group application problem (GAP) assignments (Michaelsen & Sweet, 2008a). The assignments should facilitate group interactions and promote learning. Assignments should allow the student to apply the concepts learned to complex situations which require the group to make critical decisions. The assignments should be concise and focus on problem-solving to allow for group interactions, but not lengthy as students may be overwhelmed or just divide up the work. Michaelsen and Sweet (2008c) identified four keys to developing effective group assignments, including: (1) assignments should present a problem which has significance to the students, (2) all groups should be working on the same problem, (3) students need to make a specific choice using course concepts, and (4) groups should report their choices simultaneously.

TBL offers a variety of ways to enhance student learning through individual and group activities. The individual and group activities transfer the responsibility of learning to the student. The focus of the educator changes from providing information to promoting learning. There are advantages and disadvantages to incorporating TBL as a teaching strategy.

Advantages of TBL

There are several advantages of using TBL as an instructional strategy to students, educators, and administration. One benefit to students is that TBL facilitates student progression beyond acquiring facts to the achievement of a deeper understanding of the content. This is accomplished through the application activities that encourage critical thinking and decision-

making in problem-solving (Michaelsen & Sweet, 2008b). Another benefit to students is gaining proficiency in performing evaluations with the peer evaluation process employed in TBL (Cestone et al., 2008). Students learn to provide helpful feedback in a safe environment to help them prepare for the peer review process used by many professionals, including nursing. Students also benefit by learning the value of a team in problem-solving (Sweet & Pelton-Sweet, 2008). Small group activities can motivate students to establish connections with the course content and with the group process. Another benefit of TBL to students is the insight gained into their strengths and weaknesses as individual learners and being part of a team from the variety of activities employed in the methodology (Greer, Pokorney, Brown, & Steele, 2010; Michaelsen & Sweet, 2008b). One final benefit to students is that TBL helps academically at-risk students perform better and succeed in the course (Chung, Rhee, Baik, & A, 2009; Koles, Nelson, Stolfi, Parmelee, & DeStephen, 2005; Michaelsen & Sweet, 2008b).

There are several advantages to using TBL methodology in the classroom for educators. Students are more likely to be prepared for class and are more engaged in the learning process (Michaelsen & Sweet, 2008b). Student attendance in class increases and they accept more accountability for their own learning. The student-educator relationship can be more rewarding as the educator spends more time listening and observing, than lecturing. The interactions with students are improved as the focus of the classroom is on the learning, not on the teaching. TBL can assist educators in meeting outcomes and professional competencies in large classes through the use of small group work. All of these benefits can sustain the educator's enthusiasm for the teaching role and reduce feelings of burn-out.

The administrative benefit of instituting TBL includes the cost-effectiveness of incorporating the methodology in large class sizes as only one instructor is needed to facilitate

the class (Michaelsen & Sweet, 2008b). This cuts down the need for numerous instructors in one course when employing other teaching modalities using small groups. It will also reduce the need for limiting class sizes due to the lack of faculty. Another advantage to administrators is that students who attend TBL classes tend to be more self-directed and learn to function as an actively learning student body. An effective learning community results in meeting the educational outcomes of the institution more efficiently, as results show there are higher pass rates and less attrition (Dana, 2007; Letassy, Fugate, Medina, Stroup, & Britton, 2008; McInerney & Fink, 2003; Palsolé & Awalt, 2008; Weiner, Plass, & Marz, 2009)

Disadvantages of TBL

One major disadvantage to using TBL in the classroom is that the preparation needed to be completed by the educator prior to the start of classes is time-consuming and labor intensive (Lane, 2008). To successfully implement TBL there is a need to carefully plan each component of the teaching strategy. Poor planning and implementation generate frustration for the instructor and the students. Frustration can lead to a negative TBL experience and cause student resistance to the methodology. To use TBL effectively in a course, the course will need to be redesigned. Some educators are hesitant to redesign an entire course and will institute TBL modules intermittently with other teaching modalities. The redesign process needed to institute TBL will involve determining essential components of the content, organizing content into units, developing individual and group assessment tests, and constructing group activities with a peer evaluation method (Michaelsen & Sweet, 2008a). This can take a lot of time and effort for the educator, but once the course is redesigned, the major work is done. Class time can then be devoted to facilitation of learning, instead of presentation of content.

Effectiveness of TBL

From its conception and inauguration as an instructional strategy in a large class of a business college, TBL has been commended for having a positive impact on student learning (Michaelsen et al., 2008). The instructional strategy has since been successfully instituted in science courses such as biology, microbiology, and physics. TBL has also been recently employed in law schools (Dana, 2007). TBL crossed over into the health professions in the late 1990's and was introduced in medical education (Haidet et al., 2002). TBL has since been incorporated into other health professions such as dentistry, pharmacy, and nursing (Beauty, Kelley, Metzger, Bellebaum, & McAuley, 2009; Clark, Nguyen, Bray, & Levine, 2008; Conway et al, 2010; Dunaway, 2005; Feingold et al., 2008; Letassy et al., 2008; Mennenga, 2010; Pileggi & O'Neill, 2008). Researchers from diverse educational disciplines have studied the effectiveness of TBL on student learning, performance, engagement, and satisfaction. The results of various studies have shown both positive and negative impacts on students and learning.

TBL and Student Learning

Learning is the cognitive process of acquiring knowledge. The students of today need to adopt a deeper approach to learning by connecting course content to the real world (Prince & Felder, 2007). TBL is designed to foster deeper understanding of content through the group exercises in which students apply basic concepts to complex situations. Sibley and Parmelee (2008) stressed there are increased opportunities for metacognition with TBL. Metacognition is the key to problem-solving and critical thinking because it helps students analyze their own learning. There have been several studies conducted to evaluate the effect of TBL on student learning (Beauty et al., 2009; Carmichael, 2009; Dana, 2007; Dunaway, 2005; Haidet et al.,

2002; McInerney & Fink, 2003; Parmelee, DeStephen, and Borges, 2009; Searle et al., 2003; Tai & Koh, 2008; Touchet & Coon, 2005; Weiner et al., 2009).

In a study by McInerney and Fink (2003), TBL was shown to improve microbiology students' comprehension of complex concepts with long-term retention of information and improvement in critical thinking. This was evidenced by the outcomes from team projects in which students critically interpreted and analyzed scientific data, then found creative solutions to problems comprising of the scientific data. Long-term retention of information was demonstrated by significantly improved scores on the final exam. Improvement in critical thinking was also seen in a study of psychiatric residents through evidence of integrating psychodynamic concepts into their casework more effectively than previous semesters that used conventional teaching strategies (Touchet & Coon, 2005). In another study, medical students reported that TBL helped assess current knowledge and was instrumental in reaching a higher level of knowledge and a deeper understanding of course content (Weiner et al., 2009). Another research study concluded that group activities stimulated a higher level of student learning leading to improvement in problem-solving skills for first-year medical students (Beauty et al., 2009).

Several studies have revealed an increase in students' individual accountability for learning in courses using the TBL instructional strategy. Researchers performing one study observed increased accountability for learning in which pharmacy students were better prepared for class and took an active part in their learning process (Conway, Johnson, & Ripley, 2010). Other researchers observed increased student accountability for learning by finding a substantial increase in the class attendance rate with law students (Dana, 2007) and students in an online course (Palsolé & Awalt, 2008). Dunaway (2005) found that pharmacy, biology, and medical

students in a pharmacology course expressed feeling obligated to prepare before class to increase their contribution to the group activities. Another study conducted at the initiation of TBL in medical education over ten years ago concluded that TBL fostered desired learning behaviors of accountability and responsibility for learning, in addition to making connections with important concepts (Haidet et al., 2002; Searle et al., 2003). Recent research on medical education demonstrated that TBL had a positive impact on medical students' learning by challenging them to improve classroom performance (Weiner et al., 2009).

Tai and Koh (2008) found that medical students in conventional classes (lecture based) had a higher perception of learning as compared to students in a TBL class. In contrast, this study also revealed that students in the TBL class were more actively involved in learning and had more chances to be an active learner. Active learning is known to increase critical thinking and problem-solving skills. Group discussions lead to greater understanding of the content and provide a chance to gain different perspectives during the problem-solving activities. In another study, medical students agreed that the team activities had a positive impact on the quality of learning or clinical reasoning ability (Parmelee et al., 2009).

These studies corroborate the positive impact of TBL on student learning. Improved problem-solving abilities and critical thinking skills lead to a long-term, deeper understanding of content. Individual responsibility for learning and active individual contributions enhances the group process and student learning within the group.

TBL and Student Performance

The positive impact of TBL on learning should ultimately show a positive correlation to student performance. Student performance is often analyzed through the evaluation of test scores and course grades, along with peer evaluations. Examination scores and course grades

have been evaluated to determine effectiveness of TBL on student performance (Carmichael, 2009; Chung et al., 2009; Conway et al., 2010; Dana, 2007; Hunt et al., 2003; Koles et al., 2005; Kuhne-Eversmann, Eversmann, & Fischer, 2008; Letassy et al., 2008; McInerney & Fink, 2003; Neider, Parmelee, Stolfi, & Hudes, 2002; Pileggi & O'Neill, 2008; Weiner et al., 2009).

Examination scores and course grades were frequently found to be the same or higher with the courses using TBL teaching strategy than with courses using various other strategies.

Several studies have investigated student performance after initiating TBL in a course by evaluating the IRAT and GRAT scores (Beauty et al., 2009; Chung et al., 2009; Pileggi & O'Neill, 2007; Shellenberger et al., 2009). These studies revealed GRAT scores were consistently higher than IRAT scores. The higher GRAT scores indicated peer teaching and learning had occurred which reinforced individual learning and increased understanding of course content. In general, the lowest GRAT scores were higher than the individual IRAT scores.

A few studies reported an incidental finding of improved overall performance in academically at-risk students in TBL courses and found higher course grades and increased course pass rates as compared to previous students taught with lecture (Carmichael, 2009; Koles et al., 2005; Neider et al., 2005). Koles and colleagues (2005) reported significantly less deterioration of scores ($p = 0.035$) for students in the lowest quartile when taught with TBL than when taught with case-based group discussions. Neider et al. (2005) reported fewer students with scores below 70% and needing remediation when taught with TBL. In addition, only one student failed the course with TBL as compared to 2-7 students failing in previous semesters without TBL. In a study by Carmichael (2009), results revealed the course examination scores were higher in the TBL course when compared with the scores from sections utilizing a different

teaching strategy. The results also indicated the final course grades included more As and Bs and less failing grades (Ds and Fs) in the TBL classes. Two additional studies revealed no failing grades in the TBL course as compared to previous years (Conway et al., 2010; Letassy et al., 2008).

Researchers in one study evaluated final examination scores in a course with a portion of medical students learning some of the content in modules taught with TBL (Weiner et al., 2009). The results of the study established that students who took intensive TBL modules scored 25% higher on the final examination, with almost twice as many TBL students passing the examination than their other classmates. McInerney and Fink (2003) compared examination scores of microbiology students in a TBL class to previous classes using other teaching methods. Results indicated the final examination scores to be significantly higher in the TBL group than in the control group. The TBL group also had a decrease in the number of students with failing scores. The final examination scores of medical students examined in another study (Chung et al., 2009) revealed that academically weaker students' performance improved with the institution of TBL in the course.

In contrast, the study by Carmichael (2009) compared final examination scores between lecture-based and TBL taught sections of a general biology course and the scores were not significantly different in the two sections. Further analysis of the final examination in Carmichael's study revealed that the students taught in the TBL section did score higher on data interpretation questions than the students taught in the lecture-based section. Interestingly, the course examinations scores were significantly higher for the TBL group, but the "difference in exam performance between TBL and lecture sections decreased as the semester progressed" (Carmichael, 2009, p. 58).

Three other studies also revealed no significant differences in final examination grades between TBL and other strategies (Conway et al., 2010; Koles et al. 2005; Letassy et al., 2008). Pileggi and O'Neill (2008) also evaluated final examination scores of dental students and concluded that students scored higher on the diagnostic questions in the final examination than in previous years using another teaching strategy.

Most studies indicate the active learning in TBL facilitates learning and applying course content as evidenced by higher examination scores. The higher pass rate with complex questions in examinations demonstrates that students are acquiring a deeper understanding of the content learned with the TBL method.

TBL and Student Engagement

Research on TBL has focused on evaluating student engagement in the classroom, frequently comparing TBL with traditional lecture-based courses. Several studies have shown there is increased student engagement in the TBL classroom (Dunaway, 2005; Gomez et al., 2010; Haidet et al., 2002; Hunt et al., 2003; Kelly et al., 2005; Levine et al., 2003; Tai & Koh, 2008). Dunaway (2005) reported the increased student participation and high student interest in the classroom content exceeded the instructors' expectations. This study also revealed that the students rated their perception of engagement as "high" in the TBL class. Levine and colleagues (2003) administered a Classroom Engagement Survey to medical students as a means to compare classroom engagement scores of TBL to traditional lecture-based classes. Findings revealed the scores to be significantly higher for the TBL classes. Tai and Koh (2008) compared medical student perceptions of engagement between a TBL and conventional course by asking students to state the percentage of time they participated in class discussions. This study (Tai & Koh, 2008)

also reported a significantly higher perception of engagement during the TBL course (engaged 80% of time) than during the conventional course (engaged 58% of time).

Early research conducted on the experience of TBL in medical education reported a high level of engagement as evidenced by the substantially increased number of students in attendance for the entire TBL session. Informal observations by the instructors in the classroom found all students made active contributions in the group activities during the session (Haidet et al., 2001). An independent observer trained in peer review of teaching corroborated these findings and reported exceptionally high learner engagement. In addition, the medical students rated their level of engagement as high. The findings were also validated in a later study using trained observers and an observation instrument specifically designed for measuring student engagement of medical students (Hunt et al., 2003). This later study revealed that student-to-student interactions occurred about 50% of the time as compared to 8% in a lectured based course. The results of a different research study conducted by Kelly et al. (2005) used the same observation instrument with medical and physician assistant students. Their results were consistent with the findings of Hunt and colleagues.

Gomez and associates (2010) evaluated graduate student engagement from the perspective of the interconnection between perceived motivation, enjoyment, and learning. The researchers correlated perceived enjoyment to level of engagement. This study found that higher perceived motivation leads to higher perceived enjoyment (level of engagement), and higher perceived enjoyment leads to higher perceptions of learning.

The findings of these studies validate that students feel more actively engaged in their learning with TBL. Informal and formal observations of students in a classroom revealed the majority of students displayed active participation with increased student-to-student interactions.

The activities in a TBL course encouraged individual and team motivation towards learning, resulting in higher levels of engagement.

Student Perception of TBL

The majority of research on TBL evaluates student perceptions of various aspects of the teaching strategy. A recent study asked medical and dental students what they liked most about the TBL format (Abdelkhalek, Hussein, Gibbs, & Hamdy, 2010). The top responses reported included (1) the small group learning environment, (2) learning from problems relevant to practice, (3) personal development as a result of peer evaluation, and (4) increased use of communication and leadership skills. Another study assessed pharmacy students' perceptions on the principles of TBL and found that 95% of the students considered the format to be a positive learning strategy (Beauty et al., 2009). These students felt the teamwork reinforced a deeper understanding of content and encouraged continued use of teams in the class.

A survey of medical students' perceptions of TBL revealed that students believed the teaching strategy helped them understand course content and concepts, made them study more, and encouraged interaction, discussion, and problem-solving (Chung et al., 2009). Another study on the effect of TBL was conducted with a focus group of medical students to determine student perceptions (Hunt et al., 2003). The researchers identified three themes that emerged from the interviews. The themes identified were (1) students took active responsibility for out-of-class learning, (2) teams were a major component of their learning process in the course, and (3) students devalue the TBL method and have the perception that TBL is inefficient as compared to lectures.

A study by Carmichael (2009) did not reveal positive student perceptions of TBL. Carmichael (2009) surveyed students in lecture and TBL sections of a biology course and found

an inverse correlation between the teaching strategy used and student preference. The TBL students felt they would learn more in lecture/note taking, while lecture students felt they would learn more from in-class activities. Carmichael concluded this may be due to students who are unfamiliar with TBL preferring to take a class requiring the least effort (lecture). Carmichael speculated that those students may not have an appreciation for the deeper learning that arises from TBL format and thus may consider lecture the easier learning method. An earlier study (Letassy et al., 2008) had compared pharmacy students' perceptions of TBL to lecture via the final course evaluation and results revealed lower course evaluations from the TBL group than the lecture group. Although the evaluation of TBL was positive, the lecture-based format received a much higher rating.

Other researchers compared medical students' perception of a TBL class and a case-based group discussion at mid-point and at the end of the modules (Koles et al., 2005). Findings suggested there was no overall difference in overall satisfaction between the two teaching strategies at either point in time. Further analysis did reveal that students felt the contributions of peers in the TBL class were more helpful for learning than they experienced in other classes using different teaching strategies. Palsolé and Await (2008) also found the students in an online course using TBL reported increased satisfaction with the teamwork employed by TBL methodology. These studies suggest that the group interactions utilized in TBL have a positive impact on student perception of learning.

Overall, the student perceptions of TBL were positive, valuing the increased knowledge and deeper understanding of concepts. The increased active responsibility for learning and the positive impact of team learning conveys a positive influence on their perception. However,

there are students who may not see the benefits of enhanced learning and seek the “easier” way to learn.

TBL in Undergraduate Nursing Education

There have been only three published research studies, one article on implementation of TBL, and a published dissertation related to the use of TBL in undergraduate nursing education (Anderson, Strumpel, Fensom, & Andrews, 2011; Clark et al., 2008; Feingold et al., 2008; Mennenga, 2010, 2012). Clark et al. (2008) explored the impact of classroom engagement and group activities employed in TBL on students learning and grades. To evaluate classroom engagement, a comparison was conducted of nursing student perception of engagement in a Nursing Case Management of Older Adults course (n=51) and in a Pharmacology course (n=67). The Nursing Case Management of Older Adults course was taught using TBL (experimental group) and the Pharmacology course was taught with traditional lecture (control group). Both courses were offered simultaneously, but had different students and different faculty. It was noted that the faculty teaching the TBL course were relatively new at teaching this methodology.

The nursing students in both courses completed a classroom engagement survey comprised of two subcategories: participation and enjoyment. Results of the classroom engagement survey indicated that nursing students in the TBL class gave significantly higher scores in the participation subcategory than were given by nursing students in the lecture-based class. Meanwhile, enjoyment was rated higher by the lecture-based class than the TBL. Lower ratings of enjoyment by students in the TBL class were determined by the researchers to be related to fears and anxieties with the pre-class learning. The nursing students reported feelings of uncertainty on how to focus on important content prior to class. Interestingly, the nursing students in the TBL class did report being more actively prepared for class by increasing the

amount of pre-class preparation time in order to do well on the readiness assessment tests (Clark et al., 2008).

Both groups also completed a pretest and posttest on the value of teams. Results indicated that nursing students in both groups rated the value of team learning relatively high, but there was no change in either groups in their beliefs about team learning from the pre-test to the post-test (Clark et al., 2008).

Further assessment of the TBL group in this study revealed there was no difference in successfully passing the course or distribution of course grades as compared to previous semesters taught with another teaching strategy. In addition, 33% of the nursing students in the TBL class stated they liked it very much in course evaluations, but 47% were neutral and 20% didn't like it (Clark et al., 2008). Researchers attributed the low ratings to be related to the fear of missing important content without a lecture.

Another research study by Feingold et al. (2008) performed a qualitative evaluation of nursing student perceptions of TBL and level of engagement. Evaluation of nursing student perception of TBL was accomplished with student interviews. The level of engagement was determined with the use of a non-interactive classroom observation tool called the STROBE instrument. The study focused on first semester nursing students (n=48), with 21% of those nursing students participating in the interviews (n=10).

Classroom observations with the STROBE instrument focused on the level and the direction of student engagement. The direction of student engagement was evaluated as learner-to-learner, learner-to-instructor, or self-engagement. The level of engagement was linked to activities associated with teamwork and interactions during the majority of the class time. Results also indicated that "all or almost all" of the nursing students were found to be engaged

the “majority” of the time during the instructional activities. In addition, approximately 80% of the class time was spent in learner-to-learner engagement or self-engagement (Feingold et al., 2008).

The themes that emerged from the nursing student interviews focused on student perceptions of team learning, working as a team, and learning through discussions (Feingold et al., 2008). Students also provided suggestions for improving team learning. The first theme identified student perceptions of the grading and procedures in the TBL class. The students had mixed views on the cognitive level of questions (comprehension, application, or both) used for the IRAT and GRAT. The group application problems were designed to allow for several plausible answers, which students found difficult. This approach was deemed important by researchers for students to learn as there can be multiple acceptable actions in a clinical situation. This TBL class allowed the option for students to split their answers on the IRAT and GRAT and points were assigned for correct answers. The students reported this option caused them to second guess themselves more.

The second theme that emerged in this study acknowledged student concerns about grading with the TBL format (Feingold et al., 2008). Students identified increased stress from having discussions graded as well as from the impact other team members could have on their grade. The students also disagreed with the amount of points given for partial credit on questions that were challenged by students through an appeal process. The students challenged their incorrect answers by providing rationale as evidence for their answer to be considered as correct. Relatively few points were given for an approved appeal which did not change the grade enough to make the appeal worthwhile. The positive impact established in this theme was the increased self-awareness of individual performance obtained with the peer evaluation process.

The third theme established that students value the discussions that occurred in the group tests and activities because the different perspectives led to a deeper understanding of the problem (Feingold et al., 2008). The appreciation of different perspectives coincides with the fourth theme in which students saw the value and clinical relevance of teamwork. Students expressed that it was easier to get the right answer with the help of their team members and that they strived to be an active member of the team. This reinforces the concept, “there was strength in teamwork” (Feingold et al., 2008, p. 221).

The final theme from this study involved the students’ suggestions for improvement of TBL (Feingold et al., 2008). The suggestions included increasing partial credit points assigned for questions that are challenged, reassigning students to different teams each session, allowing students to decide team composition, and allowing more time for the group application activities. The suggestions related to assignment of points and allowing more time were found to be substantiated in the review of the literature (Michaelsen, 2002; Michaelsen & Sweet, 2008a; Michaelsen & Sweet, 2008b; Michaelsen & Sweet, 2008c). The other two suggestions of different team composition or student-directed team composition were discouraged in the literature (Michaelsen & Sweet, 2008c; Pelley & McMahan, 2008; Birmingham & McCord, 2002; Fink, 2002). The literature states that keeping the same team membership increases group cohesiveness and facilitates the development of high-performing teams.

A more recent research study found in the literature was a quasi-experimental design comparing outcomes of a community health nursing course taught exclusively with TBL or lecture as the primary instructional strategy with 143 baccalaureate nursing students (Mennenga, 2010). Student outcomes, in addition to comparisons and correlations, were investigated in areas of engagement, accountability, satisfaction, examination scores, and readiness assessment scores.

Levels of engagement were statistically higher in nursing students taught with TBL than with traditional lecture which was consistent with previous research on TBL in other disciplines. There was a positive correlation between self-reported accountability and the student's total IRAT scores, indicating students felt increased responsibility for preparation for the IRATs. This is also consistent with the literature. Weak to moderate correlations were found between engagement and examination scores, encouraging the use of TBL as an instructional strategy. This study did not show significant differences in exam scores between TBL and lecture. As the review of literature showed few comparable studies, the researcher advocated for further research in this area.

Mennenga (2010, 2012) also performed psychometric testing on a newly developed tool, Team-Based Learning Student Assessment Instrument[®] in her study. Psychometric testing did establish reliability and validity for the tool and for the three subscales of accountability, preference for TBL or lecture, and student satisfaction with TBL. Results of the study indicated that students felt a high level of accountability when taught with TBL, were neutral on preference for TBL or lecture, and were generally satisfied with team-based learning.

A recent report on TBL in baccalaureate nursing education described the implementation of TBL modules (Andersen et al., 2011). Although no formal research was performed on the impact of implementing TBL, the authors found the overall “average midterm and final marks were higher than previous years and student attrition rates were reduced” during the second semester of using TBL modules (Anderson et al., 2011, p. 10). It is important to note the authors also reported a small student sector expressed an aversion for TBL and preferred traditional lecture.

Summary

The impact of TBL as a teaching strategy is well documented in various disciplines. TBL has a positive impact on student learning by fostering a deeper understanding of content and facilitating the application of concepts in complex situations. Critical thinking, problem-solving and decision-making skills are enhanced in students' learning in a TBL class (Beauty et al., 2009; McInerney & Fink, 2003; Sibley & Parmelee, 2008; Touchet & Coon, 2005; Weiner et al., 2009). Students are more accountable and responsible for their learning as evidenced by enhanced attention to class preparation, increased attendance in the classroom, and heightened contributions in group activities (Clark et al., 2008; Dunaway, 2005; Feingold et al., 2008; Haidet et al., 2001; Levine et al., 2003; Tai & Koh, 2008). There has been only one small study in nursing (Mennenga, 2010) which evaluated accountability in baccalaureate nursing students.

TBL has frequently demonstrated a positive impact on exam scores and course grades (Carmichael, 2009; Conway et al., 2010; Koles et al., 2005; Letassy et al., 2008; Neider et al., 2005; Pileggi & O'Neill, 2008). The TBL format has been especially beneficial for academically at-risk students, resulting in higher grades and increased course pass rates (Carmichael, 2009; Koles et al., 2005; Neider et al., 2005). Research on the impact of TBL on exam scores, course grades, and pass rates in the area of nursing is lacking.

The level of student engagement has been shown to be higher in a class using TBL as the instructional strategy in nursing education and other undergraduate disciplines (Clark et al., 2008; Dunaway, 2005; Gomez et al., 2010; Haidet et al., 2002; Hunt et al., 2003; Kelly et al., 2005; Levine et al., 2003; Mennenga, 2010; Tai & Koh, 2008). Students' motivation to learn and participation in classroom learning activities were substantial; student engagement in the learning process comprised a large percentage of the class time. The majority of student

perceptions of the TBL format were positive, citing a deeper understanding of content with application to the real world, increased use of communication and leadership skills with teams, and personal development as the rationale.

Conclusion

Research on nursing education has determined there is a need to transform the educational focus to engage students in learning methods which apply nursing knowledge to a variety of complex situations. Nurse educators need to facilitate students in decision-making, problem-solving, and prioritization of care. TBL is an instructional strategy that focuses on those exact concepts.

Research on the use of TBL as a teaching strategy in nursing education has shown some promising results. Nursing students' perceptions of motivation and levels of engagement, previously validated as elevated by students in other studies, were shown to be true in nursing education (Clark et al., 2008; Dunaway, 2005; Feingold et al., 2008; Gomez et al., 2010; Haidet et al., 2001; Hunt et al., 2003; Kelly et al., 2005; Levine et al., 2003; Tai & Koh, 2008). There was increased learner-to-learner engagement and self-engagement to allow for a more productive classroom. Students perceived the group application exercises requiring critical reasoning in clinical situations to be a good learning tool. Grading and scoring methods were a concern expressed by students. Students in these studies also agreed that using teams for the application activities and hearing different points of view facilitated learning.

While it is worthwhile to understand the students' perceptions of TBL in undergraduate nursing education, the true effectiveness of TBL in undergraduate nursing education can be measured by assessing the impact of TBL on student learning and performance. Validation of effectiveness can be achieved by obtaining quantitative data from examination test items and

comparing test item scores achieved in classes using other teaching strategies with those using TBL. To date, research in nursing education has been very limited in the one study with two cohorts (Mennenga, 2010). The limited research on the use of TBL in nursing education is evidence of the need for future research. The lack of data related to the impact of TBL on student learning in undergraduate nursing education demands further investigation.

Chapter III: Methods

The purpose of this chapter is to describe the methodology used to explore and describe the effect of TBL as an instructional strategy for baccalaureate nursing students. The intent of this study was to gain information about student learning as a result of TBL instructional strategy when compared to student learning in a lecture-based class from a sample of baccalaureate nursing students. A benefit of this study to nursing education was to identify an instructional strategy that can facilitate student-centered learning and promote critical thinking and clinical judgment. This chapter discusses the research design with operational definitions, sample selection, ethical considerations, data collection methods and procedures, and data analysis procedures for this study.

Research design

The major approach to this study was quantitative and includes two components: a retrospective component and a student survey component. The retrospective component includes the analysis of examination test item scores for content taught with TBL or lecture using a causal-comparative descriptive research design (LoBiondo-Wood, 2010). A causal-comparative descriptive design examines differences in two or more groups in which “the dependent variable already has been affected by the independent variable” (LoBiondo-Wood, 2010, p. 204). The student survey component includes an examination of current nursing student perceptions of TBL using a descriptive survey design (Wood & Ross-Kerr, 2011). Descriptive survey design is used to “search for accurate information about the characteristics of particular subjects” (LoBiondo-Wood, 2010, p. 198).

Research design: retrospective component.

The causal-comparative research design in the retrospective component of this study compared existing, archived records of specific test items from examinations taken by nursing students enrolled in nursing courses from 2009-2011 and examined the differences between test item scores of students taught with TBL to students taught with lecture. Using a nonequivalent comparison group design, test item scores from baccalaureate nursing students were compared retrospectively between the group in which content was taught using TBL and the comparison group in which the same content was previously taught with lecture. Assignment to a group was dependent on whether examination was taken in a nursing course prior to or after initiating team-based learning modules as an instructional strategy for specific course content.

Student learning was evaluated by performance on specific test items from archival data from examinations given from 2009-2011. A comparison was made between the TBL group and the lecture group on test item performance. Test item performance was evaluated by individual examination scores. The test item quality was determined by the difficulty index and the discrimination index. Further investigation between the TBL group and the lecture group was conducted of students in the upper and lower quartiles of each group. Additional comparisons were made between the two academic levels of sophomore and senior students in the TBL and lecture groups.

Research design: student survey component.

The purpose of this study was to describe the effect of TBL; therefore obtaining the students' perceptions of this instructional strategy provided additional data. The use of surveys in nonexperimental research is a good method to "obtain information about people's activities, beliefs, preferences, and attitudes via direct questioning" (Polit & Beck, 2008, p. 767). A sample

population of current baccalaureate nursing students in the core nursing courses utilizing TBL modules as a teaching strategy was invited to participate in this study. Students were recruited to complete the Team-Based Learning Student Assessment Instrument[©] (see Appendix A) and the Student Demographic Information survey (see Appendix B). Both surveys provided general information about students being surveyed and information on students' perceptions of TBL.

Instrument Description

The Team-Based Learning Student Assessment Instrument[©] was developed by Mennenga (2010, 2012) for a recent study examining TBL in baccalaureate nursing students and has established reliability and validity achieved through psychometric testing. The Team-Based Learning Student Assessment Instrument[©] is a 34-item, structured questionnaire using a five-point Likert scale and will facilitate collection of quantitative and qualitative data. The Team-Based Learning Student Assessment Instrument[©] ascertained the perceptions of accountability, preference for TBL or lecture, and student satisfaction of nursing students who are taught using TBL.

The participants rated declarative statements concerning many aspects of TBL as *strongly disagree, disagree, neutral, agree, or strongly agree*. The five-point scale allowed for the expression of neutrality, thus allowing participants to express their true feelings (Polit & Beck, 2008). Interval scoring of the instrument was accomplished by the assignment of 1, 2, 3, 4, or 5 to positively stated items and 5, 4, 3, 2, or 1 to the negatively stated items. The possible range of total scores for the instrument was from 34 to 170. The possible ranges for the subscale scores were: accountability subscale, 9-45; preference for TBL or lecture subscale, 16-80; and student satisfaction subscale, 9-45. A higher total score indicated a more positive perception of the use

of TBL. A higher score for each subscale indicated a higher level of accountability with TBL, preference for TBL over lecture, and high level of satisfaction with TBL

The participants were also allowed to provide comments regarding their experiences with TBL in a section at the end of the Team-Based Learning Student Assessment Instrument[®]. Student comments were coded into categories to provide additional information on students' perceptions of TBL.

Content validity was established for the tool with an acceptable content validity index (greater than .80) on the three sub-scales of accountability (.90), preference for TBL or lecture (.89), and student satisfaction (.89). Total scale content validity index was .89. Further construct validity was established using factor analysis with factor loadings greater than .40, which is within the acceptable range of greater than .30 (Burns & Grove, 2001). Exploratory factor analysis was used to confirm the accuracy of the items measuring accountability, preference, and satisfaction with TBL. Internal consistency reliability was established with a Cronbach's alpha of greater than .80 on each of the factors, subscales, and total scales (Mennenga, 2010, 2012). This coefficient of reliability was important to establish how closely related the set of items in the Team-Based Learning Student Assessment Instrument[®] were as a group and that each item measured the underlying construct of student perceptions of TBL as an instructional strategy. Permission was given by the tool developer to this researcher to use the tool (see Appendix C) with a request to share results upon completion of the study.

The information gathered from the instrument was used to obtain data regarding current student perceptions on three different subscales related to TBL as an instructional strategy. Understanding the students' perception of the strategy will promote faculty development and possible revision of TBL modules to facilitate student learning.

Operational Definitions

The following operational definitions of concepts and variables used for this research study are provided for clarification purposes:

Team-based learning: a classroom instructional strategy used to facilitate learning specific content using several small teams and an individual readiness assessment test (IRAT), a group readiness assessment test (GRAT), and a group application problem (GAP).

Lecture: a classroom instructional strategy used by educators to impart knowledge to students primarily through oral presentation 75% of the time, with occasional student engagement techniques.

Core nursing course: a nursing course with classroom and clinical components being taught concurrently throughout a semester

Academic level: the number of years completed of the four years required in baccalaureate education; commonly labeled as freshman (1st year), sophomore (2nd year), junior (3rd year), and senior (4th year).

Upper quartile: nursing students who scored in the upper 25% on all examinations in a nursing course.

Lower quartile: nursing students who scored in the lower 25% on all examinations in a nursing course.

Academically at-risk student: a student who was in the lower quartile.

Test item: a multiple-choice question used to assess learning of content by nursing students in a cohort taught with lecture methodology or TBL.

Test item difficulty index: a measure to determine test item quality measured by the *p*-value (0-1.00); indicates the percentage of students who answered the item correctly

(Oermann & Gaberson, 2006). For the purposes of this study the acceptable difficulty index was > 0.20 .

Test item discrimination index: a measure to determine test-item quality, measured by the point biserial index (-1.0 to +1.0); indicates the ability of the test item to discriminate between the high and low achievers (McDonald, 2007). For the purposes of this study, the acceptable point biserial index (PBI) was > 0.30 for all test items with a test item difficulty index of .20-.80. The PBI was not considered for all test items with a test item difficulty index > 0.80 as these test items are typically important concepts that all students were required to master and not an easy test item as defined by McDonald (2007).

Test item cognitive level: a method to categorize test items with increasing complexity of knowledge and intellectual skills through six levels of cognitive learning: knowledge, comprehension, application, analysis, synthesis, and evaluation (Oermann & Gaberson, 2006).

Individual exam score sheet: a computer-generated score sheet depicting the correct and incorrect responses for each test item by one nursing student.

Content score: the number of correct responses on test items in an examination assessing content that was currently being taught using TBL, but previously taught with lecture.

Accountability: student demonstration of advanced preparation for class or contribution to other team members (Michaelsen, 2002). Accountability was operationally defined by the accountability subscale on the Team-Based Learning Student Assessment Instrument[®]. A higher score (greater than 20) indicated an increased level of accountability with team-based learning.

Preference: student choice of team-based learning or traditional lecture as favored instructional strategy (Mennenga, 2010, 2012). Preference was operationally defined by the preference subscale on the Team-Based Learning Student Assessment Instrument[®]. A higher score (greater than 40) indicated a preference for team-based learning and a lower score (less than 40) indicated a preference for traditional lecture.

Student Satisfaction: a student's positive feelings toward team-based learning. (Mennenga, 2010, 2012). Student satisfaction was operationally defined by the satisfaction subscale on the Team-Based Learning Student Assessment Instrument[®]. A higher score (greater than 20) indicated a higher satisfaction for team-based learning.

Population and Sample

The population used for this study was limited to baccalaureate nursing students and a purposive sample was obtained from nursing students at Nebraska Methodist College, a private, midwestern college in the United States where this researcher is employed as full-time faculty in the Department of Nursing. The research site had integrated TBL as a college-wide initiative in the fall semester of 2008. All educators were encouraged to incorporate TBL modules, along with other learner-centered strategies, into courses. Many nursing educators had incorporated TBL modules into core nursing courses by the spring of 2010. It is important to note that many of the baccalaureate nursing students had been exposed to the methodology of TBL in the science courses prior to enrollment in nursing courses.

Participants: retrospective component

The archival data of test item scores compared originated from baccalaureate nursing students enrolled in sophomore and senior core nursing courses from 2009 to 2011. The test items from 638 baccalaureate nursing students from two different academic levels were

investigated retrospectively. The evaluation of two academic levels accounted for accumulated knowledge differences and experiences with TBL. Historical content scores arose from cohorts in one to three semesters taught with lecture prior to incorporation of TBL and one to three semesters after the initiation of TBL. This cross-section of cohorts was important because each cohort had unique characteristics and academic abilities. The uniqueness of an individual cohort and the use of a purposeful sample required a cross-section of multiple cohorts for each instructional strategy to aid in the control of research bias (Polit & Beck, 2008).

It was important to determine the difference in the upper quartile and lower quartile to compare and evaluate the effect of TBL on student learning according to academic ability. The literature review supported increased performance in the academically-at-risk students, which were determined as the lower quartile (Beauty et al., 2009; Carmichael, 2009; Chung et al., 2009; McInerney & Fink, 2003; Pileggi & O'Neill, 2007; Shellenberger et al., 2009). A comparison of the content scores from the upper and lower quartile students in the TBL group and in the lecture group was made. Determination of the upper and lower quartile was accomplished by sequencing examination scores from highest scores to the lowest scores. The upper quartile was determined from the top 25% of scores and the lower quartile from the bottom 25% of scores. The sample size for test item scores of each subgroup ranged from 4-15 for each cohort in the TBL group and lecture group. Determination of the academic differences by examination performance, instead of course grades or grade point averages (GPA), maintained anonymity of each student. A possible limitation of this approach was the possibility that a student could have a course grade that was markedly different from the specific examination scores used in this study. Determining academic differences by examination performance also helped account for

student study habits for exams, aptitude for the course content, and was a more accurate representation of the academic ability of nursing students for a particular course.

The nursing courses used in the archived component of the study were similar in that the courses had both classroom and clinical components and the courses had:

- a. instituted TBL modules between 2008 and 2011
- b. previously used lecture for the content currently taught with TBL
- c. utilized examinations to test student knowledge of specific nursing content
- d. used the same test items for content taught with both lecture and TBL format

The same classroom content was presented to both groups, but either TBL or lecture was used as the primary instructional strategy.

Participants: student survey component

All baccalaureate nursing students enrolled in six core nursing courses in the spring semester of 2012 at Nebraska Methodist College were recruited to complete the student Team-Based Learning Student Assessment Instrument[®] and the Student Demographic Information Survey. Only students who were 19 years of age and older were allowed to participate as this is the legal age of majority in Nebraska. The first core nursing course is taken the second semester of the freshman year which allowed for the majority of students to be 19 years of age and eligible to participate. Only nursing students from the traditional baccalaureate program, not the accelerated baccalaureate program, were asked to participate. Students who were enrolled in NRS 450, the course coordinated by the researcher, were excluded. There were no other restrictions to the characteristics of participants.

Ethical Considerations

Approval from the research site to conduct research was requested (see Appendix D) and was granted (see Appendix E). Approval from the Institutional Review Boards (IRB) of College of Saint Mary and Nebraska Methodist College (the research site) was obtained prior to the initiation of the study (see Appendices F and G respectively). According to Polit and Beck (2008), a research study that is descriptive in nature, studies perceptions, and is of minimal risk to participants requires an expedited review. There was negligible risk of harm to the nursing students used in the archived component of the study as all information from the examinations and examination statistics utilized for this study did not have any student identifiers available to the researcher. Informed consent was obtained prior to administering the student questionnaire or faculty survey in the 2011-2012 academic year. A possible benefit to participants was the opportunity to reflect on and describe their experiences with TBL. Another benefit was to give educators information about how baccalaureate nursing students are learning with TBL.

All nursing students were assigned a number by the course coordinators of the nursing courses or another faculty member in the Department of Nursing for retrospective test item evaluation and each individual exam score sheet was labeled with that number. For the nursing course in which the researcher is the course coordinator, another faculty member in the Department of Nursing performed the assignment of student numbers.

The Team-Based Learning Student Assessment Instrument[©] used to obtain information from current students on their perspective of TBL was not invasive and did not impart psychological discomfort. A student recruitment letter was provided to approximately 350 potential participants explaining the research study and what participation in the study would entail (see Appendix H). Informed consent was obtained after verbal description of the purpose

and rationale for the research was provided to students (see Appendix I). Students in the course from which the researcher is the course coordinator were omitted from participation in this study to prevent the possibility of students feeling coerced to complete the questionnaire. Students were notified verbally and on the consent form that data from the Team-Based Learning Student Assessment Instrument[®] would be shared with the tool developer for further psychometric testing. All participants were given the Rights of Research Participants document (see Appendix J). Administration of a student evaluation tool was voluntary and anonymous. All materials were kept secure in a locked drawer in the researcher's home.

Data Collection Procedure

Data collection: retrospective component.

The researcher solicited the required information for the archival component of the study from the course coordinators of sophomore and senior level nursing courses that had incorporated TBL modules via a recruitment letter (see Appendix K). Only course coordinators from the sophomore and senior nursing courses were recruited. The sophomore and senior courses had been identified by the researcher as the courses used to determine if students having more years of experience with TBL (seniors) would have an influence on their test item scores. The course coordinator recruitment letter identified the researcher and explained the purpose of research study. The letter requested that course coordinators delineate specific content that was currently taught with TBL and was previously taught with lecture. An additional requirement to delineating content was that student learning was assessed with examinations using multiple-choice test items for that specific content. Only multiple-choice test items were used for this study as the majority of test items are based on National Council of Licensure Examination (NCLEX) test blueprints primarily used by the National Council of State Boards of Nursing

(2010). The recruitment letter also included a request for copies of examinations, examination blueprints, individual exam score sheets, and test item analysis report of examinations for that specific content. A copy of the Rights of Research Participants document was also included with the recruitment letter.

To confirm the specifications requested from the course coordinators, the three course coordinators were asked to complete the Course Information Survey (see Appendix L). Informed consent was obtained after verbal description of the purpose and rationale for the research (see Appendix M) and the course coordinators were given the Rights of Research Participants document. The survey was used to obtain additional information on teaching strategies previously used for the content currently taught using TBL and was limited to facts on prior use and timing of content, instructional strategies, and testing in each course. This was used to determine the examination content that was eligible for the study.

Another faculty member in the Department of Nursing was recruited to act as a research assistant to collect the individual exam score sheets for the course in which the researcher was the course coordinator to uphold anonymity of the students. The research assistant prepared the individual exam score sheets with the research number and removed all student identifiers prior to providing the data to the researcher. All nursing examinations at the institution where this study was performed were analyzed with the use of electronic answer sheet scanning equipment. Computer-generated reports include an individual student score sheet. The individual student score sheets, without student identifiers, were requested from each course coordinator. Instead of names or college identification numbers, each student was given a randomly assigned number by the course coordinator or another faculty member in the Department of Nursing. Those numbers were transcribed on the individual exam score sheets. Another faculty member

associated with the course in which the researcher is the course coordinator performed this task to uphold anonymity.

The examinations were evaluated to delineate the multiple-choice test items used for both lecture and TBL. The test item scores and the TBL content scores were analyzed and compared to scores from the lecture group. Each student's average examination score was used to determine the upper and lower quartiles of each cohort. Each quartile group was analyzed and comparisons made between the TBL group and lecture group for each quartile.

In addition to examinations and individual exam score sheets, statistical analysis on test items of each examination was requested from the course coordinators to evaluate the quality of each question used to compare performance of the TBL and lecture groups. A computer-generated item analysis report was provided by the electronic scanning and grading equipment. The statistical item analysis report provided a *p-value* to determine the difficulty index of each test item and *point biserial index* to determine the discrimination index for each test item on the examination. A test item with a *p-value* of .20 and below was determined as a difficult question, while a test item with a *p-value* of .80 and above was deemed easy. The discrimination index provided information on the students who did well or did poorly on the entire examination. According to Oermann and Gaberson (2006), "a positively discriminating item is one that was answered correctly more often by students who scored well on the total test than by those who scored poorly on the total test" (p. 175). For a test item to discriminate well, the point biserial should be $>.30$.

For further evaluation of the test items, course coordinators were asked to provide the exam blueprint for each question used to compare performance between the two groups. Elements of the exam blueprint contained the level of complexity and cognitive skill for each test

item derived from Bloom's Taxonomy (Oermann & Gaberson, 2006). Each test item was blueprinted according to the cognitive domains of knowledge, comprehension, application, analysis, synthesis, or evaluation question. These cognitive domains were organized by levels of increasing complexity (McDonald, 2007). As TBL has been shown to foster higher levels of thinking, it was important to evaluate the cognitive complexity of each test item to be analyzed.

All archived data obtained from course coordinators was organized in a table for each course and each semester. Data was entered by course content and included the student assigned identification number, individual student exam score average, and scores for test items used to assess learning of content taught with TBL and lecture. Each test item was also listed with corresponding *p-value*, point biserial index, and cognitive level. Upper and lower quartiles were determined from the exam averages and noted in the table. The TBL content was tested on several exams; therefore a document was created with a table for detailed data. This document compiled data from various sources which decreased error in data entry for statistical analysis.

Data collection: student survey component.

Information on the students' perceptions of TBL as an instructional strategy as compared to lecture, was obtained with the Team-Based Learning Student Assessment Instrument[®]. Participants for the Team-Based Learning Student Assessment Instrument[®] were recruited from core nursing courses using TBL in the spring semester of 2012 and were recruited by the researcher. The researcher obtained permission from the course coordinators to address current students at the end of their class. Only the researcher and a research assistant were in attendance with the students in the classroom during the recruitment phase.

Students were provided the reason for the research study and were informed that the questionnaire was completely voluntary with all responses anonymous. An explanation of the

risks and benefits of the study was provided to the students. Students were given a copy of the Rights of Research Participants, consent form, Student Demographic Information Survey and the Team-Based Learning Student Assessment Instrument[©]. Students were instructed to put their completed or blank consent forms in an envelope marked “consent forms” and their completed or blank demographic survey and TBL instrument in another envelope marked “surveys”. Students were informed that the envelope would be sealed after all forms were inserted by the research assistant. The researcher left the classroom and the students chose whether or not to participate in the study without the researcher present. The research assistant facilitated collection of completed or blank forms and ensured that all completed surveys had a signed consent form as students submitted the forms. Students wishing to participate in the study submitted completed consent form and surveys in the appropriate envelopes. Students declining to participate submitted blank forms in the appropriate envelopes.

Informed consent was obtained of all students 19 and older. Students less than 19 years of age were not allowed to participate. The Student Demographic Information Survey and the Team-Based Learning Student Assessment Instrument[©] required a total of 15-20 minutes to complete. Students were reminded by the researcher and the research assistant that they could discontinue participation at any time during the completion of the surveys.

Data Analysis Procedure

Information obtained from the examination test items and Team-Based Learning Student Assessment Instrument[©] was analyzed using IBM[®]SPSS[™] software Version 19. To reduce the incidence of a Type I error, results were determined significant at the .05 level.

Research question #1. Is there a difference in performance on examination test items of baccalaureate nursing students on classroom content taught with TBL as compared to lecture?

Hypothesis #1. Baccalaureate nursing students taught with TBL will achieve higher scores on examination test items than baccalaureate nursing students taught with lecture.

Statistical analysis. An independent samples *t*-test was performed to compare test item scores on content taught with the TBL strategy and with test item scores on content taught with lecture. Independent samples *t*-test is a parametric analysis technique used to determine significant differences between measures of two sets of data not taken from the same participants and the scores in the two groups are not related (Burns & Grove, 2009). It is an appropriate data-analysis technique to compare data (means) when only two groups are being tested (Salkind, 2008).

Research question #2. Is there a difference in performance on examination test items of sophomore and senior level baccalaureate nursing students on classroom content taught with TBL as compared to lecture?

Hypothesis #2. Senior baccalaureate nursing students taught with TBL will have a greater increase in test item scores than sophomore nursing students taught with TBL as compared to the same academic levels taught with lecture.

Statistical analysis. An independent samples *t*-test was used to compare scores of examination test items of the sophomore and senior students taught with TBL or lecture. This analysis procedure was used to help determine if senior baccalaureate nursing students have a greater improvement in scores on examination test items than the sophomore baccalaureate nursing students when taught with TBL. The independent samples *t*-test is an appropriate data-analysis technique to compare the data as only two groups (students taught with lecture and students taught with TBL) are being tested for each academic level (Salkind, 2008).

Research question #3. Is there a difference between upper quartile and lower quartile baccalaureate nursing students in performance on examination test items on classroom content taught with TBL as compared to lecture?

Hypothesis #3. Lower quartile baccalaureate nursing students taught with TBL will have a greater increase in test item scores than the upper quartile baccalaureate nursing students taught with TBL as compared to the same quartiles taught with lecture.

Statistical analysis. An independent samples *t*-test was used to compare the test item scores of the upper and lower quartile students taught with TBL or lecture. This analysis will also help determine if the lower quartile students have a greater improvement in scores on examination test items than the upper quartile students. The independent samples *t*-test is an appropriate data-analysis technique to compare the data as only two groups are being tested for each quartile in each academic level (Salkind, 2008).

Research question #4. Is there a difference in performance on cognitive-level test items of baccalaureate nursing students on classroom content taught with TBL as compared to lecture?

Hypothesis #4. Baccalaureate nursing students taught with TBL will achieve higher test item scores with higher cognitive-level test items than baccalaureate nursing students taught with lecture.

Statistical analysis. An independent samples *t*-test was used to compare the scores of the five different cognitive-levels of examination test items taught with TBL or lecture. The independent samples *t*-test analyzed differences on the scores of examination test items with a higher cognitive-level between the two major groups (TBL and lecture). This analysis provided information as the effectiveness of team-based learning on higher level test items. The

independent samples *t*-test is an appropriate data- analysis technique to compare the data as only two groups are being tested for each cognitive-level test item (Salkind, 2008).

Research question #5. What are baccalaureate nursing students' perceptions regarding accountability, preference for TBL or lecture, and satisfaction with TBL as an instructional strategy?

Hypothesis #5. Baccalaureate nursing students will perceive having a favorable experience with TBL as evidenced by high total instrument scores and high subscale scores of accountability, preference for TBL or lecture, and satisfaction with TBL on the Team-Based Learning Student Assessment Instrument[©].

Hypothesis #6. Higher academic levels of baccalaureate nursing students will have higher total instrument scores and subscale scores of accountability, preference for TBL or lecture, and satisfaction with TBL on the Team-Based Learning Student Assessment Instrument[©] than lower academic levels.

Statistical analysis. To answer this research question, descriptive statistical analysis was conducted for each item of the Team-Based Learning Student Assessment Instrument[©]. Descriptive analysis provided calculation of the average total score of the Team-Based Learning Student Assessment Instrument[©] and information on the frequency distribution of scores. Further calculation of scores for the three subgroups (accountability, preference, and satisfaction) was conducted to provide subscale scores with their frequency distribution. To evaluate the differences in total and subscale scores between the cohorts, a one-way between subjects analysis of variance (ANOVA) with Tukey HSD post hoc testing was conducted. ANOVA was used because "more than two groups were being tested, and these groups were compared on the average performance" (Salkind, 2008, p. 201). Additional qualitative data was obtained with a

section for student comments and was coded using content analysis to organize individual comments. Common themes were identified and will provide a basis for discussion in this study.

Threats to Internal Validity

Internal validity is the degree to which the researcher can make an inference that the observed effects were truly caused by the treatment (Polit & Beck, 2008). In this study, TBL was the treatment. Identification by this researcher of all the possible threats was the first step in controlling for threats to internal validity. A possible threat to internal validity in this causal-comparative study was the non-randomization of participants. This meant that cohorts and/or groups may not be equivalent. Cohorts may have differed in ability and experience with TBL. This researcher attempted to control for this threat using a larger sample size and using a comparison group of students taught with lecture as the instructional strategy in nursing courses.

Another threat to validity was the expertise of the nursing faculty teaching with TBL. The nursing faculty started as novices in the first class utilizing TBL as a new instructional strategy, but with experience in using TBL they possibly gained expertise. Instructor variability is another consideration as there were multiple educators teaching content using TBL in each core nursing course. It was also not known if all instructors used the Readiness Assessment Process exactly as described by Michaelsen and Sweet (2008b). Factors that helped control for this threat to validity was that each educator has taught the same content for both the lecture and TBL group and the research site has a negligible turnover rate of nurse educators. In addition, determining the significance of the results at the .05 level of confidence was also used to reduce the threats to validity.

Chapter IV: Results

The purpose of this chapter is to describe the results of the study designed to explore and describe the effect of TBL as an instructional strategy on baccalaureate nursing students. The purpose of this study was two-fold. First, it examined retrospective data obtained from the analysis of examination test item scores for potential differences in content taught with TBL or lecture. Second, it examined current nursing student perceptions of accountability, preference for TBL or lecture, and student satisfaction with TBL. This chapter is organized by the research questions and provides the results of the statistical analysis of data obtained.

Analysis of Data

Data were analyzed using IBM®SPSS™ Version 19 software. Descriptive statistics described the sample characteristics, as well as the total and subscale instrument scores obtained from the Team-based Learning Student Assessment Instrument®. Inferential statistics were used for testing differences between the means of two groups for both the retrospective and survey components of the study.

Demographic Information

Demographic information: retrospective component.

The study sample for the retrospective examination of archived test items was obtained from Nebraska Methodist College in Omaha, NE. The sample consisted of test items from 638 nursing students enrolled in sophomore and senior nursing courses from 2009 to 2011; 294 students (46.08%) of students had been taught using lecture and 344 students (53.92%) of students had the same content taught using TBL. A total of 220 (34.48%) students were from the sophomore course NS 220 with 107 (48.63%) students taught using lecture and 113 (51.36%) taught using TBL. A total of 184 (28.84%) students were from the sophomore course NS240

with 88 (47.82%) students taught using lecture and 96 (52.17%) students taught using TBL. A total of 156 (24.45%) students were from the senior course NS 450 with 76 (48.72%) students taught using lecture and 80 (51.28%) students taught using TBL. A total of 78 (12.23%) students were from the senior course NS 460 with 23 (29.48%) students taught using lecture and 55 (70.51%) students taught using TBL

Demographic information: examination test items.

There were a total of 45 test items analyzed from the four nursing courses: five test items from the sophomore course NS 220, six test items from the sophomore course NS 240, 21 test items from the senior course NS 450, and 13 test items from the senior course NS 460. Cognitive-level is a standardized taxonomy used in nursing education to establish the level of difficulty for each test item and is based on Bloom's Taxonomy (Oermann & Gaberson, 2006). The five cognitive levels include knowledge (recall of facts), comprehension (understand facts), application (use of knowledge in new situation), analysis (identify relationships between concepts), and synthesis (combine concepts to form new ideas). There were five cognitive levels of test items in this study and were comprised of one knowledge-level test item, 11 comprehension-level test items, 28 application-level test items, 4 analysis-level test items, and one synthesis-level test item.

Demographic information: student survey component.

The number of possible participants for this study consisted of 322 baccalaureate nursing students from Nebraska Methodist College, with a total of 270 students who submitted surveys in the spring semester of 2012. This was a response rate of 83.9%. After eliminating incomplete surveys, the valid number of participants was reduced to 254 students with an overall response rate of 78.9%. Further demographic characteristics are provided in Table 1. The majority of

students were 19-24 years of age (71.5%), female (92.6%), and Caucasian (88.1%). A high percentage were also single (83%) and without children (84.4%). Many students were employed (79.3%) in addition to attending college. Over half (50.4%) of the students had a student-reported grade point average (GPA) over 3.5, with an additional 40.4% of students having a student-reported GPA of 3.0 to 3.49. The minimum required GPA for admission in the nursing program is 2.5.

Table 1

Demographic Information for Student Survey Component

Characteristic		<i>n</i>	%
Age	19-24 yrs	193	71.5
	25-29 yrs	43	15.9
	30-34 yrs	18	6.7
	35-39 yrs	7	2.8
	40-44 yrs	4	1.5
	< 45 yrs	5	1.9
Gender	Female	250	92.6
	Male	20	7.4
Ethnicity	African American	14	5.2
	Asian/Pacific Islander	9	3.3
	Caucasian	238	88.1
	Hispanic/Latino	4	1.5
	Native American	2	0.7
	Other	2	0.7
Status	Single	224	83
	Married	38	14.1
	Divorced	8	2.9
Employment	Yes	214	79.3
	No	56	20.7
Children	Yes	42	15.6
	No	227	84.4
GPA	3.5 - 4.0	136	50.4
	3.0-3.49	109	40.4
	2.5-2.99	25	9.2
	2.0-2.49	0	0
	< 2.0	0	0
Enrollment Level	Freshman	25	9.3
	Sophomore	97	35.9
	Junior	111	41.1
	Senior	37	13.7

Statistical Analysis of Research Questions

Additional data analysis was completed to answer the five research questions using archival data of student examination test item scores and content scores and using data obtained from the Team-Based Learning Student Assessment Instrument[®]. Test items scores were determined as the score achieved by each student in a nursing course on test items used on examinations testing content taught with lecture and TBL. Content scores were determined in nursing courses in which more than one TBL module was taught and represent a breakdown of test items scores for those courses.

Research question #1. Is there a difference in performance on examination test items of baccalaureate nursing students on classroom content taught with TBL as compared to lecture?

Hypothesis #1. Baccalaureate nursing students taught with TBL achieve higher scores on examination test items than baccalaureate nursing students taught with lecture.

Statistical analysis. Test item scores from examinations were collected from four courses regarding content taught with either TBL or lecture. The quality of the test items were verified as having a difficulty index between 0.20 and 0.80 and a discrimination index of > 0.30 . Test items with a difficulty index of >0.80 did not have the requirement of having a discrimination index of >0.30 . Test items with a difficulty index of >0.80 are typically important concepts that all students were required to master and were not considered an “easy test item” defined by McDonald (2007).

There were a total of 45 test items compared between lecture and TBL.

An independent samples *t*-test was used to analyze the test item scores for the students taught with TBL as compared to the students taught with lecture. The mean for the average test item scores was 79.79 (*SD* 16.73) for students taught with lecture and 79.39 (*SD* 15.96) for

students taught with TBL. There was no significant difference in test item scores between students taught with TBL and students taught with lecture; $t(636) = .306, p = .760$. There is no evidence to support the hypothesis that baccalaureate nursing students taught with TBL achieve higher scores on examination test items than baccalaureate nursing students taught with lecture.

Research question #2. Is there a difference in performance on examination test items of sophomore and senior level baccalaureate nursing students on classroom content taught with TBL as compared to lecture?

Hypothesis #2. Senior baccalaureate nursing students taught with TBL will have a greater increase in test item scores than sophomore nursing students taught with TBL as compared to the same academic levels taught with lecture.

Statistical analysis. Test items from each of the four courses were compared between sophomores and seniors taught with either TBL or lecture. Test items were analyzed using an independent samples t -test. Table 2 provides further analysis of the means for test item scores of the specific courses.

Table 2

Test Item Score Comparisons of the Four Courses between Lecture and TBL

Course /Strategy	<i>N</i>	<i>M</i>	<i>SD</i>
NS 220 Test Item Scores			
Lecture	107	86.36	16.39
TBL	113	85.49	16.53
NS 240 Test Item Scores			
Lecture	88	71.72	19.57
TBL	96	76.41	17.63
NS 450 Test Item Scores			
Lecture	76	79.53**	10.07
TBL	80	69.81	9.89
NS 460 Test Item Scores			
Lecture	23	83.27	10.42
TBL	55	88.08	7.95

Note: Significance results are boldfaced for the strategy with the highest test item mean score.
 ** $p < .001$.

Sophomore students taught with lecture in NS 220 scored slightly better on test items than the students who were taught with TBL, although there was no significant difference between the two instructional strategies; $t(218) = .391, p = .696$. Sophomore students taught with TBL in NS 240 scored better than the students who were taught with lecture, but there was no significant difference between the two strategies; $t(182) = -1.710, p = .089$. It is important to note that the test items from the sophomore courses covered only one content area for each course.

Senior students in NS 450 scored significantly higher on test items taught with lecture than those taught with TBL; $t(154) = 6.086, p < .001$. Senior students in NS 460 scored higher on test-items taught with TBL than those taught with lecture; it was not a statistically significant difference although the results were close to being significant; $t(33.195) = 1.988, p = .055$. These mixed results show there is insufficient evidence to support the hypothesis that senior students taught with TBL will have increased performance on test items as compared to the

sophomore students. The test items in the senior courses were derived from five different areas of content: three content areas in NS 450 and two content areas in NS 460.

Further breakdown of each content area was analyzed using an independent sample *t*-test (see Table 3 for results) for the senior level courses with more than one content area using TBL modules. For NS 450 Content #1 scores, results indicated that the test item scores were significantly higher for the students taught with TBL as compared to the students taught with lecture; $t(154) = -2.337, p = .021$. Results for NS 450 Content #2 and Content #3 indicated significantly higher test item scores for the students taught with lecture than for those taught with TBL: $t(148.135) = 6.070, p < .001$; $t(154) = 5.977, p < .001$ respectively. For NS 460, results indicated that Content #1 was significantly higher for students taught with TBL; $T(76) = -1.993, p = .050$. Content #2 test item scores were higher for students taught with TBL but results were not significant; $t(33.644) = -1.045, p = .303$.

Table 3

Test Item Score Comparisons of Content taught in Senior Nursing Courses

Course /Strategy	<i>M</i>	<i>SD</i>
NS 450 Content #1 Scores		
Lecture	66.01	18.55
TBL	73.23*	19.96
NS 450 Content #2 Scores		
Lecture	92.27**	9.99
TBL	81.09	12.89
NS 450 Content #3 Scores		
Lecture	73.71**	14.63
TBL	58.16	17.72
NS 460 Content #1 Scores		
Lecture	77.32	11.34
TBL	83.45*	12.79
NS 460 Content #2 Scores		
Lecture	89.13	14.74
TBL	92.73	11.46

Note: Significance results are boldfaced for the strategy with the highest test item mean score.
p* = .05. *p* < .001.

This further analysis of the content areas show there is insufficient evidence to support the hypothesis that senior baccalaureate nursing students taught with TBL have a greater increase in test item scores (mean test item score) than the sophomore students as compared to the same academic levels taught with lecture.

Research question #3. Is there a difference between upper quartile and lower quartile baccalaureate nursing students in performance on examination test items on classroom content taught with TBL as compared to lecture?

Hypothesis #3. Lower quartile baccalaureate nursing students taught with TBL will have a greater increase in test item scores than upper quartile baccalaureate nursing students taught with TBL as compared to the same academic levels taught with lecture.

Statistical analysis. Upper and lower quartiles were determined from each cohort's average exam scores. Upper and lower quartiles were determined by the upper or lower 25% of the average scores on all examinations in a nursing course. Test item scores were then analyzed using an independent samples *t*-test. Data analysis of the mean scores for upper and lower quartiles for each course was performed and results are provided in Table 4.

Table 4

Comparison of Upper and Lower Quartiles taught with Lecture and TBL

Course / Strategy	Upper Quartile			Lower Quartile		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
NS 220 Test Item Score						
Lecture	27	94.07	9.31	26	81.54	15.92
TBL	27	92.59	11.30	27	77.78	18.67
NS 240 Test Item Score						
Lecture	19	83.21	11.00	20	64.10	19.69
TBL	24	81.92	18.93	23	72.57	17.76
NS 450 Test Item Score						
Lecture	19	83.89**	8.03	19	75.08**	12.58
TBL	20	73.55	7.60	20	64.08	11.43
NS 460 Test Item Score						
Lecture	6	84.78	13.19	4	84.40	13.00
TBL	16	91.57	8.99	13	87.45	8.11

Note: Significance results are boldfaced for the strategy with the highest test item mean score.

** $p < .001$.

There was no significant difference in test item scores of the upper quartiles between students taught with TBL or lecture for all courses with the exception of NS 450. There was no significant difference in test item scores of the lower quartiles between students taught with TBL or lecture, again with the exception of NS 450.

The mean test item score of the sophomore students (NS 220 and NS 240) in the upper quartile were slightly higher for the students taught with lecture as compared to the students taught with TBL, but there was no significant difference between the two groups: $t(52) .526, p=.601$; $t(37.981) .280, p=.781$, respectively). The mean test item scores varied for the lower quartile of the sophomore students. The sophomore NS 220 students in the lower quartile taught with lecture scored higher than the students taught with TBL, although there was no significant difference; $t(51) .787, p= .435$. The sophomore NS 240 students in the lower quartile taught with TBL scored higher than the students taught with lecture, although once again there was no significant difference; $t(41) -1.482, p= .146$.

For the senior students in NS 450 there was a significant difference between test item scores of students taught with TBL or lecture in both the upper and lower quartiles. Results show that students taught with lecture had significantly higher test item scores in the upper quartile and in the lower quartile: $t(37) 4.135, p=.000$; $t(37) 2.863, p=.007$, respectively. For the senior students in NS 460, the test item scores were higher for students taught with TBL for both the upper and lower quartiles, but results were not significant: $t(20) -1.390, p=.180$; $t(15) -.573, p=.575$, respectively).

Further comparisons of specific content areas in the senior level courses between TBL and lecture of the upper and lower were conducted using an independent samples t -test. Results were varied and are depicted in Table 5.

Table 5

Comparison of Content Areas of the Senior Upper and Lower Quartiles

Course / Strategy	Upper Quartile			Lower Quartile		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
NS 450 Content Score #1						
Lecture	19	71.05	18.28	19	58.77	20.32
TBL	20	77.08	16.85	20	64.17	22.96
NS 450 Content Score #2						
Lecture	19	96.05*	7.28	19	87.50*	12.50
TBL	20	86.88	9.49	20	76.88	15.85
NS 450 Content Score #3						
Lecture	19	82.05**	14.97	19	67.65**	14.94
TBL	20	59.63	14.51	20	52.86	17.38
NS 460 Content Score #1						
Lecture	6	77.80	14.04	4	75.03	13.97
TBL	16	89.59	12.47	13	78.66	14.66
NS 460 Content Score #2						
Lecture	6	91.67	12.91	4	93.75	12.50
TBL	16	93.75	11.18	13	96.15	9.39

Note: Significance results are boldfaced for the strategy with the highest test item mean score. The NS 460 sample size for content scores in the lecture group was not large enough to perform statistical testing.

** $p < .001$.

Results of the independent samples *t*-test for the content scores for the senior course NS 450 show that for Content #1, the upper quartile students scored higher with TBL, although results were not significant: $t(37) -1.071, p = .291$. The upper quartile students in the senior course NS 450 scored significantly higher with lecture for Content #2 and Content #3: $t(37) 3.376, p = .002$; $t(37) 4.750, p < .001$, respectively.

Results for the senior course NS 450 show that the lower quartile students scored higher with TBL with Content #1, although results were not significant: $t(37) -.776, p = .443$. The

lower quartile students also scored significantly higher with lecture for Content #2 and Content #3: $t(37) 2.316, p = .026$; $t(37) 2.844, p = .007$, respectively. As Content #1 was taught early in the semester and the other two content areas were taught later in the semester this indicates that students may have been more receptive to TBL modules in the beginning of a new course.

The content scores for the senior course NS 460 were not evaluated due to the low sample size for the upper and lower quartiles in the lecture group. The low sample size did not allow for statistical analysis of the two content areas.

Analysis of the test item scores and content scores show there is insufficient evidence to support the hypothesis that the lower quartile baccalaureate nursing students taught with TBL will have a greater increase in test item scores (mean test item score) than upper quartile baccalaureate nursing students taught with TBL as compared to the same academic levels taught with lecture.

Research question #4. Is there a difference in performance on cognitive-level test items of baccalaureate nursing students on classroom content taught with TBL as compared to lecture?

Hypothesis #4. Baccalaureate nursing students taught with TBL will achieve higher test item scores with higher cognitive-level test items than baccalaureate nursing students taught with lecture.

Statistical analysis. Exam blueprints with cognitive-level of all test items to be analyzed were obtained from course coordinators. Data analyses results for the five cognitive level test items with a total of 45 test items was conducted with an independent samples t -test to compare the scores for each cognitive-level test item taught with TBL or lecture (see Table 6).

Application, analysis, and synthesis types of test items were deemed to be a higher cognitive-

level test item. Results indicate there is no significant difference between the lecture group and the TBL groups on the various cognitive levels of test items.

Table 6

Comparison of Cognitive Level Test Items

Cognitive Level		<i>M</i>	<i>SD</i>	<i>p</i>
Knowledge (<i>n</i> =1)	Lecture	86.95		
	TBL	91.89	11.47	.785
Comprehension (<i>n</i> =11)	Lecture	80.08	17.49	
	TBL	83.92	19.11	.872
Application (<i>n</i> =28)	Lecture	79.06	17.70	
	TBL	75.02	19.85	.229
Analysis (<i>n</i> =4)	Lecture	64.92	27.95	
	TBL	61.90	19.10	.813
Synthesis (<i>n</i> =1)	Lecture	69.11	9.67	
	TBL	79.00	11.04	.308

Further analysis was performed on the upper and lower quartiles for each cognitive level using an independent samples *t*-test. Results are depicted in Table 7. For the students in the upper quartile, there was no difference between lecture and TBL on knowledge level test item as students achieved a 100% with both strategies. Students in the upper quartile taught with lecture scored higher on comprehension-level test items, but there was no significant difference: $t(49) .017, p = .986$. There were significantly higher scores on application-level test items for the upper quartile students taught with lecture; $t(126) 1.995, p = .046$. Upper quartile students did

score slightly higher on analysis-level test items with TBL, although there was no significant difference between lecture and TBL; $t(6.391) = -.086, p = .934$. Students taught with lecture scored higher on synthesis level test items, but there was no significant difference; $t(4, 196), p = .854$.

The students in the lower quartile scored higher on comprehension, analysis, and synthesis level test items taught with TBL rather than lecture, but results were not significant: $t(49) = -.513, p = .513$; $t(6.097) = -.264, p = .800$; $t(4) = -.317, p = .767$, respectively. The students in the lower quartile scored higher on knowledge and application level test items taught with lecture, again results did not show significance: $t(1) = .557, p = .667$; $t(126) = 1.027, p = .306$, respectively.

Table 7

Comparison of Cognitive Level of Test Items in Upper and Lower Quartiles

Cognitive Level	Upper Quartile		Lower Quartile	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Knowledge ($n=1$)				
Lecture	100.00		100.00	
TBL	100.00	.00	95.00	7.07
Comprehension ($n=11$)				
Lecture	86.61	19.02	77.39	22.01
TBL	86.52	18.91	81.58	23.37
Application ($n=28$)				
Lecture	87.29*	17.47	72.92	25.11
TBL	80.94	21.11	68.12	27.39
Analysis ($n=4$)				
Lecture	63.82	42.49	55.55	39.13
TBL	65.40	24.62	59.99	20.19
Synthesis ($n=1$)				
Lecture	86.90	12.54	56.47	16.29
TBL	83.33	28.87	64.07	38.27

Note: Significance results are boldfaced for the strategy with the highest test item mean score.
* $p < .05$.

There is insufficient evidence to support the hypothesis that baccalaureate nursing students taught with TBL performed better on test items with a higher cognitive level than baccalaureate nursing students taught with lecture. Furthermore, there is insufficient evidence to support the hypothesis that upper or lower quartiles of baccalaureate nursing students taught with TBL performed better on test items with a higher cognitive level than baccalaureate nursing students taught with lecture. There is some evidence to support that the upper quartile of baccalaureate nursing students taught with lecture in a senior level nursing course performed better on application-level test items.

Research question #5. What are baccalaureate nursing students' perceptions regarding accountability, preference for TBL or traditional lecture, and satisfaction with TBL as an instructional strategy?

Hypothesis #5. Baccalaureate nursing students will perceive having favorable experience with TBL as evidenced by high total instrument scores and high subscale scores of accountability, preference for TBL or lecture, and satisfaction with TBL on the Team-Based Learning Student Assessment Instrument[©].

Hypothesis #6. Higher academic levels of baccalaureate nursing students will have higher total instrument scores and subscale scores of accountability, preference for TBL or lecture, and satisfaction with TBL on the Team-Based Learning Student Assessment Instrument[©] than lower academic levels.

Statistical analysis. There were a total of 254 students who completed the Team-Based Learning Student Assessment Instrument[©]. Descriptive statistics were used to calculate the frequency distribution of the total instrument score and subscale scores of accountability, preference (for TBL or lecture), and satisfaction (with TBL). A one-way between subjects

analysis of variance (ANOVA) was used to evaluate the differences in the total instrument score and the subscale scores between academic levels. Student comments were coded into five themes using content analysis. Verification with another nursing faculty member was conducted to confirm themes. Results for the statistical analysis of participant responses in the Team-Based Learning Student Assessment Instrument[®] are as follows.

A total instrument score was calculated with possible scores of participants ranging from 34-170. A higher score indicated a more favorable experience with TBL. The scores of the participants ranged from 46-150, with a mean score of 102.20 ($SD=19.71$; see Figure 3). Based on a score of 102 as neutral, participants were neutral about their overall experience with team-based learning. It is important to note that the wide range of scores indicates that the participants expressed a variety of both positive and negative experiences with TBL.

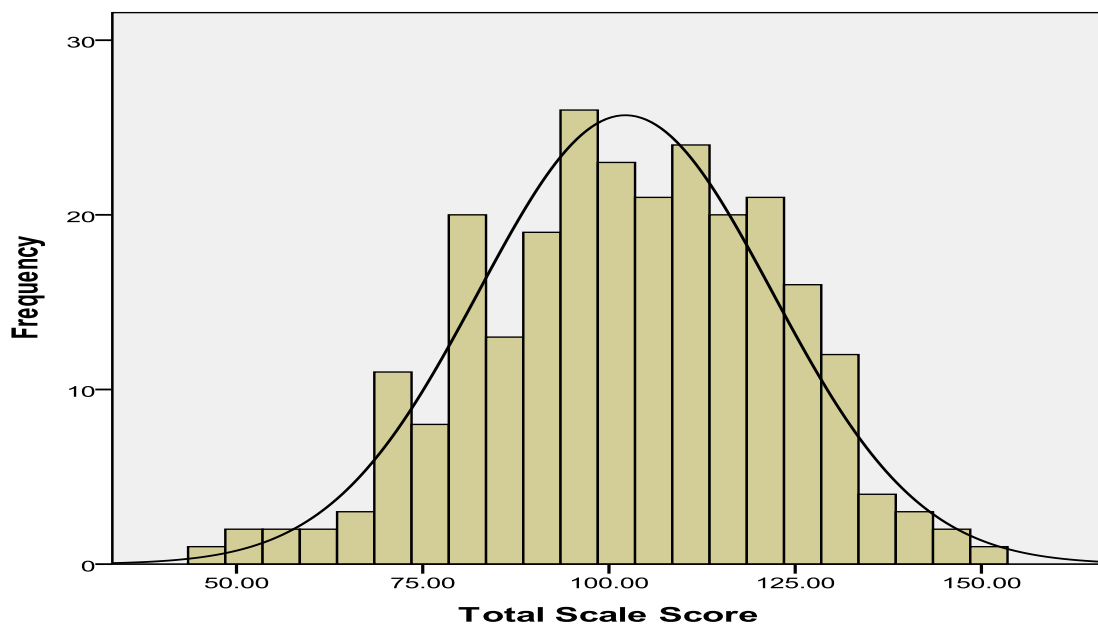


Figure 3. Total Team-Based Learning Student Assessment Instrument score.

Frequencies and mean scores of the three subscales of accountability, preference, and satisfaction obtained from the Team-Based Learning Student Assessment Instrument[®] were also assessed.

On the “accountability” subscale, possible scores ranged from 9-45. A higher score indicated a higher level of accountability. The accountability subscale scores of participants ranged from 13-41, with a mean of 32.76 ($SD= 4.23$; see Figure 4). Based on a score of 27 as neutral, participants perceived a high level of accountability with TBL.

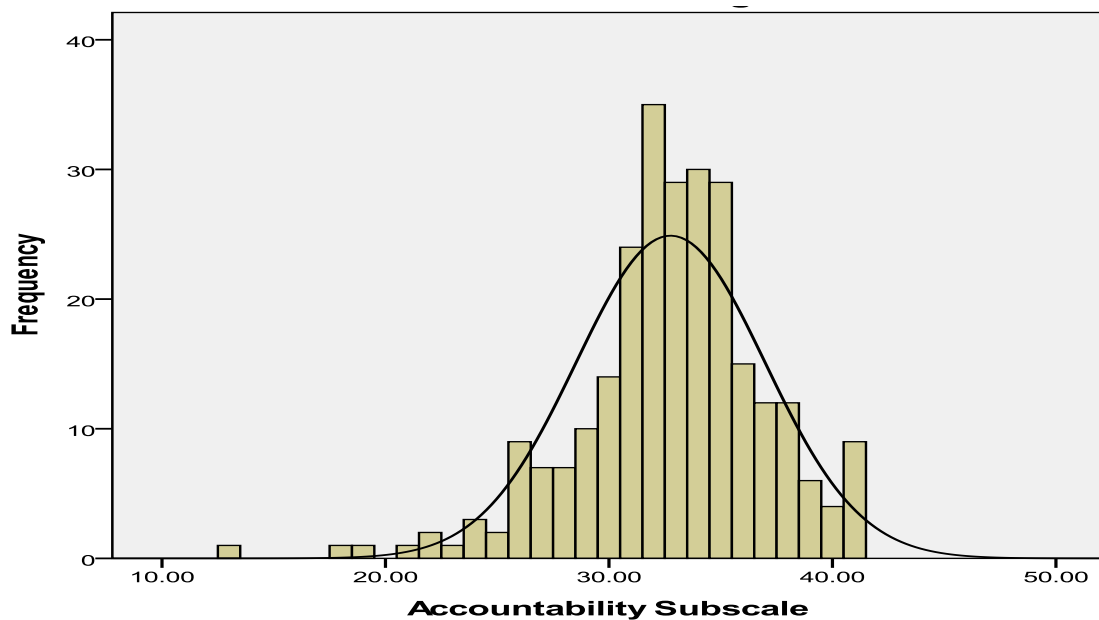


Figure 4. Total accountability subscale score.

The subscale of “student preference for lecture or TBL” had a possible range of scores from 16-80. A higher score indicated a preference for team-based learning. The preference for lecture or TBL scores of participants ranged from 20-76, with a mean score of 42.69 ($SD=$

10.57; see Figure 5). Based on a score of 48 as neutral, participants had a slight preference for lecture over TBL.

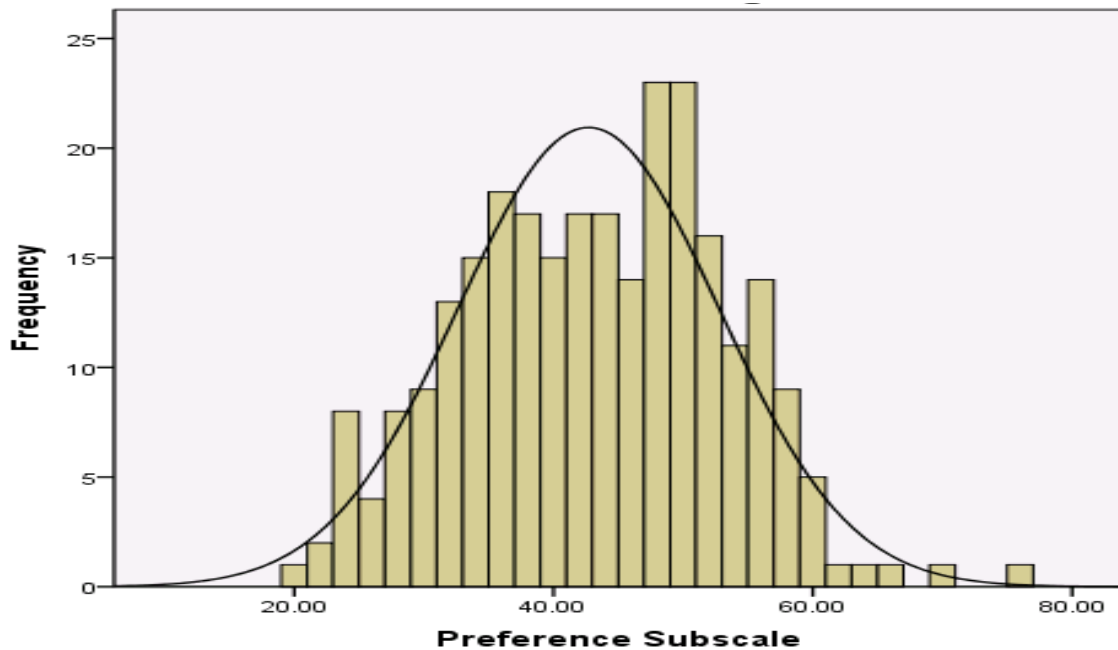


Figure 5. Total preference for TBL or lecture subscale score.

On the “student satisfaction” subscale, possible scores ranged from 9-45. A higher score indicated a higher level of satisfaction with TBL. The satisfaction scores of participants ranged from 9-44, with a mean score of 26.63 ($SD= 8.22$; see Figure 6). Based on a score of 27 as neutral, participants were almost neutral in their satisfaction with TBL. It is important to note that the wide range of scores indicates that the participants expressed various levels of satisfaction and dissatisfaction with TBL.

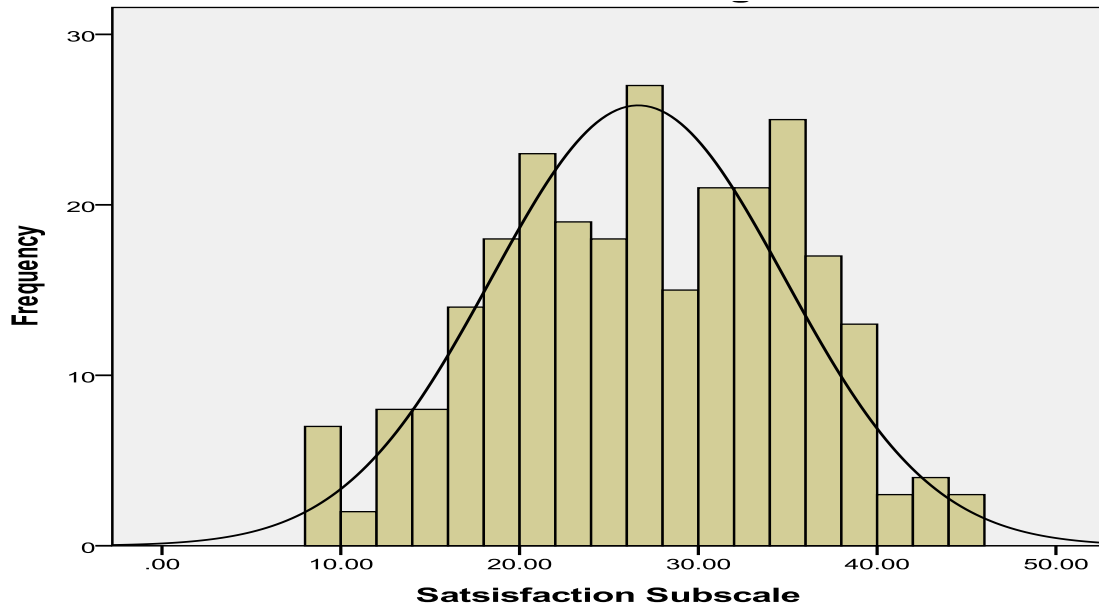


Figure 6. Total satisfaction with TBL subscale score.

The means for the academic levels of freshman, sophomore, junior, and senior were computed for the total score and the three subscale scores of accountability, preference, and satisfaction (see Table 8). The mean for the total instrument scores and all three of the subscales scores were the highest for the freshman students and were slightly lower for the sophomore students. The mean scores also were lower for the junior students than the sophomore students and the lowest for the seniors.

The mean for the total instrument scores of the freshman and sophomore participants ($m=121.52$, $m=110.10$ respectively) were higher than the neutral score of 102 and the mean scores of the junior and senior participants ($m=95.33$, $m=89.99$ respectively) were lower than the neutral score. This indicates that the freshman and sophomore participants were more positive about their experience with TBL and the junior and senior participants were more negative.

Table 8

Total Instrument and Subscale Scores per Academic Level

Academic Level	Total Scale <i>M</i> (<i>SD</i>)	Accountability <i>M</i> (<i>SD</i>)	Preference <i>M</i> (<i>SD</i>)	Satisfaction <i>M</i> (<i>SD</i>)
Freshman	121.52 (12.32)	33.71 (4.01)	51.83 (7.01)	34.32 (6.48)
Sophomore	110.10 (16.33)	33.62 (3.69)	46.16 (8.35)	29.47 (7.44)
Junior	95.33 (17.31)	32.12 (4.39)	39.76 (9.26)	24.07 (6.90)
Senior	89.89 (20.86)	31.78 (4.79)	36.43 (10.82)	21.68 (8.60)

Note: Scores were obtained from the Team-Based Learning Student Assessment Instrument[©]

On the accountability subscale, the mean score for each academic level was higher than the neutral score of 27, indicating participants perceived a high level of accountability with TBL (see Table 8).

The mean score for the preference subscale for each academic level revealed that only the freshmen had a higher mean score than the neutral score of 48 ($M = 51.83$, $SD = 7.01$). This indicates a slight preference of the freshman participants for TBL over lecture. The mean score of the sophomores ($M = 46.16$, $SD = 8.35$), juniors ($M = 39.76$, $SD = 9.26$), and seniors ($M = 36.43$, $SD = 10.82$) were lower than the neutral score, indicating participants had a preference for lecture over TBL.

The mean score for the satisfaction subscale for each academic level indicated that the freshmen ($M = 34.32$, $SD = 6.48$) and the sophomore ($M = 29.47$, $SD = 7.44$) participants had

higher mean score than the neutral score of 27. This indicates freshman and sophomore participants were satisfied with TBL. In contrast, the mean score of the junior ($M = 24.07$, $SD = 6.90$) and senior ($M = 21.68$, $SD = 8.60$) participants were lower than the neutral score of 27, indicating dissatisfaction with TBL.

To determine if there was a significant difference between the total instrument and subscale mean scores of the academic levels, a one-way between subjects analysis of variance (ANOVA) was conducted. There was a significant difference in the total instrument score between the academic levels; $F(3, 250) = 28.012$, $p < .001$. As there was a statistically significant result, a Tukey HSD post hoc test was performed. Results are depicted in Table 9. Post hoc comparisons indicated that the mean score was significantly higher for the freshman participants than the sophomore, junior, and senior participants. The sophomore participants scored significantly higher than the junior and senior participants. There was not a significant difference between the junior and senior participants.

Table 9

Tukey HSD Post Hoc Comparisons between Academic Levels on Total Instrument Score

Academic Level	<i>M (SD)</i>	<i>p</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Freshman	121.52 (12.32)			
Sophomore		.024*	1.07	21.78
Junior		.000**	15.96	36.42
Senior		.000**	19.85	43.41
Sophomore	110.10 (16.33)			
Freshman		.024*	-21.78	-1.07
Junior		.000**	8.39	21.15
Senior		.000**	11.56	28.86
Junior	95.33 (17.31)			
Freshman		.000**	-36.42	-15.96
Sophomore		.000**	-21.15	-8.39
Senior		.350	-3.066	13.94
Senior	89.89 (20.86)			
Freshman		.000**	-43.41	-19.85
Sophomore		.000**	-28.86	-11.56
Junior		.350	-13.94	3.07

Note: CI = Confidence Interval; *LL* = lower limit, *UL* = upper limit.

* $p < .05$. ** $p < .001$

The one-way between subjects ANOVA conducted on the accountability subscale showed there was a significant difference; $F(3, 260) = 3.275, p = .022$. Post hoc comparisons using the Tukey HSD test indicated there was no significant difference between the academic levels on the accountability subscale scores.

A one-way between subjects ANOVA conducted on the preference subscale showed there was a significant difference; $F(3, 260) = 22.720, p < .001$. Post hoc comparisons using the Tukey HSD test indicated there was a significant difference on the preference subscale score between the academic levels (see Table 10). Again, there was not a significant difference between the mean scores of the juniors and seniors.

Table 10

Tukey HSD Post Hoc Comparisons between Academic Levels on Preference Subscale Score

Academic Level	<i>M (SD)</i>	<i>p</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Freshman	51.83 (7.01)			
Sophomore		.031*	.36	10.99
Junior		.000**	6.82	17.33
Senior		.000**	9.30	21.50
Sophomore	46.16 (8.35)			
Freshman		.031*	-10.99	-.36
Junior		.000**	3.12	9.67
Senior		.000**	5.21	14.24
Junior	39.76 (9.26)			
Freshman		.000**	-17.33	-6.82
Sophomore		.000**	-9.67	-3.12
Senior		.214	-1.11	7.76
Senior	36.43 (10.82)			
Freshman		.000**	-21.50	-9.30
Sophomore		.000**	-14.24	-5.21
Junior		.214	-7.76	1.11

Note: CI = Confidence Interval; *LL* = lower limit, *UL* = upper limit.

p* < .05. *p* < .001

A one-way between subjects ANOVA conducted on the satisfaction subscale showed there was a significant difference; $F(3, 262) = 24.096, p = .000$. Post hoc comparisons using the Tukey HSD test indicated there was a significant difference on the preference subscale score between the academic levels with the exception of the difference between the mean scores of the juniors and seniors (see Table 11).

Table 11

Tukey HSD Post Hoc Comparisons between Academic Levels on Satisfaction Subscale Score

Academic Level	<i>M (SD)</i>	<i>p</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Freshman	34.32 (6.48)			
Sophomore		.018*	.60	9.10
Junior		.000*	6.05	14.44
Senior		.000**	7.75	17.54
Sophomore	29.47 (7.44)			
Freshman		.018*	-9.10	-.60
Junior		.000**	2.75	8.05
Senior		.000**	4.13	11.46
Junior	24.07 (6.90)			
Freshman		.000**	-14.44	-6.05
Sophomore		.000**	-8.05	-2.75
Senior		.314	-1.20	6.00
Senior	21.68 (8.60)			
Freshman		.000**	-17.54	-7.74
Sophomore		.000**	-11.46	-4.13
Junior		.314	-5.60	1.20

Note: CI = Confidence Interval; *LL* = lower limit, *UL* = upper limit.

p* < .05. *p* < .001

The overall results of the one-way ANOVA and post hoc testing indicate that freshman participants were the most positive about TBL and the senior participants were the most negative about TBL as seen with lower satisfaction scores and higher preference for lecture. The results of comparisons between all academic levels were significant with the exception of the comparison between junior and senior participants. As the senior participants had been taught with TBL for several semesters, this may indicate that the more exposure to TBL, the less favorable the perception of the instructional strategy will be.

There is no evidence to support the hypothesis that higher academic levels of baccalaureate nursing students will have higher total instrument scores and subscale scores of accountability, preference for TBL or lecture, and satisfaction with TBL on the Team-Based

Learning Student Assessment Instrument[©] than lower academic levels. Conversely, the opposite was true in that the evidence supported that lower academic levels had higher scores, thus a more positive perception of TBL.

Student Comments: Team-Based Learning Student Assessment Instrument[©]

Participants were provided the opportunity for comments regarding their experiences with TBL at the end of the Team-Based Learning Student Assessment Instrument[©]. There were only three (12%) participants who provided comments out of 25 freshman participants with 17 out of the 97 sophomores (17.53%), 32 out of 111 juniors (28.83%), and 13 out of 37 seniors (35.14%). Content analysis was performed on individual comments by clustering similar phrases and then coding comments and phrases into themes. Verification of themes was confirmed by a nursing faculty member. Five major themes emerged from the analysis: negative reactions, effect on learning, lack of lecture, team dynamics, and expressions of entitlement. Each of these themes will be discussed individually.

Negative reactions. The vast majority of comments were negative reactions to the use of TBL as an instructional strategy. There were several participants stating “it’s a waste of time”. Other negative reactions were centered on the format of TBL modules. One participant commented “learning opportunities were pointless”, while another participant called the activities “busywork”. Many of the negative reactions focused on team dynamics, as one participant stated, “It is not fair to put people in groups where they must rely and trust that others will be prepared”. Another participant stated “I hate TBL! I cannot learn like this and do not want to hear something from another student who doesn’t have a clue!”

Many of the negative reactions were from the upper academic levels. Comments made by freshman were more positive than negative. One participant commented, “I think all colleges

must have team-based learning to encourage their students”. Another participant stated, “team-based learning makes you ready and study the material better before class”.

Effect on learning. Several participants commented on TBL’s effect on learning. Some participants were concerned with “missing important information” or “getting wrong information”. Several participants commented on the fact that they do poorer on tests and exams on the content taught with TBL and that they have to spend more time studying that material. Other participants simply stated, “I do not learn like this.” and another participant stated, “I don’t think it necessarily makes me remember more.” It is interesting to note that a few participants referred to TBL being used differently in courses and were “less effective”. One participant commented, “There is no current way to ensure the information is correct and since I question what my peers know, I don’t rely on info learned in TBL.” A few participants reported poor performance with the TBL content on exams. One participant stated, “I personally do not get anything out of TBL activities and generally do poorly on that portion of the exams because of it.”

Lack of lecture. Many participants commented on the lack of lecture as exemplified by one comment, “Lecture is so much more beneficial! Students constantly complain about TBL and how frustrating it is when instructors do not lecture over the content.” Several participants expressed a desire to have lecture in conjunction with TBL as evidenced by these participant comments: “TBL would be more effective if we lectured before then did an application.” and “I like a balance between team-based learning with lecture.” Many participants expressed that they learn better with lecture. One participant stated, “I learn better when someone lectures on it and explains it to me in person.”

Team dynamics. Many participants expressed concerns about different aspects related to the teams in TBL. Student accountability to the team was one area of concern mentioned by several participants. One participant commented, “Often times with TBL, other students do not come prepared and rely on others who they know do. It is not fair to put people in groups where they must rely and trust that others will be prepared.” Another participant stated, “Many people will just put all of the workload on one team member.” This sentiment was confirmed with a participants comment, “team based learning makes me feel that if I don’t study then my teammates will help me out and I won’t fail.”

Another issue with team dynamics on which participants commented regarded the peer evaluations. One participant commented, “I also don’t like the fact that we have to do an evaluation at the end, because some people take points away from others just because they don’t like them.” Another participant stated, “sometimes other girls in our class can be caddy and give one another bad feedback, which then directly affects our grade.” Several participants expressed a desire to pick their own TBL group and comments included: “if TBL groups could be chosen by students I think they would be more effective.” and “I think team based learning would be a great benefit if students can pick their own TBL group.”

Expressions of entitlement. The last theme that emerged from several participant comments revealed a strong expression of entitlement in which students pay a lot of money in tuition and want instructors to provide the information. This is evident in a comment by one participant, “I find it offensive that we tend to waste an entire class period trying to teach ourselves what we are paying the instructors to teach us.” Another student stated, “team based learning is horrible, not helpful, and the teachers are just lazy and use it as a way out. We aren’t taught info and it’s a waste of time.” Other comments included: “I’m paying you to teach me,

not myself / others.” and “we are paying a lot of money to have instructors lecture so I like it and learn better than TBL.”

Summary

This chapter reported the findings of the data analysis for this study. In general, the results of the retrospective component of the study indicated that the null hypothesis was true: there was no significant difference in examination test item scores between TBL and lecture as the instructional strategy for baccalaureate nursing students. Results of the student survey component indicated baccalaureate nursing students were neutral about their overall perception and satisfaction with TBL. Participants did perceive a higher level of accountability with TBL, but a slight preference for lecture. Preference for lecture became apparent as students progressed through the academic levels. A discussion of these findings with the conclusions, limitations, and recommendations for future research will be presented in the next chapter.

Chapter V: Discussion and Summary

The purpose of this study was to describe the effect of TBL as an instructional strategy on baccalaureate nursing students. This study had two components: retrospective analysis of archived data and an analysis of a student survey on perceptions of TBL. This chapter will provide a discussion of the results of the data analysis, implications for nurse educators, limitations of the study, and recommendations for future research for both components of the study.

Retrospective Component

The retrospective component evaluated archived test items of content taught with both TBL and lecture. Statistical analysis was performed to compare the effect of the two instructional strategies on baccalaureate nursing student test items scores in general, and then specifically between sophomore and senior student test item scores and the upper and lower quartile student test item scores. Comparisons were further delineated between the test items of specific content within the senior level courses. The research questions that were answered for the retrospective component in this study will be discussed with a summary of the results and recommendations for future research.

Research Question #1: Differences in Test Item Scores

This study demonstrated no significant difference in test item scores between students taught with TBL and students taught with lecture ($p = .761$). The results were significantly higher for the lecture group than the TBL group in one of the senior nursing courses. The overall results are consistent with other studies in which there were no significant differences found between TBL and other instructional strategies (Carmichael, 2009; Conway et al, 2010; Koles et al., 2005; Letassy et al., 2008; Mennenga, 2010). Despite the fact that the results of this study

did not prove the hypothesis that test item scores for students taught with TBL would be higher than lecture, the findings do suggest that TBL is at minimum equally as effective as lecture. The nursing courses in this study have incorporated one to four TBL modules in addition to other instructional strategies. The majority of studies in other disciplines compared semesters with all TBL to semesters with another instructional strategy. An area of future research would be to compare the two methods of incorporating TBL in nursing education on student learning: a course using only TBL or a course using TBL modules in addition to other strategies.

Instructor variability could have also influenced the results in this study. There were four courses with seven different instructors using TBL to teach nursing content. Some instructors used “preparation worksheets” for students to focus their readings prior to the TBL class. Some instructors did not clarify right or wrong answers from the IRAT/GRAT or GAP for students. Some instructors did not use peer evaluation to facilitate student accountability. This variability may affect how students learn from the TBL modules and perform on test items related to the content. An area of future research would be a comparison of nursing instructor integration and utilization of TBL in the classroom. Research on the effects of instructor variability in using TBL on student learning is also needed.

Research Question #2: Differences between Sophomore and Senior Students

The results of this study did not demonstrate that senior baccalaureate nursing students had a greater increase in test item scores taught with TBL than sophomore nursing students as compared to the same academic levels taught with lecture. It was speculated that seniors would have more experience with TBL, thus would perform better than sophomores with the relatively new instructional strategy. The only significant result was that the senior students in NS 450 performed better on test items when taught with lecture ($p=.000$). To further evaluate the results

for senior students in NS 450, the total test item scores were delineated into test item scores for three content subcategories. Results showed that Content #1 test item scores were significantly higher for TBL than lecture, but Content #2 and #3 test item scores were significantly higher for lecture as compared to TBL. It is important to note that Content #1 is the first TBL module used in the semester in the senior course of NS 450. Students may be more eager and revitalized starting a new semester, thus may actively prepare more for the first TBL module than later in the semester when they may be more overwhelmed with assignments and coursework. There is no literature to support this reasoning; therefore this is an area where future research would be useful.

Results of the two content areas for senior students in NS 460 did show that students performed better on test items when taught with TBL, with significant results for Content #1 ($p=.050$). The mixed results for the content areas for the senior students could be related to a variety of reasons. First and foremost, the type of content taught with TBL modules in the two courses is very different. The senior course of NS 450 contains content centered on nursing care of complex patients in the Intensive Care Unit (ICU). Much of the content is new to students. In contrast, the content taught in the senior course of NS 460 focuses on nursing care of the geriatric patient. Gerontology is a concept that is threaded through all nursing courses in the curriculum, therefore much of the content is reinforcement of prior knowledge. Students in NS 460 would be more familiar with the content and may perform better with TBL as an application of knowledge. An area of future research would include evaluation of the type of content taught with TBL and student performance in the different types of content.

Another possible reason for the mixed results could be related to instructor variability with the differences in instructor styles in teaching the content. Some instructors use

“preparation worksheets” for students to focus their studies in preparation for the TBL module. Also it was noted that in the senior course of NS 460, some of the questions from the IRAT and GRAT were repeated on the examinations, thus increasing the likelihood of students answering the test item correctly. The test item would not have been introduced to the students who were taught with lecture prior to taking the examination.

Research Question #3: Differences between Upper and Lower Quartile.

It was hypothesized that lower quartile students would have a greater increase in test item scores than the upper quartile students when taught with TBL as compared to lecture. There were no significant differences between the upper or lower quartile students taught with TBL or lecture for the sophomore nursing courses of NS 220 and NS 240, and the senior course of NS 460. There was a significant difference between the upper and lower quartile students in the senior nursing course of NS 450.

The upper and lower quartiles of the sophomores in NS 220 scored better on test items when taught with lecture, but the results were not significant. This was not consistent with the literature supporting that the lower quartile or academically-at-risk students perform better when taught with TBL (Carmichael, 2009; Conway et al., 2010; Koles et al., 2005; Letassy et al., 2008; Neider et al. 2005).

For the sophomore course of NS 240, the students in the upper quartile scored higher when taught with lecture, but results were not significant. There was only 1.29 points difference between the lecture mean score and the TBL mean score. For the lower quartile, the students scored higher when taught with TBL. Although results were not significant it was noted that the mean score for the TBL group was 8.47 points higher than the mean score for the lecture group. This does lead one to consider that the lower quartile students in the sophomore course of NS

240 did have more of an increase in test item scores than the upper quartile when taught with TBL. This outcome is supported by the literature (Carmichael, 2009; Chung et al., 2009; Koles et al., 2005; Neider et al. 2005). A factor influencing the differences between the mean scores of the upper and lower quartile students may be related to the ceiling effect for the upper quartile students as their higher scores did not have a possibility for improvement.

The students in the senior course of NS 450 once again exhibited significant results of increased performance on test items with lecture for students in the upper quartile ($p=.000$) and the lower quartile ($p=.007$); while the students in the other senior course (NS 460) exhibited increased performance on test items with TBL, although results were not significant. Further comparisons of the content areas showed the same results as the analysis of sophomore and seniors. The scores for NS 450 Content #1, NS 460 Content #1, and NS 460 Content #2 were higher for students taught with TBL, while the content scores for NS 450 Content #2 and #3 were significantly higher for students taught with lecture. These results could also be related to the type of content taught in the senior courses of NS 450 and NS 460, instructor teaching style and/or use of worksheets, and use of IRAT/GRAT test items on examinations. Influencing factors on performance on test items taught with TBL would be another area for future research.

Research Question #4: Differences between Cognitive-Level Test Items

Analysis of the cognitive levels of test items revealed there were no significant differences between TBL and lecture for knowledge, comprehension, application, analysis, or synthesis levels of test items. The literature did not reveal that this type of analysis with multiple-choice test items has been performed, although Carmichael (2009) did demonstrate that students taught with TBL scored higher on data interpretation questions than the students taught with lecture. Touchet and Coon (2005) established that psychiatric students had an improvement

in critical thinking with more effective integration of psychodynamic concepts. Another study by Beauty et al. (2009) demonstrated improvement in problem solving skills by students.

Interpretation and improvement in critical thinking or problem solving skills could correlate with higher level of cognitive test items. Additional research is needed to confirm results of this study or to use a larger sample size to assess whether students do perform better on higher cognitive-level multiple-choice test items with TBL or another teaching strategy.

Student Survey Component

The student survey component evaluated nursing student responses on the Team-Based Learning Student Assessment Instrument[®]. Total instrument scores and subscale scores of accountability with TBL, preference for TBL or lecture, and satisfaction with TBL were analyzed. Content analysis of student comments was performed and comments were organized into five themes. The student comments provided additional information regarding students' perceptions of TBL. The research question that was answered for the student survey component in this study will be discussed with a summary of the results and recommendations for future research.

Research Question #5: Student Perceptions of TBL

The mean total instrument score of 102.20 indicates participants expressed neutrality about their experiences with TBL (neutral score = 102). The wide range of scores (46-150) indicates that many students were favorable towards TBL and many students were negative. The neutral results of the mean total instrument score were consistent with the neutral subscale score of satisfaction with TBL ($M = 26.63$, $SD = 8.22$; neutral = 27). The satisfaction subscale range of scores was also variable with a range from 9-45. This wide range of variability is also demonstrated in the variability of positive or negative scores between academic levels from

freshman, sophomore, junior, and senior participants. The freshman and sophomores have the more positive perceptions and the juniors and seniors lean toward more negative perceptions of TBL. Students also preferred lecture over TBL as evidenced by the mean subscale score of 42.69 ($SD = 10.57$; neutral = 47). Student preference for lecture has been demonstrated in other studies on the use of TBL with graduate and undergraduate students in other disciplines (Carmichael, 2009; Koles et al., 2005; Letassy et al., 2008).

The total instrument and subscale scores from this study exhibited lower mean scores and wider ranges of scores than those same scores obtained in Mennenga's study (2010). This difference may be related to the nursing course in Mennenga's study was entirely taught with TBL as compared to incorporation of only a few TBL modules with lecture in this study. In addition to the differences in the scores on the Team-Based Learning Student Assessment Instrument[®], there were also differences in the themes identified from student comments in each study. Only one theme was identified in both studies: lack of lecture. Students in both studies felt they learned better from lecture and thought TBL would be better if lecture was included. It appears that nursing students may become dependent on lecture and are leery about new methods of learning. The other comments from Mennenga's study were positive in regards to the themes of student accountability, retainment of material, and positive reactions. These comments were contrary to the comments from students in this study with the negative themes of team dynamics, effect on learning, and negative reactions. In addition, the students in Mennenga's study commented on the distractions that can occur in team discussion while the students in this student voiced a sense of entitlement in the learning process. The differences in the student comments may also be related to the differences between a TBL course versus incorporating

TBL modules with other instructional strategies. These differences present an opportunity for future research.

Many of the student comments demonstrated a negative perception of TBL. Students were concerned with not receiving correct or valuable information. This was confirmed with comments regarding lack of lecture to clarify information. Comments related to the lack of lecture were elicited from students in other studies on use of TBL in nursing education (Clark et al., 2008; Mennenga, 2010). This research illustrates that students have been taught to learn passively and have come to depend on lecture format. The comments lead one to question if the incorporation of TBL in the courses retained some of the essential elements described by Michaelsen and Sweet (2008a). One of the four essential elements includes providing immediate feedback and clarification of content. This would facilitate students' perceptions of receiving correct and important information and students wouldn't feel they needed lecture to understand the information. Another essential element is the successful development of assignments to facilitate interactions and promote learning. Content in the group application problem (GAP) should include key concepts of the content being taught with TBL. Future research comparing the effects of student learning from various types of application activities is also recommended.

It was also evident that not all students prepared for TBL or collaborated well with peers, although the results of mean subscale scores on accountability were above the neutral score of 27 ($M = 32.76$, $SD = 4.23$). According to Michaelsen and Sweet (2008a), the second essential element of TBL focuses on individual and group accountability that includes comprehensive individual class preparation and significant contributions to the group. A good peer assessment ensures accountability from all students and can provide formative and summative information. It was noted that not all instructors in this study utilized peer assessment and not all instructors

used the same type of peer assessment. These variations could have influenced student perceptions on preparedness and collaboration. A recommendation for future research on TBL would be to assess student perceptions on individual preparedness and collaboration skills with the use or type of peer evaluation used.

One important finding from this study is from the analysis of the mean total instrument scores and mean subscale scores among the four academic levels. Results demonstrated that the mean scores were the highest for the freshmen participants and the mean scores were consistently lower for each consecutive academic level through the senior participants on the total instrument score, the preference for TBL subscale score, and the satisfaction with TBL subscale score. Results were significant between all other academic levels with the exception of between junior and senior participants. The seniors in this study had several years of experience with TBL and the freshmen had limited experience. These results suggest that as students have more experience with TBL, they may become more dissatisfied with TBL although there may be a variety of factors that may influence this negative perception. These results were consistent with the disposition of negative comments provided at the end of the survey. The majority of the negative comments were from the upper classmen, with 65% of comments from sophomore participants being negative. Approximately 94% of comments from junior participants and 100% of comments from senior participants were negative. Two out of the three comments from freshmen participants were positive. The freshman and sophomore participants had more positive comments that can lead one to propose that they may have had more experience with group and student-centered learning during their elementary education. The concept of understanding the influence of prior elementary educational experience with group or student-centered learning on student perceptions of instructional strategies used in undergraduate

education is one area for future research, especially the influence of prior experience on students' perception of TBL.

The other thought that arises from these results relates to possible reasons for why the upper academic levels have more negative comments. Although only 18% of freshman and sophomore participants and 31% of junior and senior participants provided comments, it was the themes that arose from the comments that beg one to question if more exposure to lecture discourages students from the student-centered strategies. The comments did focus on wanting more lectures, so perhaps that was what they were used to. An area of research to explore would be in comparing students' perceptions of TBL when taught entirely by TBL or taught with a few TBL modules. In the study by Mennenga (2010), the entire nursing course was taught with TBL and the student responses on the Team-Based Learning Student Assessment Instrument© were higher for the total instrument and all three subscale scores than the scores for this study. This provides encouragement to pursue further research in this area.

Implications for Nurse Educators

Several professional organizations and studies have identified the need to transform nursing education to include innovative teaching strategies that engage students in meaningful learning (American Association of Colleges of Nursing, 1997; Benner et al., 2010; Dalley et al., 2008; Diekelmann, 2002; Forbes & Hickey, 2009; Institute of Medicine, 2010; National League for Nursing, 1988, 2003, 2005). The use of evidenced-based instructional strategies to accomplish this task should be incorporated into all nursing curricula. The NLN in 2005 called for nurse educators to involve students as active participants in education and to base teaching practices on strategies that research has proved to be effective for student-centered learning. The IOM also encourages nurse educators to incorporate student-centered learning strategies (2010).

TBL has been shown to be effective in other disciplines in increasing student engagement in their learning process through student-centered learning (Conway et al., 2010; Dana, 2007; Dunaway, 2005; Tai and Koh, 2008). Although this study did not provide direct evidence related to student engagement, nurse educators should be encouraged to incorporate TBL as an instructional strategy to promote active student learning.

TBL has been shown to be, at minimum, equally effective on student learning as other instructional strategies in other disciplines (Carmichael, 2009; Koles et al., 2005; Neider, et al., 2005, Weiner et al., 2009). In a previous study on the use of TBL in nursing education, Mennenga found no significant differences between examination scores between a class taught with lecture and a class taught with TBL (2010). This study has demonstrated that TBL is as effective as lecture on student learning as seen with no significant difference between test item scores on nursing student examinations. As TBL has been confirmed to be equally effective on student scores, this also should encourage nurse educators to incorporate TBL as an instructional strategy.

Despite the negative comments and lower scores from the Team-Based Learning Student Assessment Instrument[®], TBL has been shown to be an effective instructional strategy. Nurse educators need to be well informed on the many aspects of TBL before initiation of the strategy in a course. Mennenga's study (2010) showed that students taught in an all TBL course had higher mean scores than the students in this study who were taught with a few TBL modules with other instructional strategies. Although one cannot compare scores from the two studies, this does imply that students may have a more positive reception of TBL when that is the only method of instruction used in a course. Nurse educators will need to determine what method of delivery would work best in their course when instituting TBL as an instructional strategy. Well-

prepared TBL modules may influence student perceptions on the use of TBL. Discussions on the implementation and use of TBL among all nurse educators using the strategy can benefit students through increased consistency on how TBL is employed.

Limitations

There are several limitations of this study. First, this study took place at one small, private college of nursing. Although there was a high response rate (78.9%) for the student survey component, there was a small sample size of 254 participants. The sample was also homogenous which limited the generalizability to the population. A true randomized sample was not used and the sample was recruited from a preselected group who fit the defined characteristics.

Second, the retrospective component was limited in the number of semesters and the number of courses used to compare TBL and lecture. The researcher was also limited in the number of TBL modules to evaluate, with only seven of a possible ten modules evaluated. This was due to missing data in two of the courses studied.

Third, the nursing instructors were all novices in the implementation of TBL modules in their course. Both the inexperience of the faculty and the newness of the instructional strategy to students could have affected student responses and performance on test items. It is unknown if all nursing faculty used the Readiness Assessment Process in the approved manner and that is a limitation to this study.

An additional limitation is the unknown factor of any previous exposure by students to TBL in science courses and if that exposure had any influence on the results of this study. Another limitation to this study was the number of test items evaluated. There were several test items that were not used on all examinations evaluated in this study. In addition there was a

limitation in the number of cognitive-levels of test items used for this study. In addition, only multiple-choice test items were studied, thus limiting the results.

One final limitation to this study was that the researcher is a faculty member at the college and teaches students in one of the nursing courses evaluated. All nursing students are required to enroll in the nursing course from which this researcher is the course coordinator. Students may have responded differently to the Team-Based Learning Student Assessment Instrument[®] because of this association, despite the precautions taken during the administration of the tool and omission of the current course being taught by the researcher.

Recommendations for Future Research

There have been several areas of future research recommended in the discussion of the results for this study: effects of instructor variability in using TBL, comparing perceptions and learning in a TBL course to a course with occasional TBL modules, timing of TBL modules in a course, evaluating type of content taught with TBL, influencing factors on performance with TBL, comparing preparedness and collaboration skills with peer evaluation, and assessing prior experiences with group or student-centered learning on perceptions of TBL. This study contributed to the limited research on TBL in nursing education and has led to other recommendations for future study.

- Research on TBL in nursing education is limited, therefore continued research is necessary. There have been only three other research studies to date on the use of TBL in nursing education (Clark et al., 2008; Feingold et al., 2008; Mennenga, 2012).
- TBL has been shown to be as effective as lecture in performance on examinations but there is a need to research the effect of TBL on nursing student performance in clinical situations or simulation scenarios.

- TBL has been compared to other instructional strategies in other disciplines; there needs to be research on the effect of other active learning strategies on student learning as compared with TBL in nursing education.
- TBL has been shown to be effective in developing skills in teamwork and collaboration in other disciplines; there needs to be research on the effect of TBL on development of those skills in nursing.
- Future research needs to explore the differences in student learning when using only TBL as the only instructional strategy in a course compared to using a few TBL modules mixed with other instructional strategies

Summary

This study explored and described the effect of TBL as an instructional strategy for baccalaureate nursing students and contributed to the limited body of research on TBL in nursing education. Nursing education has been challenged to transform undergraduate nursing curricula to promote application of nursing concepts to clinical situations. This study determined that TBL is as effective as lecture in student examination performance; despite the belief of many students that the opposite is true. It is important to question if the value of an instructional strategy or the achievement of student outcomes should be assessed by examination performance alone. As TBL focuses on helping students to apply learning to complex situations, it would be better to assess student outcomes with performance in clinical or with simulation scenarios.

This study demonstrated that student perceptions on accountability for learning are higher with TBL than lecture, although preference and satisfaction with TBL were not as positive. Students may have learned to be passive learners with much of their prior learning resulting from lectures. Active learning strategies, such as TBL, may precipitate fears and anxieties related to a

new learning environment. The continued use of lecture, in conjunction with TBL modules, may also precipitate negative perceptions of the learning strategy.

The major contribution to the existing research on TBL from this study originated from the finding of increasing negative perceptions of students towards TBL as they progressed through the nursing program. It is important to query the reason(s) for this finding. Only in the frequent utilization of active learning strategies by nurse educators can students increase their comfort level and perception of TBL. In addition, the extension on the body of research on TBL in nursing education can facilitate nurse educators in using TBL effectively, thus promoting student learning. This is the ultimate goal of any instructional strategy in nursing education.

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Appendix A

Team-Based Learning Student Assessment Instrument ©

This instrument asks you about your experience with team-based learning. There are no right or wrong answers. Please be honest and report your true reaction to each question by circling the number for the response that best describes your answer.

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Disagree or Agree (Neutral)	Agree	Strongly Agree
1. I spend time studying before class in order to be more prepared.	1	2	3	4	5
2. I feel I have to prepare for this class in order to do well.	1	2	3	4	5
3. Team-based learning makes me accountable.	1	2	3	4	5
4. I contribute to my team members' learning.	1	2	3	4	5
5. My contribution to the team is not important.	1	2	3	4	5
6. My team members expect me to assist them in their learning.	1	2	3	4	5
7. I am accountable for my team's learning.	1	2	3	4	5
8. I am proud of my ability to assist my team in their learning.	1	2	3	4	5
9. I need to contribute to the team's learning.	1	2	3	4	5
10. During traditional lecture, I often find myself thinking of non-related things.	1	2	3	4	5
11. I am easily distracted during traditional lecture.	1	2	3	4	5
12. I am easily distracted during team-based learning activities.	1	2	3	4	5
13. I am more likely to fall asleep during lecture than during classes that use team-based learning activities.	1	2	3	4	5
14. I get bored during team-based learning activities.	1	2	3	4	5
15. I talk about non-related things during team-based learning activities.	1	2	3	4	5
16. I easily remember what I learn when working in a team.	1	2	3	4	5
17. I remember material better when the instructor lectures about it	1	2	3	4	5
18. Team-based learning activities help me recall past information.	1	2	3	4	5
19. It is easier to study for tests when the instructor has lectured over the material.	1	2	3	4	5

Circle the number for the response that best describes your answer.

	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Disagree or Agree (Neutral)	Agree	Strongly Agree
20. I remember information longer when I go over it with team members during the GRATS used in team-based learning.	1	2	3	4	5
21. I remember material better after the application exercises used in team-based learning.	1	2	3	4	5
22. I can easily remember material from lecture.	1	2	3	4	5
23. After working with my team members, I find it difficult to remember what we talked about during class.	1	2	3	4	5
24. I do better on exams when we used team-based learning to cover the material.	1	2	3	4	5
25. After listening to lecture, I find it difficult to remember what the instructor talked about during class.	1	2	3	4	5
26. I enjoy team-based learning activities.	1	2	3	4	5
27. I learn better in a team setting.	1	2	3	4	5
28. I think team-based learning activities are an effective approach to learning.	1	2	3	4	5
29. I do not like to work in teams.	1	2	3	4	5
30. Team-based learning activities are fun.	1	2	3	4	5
31. Team-based learning activities are a waste of time.	1	2	3	4	5
32. I think team-based learning helped me improve my grade.	1	2	3	4	5
33. I have a positive attitude towards team-based learning activities.	1	2	3	4	5
34. I have had a good experience with team-based learning.	1	2	3	4	5
Please add any comments you may have about your experience with team-based learning.					

Appendix B

Student Demographic Information Survey

Team-based Learning Research Study

This information will be used for research purposes only. Please answer all questions by placing an "X" in the blank beside the most appropriate answer.

1. What is your age? _____
2. What is your gender?
 Female
 Male
3. What is your ethnicity? (Choose only one.)
 African American
 Asian American/Pacific Islander
 Caucasian
 Hispanic/Latino
 Native American
 Other: _____
4. Are you currently employed? If yes, how many hours per week?
 Yes _____ hours/week
 No
5. Do you have experience in health care?
 Yes
 No
6. Are you:
 Single
 Married
 Separated
 Divorced
7. Do you have any children? If yes, how many?
 Yes _____ children
 No
8. What is your cumulative grade point average (GPA) before the current nursing course?
 3.5 - 4.0
 3.0 - 3.49
 2.5 - 2.99
 2.0 - 2.49
 < 2.0
9. What level are you currently enrolled in the nursing program?
 Freshman
 Sophomore
 Junior
 Senior

Appendix C

Copyright Permission to use Instrument

Dr. Heidi Mennenga
South Dakota State University
Box 2275
Brookings, SD 57007

May 19, 2011

Dear Ms. Kniewel,

This letter will confirm our recent conversation regarding your request to use the “Team-Based Learning Student Assessment Instrument” for your doctoral research. I grant you permission to use this instrument to research nursing students’ perceptions of learning with team-based learning and perceptions of nursing students in relation to team-based learning or lecture as the instructional strategy.

As a courtesy for sharing my instrument, I do ask that you provide me with the results once your research is completed.

Sincerely,
Heidi Mennenga, PhD, RN

Appendix D

Request Letter to Conduct Research at Site



Dr. Ken Ryalls
 Vice President Academics Affairs
 Nebraska Methodist College
 Josie Harper Campus
 720 N. 87th Street
 Omaha NE 68114

Dear Dr. Ryalls

I am currently working on my dissertation for a doctorate degree from College of Saint Mary and would like approval to conduct research at Nebraska Methodist College. The title of my research study is: *The Effectiveness of Team-Based Learning as an Instructional Strategy on Student Learning in Baccalaureate Nursing Education*. The purpose of this letter is to obtain a letter with site approval to conduct research as a requirement of the Institutional Review Board from College of Saint Mary.

The study will be used to explore and describe the effectiveness of team-based learning as an instructional strategy on student learning in a baccalaureate nursing program at Nebraska Methodist College. I will obtain the Institutional Review Board's approval from College of Saint Mary and Nebraska Methodist College prior to conducting the research. My study is attempting to answer the following research question(s):

1. Do baccalaureate nursing students who are taught with team-based learning as the primary instructional strategy achieve higher scores on examination questions than baccalaureate nursing students who are taught with traditional lecture?
2. When comparing examination scores of traditional lecture and team-based learning, do senior or sophomore level baccalaureate nursing students have a greater change in exam scores with team-based learning?
3. Is there a difference in performance on examination questions of the academically strong and academically weak students with team-based learning as the primary instructional strategy as compared to traditional lecture?
4. Do baccalaureate nursing students who are taught with team-based learning as the primary instructional strategy perform better on higher cognitive level examination questions than baccalaureate nursing students who are taught with traditional lecture?
5. What are baccalaureate nursing students' perceptions of learning with team-based learning as an instructional strategy?

I will need to obtain exams, individual exam score sheets, test item analysis, and test blueprints from course coordinators of the sophomore and senior nursing courses. No student identifiers will be provided to me for this study. I will also be administering the *Team-Based Learning Student Assessment Instrument*® to nursing students after obtaining informed consent. This tool evaluates students' perceptions of accountability, satisfaction, and preference for team-based learning as compared to lecture.

If you have any questions concerning this study, please feel free to contact me or my dissertation chair, Martha Brown.

Sincerely,

Marla Kniewel MSN RN
 Doctoral Student
 College of Saint Mary
 7000 Mercy Road
 Omaha, NE 68106
 402-354-7036
mkniewel33@csm.edu

Melanie Felton PhD
 Graduate Faculty
 College of Saint Mary
 7000 Mercy Road
 Omaha, NE 68106
 402-399-2625
mfelton@csm.edu

Appendix E

Approval to Conduct Research from Site



Dr. Ken Ryalls
Vice President Academics Affairs
Nebraska Methodist College
Josie Harper Campus
720 N. 87th Street
Omaha NE 68114

Institutional Review Board
College of Saint Mary
7000 Mercy Road
Omaha, NE 68106

Please note that Marla Kniewel, CSM Graduate Student, has the permission of Nebraska Methodist College to conduct research at our institution for her study, "The Effectiveness of Team-Based Learning as an Instructional Strategy on Student Learning in Baccalaureate Nursing Education".

If there are any questions, please contact my office.

Signed,

A handwritten signature in blue ink, appearing to be "Ken Ryalls", with a horizontal line extending to the right.

Dr. Ken Ryalls, VPAA

Appendix F

College of Saint Mary IRB Approval Letter



December 21, 2011
Marla Kniewel
7000 Mercy Road
Omaha NE 68127

Dear Ms. Kniewel,

Congratulations! The Institutional Review Board at College of Saint Mary has granted approval of your study titled “The Effect of Team-Based Learning as an Instructional Strategy on Baccalaureate Nursing Students”.

Your CSM research approval number is **CSM #11-25**. It is effective through Dec 21, 2012. If your research extends beyond that date, please submit a “Change of Protocol/Extension” form (found at the end of the College of Saint Mary Application Guidelines posted on the IRB Community site). It is important that you include your research number on all correspondence regarding your study. Please submit a closing the study form (page 40 of the IRB Guidebook) when you have completed your study.

Good luck with your research! If you have any questions or I can assist in any way, please feel free to contact me.

Sincerely,

Kristin B Haas

Dr. Kristin B Haas, OTR/L
Associate Professor, Occupational Therapy
Chair, Institutional Review Board * irb@csm.edu

Appendix G

Nebraska Methodist College IRB Approval Letter



January 10, 2012

Marla D. Kniewel
720 N. 87th Street
Omaha, Nebraska 68114

Melanie Felton
7000 Mercy Road
Omaha, NE 68106

Dear Marla and Melanie,

This letter is to formally notify you that your research study, "*The effect of Team-based Learning as an Instructional Strategy on Baccalaureate Nursing Students*," IRB # 01-12-FS-KF has been approved and given expedited status.

You are authorized to begin this study on 01/10/12. This approval is valid until 01/10/13. If it should continue beyond that period, you will need to seek continuing review and update the IRB on the research project. You must also advise the IRB in writing when the project is completed or discontinued. If any unanticipated risks to the participants occur, these should be reported to IRB. Any changes in protocol will require that you submit a new IRB document.

If you have any questions, please contact April Horstman Reser, IRB chair at 354-7046, or e-mail at april.horstmanreser@methodistcollege.edu.

Sincerely,

A handwritten signature in cursive script that reads "April Horstman Reser".

April Horstman Reser, Ph.D.
IRB Chair

Appendix H

Student Recruitment Letter



Dear nursing student,

I am a doctoral candidate and am conducting a research study on the effectiveness of team-based learning in baccalaureate nursing students. I am conducting this research for my dissertation at College of Saint Mary. I am in the process of collecting data and would appreciate your assistance.

The purpose of my research is to explore and describe the effectiveness of team-based learning as an instructional strategy on student learning for baccalaureate nursing students. As team-based learning has been recently adopted as a learner-centered teaching strategy at Nebraska Methodist College (NMC), it is important to evaluate its effect on student learning in comparison to the traditional lecture format. Ultimately I hope that the findings from this study will provide information on student learning to assist nurse educators in the planning and utilization of an effective teaching strategy in baccalaureate nursing education.

Your participation would consist of completing the *Team-Based Learning Student Assessment Instrument*[®]. This instrument asks you about your experience with team-based learning. There are 34 statements that you will rate on a scale from 1 – 5. There are no right or wrong answers. I want to assure you that all of your responses will be anonymous and kept in strict confidence. Results of the study will be shared with the tool developer for further psychometric testing of the tool. I thank you in advance for your assistance in this research project. If you have any questions, please feel free to contact me or my dissertation chair, Dr. Martha Brown.

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Appendix I

Student Informed Consent Form



STUDENT INFORMED CONSENT FORM

IRB#: CSM #11-25 Approval Date: December 21, 2011 Expiration Date: December 21, 2012

THE EFFECT OF TEAM-BASED LEARNING AS AN INSTRUCTIONAL STRATEGY ON
BACCALAUREATE NURSING STUDENTS

Invitation:

You are invited to take part in this research study. The information in this form is meant to help you decide whether or not to take part. If you have any questions, please ask.

Why are you being asked to be in this study?

You are being asked to participate in this study because you are a baccalaureate nursing student enrolled in a core nursing course at Nebraska Methodist College and that nursing course has incorporated team-based learning as an instructional strategy.

What is the reason for doing this research?

The purpose of this research study is to examine the effect of team-based learning as an instructional strategy on baccalaureate nursing students. Outcomes of team-based learning will be compared to traditional lecture format by examining performance on exam questions over content taught with both methods. This study will also evaluate nursing students' perceptions of various aspects of team-based learning. Understanding the students' perception of team-based learning can provide information to educators to enhance learning in undergraduate nursing education.

What will be done during this research study?

Your involvement in this study will consist of about 15-20 minutes to complete the *Team-Based Learning Student Assessment Instrument*[®] and the *Student Demographic Information Survey*. In this research study, the *Team-Based Learning Student Assessment Instrument*[®] will be administered to explore nursing student perceptions on various aspects of team-based learning. The *Student Demographic Information Survey* will be used to explore the relationship between specific demographic variables and student perceptions of team-based learning.

What are the possible risks of being in this study?

There are risks involved in all research studies. This research study may involve minimal risk of discomfort related to the completion of the surveys, but no more than is ordinarily encountered in daily life.

Participant Initials _____

What are the possible benefits to you?

You may get some satisfaction from knowing that the information you provide can help improve the quality of nursing education for future nursing students. However, you may not get any direct benefit from being in this research study.

What are the possible benefits to other people?

There is some benefit to the advancement of knowledge for nurse educators in the instructional strategy of team-based learning.

What are the alternatives to being in this research study?

Instead of being in this research study, you can choose to not participate.

What will being in this research study cost you?

There is no cost to you to be in this research study.

Will you be paid for being in this research study?

You will not be paid or compensated for being in this research study.

What should you do if you have a problem during this research study?

Your well-being is the major focus of every member of the research team. If you have a concern as a direct result of being in this study, you should immediately contact one of the people listed at the end of the consent form.

How will information about you be protected?

Reasonable steps will be taken to protect your privacy and the confidentiality of your study data. All data collected will be stored on an external USB hard drive and will be stored in a locked cabinet in the researcher's home. All data will be destroyed after 7 years.

The only persons who will have access to your research records are the study personnel, the Institutional Review Board (IRB), and any other person or agency required by law. Data will be shared with the developer of the *Team-Based Learning Student Assessment Instrument*[®] for further psychometric testing of the tool. The information from this study may be published in scientific journals or presented at scientific meetings, but your identity will be kept strictly confidential.

What are your rights as a research participant?

You have rights as a research participant. These rights have been explained in this consent form and in *The Rights of Research Participants* that you have been given. If you have any questions concerning your rights, talk to the investigator or call the Institutional Review Board (IRB), telephone 402-399-2400.

Participant Initials _____

What will happen if you decide not to be in this research study or decide to stop participating once you start?

You can decide not to be in this research study, or you can stop being in this research study (“withdraw”) at any time before, during, or after the research begins. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with the investigator, the College of Saint Mary, or Nebraska Methodist College.

You will not lose any benefits to which you are entitled.

If the research team gets any new information during this research study that may affect whether you would want to continue being in the study, you will be informed promptly.

Documentation of informed consent

You are freely making a decision whether to be in this research study. Signing this form means that (1) you have read and understood this consent form, (2) you have had the consent form explained to you, (3) you have had your questions answered and (4) you have decided to be in the research study.

If you have any questions during the study, you should talk to one of the investigators listed below. You will be given a copy of this consent form to keep.

If you are 19 years of age or older and agree with the above, please sign below.

Signature of Participant _____ Date _____ Time _____

Principal Investigator:

Marla D. Kniewel, MSN, RN, College of Saint Mary, 402-354-7036

Research Advisor:

Melanie Felton, PhD, College of Saint Mary, 402-399-2625

My signature certifies that all elements of the informed consent described on this consent form have been explained fully to the participant. In my judgment, the participant possesses the legal capacity to give informed consent to participate in this research and is voluntarily and knowingly giving consent to participate.

Signature of Investigator _____ Date _____

Participant Initials _____

Appendix J

Rights of Research Participants



THE RIGHTS OF RESEARCH PARTICIPANTS*
AS A RESEARCH PARTICIPANT AT COLLEGE OF SAINT MARY
YOU HAVE THE RIGHT:

1. TO BE TOLD EVERYTHING YOU NEED TO KNOW ABOUT THE RESEARCH BEFORE YOU ARE ASKED TO DECIDE WHETHER OR NOT TO TAKE PART IN THE RESEARCH STUDY. The research will be explained to you in a way that assures you understand enough to decide whether or not to take part.
2. TO FREELY DECIDE WHETHER OR NOT TO TAKE PART IN THE RESEARCH.
3. TO DECIDE NOT TO BE IN THE RESEARCH, OR TO STOP PARTICIPATING IN THE RESEARCH AT ANY TIME. This will not affect your relationship with the investigator or College of Saint Mary.
4. TO ASK QUESTIONS ABOUT THE RESEARCH AT ANY TIME. The investigator will answer your questions honestly and completely.
5. TO KNOW THAT YOUR SAFETY AND WELFARE WILL ALWAYS COME FIRST. The investigator will display the highest possible degree of skill and care throughout this research. Any risks or discomforts will be minimized as much as possible.
6. TO PRIVACY AND CONFIDENTIALITY. The investigator will treat information about you carefully and will respect your privacy.
7. TO KEEP ALL THE LEGAL RIGHTS THAT YOU HAVE NOW. You are not giving up any of your legal rights by taking part in this research study.
8. TO BE TREATED WITH DIGNITY AND RESPECT AT ALL TIMES.

THE INSTITUTIONAL REVIEW BOARD IS RESPONSIBLE FOR ASSURING THAT YOUR RIGHTS AND WELFARE ARE PROTECTED. IF YOU HAVE ANY QUESTIONS ABOUT YOUR RIGHTS, CONTACT THE INSTITUTIONAL REVIEW BOARD CHAIR AT (402) 399-2400. *ADAPTED FROM THE UNIVERSITY OF NEBRASKA MEDICAL CENTER, IRB WITH PERMISSION.

Appendix K

Research Information Request Letter



Dear _____,

I am contacting you in regards to a research study I am conducting for my dissertation at College of Saint Mary. I am in the process of collecting data and would appreciate your assistance. The purpose of my research is to explore and describe the effectiveness of team-based learning as an instructional strategy on student learning for baccalaureate nursing students. As team-based learning has been recently adopted as a learner-centered teaching strategy at Nebraska Methodist College (NMC), it is important to evaluate its effect on student learning in comparison to the traditional lecture format. Ultimately I hope that the findings from this study will provide information on student learning to assist nurse educators in the planning and utilization of an effective teaching strategy in baccalaureate nursing education.

The information that I will need to complete this study is:

1. A list of all content taught in your course using team-based learning, that was previous taught with lecture from 2007-2011. Student learning in this content must be assessed with multiple-choice examination questions.
2. Examination questions with statistical measurements related to the content taught with both team-based learning and traditional lecture format.
3. Student exam results (without NMC student identifiers) from exams in which the content using both team-based learning and traditional lecture format was taught. All students will need to be assigned a number and that number will need to be on the individual exam score sheets.
4. Exam blueprints with level of difficulty for each exam question.
5. Completed *Course Information Survey* (see attached).

All information will be kept strictly confidential and in a locked area. I thank you in advance for your assistance in this research project. I would appreciate a response by September 15, 2011. If you have any questions, please feel free to contact me or my dissertation chair, Dr. Martha Brown.

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Appendix L

Course Information Survey

Please answer the following questions related to teaching experience and instructional strategies in your course.

1. What is your highest level of degree completion?

_____ Masters in Nursing (in process)	_____ Doctorate (in process)
_____ Masters in Nursing	_____ Doctorate
_____ Masters (not nursing)	

2. How many years have you taught nursing students in a baccalaureate nursing program?

_____ 1-5 years	_____ 16-20 years
_____ 6-10 years	_____ Over 20 years
_____ 11-15 years	

3. What semester and year was team-based learning modules incorporated as an instructional strategy for content covered in your course?

4. Has team-based learning been used consecutively for specific content since incorporated into the course? If yes, what semesters has team-based learning been used?

5. How many team-based learning modules are used in your course?

6. What is the specific content in the course is taught using team-based learning as the instructional strategy?

7. How many faculty teach the team-based learning content in your course?

8. Did those faculty members teach that content prior to incorporating team-based learning in your course?

9. What was the primary teaching methodology used for that specific content prior to utilizing team-based learning?

Select the 2 most frequently used:

- | | |
|---|---|
| <input type="checkbox"/> Lecture* with: | <input type="checkbox"/> Role playing |
| <input type="checkbox"/> • Overheads | <input type="checkbox"/> Demonstrations/skits |
| <input type="checkbox"/> • PowerPoint | <input type="checkbox"/> Simulations |
| <input type="checkbox"/> • Slides | <input type="checkbox"/> Games |
| <input type="checkbox"/> • Engagement techniques | <input type="checkbox"/> PC |
| <input type="checkbox"/> • Q & A | <input type="checkbox"/> Course Web site |
| <input type="checkbox"/> • Discussion | <input type="checkbox"/> Internet |
| <input type="checkbox"/> • Small-group activities | <input type="checkbox"/> Videos |
| <input type="checkbox"/> • Student individual/panel presentations | <input type="checkbox"/> Audiotapes |
| <input type="checkbox"/> • Active learning (e.g., think-pair-share) | <input type="checkbox"/> Experimental/Innovative techniques |
| <input type="checkbox"/> • One-minute paper | <input type="checkbox"/> Specify: |

Other:

****Lecture is defined as a strategy to impart knowledge to students through oral presentations with occasional student engagement techniques.***

10. Was that instructional strategy used for at least 3 semesters prior to utilizing team-based learning?

11. Is the content taught with team-based learning tested with multiple-choice questions on an examination?

12. Were the same test items in the examinations used for both team-based learning and the methodology used prior?

Appendix M

Course Coordinator Informed Consent Form



You are invited to participate in a research study. This form provides you with information about the study. Please read the information below and ask questions about anything you don't understand before deciding whether to participate or not. Your participation is entirely voluntary and you can refuse to participate at any time.

Title of Research Study

The Effectiveness of Team-Based Learning as an Instructional Strategy on Student Learning in Baccalaureate Nursing Education

Purpose of the Research Study

The purpose of this research study is to explore and describe the effectiveness of team-based learning as an instructional strategy on student learning for baccalaureate nursing students. Outcomes of team-based learning will be compared to traditional lecture format by examining performance on exam questions over content taught with both methods. This study will also evaluate nursing students' perceptions of various aspects of team-based learning. Understanding the students' perception of team-based learning can provide information to educators to enhance learning in undergraduate nursing education.

Selection of Research Participants

In this research study, the *Nursing Faculty Teaching Experience Survey* will be administered to obtain information on your previous experience and the teaching strategies previously used for content currently taught using team-based learning. You are being asked to participate in this study because you are a course coordinator of a sophomore or senior level nursing course at Nebraska Methodist College that has incorporated team-based learning as an instructional strategy.

Participant Involvement

Your involvement in this study will consist of about 15-20 minutes to complete *Nursing Faculty Teaching Experience Survey*. Should participation in this study become an inconvenience, you are free to stop participation at any time.

Reasonable steps will be taken to protect your privacy and the confidentiality of your study data. All data collected will be stored on an external USB hard drive and will be stored in a locked cabinet in the researcher's home. All data will be destroyed after 5 years.

Participant Initials _____

Benefits for Participants

There are no known benefits to you from being in this research study. You may get some satisfaction from knowing that the information you provide can help improve the quality of nursing education for future nursing students. There will be no costs to you as a result of taking part in this research study. You will not be paid or compensated for being in this research study.

Risks for Participants

There are risks involved in all research studies. This research study may include only minimal risks. There may be some discomfort related to completion of the instrument.

Your welfare is a major concern of every member of the research team. If you have a problem as a direct result of this of being in this study, you should immediately contact one of the people listed at the end of the consent form.

Voluntary Participation

Participation in this study is entirely voluntary. You can decide not to be in this research study, or you can stop being in this research study (“withdraw”) at any time before, during, or after the research begins. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with the investigator, the College of Saint Mary, or Nebraska Methodist College.

You will not lose any benefits to which you are entitled.

If the investigator gets any new information during this research study that may affect whether you would want to continue being in the study, you will be informed promptly.

You have rights as a research participant. These rights have been explained in this consent form and in *The Rights of Research Participants* that you have been given. If you have any questions concerning your rights, talk to the investigator or call the Institutional Review Board (IRB), telephone 402-399-2400.

You are freely making a decision whether to be in this research study. Signing this form means that (1) you have read and understood this consent form, (2) you have had the consent form explained to you, (3) you have had your questions answered and (4) you have decided to be in the research study.

If you have any questions during the study, you should talk to one of the investigators listed below. You will be given a copy of this consent form to keep.

Participant Initials _____

If you are 19 years of age or older and agree with the above, please sign below.

Signature of Participant _____ Date _____ Time _____

Principal Investigator:
Marla D. Kniewel, MSN, RN, College of Saint Mary, 402-354-7036

Secondary Investigator:
Melanie Felton, PhD, College of Saint Mary, 402-399-2625

My signature certifies that all elements of the informed consent describes on this consent form have been explained fully to the participant. In my judgment, the participant posses the legal capacity to give informed consent to participate in this research and is voluntarily and knowingly giving consent to participate.

Signature of Investigator _____ Date _____

Participant Initials _____