

5-2016

# Building the Foundation: Utilizing Concept Maps to Enhance Critical Thinking in First Semester Nursing Students

Lisa S. Smith  
*Gardner-Webb University*

Follow this and additional works at: [https://digitalcommons.gardner-webb.edu/nursing\\_etd](https://digitalcommons.gardner-webb.edu/nursing_etd)



Part of the [Medical Education Commons](#), and the [Nursing Commons](#)

---

## Recommended Citation

Smith, Lisa S., "Building the Foundation: Utilizing Concept Maps to Enhance Critical Thinking in First Semester Nursing Students" (2016). *Nursing Theses and Capstone Projects*. 258.  
[https://digitalcommons.gardner-webb.edu/nursing\\_etd/258](https://digitalcommons.gardner-webb.edu/nursing_etd/258)

This Capstone is brought to you for free and open access by the Hunt School of Nursing at Digital Commons @ Gardner-Webb University. It has been accepted for inclusion in Nursing Theses and Capstone Projects by an authorized administrator of Digital Commons @ Gardner-Webb University. For more information, please see [Copyright and Publishing Info](#).

Building the Foundation:

Utilizing Concept Maps to Enhance Critical Thinking in First Semester Nursing Students

by

Lisa S. Smith

A capstone project submitted to the faculty of  
Gardner-Webb University Hunt School of Nursing  
in partial fulfillment of the requirements for the degree of  
Doctorate of Nursing Practice

Boiling Springs, NC

2016

Submitted by:

---

Lisa S. Smith

---

Date

Approved by:

---

Dr. Frances Sparti

---

Date

Approval Page

This capstone project has been approved by the following committee members:

Approved by:

---

Wanda Capps, MSN, RN  
Committee Member

---

Date

---

Frances Thunberg, DNP, MSN, CPN, CNE  
Committee Member

---

Date

---

Cindy Miller, PhD, RN  
Graduate Program Chair

---

Date

## Abstract

Critical thinking and clinical decision making are essential components of the knowledge and skills necessary for all nurses in order to make complex decisions that improve patient outcomes, safety, and quality of nursing care. Promoting student competence in critical thinking skills is imperative for nurse educators. Concept mapping is an active teaching strategy that can assist nurse educators in preparing nursing students to think critically in today's complex health care environment. The purpose of this project was to implement concept maps as an additional instructional activity with first semester Associate Degree Nursing (ADN) students to promote confidence in basic critical thinking skills. It was foreseen the first semester ADN student would demonstrate beginning skills in concept map development anticipated to lead to critical thinking applicable in the practice of nursing.

*Keywords:* concept maps, critical thinking, nursing education, teaching methods.

## Acknowledgements

I feel privileged and grateful in taking this opportunity to express my gratitude to those who have contributed to the completion of this project. First of all, I would like to thank my Capstone Project Chair, Dr. Frances Sparti for her valuable guidance and motivating mentorship during this project. Additionally, I appreciate the support and encouragement of my Project Committee Members, Mrs. Wanda Capps and Dr. Frances Thunberg. I am highly indebted to the faculty, staff, and administrative support at Gardner-Webb University (GWU) and Sampson Community College. To my nursing colleagues and students, thank you for supporting me during this academic endeavor. Your participation and kind words of encouragement are valued. I thank the former student who shared with me a statement that became my motto during this journey:

*“Failure is not an option!”*

To the GWU Doctor of Nursing Practice Class of 2016, we did it! I will be eternally grateful for the friendships I have developed and more importantly, sharing this opportunity with you. To Shannon Matthews, thank you for coercing me to take on this challenge and to ride for over eight hours in one day to tour GWU, when I was nine months pregnant! More importantly, thank you for walking with me to the bookstore on day four of this journey to buy the GWU t-shirt, which convinced me to stick this adventure out until the end. Believe it or not, I will miss our sleepless nights during our “retreat”, our Zaxby’s and Salsarita’s dining, our picnic lunches on class days, and the caramel macchiato that got us through the drive home. We have been an amazing team and I cannot imagine enduring this journey with anyone else.

To my family and friends, thank you for your love and words of encouragement. I would like to thank my parents for your guidance and support. I'm especially thankful for my daddy, who has loved me unconditionally and supported me during all my life-adventures. I owe my determination, confidence, and ultimately, my success to you. Without your love and support, I would not be the woman I am today. I complete this project in memory of my grandmother, Annie Reese Simmons. My grandmother was the most selfless and loving person I've ever known and was my biggest cheerleader. I began this journey with her by my side and I finish it with her looking over me.

I give the greatest thanks to God, who has always remained faithful to me and has guided me through many trials and tribulations. I am blessed to be surrounded by so many wonderful people who support and encourage me daily, but God's blessing has allowed me to achieve my goals. To my husband Jeff, thank you for enduring yet another adventure with me. Your unconditional love and support strengthens me. I am thankful to share this life with you, with the joys and even the challenges we have faced. Thank you for encouraging and accepting me, regardless of the mood or circumstance. I love you with all of my heart.

Finally, to my children, to whom I dedicate this project: you are my reason, my reason for everything. I never knew how much love a heart could hold until you both came into my life. Logan, my blessing, you give me purpose to be better. As I help you determine ways to be a better person, I find ways to improve myself. To Channing, my miracle, you give me purpose to stay young. Though tiring, I am thankful for your energy and spontaneity. You both are the greatest joy of my life and I hope my actions

inspire you to always dream bigger, do more, and make a difference in this world. I love you more than you will ever know.

*For I know the plans I have for you," declares the LORD, "plans to prosper you and not to harm you, plans to give you hope and a future. Jeremiah 29:11*

Faith...believing in something when common sense tells you not to.

© Lisa S. Smith 2016

All Rights Reserved



## TABLE OF CONTENTS

Problem Background and Significance.....	1
Problem Statement.....	2
Needs Assessment.....	5
Population Identification.....	5
Identification of Project Sponsor and Key Stakeholders .....	6
Organizational Assessment and SWOT Analysis.....	6
Assessment of Available Resources .....	8
Theoretical Framework.....	9
Literature Review.....	12
Concept Maps for Improving Critical Thinking .....	13
Strengths of Literature .....	15
Project Scope .....	16
Project Goal and Outcome Objectives .....	17
Mission Statement.....	18
Project Design and Planning.....	18
Population, Setting, and Team Selection .....	18
Milestones and Timeline.....	19
Outcome Measurements.....	21
Logic Model .....	25
Cost-Benefit Analysis .....	25
Ethical Considerations .....	26

Project Implementation.....	26
Process of Project.....	26
Outcome Data .....	28
Project Evaluation.....	32
Interpretation of Outcomes .....	32
Comparison to Literature and Theoretical Framework .....	34
Interpretation of Process .....	35
Achievements .....	35
Recommendations for Improvements .....	36
Plan for Sustainability .....	36
Conclusion .....	37
Implications for Practice.....	37
References.....	39
Appendices	
A: SWOT Analysis .....	42
B: Gantt Chart.....	43
C: NUR 111 Clinical Evaluation Tool.....	44
D: NUR 111 Concept Map Grading Rubric .....	45
E: Logic Model .....	47

## List of Tables

Table 1: ATI Proctored Fundamentals Assessment – Clinical Judgment/Critical Thinking in Nursing Subsection Comparison .....	23
Table 2: Concept Map Utilization and Clinical Evaluation Data .....	29

List of Figures

Figure 1: ATI Proctored Fundamentals Assessment – Clinical Judgment/Critical

Thinking in Nursing Subsection Comparison.....33

## Building the Foundation:

### Utilizing Concept Maps to Enhance Critical Thinking in First Semester Nursing Students

The complexity of health care is becoming more prominent as the aging population is increasing and requiring extensive health care services. The level of acuity is increasing while advances in treatments, medications, and equipment are evident. As a result, the demand for Registered Nurses (RNs), the largest working group in health care, continues to grow (National Advisory Council on Nurse Education and Practice (NACNEP), 2008). According to the United States Department of Labor, Bureau of Labor Statistics (2014), it is projected that employment of registered nurses will grow 19% from 2012 to 2022, more than the average for other occupations. With the ever-changing health care system, it is a necessity for nurses to not only provide compassionate and professional care, but to be proficient in critical thinking and analytical abilities (NACNEP, 2008). It is essential for nurses to be able to critically analyze significant amounts of information in order to appropriately determine the course of action based on patient data. Aiding in the development of these skills is one of the greatest challenges that nursing educators face. Learning to think critically requires the nursing student to be an active participant while nursing educators facilitate the learning process to “create an environment that empowers students” (Billings & Halstead, 2012, p. 260).

Through the educational experience, nursing students are expected to gain the necessary knowledge and skills to provide comprehensive care in the health care setting. The prepared nursing graduate must have the ability to make appropriate decisions, manage time effectively, problem-solve, and think critically. Nursing education is

trending away from rote memorization and more toward meaningful learning (Abel & Freeze, 2006). According to Chen, Liang, Lee, and Liao (2011), teaching students how to critically think is one of the most essential goals of higher education. Vacek (2009) identified a variety of educational strategies to promote critical thinking. One teaching and learning strategy, the concept map, is an alternative to the traditional nursing care plan. Nursing care plans play a vital role in transferring theoretical information to the clinical setting and providing a plan of care for the patient. Concept mapping is an effective strategy to examine the existing knowledge and thought processes of nursing students by visually arranging concepts hierarchically and identifying their relationships, while ensuring appropriate patient care is provided (Atay & Karabacak, 2012).

The use of concept maps and their effect on critical thinking has been studied with various levels of nursing education. Concept maps should be implemented with the first semester nursing students where the foundation of critical thinking development is established. The purpose of this project is to utilize the evidence that concept mapping increases critical thinking to improve the foundation of critical thinking in first semester nursing students enrolled in an ADN program. Upon incorporating concept maps into the curriculum, this project will demonstrate success if the scores on the Clinical Judgment/Critical Thinking in Nursing sections of the Assessment Technologies Institute (ATI) show improvement. By fostering critical thinking, especially early in the nursing program, the potential to prepare better qualified nursing graduates is strengthened.

### **Problem Statement**

Nursing students and new nursing school graduates are deficient in critical thinking skills (Oermann, Poole-Dawkins, Alvarez, Foster, & O'Sullivan, 2010; Toofany,

2008; Wilgis & McConnell, 2008). Critical thinking skills are necessary to assess, manage, and prioritize patient problems and life-threatening issues. Success in the academic and patient care environment is negatively affected by the lack of or inability to critically think (Oermann et al., 2010). Better educated nurses with advanced knowledge and skills are required to safely provide quality patient care in a health care environment that is ever-changing (National Advisory Council on Nurse Education and Practice, 2008). Nursing educators are faced with the responsibility of preparing nursing students for professional practice by utilizing teaching strategies that foster critical thinking. Concept mapping is a strategy that allows educators to assist nursing students in organizing information, prioritizing patient care needs, and visually understanding the connection between assessment, diagnoses, and interventions. In other words, a concept map is a diagram that identifies multiple relationships among concepts. Evidence supports incorporating concept maps into the curriculum, resulting in nurses better qualified in providing complex and comprehensive patient care.

According to Billings and Halstead (2012) “nurses need a high level of critical thinking skills and a critical thinking disposition” (p. 259). However, as health care advances become more complex, nursing students are having difficulty with analyzing vast amounts of information critically (Toofany, 2008). In a rural town in southeastern North Carolina, there is local concern among nurse educators and administrators, which is congruent with literature, indicating a deficiency in critical thinking in nursing students and new graduates. During a recent phone interview, a unit manager in a local hospital identified new graduates having trouble prioritizing patient care and nursing interventions. The unit manager voiced concern that new graduates are task-oriented and

have difficulty determining which patient should receive priority or which nursing action to implement first (Unit Manager, personal communication, March 19, 2015). During a 2015 nursing faculty meeting at a local community college in the same town in rural southeastern North Carolina, the nursing faculty agreed that critical thinking development is crucial especially with more complex health care environments. The faculty also agreed that current nursing students require a higher level of thinking beyond memorization. Group scores on the Clinical Judgment/Critical Thinking in Nursing subsection of the ATI were shared with the faculty. For the 2013, 2014, and 2015 graduating classes of the Associate Degree in Nursing (ADN) program, the group scores for the Clinical Judgment/Critical Thinking in Nursing subsection on the Proctored Fundamentals Assessment, which is administered at the end of the first semester, ranged from 71.1% to 74.0%. The group scores for the same classes on the Clinical Judgment/Critical Thinking in Nursing subsection of the Proctored Comprehensive Predictor, administered at the end of the final semester, ranged from 70.3% to 71.1%. The faculty conveyed the scores on the ATI assessments do not reflect growth and higher scores are preferred. Additionally, students in the previous three classes in the same ADN program received a satisfactory rating on their Clinical Evaluation Tool for the objective addressing nursing judgment competence. The faculty agreed this indicates a disconnection between the students' low ATI Clinical Judgment/Critical Thinking scores and their satisfactory clinical evaluations. During an Advisory Committee meeting in 2013 at the same community college, the Chief Nursing Officer at a local hospital commented there is a need for more work with critical thinking and leadership skills in new nursing student graduates. Additionally, at an Advisory Committee meeting in



2015, a survey response from a local hospital representative noted that while some graduates do well, they seem to be task-oriented which hinders their ability to think critically.

While literature supports that concept maps promote critical thinking, a vast amount of research has been conducted with baccalaureate nursing students and nursing students in the final semesters of their program (Abel & Freeze, 2006; Atay & Karabacak, 2012; Harrison & Gibbons, 2013; Huang, Chen, Yeh, & Chung, 2012; Lee et al., 2013). The process of establishing critical thinking begins in the first semester of a nursing student's program of study. The potential outcome of initiating concept maps with first semester ADN students could be enhanced critical thinking development early in the nursing program. Early implementation of concept maps in the curriculum has the potential to improve critical thinking while promoting academic success and may better prepare nursing students to provide comprehensive patient care. The following question has been developed to guide this project: In first semester ADN students, will utilization of concept maps in addition to traditional nursing care plans lead to improved basic critical thinking skill development at the end of the semester, as measured by ATI assessment scores, clinical evaluation by faculty, and the concept map grading rubric?

## **Needs Assessment**

### **Population Identification**

While critical thinking development is an issue among nursing students in various nursing programs, the target population for this intervention involves nursing students enrolled in an ADN program of a community college in a rural southeastern town of North Carolina. The evidence-based intervention specifically applies to the first semester

ADN students during fall semester of the 2015-2016 academic year and will include 37 students. The first semester ADN course, NUR 111: Intro to Health Concepts, introduces nursing students to fundamental skill development and basic nursing care.

### **Identification of Project Sponsor and Key Stakeholders**

Various groups of individuals and facilities have vested interest in the outcome of this project. The project sponsors include the project leader, the Division Chair of Health Programs, as well as the ADN program at the participating community college in southeastern North Carolina. Key stakeholders include the nursing programs, both ADN and Practical Nursing (PN) at the participating community college, the nursing faculty, current and future nursing students. The Division Chair of Health Programs and administration are key stakeholders as well. Success of this project may positively impact retention and attrition rates of enrolled nursing students in both the ADN and PN programs. First attempt success on the National Council Licensure Examination for Registered Nurses (NCLEX-RN) may be supported by implementation of this project. Additional key stakeholders include local hospitals and clinics, health departments, home health agencies, long-term care facilities, and local patients in the area. Strengthening the foundational base of critical thinking in nursing students may better prepare new nursing graduates for employment in local facilities.

### **Organizational Assessment and SWOT Analysis**

The project leader's values and mission are consistent with the organization in which the project will be conducted. It is the project leader's mission to provide accessible education for all students and promote lifelong enrichment. Utilizing various yet effective teaching strategies and partnering with local organizations to improve the

quality of life for people within the community are goals held by the project leader and organization.

A SWOT analysis revealed strengths and weaknesses as well as opportunities and threats for the ADN program (see Appendix A for SWOT analysis). Strengths of the ADN program at the participating community college include five of the six faculty members have a minimum of a Master of Science in Nursing (MSN) degree, with one currently enrolled in a MSN program. The faculty is committed to the education of nursing students and demonstrates exemplary team work. Additionally, the ADN program has been successful for over 35 years, and is currently accredited by the Accreditation Commission for Education in Nursing (ACEN). The ADN program offers concept-based instruction and demonstrates use of current technology through utilization of a Simulation Lab. The Division Chair of Health Programs and the nursing faculty are supportive of the capstone project, receptive to implementation of concept mapping and willing to incorporate the strategy into the curriculum.

Weaknesses of the ADN program at the participating community college include the costs of the program, such as books, supplies, and uniforms. Another challenge that presents a concern at times includes having to share one large nursing lab between the ADN, PN, and Certified Nursing Assistant (CNA) classes. The ADN program at the participating community college has experienced faculty turnover in the last couple of years resulting in hiring of new faculty, some of which have minimal nursing education experience. Additionally, the ADN faculty has limited experience with concept map instruction and grading.

Opportunities for the ADN program at the participating community college include community involvement such as a Wellness on Wheels program, early recruitment events with high school students interested in health careers, an online Licensed Practical Nursing (LPN) to ADN option beginning fall 2015, and a partnership with a nearby university in offering a Regionally Increasing Baccalaureate Nursing (RIBN) program. The community college receives tremendous support from local healthcare facilities as clinical sites. Additionally, implementation of concept maps provides leadership and mentorship opportunities with other ADN programs. Threats include the participating community college being located in a rural setting and competing with other schools of nursing for space at clinical sites. Recruiting qualified admission candidates sometimes poses a challenge as well as recruiting qualified MSN prepared faculty for full-time and part-time employment. Financial constraints on the community college set forth by local and state funding and insufficient nursing faculty salaries compared to other local community colleges and local healthcare facilities are additional threats.

#### **Assessment of Available Resources**

Implementation of this project required minimal to no outside expense. Due to the project leader having direct access to the community college in which this project will occur, office space and instructional materials are readily available. The ATI Proctored Fundamentals Assessment is included in the student fees; therefore the participating students will not incur any extra expense. Any statistical analysis support, consulting costs, or travel expenses will be the responsibility of the project leader.

## Theoretical Framework

The concept map was developed by Joseph Novak in 1972 based on Ausubel's Assimilation Theory, to facilitate the critical thinking process (Atay & Karabacak, 2012; Harrison & Gibbons, 2013; Lee et al., 2013; Moattari, Soleimani, Moghaddam, & Mehbodi, 2014; Vacek, 2009). David Ausubel's assimilation theory sometimes referred to as subsumption theory or theory of meaningful learning was developed in 1962. The teaching and learning process for nursing students is based on building upon existing knowledge or previously learned information. Ausubel's Assimilation Theory explains cognitive learning noting "new knowledge is acquired and mastered when it is linked to existing knowledge in a structured and hierarchical manner" (Harrison & Gibbons, 2013, p. 395). Ausubel's theory has applicable use with nursing students, especially with concept map instruction and utilization. Due to the ordered nature of concept maps, Ausubel's Assimilation Theory correlates appropriately because students build and integrate new knowledge into what they already know. Atay and Karabacak (2012) indicate that concept maps direct students where to provide detail when given a basic structure and assist students to see "the place of a newly learned concept among other previously learned concepts and draw boundaries" (p. 234).

Vacek (2009) describes the five steps of the learning process included in Ausubel's theory as (1) concept formation, (2) subsumption, (3) progressive differentiation, (4) integrative reconciliation, and (5) consolidation. Conceptual formation is an organizing process of concepts which is an imperative aspect of critical thinking. Concept formation begins in childhood and develops with age. Subsumption is the integration of new information with prior knowledge, which is the foundation of

Ausubel's Assimilation Theory. Progressive differentiation refers to the organization of knowledge, typically from general to more specific material. Integrative reconciliation is the recognition that certain concepts are different yet similar to another concept and consolidation is having complete understanding of one concept before moving on to another concept. Additionally, Vacek (2009) notes that all five steps of the learning process play an important role in critical thinking and were infused into the construction of a concept map by Novak.

Ausubel's Assimilation Theory of Learning is noted as the theoretical framework in the studies conducted by Atay and Karabacak (2012) and Lee et al. (2013), in addition to Novak's concept map. In the pre-test post-test control group study by Atay and Karabacak (2012), after receiving concept map training sessions, the experimental group completed concept map care plans throughout the semester. Additionally, the California Critical Thinking Disposition Inventory (CCTDI) was utilized to measure critical thinking dispositions during the pre-test and post-test stages (Atay & Karabacak, 2012). While there was no statistical difference in pre-test critical thinking disposition scores of the control and experimental groups, there was a statistical difference in the post-test mean score, indicating the concept map utilization improved critical thinking skills of the experimental group (Atay & Karabacak, 2012). Additionally, according to Atay and Karabacak (2012), the concept map care plan evaluation criteria increased on the second, third, and fourth concept maps for the participants in the experimental group. This successful outcome correlates with Ausubel's theory of mastering, retaining, and retrieving knowledge in a structured manner.

In the longitudinal study conducted by Lee et al. (2013), concept map instruction was provided to the experimental group during the second semester. The control group presented findings utilizing the nursing process while the experimental group presented findings with concept maps (Lee et al., 2013). Data was collected using the Critical Thinking Scale and the Approaches to Learning and Studying at the beginning of each semester (Lee et al., 2013). According to Lee et al. (2013), over time the experimental group showed significantly higher critical thinking growth rate than the control group. The findings of this study correlates with Ausubel's assimilation of cognitive learning theory in which learning occurs as an assimilation process of new information (Lee et al., 2013).

David Ausubel's assimilation learning theory is appropriate for the use of concept maps as it explains how they may be a successful tool for teaching problem-solving and critical thinking. Concept maps can positively affect critical thinking in nursing students, which in turn can enhance their success as a student and ensure appropriate patient outcomes (Abel & Freeze, 2006; Atay & Karabacak, 2012; Chen et al., 2011; Hicks-Moore & Pastirik, 2006; Lee et al., 2013; Moattari et al., 2014; Tseng et al., 2011). Concept maps help students who write them assimilate knowledge, identify and incorporate what they already know and help reveal what they do not understand (Schuster, 2012). The use of concept maps can be an effective teaching and learning strategy to instill the necessary qualities in the nursing graduate in order to provide comprehensive patient care.

## Literature Review

A literature search resulted in 157 articles on the topics of critical thinking and concept maps. The search was further refined to 46 relevant articles with seven articles noted as research studies focusing on the effect of concept maps on critical thinking. The remaining 39 articles provided supportive information regarding critical thinking and concept maps but were not research studies. The databases utilized in the search were Cumulative Index to Nursing and Allied Health (CINAHL) Plus with Full Text and Academic OneFile. Key search terms used in performing the literature search included concept maps, critical thinking, nursing education, and teaching methods. In addition to being peer-reviewed, limitations to the search included full text and published dates of 2004 to 2015.

Critical thinking is a core component in nursing practice and nursing faculty are challenged with and must continually reevaluate how to best teach students to critically think (Billings & Halstead, 2012). From experience, it was determined that critical thinking is a skill that can be difficult for some students to master. There are consistent reports of new graduate nurses lacking the ability or skills to think critically (Oermann et al., 2010; Romeo, 2010; Spencer, 2008; Wilgis & McConnell, 2008). Nursing care plans have long been utilized to educate students on the use of the nursing process as a framework for problem-solving. Traditional column format nursing care plans are often a recitation of information gleaned from textbooks and online sources, but have limitations with connecting the components of the plan. The plan of care is presented in a linear manner and does not identify the relationships between problems. On the other hand, concept maps empower students to develop the ability to organize, relate, and



process information, assist them in learning to think critically and develop problem-solving and decision-making skills (Hill, 2006; Atay & Karabacak, 2012). Concept maps allow students to creatively note concepts and visualize their connectedness and relationships (Hill, 2006; Atay & Karabacak, 2012).

### **Concept Maps for Improving Critical Thinking**

Concept maps are an effective teaching strategy to improve critical thinking by allowing the nursing students to organize their thoughts to discover new relationships among concepts, while linking knowledge gained in the classroom to nursing practice in the clinical setting (Abel & Freeze, 2006; Atay & Karabacak, 2012; Chen et al., 2011; Hicks-Moore & Pastirik, 2006; Lee et al., 2013; Moattari et al., 2014; Tseng et al., 2011). In a one-year study with 28 students in one graduating associate degree nursing class, Abel and Freeze (2006) concluded early introduction of concept maps for clinical purposes was beneficial in increasing nursing students' critical thinking skills as identified by an increase of map scores over a period of time. Not only did Abel and Freeze (2006) identify as students progressed through the program there was a steady increase in cross-links, which indicates the student's ability to make meaningful connections among concepts, but both faculty and students noted an improvement in knowledge and critical thinking. Similarly, Hicks-Moore and Pastirik (2006) concluded while creating concept maps can be time-consuming when processing and interpreting vast amounts of patient data, high Holistic Critical Thinking Scoring Rubric (HCTSR) scores of the volunteering students and the perspectives of students and instructors, support concept maps as a useful method to promote critical thinking. Focus groups in

the Hicks-Moore and Pastirik (2006) study, further supported concept maps enhancing clinical preparedness.

Tseng et al. (2011) investigated the effectiveness of implementing problem-based learning and concept mapping in an educational program with a quasi-experimental study of 120 Taiwanese registered nursing students, with 51 in the experimental group and 69 in the control group. According to Tseng et al. (2011), evaluation occurred during three time schedules: a pre-test before the course began, a post-test at the end of the course, and a follow-up test six months after the end of the course, resulting in higher scores in the experimental group than the control group for the Critical-Thinking Scale, Self-Directed Learning Scale, and Students' Performance in Problem-based Learning Tutorial Sessions Questionnaire. It was further concluded that problem-based learning and concept mapping enhanced critical thinking skills (Tseng et al., 2011). A similar study conducted by Atay and Karabacak (2012) with 80 freshman and sophomore nursing students revealed concept mapping improved critical thinking skills of students upon concept map education and implementation over time, when compared to students completing care plans utilizing the column format.

Chen et al. (2011) conducted a preliminary quasi-experimental, pre-test post-test study which included a control group for baseline comparison, to determine the effects of concept map instruction in developing critical thinking and approach to teaching and learning. This study was followed-up with a longitudinal study of the same group by Lee et al. (2013). Both Chen et al. (2011) and Lee et al. (2013) concluded the increase in critical thinking suggests that concept map instruction may foster critical thinking skills such as inference. Both studies indicated that concept maps are useful in promoting more

in-depth, active, and meaningful learning, while Lee et al. (2013) concluded that improving cognitive critical thinking skills may happen over a longer time frame rather than one semester.

In the study of a convenience sample of 32 fourth year nursing students conducted by Moattari et al. (2014), significant differences were noted on the critical thinking measurement tool and it was reported that concept mapping is effective in improvement of critical thinking skills. Interestingly, Moattari et al. (2014) recommended further studies to generalize the result of improving critical thinking to nursing students in their earlier stage of education.

### **Strengths of Literature**

The literature supports the use of concept maps as a teaching and learning strategy to promote critical thinking ability in nursing students (Abel & Freeze, 2006; Atay & Karabacak, 2012; Chen et al., 2011; Hicks-Moore & Pastirik, 2006; Lee et al., 2013; Moattari et al., 2014; Tseng et al., 2011). Additional strengths included faculty and students noting improvement in knowledge and critical thinking and that one-page concept maps allow for a quick visualization of the clinical situation. Faculty members were able to evaluate the preparedness of the student in providing nursing care with the use of concept maps (Abel & Freeze, 2006). Students in the Hicks-Moore and Pastirik (2006) study noted being better prepared for clinical as the concept maps required them to access and assimilate various sources beyond the patient record. Concept maps are found to be a beneficial tool in transitioning students' learning process from passive and repetitive-based to active and meaningful learning (Chen et al., 2011). The one-page concept map allows faculty and students to quickly visualize the clinical situation and

allows faculty to evaluate the preparation of the student in providing nursing care (Abel & Freeze, 2006).

### **Project Scope**

Critical thinking skills are necessary to assess and manage patient problems and life-threatening issues. Success in the academic and patient care environment is negatively affected by the lack of or inability to critically think (Oermann et al., 2010). Better educated nurses with advanced knowledge and skills are required to safely provide quality patient care in a health care environment that is ever-changing (National Advisory Council on Nurse Education and Practice, 2008). Nursing education has shifted from the traditional, lecture-style of teaching to a learner-focused approach. Nurse educators are now utilized to facilitate learning and application of complex concepts. Concept mapping is a teaching strategy which has gained popularity in nursing education due to its ability to facilitate active learning and enhance the development of critical thinking skills.

The process of establishing critical thinking begins with the first semester nursing student. Utilizing concept maps encourages student-discovery while learning and allows for the examination of a student's individual decision making process. Concept maps are used in the clinical setting to help students bridge the gap between theory and clinical practice by identifying significant relationships within the given clinical situation. The potential outcome of initiating concept maps, in addition to traditional nursing care plans, with first semester associate degree nursing students could be enhanced critical thinking development early in the nursing program. Implementation of this evidence-based intervention is needed to evaluate whether utilizing concept maps to improve critical

thinking will be successful for the chosen ADN program of a community college in a rural southeastern town of North Carolina.

### **Project Goal and Outcome Objectives**

The overall goal of this project is to promote successful completion of the first semester ADN course, with the nursing student exhibiting beginning competence and confidence in basic critical thinking skills. The first semester ADN student will demonstrate beginning skills in concept map development anticipated to lead to critical thinking applicable in the practice of nursing. Through implementation of concept map instruction and utilization with traditional nursing care plans, it is predicted that critical thinking scores will increase when compared to previous students who utilized traditional nursing care plans alone. In an effort to meet the goal of this project, after implementing the project with first semester ADN students at the community college where the project will take place, the following objectives are expected to be met:

- Students will obtain a group score of 80% or higher on the Clinical Judgment/Critical Thinking in Nursing subsection of the ATI Proctored Fundamentals Assessment.
- Students will achieve 100% satisfactory evaluation on the NUR 111 Clinical Evaluation Tool broad clinical objective addressing nursing judgment competence.
- Students will demonstrate basic concept map development skills utilizing the NUR 111 Concept Map Grading Rubric.
- Faculty will voice satisfaction with implementation of concept mapping and its effects on student's critical thinking development.

### **Mission Statement**

This project is intended to implement concept mapping as an effective, evidence-based teaching strategy for first semester students in an ADN program to promote the foundational development of critical thinking. The ability to critically analyze patient information and take appropriate action is an essential skill for nurses to develop. Enhancing early development of critical thinking is imperative for academic success of nursing students and ultimately contributes to the improvement of quality of life for the people within the community.

### **Project Design and Planning**

Adequate time and appropriate planning are necessary for the implementation of concept maps as an instructional activity. Planning began during the 2015 summer semester and continued into early fall semester of 2015 when implementation of the project occurred. Milestones of the planning and implementation phases were identified and a timeline was developed. The Capstone Project Committee Members form, Practicum Partner Contract, and the Facility Contract was completed. Additionally, a letter from the participating facility approving implementation of this capstone project was obtained.

### **Population, Setting, and Team Selection**

The target population for this intervention involved nursing students enrolled in an ADN program of a community college in a rural southeastern town of North Carolina. The evidence-based intervention specifically applied to the first semester ADN students during fall semester of the 2015-2016 academic year and tentatively included approximately 37 students. The first semester ADN course, NUR 111: Intro to Health

Concepts, introduces nursing students to fundamental skill development and basic nursing care.

The project team consisted of the first year ADN faculty, clinical faculty, and the Division Chair of Health Programs. The project leader and an additional full-time faculty member provided class and clinical instruction to the first year ADN students. Three additional faculty members assisted with clinical instruction during the fall semester of the 2015-2016 academic year.

The project committee consisted of four individuals, including the project leader as the team leader and a project chairperson assigned by the University. The additional team members included the Division Chair of Health Programs at the participating community college and an Associate Professor of Nursing and Associate Dean of School of Nursing at a nearby four-year college. All members of the team have extensive experience in nursing education.

### **Milestones and Timeline**

A timeline with major milestones was developed to guide the planning and implementation phases of this project to ensure the work was managed and the project was completed in a timely manner (see Appendix B for Gantt chart). During July 2-18, 2015 the project leader developed the project proposal and initiated the development of the teaching tools to submit to the project chairperson on July 18, 2015. The first milestone, development of teaching tools, was accomplished by July 11, 2015. The project leader sought Institutional Review Board (IRB) approval from the University during July 18-26, 2015. Revisions were made to Steps 1-6 of the capstone project during August 2-12, 2015 and initiation of the project implementation, Step 7, was

predicted to occur August 2 and continue until December 13, 2015. Nursing faculty at the community college in which the project occurred, were to receive instruction on concept maps on August 10 or August 11, 2015, depending on availability, marking the second milestone of the project. Classes at the participating community college began August 17, 2015 and clinical orientation including paperwork review was conducted on August 25, 2015. Concept map instruction for students in NUR 111: Intro to Health Concepts occurred September 2-10, 2015 during Unit 3 Clinical Decision Making. Student instruction on concept maps noted the third milestone. The fourth milestone occurred September 21, 2015 and involved the initiation of concept map implementation. Students utilized a template similar to what was used during class instruction to construct a basic concept map on their assigned patient. One nursing diagnosis was to be included with identification of one general problem with supportive data that represented the patient's response to the medical diagnosis. The concept map was due September 24, 2015 and the students received faculty feedback September 28, 2015. The second concept map development occurred either October 5-6, 2015 or October 19-20, 2015. The students had the choice to use the template provided or construct their own map. One nursing diagnosis was required as well as inclusion of pertinent lab and diagnostic data, medications, and treatments. Two general problems with supportive data were to be included and appropriately prioritized. Students could include additional patient data if needed. The final date for the second concept map to be turned in was October 22, 2015 and faculty feedback was provided October 27, 2015. The third and final concept map development occurred either November 9-10, 2015 or November 16-17, 2015. November 17, 2015 marked the fifth milestone of the capstone project. The students



were to include one nursing diagnosis and main concepts from the second map. Additionally, three or more general problems with supportive data were included and appropriately prioritized. The final concept map was to be a printed copy of an electronic map developed by the student and should identify growth in understanding the connections and relationships between assessment, diagnoses, and interventions as well as the noted general patient problems. The final date for the third concept map to be turned in was November 18, 2015 and faculty feedback was provided November 23, 2015. The ATI Proctored Fundamentals Assessment was administered November 24, 2015 and evaluative data was reviewed and analyzed December 8-13, 2015, which marked the sixth milestone and conclusion of the implementation phase.

### **Outcome Measurements**

The primary concept for evaluation of this project is critical thinking development in which quantitative and qualitative data was analyzed to evaluate the effectiveness of the intervention. In order to evaluate the success of implementing concept maps as a teaching strategy, critical thinking was assessed utilizing the ATI Proctored Fundamentals Assessment in which the group scores on the Clinical Judgment/Critical Thinking in Nursing subsection were compared to the previous three graduating classes. The students were evaluated in clinical with the NUR 111 Clinical Evaluation Tool and were expected to achieve a satisfactory evaluation on the broad objective addressing nursing judgment competence. Students also received evaluation on concept map development utilizing the NUR 111 Concept Map Grading Rubric. Additionally, the faculty's general perceptions of concept map development and its effect on student's critical thinking were evaluated during a group discussion led by the project leader.

The ATI Proctored Fundamentals Assessment is an exam that assesses student's basic comprehension and mastery of fundamental principles for nursing practice. Concepts in the assessment include foundations of practice, basic nursing care, health assessment, and support of psychosocial and physiologic needs. The Clinical Judgment/Critical Thinking in Nursing is a subsection of the Fundamentals Assessment which assesses a student's ability to use critical thinking skills, such as interpretation, analysis, evaluation, inference, and explanation, to make clinical judgment regarding clinical problems. Cognitive abilities of application and analysis are included in the subsection. According to Director of Product Evaluation and Measurement Services with ATI, all subsections of the ATI Proctored Assessments are not equated across forms and are not directly comparable due to one form possibly being more difficult in a specific subsection than other forms (Director of Product Evaluation and Measurement Services, personal communication, July 2, 2015). Additionally, while national comparisons are available for the group mean percentile for the overall group score as well as group performance in the major content areas, ATI does not publish normative data on subsection scores (Director of Product Evaluation and Measurement Services, personal communication, July 2, 2015). However, comparisons of the Clinical Judgment/Critical Thinking in Nursing subsection are available for the past three graduating classes at the community college where the project took place. The group scores for the Clinical Judgment/Critical Thinking in Nursing subsection on the Proctored Fundamentals Assessment for the 2013, 2014 and 2015 graduating classes of the ADN program ranged from 71.1% to 74.0% (see Table 1 for graduating class comparison). The faculty prefer students to obtain a group score of 80.0% or higher on the Clinical Judgment/Critical

Thinking in Nursing subsection as this is the minimum score required on course work in the ADN program. Obtaining a group score of 80% or higher would be a significant increase from previous years and is viewed by the faculty as an appropriate goal for the students.

Table 1

*ATI Proctored Fundamentals Assessment - Clinical Judgment/Critical Thinking in Nursing Subsection Comparison*

Graduating Class	Clinical Judgment/Critical Thinking in Nursing Group Score
2015	74.0%
2014	71.1%
2013	73.8%

The NUR 111 Clinical Evaluation Tool is a form utilized in the ADN program at the community college where the project took place. This form identifies behaviors necessary for satisfactory clinical performance within the three domains of the individual, nursing, and healthcare. To demonstrate satisfactory clinical performance, the student must perform in a safe, therapeutic manner, require appropriate guidance to function in nursing situations, and is prepared for each learning experience. In order to achieve a satisfactory clinical evaluation, the student must meet all broad clinical objectives. As an evaluative tool for this project, the student must satisfactorily meet the broad objective addressing nursing judgment competence at the time of the final clinical evaluation (see Appendix C for NUR 111 clinical evaluation tool).

The NUR 111 Concept Map Grading Rubric was developed to evaluate and provide feedback to students as they learn to construct concept maps (see Appendix D for NUR 111 concept map grading rubric). The concept map is a method of evaluating the cognitive thinking skills of the student and the ability of the student to perceive and understand the relationships between the different components of the concept map in the care of the assigned patient. Through implementation of the three assigned concept maps during the course, there was an expectation that faculty would identify improvement in concept map scores on the grading rubric as well as growth in understanding of the concept map components as they related holistically to the patient. As the student advanced through the course, assigned components were added to the concept map resulting in a more detailed final concept map compared to basic initial concept map.

Students received formative and summative evaluations during the course. At the beginning of the course specific clinical objectives were reviewed and guidelines were provided for clinical work, including concept maps, in addition to the assigned lecture on nursing process, care plan, and concept map development. Weekly, students performed self-evaluations and faculty evaluated the student as well, based on clinical and weekly focus objectives. Students were evaluated at mid-term utilizing the Clinical Evaluation Tool through self and faculty evaluations and again at the end of the semester. Additionally, at the end of the semester, a discussion group with the assigned nursing faculty was led by the project leader in order to obtain feedback on student's clinical performance and faculty's general perceptions of concept map development and its effect on student's critical thinking. It was desired that this discussion group would result in positive feedback and satisfaction from the nursing faculty regarding the use of concept

maps as a teaching strategy to enhance critical thinking development in first semester ADN students.

**Logic model.** A logic model was developed to depict the logical relationship between the resources, activities, outputs, and outcomes of the concept map implementation project. Critical thinking development in nursing students and new graduates has been identified as an area of concern for nursing faculty and employers. The developed Logic Model provides a visual of how available resources and successful implementation of specified activities can produce expected outputs and outcomes (see Appendix E for logic model). Implementation of concept maps with first semester ADN students will allow for enhanced development of critical thinking skills and ultimately produce better prepared nursing graduates with the ability to provide comprehensive patient care.

### **Cost-Benefit Analysis**

The project leader has direct access to any instructional equipment and supplies necessary for implementation of this project at the community college in which this project will occur, which includes office space and computer and printer access. The project leader has classroom space with SMART Board capability pre-assigned for the NUR 111 course during fall semester 2015. There were no additional costs accrued by the participating community college or nursing department. The participating students incurred no extra expense as the ATI Proctored Fundamentals Assessment is already included in the student fees. Aside from personal time of the project leader, there were no additional expenses involved with the implementation of this project. Any travel expenses, statistical analysis support, or consulting costs were the responsibility of the

project leader as an expectation for completing the required project. Based on the success of this intervention, the benefits for the nursing programs and the community college may include higher retention rates with ultimately more successful graduates.

### **Ethical Considerations**

This project was reviewed and granted ethical approval by the Institutional Review Board of the University's School of Nursing. Additionally, a letter of approval to implement the project was obtained by the participating facility. Prior to commencement of the project, the participants were informed of the aim of the project, how it would be carried out and the potential benefits to be gained. Informed consent was not necessary due to the project being a teaching strategy for all participants, though confidentiality was assured.

## **Project Implementation**

### **Process of Project**

Prior to the beginning of the fall semester, a faculty meeting was held with the entire clinical faculty for the first ADN course. Concept map instruction was shared with the faculty and copies of all teaching tools were provided, including the presentation and an example to be utilized during class instruction. The grading rubric was reviewed and questions were answered. From the time of planning until IRB approval was received, faculty assignments and the enrollment number changed. One full-time faculty member resigned and another faculty member was hired. A part-time faculty member was also utilized. This provided a total of five faculty members with concept map grading and instruction responsibilities in clinical. Additionally, the enrollment changed from 37 students to 36.

The concept mapping process was introduced to the 36 first semester students during the Clinical Decision Making – Nursing Process lecture. The traditional nursing care plan and the concept map were reviewed with examples given for both styles. The students received the following documents to guide in the creation and utilization of concept maps: Guidelines for Completing Concept Map Care Plans, Concept Map Expectations, Concept Map Grading Rubric, and a Concept Map Template. Students were instructed per their Clinical Focus Sheets, to construct three concept maps during the semester on a patient assigned to them during their medical-surgical clinical rotation. For the first concept map assignment, students utilized a template similar to what was used during class instruction to construct a basic concept map on their assigned patient. One nursing diagnosis was required with identification of one general problem with supportive data that represented the patient's response to the medical diagnosis. The second concept map provided the students a choice to use the template provided or construct their own map. One nursing diagnosis was required as well as inclusion of pertinent lab and diagnostic data, medications, and treatments. Two general problems with supportive data were expected and appropriately prioritized. Students were instructed to include additional patient data if needed. The third and final concept map development required one nursing diagnosis and the main concepts included from the second map. Additionally, three or more general problems with supportive data were expected and appropriately prioritized. The final concept map was required to be a printed copy of an electronic map developed by the student and with identification of growth in understanding the connections and relationships between assessment, diagnosis, and interventions as well as the noted general patient problems. The three

concept maps were spaced throughout the semester to allow time for adequate feedback. The maps were reviewed with each student individually during the clinical day, and students were encouraged to verbalize clarifications and propose needed revisions. Each student's map was evaluated for validity and content sufficient for safe nursing care prior to the numerical scoring of the maps. Two weeks prior to the end of the course, the ATI Proctored Fundamentals Assessment was administered. At the conclusion of clinical, clinical evaluations were performed with the students utilizing the NUR 111 Clinical Evaluation Tool. A meeting to obtain feedback from the faculty was conducted at the end of the semester and feedback was obtained from the participating faculty.

### **Outcome Data**

Upon completion of the intervention, the ATI Proctored Fundamentals Assessment results were reviewed for comparison to previous years. The group score on the Clinical Judgment/Critical Thinking in Nursing subsection was 59.8%. The concept map scores were compiled and reviewed for identification of improvement during the semester. Of the 33 students who completed all three concept maps and were evaluated in clinical, all students (100%) received a satisfactory score on the Concept Map Grading Rubric on the third concept map. Twenty-five students (75.8%) showed improved scores with each concept map creation. Six students (18.2%) had noted improvement from the first concept map to the third, though the second concept map score was a bit lower than the first. Two students (6%) did not show improved scores on each concept map but still received satisfactory scores overall. All 33 students (100%) received a satisfactory evaluation on the NUR 111 Clinical Evaluation Tool broad clinical objective addressing nursing judgment competence (see Table 2 for concept map and clinical evaluation data).



Table 2

*Concept Map Utilization and Clinical Evaluation Data*

<b>Student</b>	<b>Concept Map #1</b>	<b>Concept Map #2</b>	<b>Concept Map #3</b>	<b>Clinical Evaluation Tool</b>	<b>Comments</b>
1	17	19	21	S	
2	13	22	22	S	
3	15	19	18	S	
4	18	21	23	S	
5	13	13	20	S	
6	16	20	22	S	
7	20	22	24	S	
8	16	21	21	S	
9	19	20	20	S	
10	16	18	21	S	
11	20	15	23	S	
12	16	19	20	S	
13	15	22	18	S	
14	19	22	24	S	
15	13	-	-	-	Withdrew 11/5/15 (academic reasons)
16	15	20	20	S	
17	18	23	23	S	
18	17	19	19	S	
19	21	21	22	S	
20	23	22	24	S	
21	22	20	22	S	

22	17	19	24	S	
23	19	17	24	S	
24	14	17	19	S	
25	14	17	19	S	
26	18	21	24	S	
27	18	19	22	S	
28	-	-	-	-	Withdrew 11/2/15 (personal reasons)
29	16	20	24	S	
30	19	22	24	S	
31	17	19	23	S	
32	-	-	-	-	Withdrew prior to CM implementation
33	20	18	19	S	
34	17	17	19	S	
35	22	22	20	S	
36	19	22	20	S	

---

Upon obtaining feedback from the nursing faculty, satisfaction and concerns with the concept maps were noted. Some common themes noted from the feedback included:

- Concept maps allowed the student to gain knowledge on collecting patient data and better understand the link between assessment data and nursing diagnoses.
- Students voiced to the faculty that concept maps were time consuming and they had difficulty condensing the information to fit in the map.
- Students were no more prepared for clinical when using the concept map compared to the traditional nursing care plan.
- Continuation of concept maps may be more appropriate after the first semester, but still during the first year. This would allow time for a better understanding of the nursing process and the nursing care plan in general before the concept map is introduced.

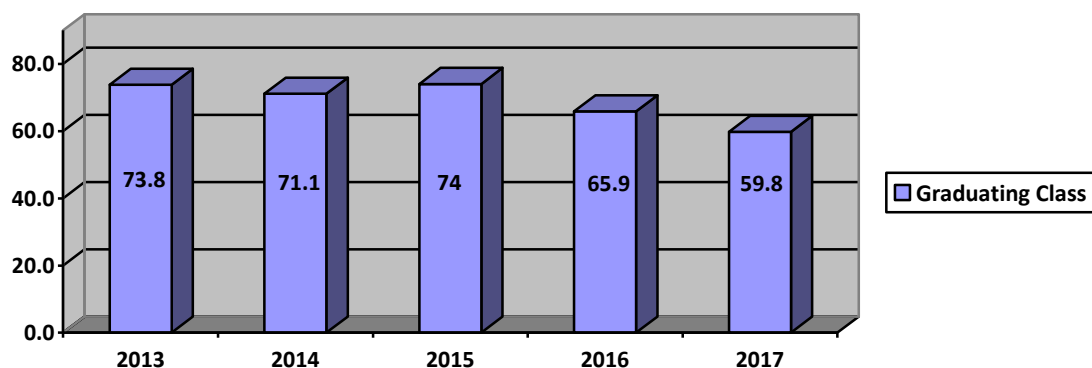
Additionally, at the end of the semester upon completion of the intervention, the students completed a short survey to evaluate their perception of benefits and challenges of concept maps. The surveys were anonymous and the students were assured their comments would not impact their clinical evaluation or course grade. Several students enjoyed utilizing the concept map but some common challenges noted by the students included that they were time-consuming and challenging to fit the needed content within the document. One student indicated that concept maps would be more useful for those more experienced in working with care plans in general, which correlates with the suggestion made by the nursing faculty. Some common benefits noted by the students included the following:

- Better organization of thoughts and correlation of assessment, nursing diagnosis, and interventions.
- Ability to be creative and color code components of the map.
- Easier to understand and helped to better understand how to determine nursing diagnoses, goals, and interventions.
- Enjoyed identifying growth from the first concept map to the third.

### **Project Evaluation**

#### **Interpretation of Outcomes**

Descriptive statistics was used to analyze and compare outcome data to previous data. Three of the 36 students withdrew during the first course for either personal or academic reasons. The anticipated goal for the group score on the Clinical Judgment/Critical Thinking in Nursing subsection of the ATI Proctored Fundamentals Assessment was 80% or higher. A considerable decline in the 2017 graduating class group score is noted compared to the 2013-2015 graduating classes (see Figure 1 for comparison of group scores, with inclusion of the 2016 graduating class). Upon discussing the results with the nursing faculty, it was concluded that the several students in the current group lacked motivation and were having academic concerns prior to concept map implementation. In fact, at the time of concept map implementation, 12 of the 33 students (36.4%) were unsuccessful on at least one of three unit tests. Ultimately, 12 students (36.4%) were not successful in passing the first nursing course. The faculty agreed that it is possible this may have had an impact on the ATI score.



*Figure 1*

ATI Proctored Fundamentals Assessment - Clinical Judgment/Critical Thinking in  
Nursing Subsection Comparison

Overall, the Concept Map Grading Rubric scores reflected a positive growth in understanding and development. Upon completion of the third concept map, all student scores (100%) were satisfactory as expected. All students (100%) received a satisfactory evaluation on the NUR 111 Clinical Evaluation Tool broad objective addressing nursing judgment competence, which is an expectation in order to satisfactorily pass the clinical component of the course.

Review of faculty comments and concerns indicated the faculty was not completely satisfied with utilizing concept maps with the first semester nursing student. While growth and understanding was evident during the progressive development of the three concept maps, the faculty did not feel they better prepared the students for clinical. The faculty voiced the necessity for the first semester nursing student to establish

foundational knowledge and utilization of the nursing process and nursing care plan prior to introducing the concept map.

**Comparison to literature and theoretical framework.** Concept mapping is a teaching strategy to facilitate critical thinking by organizing, analyzing, and communicating interrelationships among concepts through a visual representation of nursing process components (Abel & Freeze, 2006; Atay & Karabacak, 2012; Toofany, 2008). Stimulating creativity and critical thinking, concept maps are able to merge knowledge with care planning and outcomes and to encourage questioning that gives rise to more effective and complete critical thinking. During implementation of this project, the faculty recognized students having an enhanced understanding of linkage between assessment data and nursing diagnoses. Utilization of concept maps correlates with the theoretical framework in that they assist with the development and growth of critical thinking skills and demonstrate how to use critical thinking to view differences and similarities among and between data to analyze relationships. It is important to recognize that most learning is based on Ausubel's Assimilation Theory, whether concept maps are utilized or not. However, concept maps provide a visual understanding of care planning by grouping and linking patient information and allowing both students and instructors to see the clinical situation at a glance. Overall, the faculty agreed that the concept maps allowed a quick interpretation of the student's ability to understand patient problems based on gathered data. Faculty noted this visualization provided an opportunity to educate the students on linking pertinent data with patient problems and nursing diagnoses. With utilization of concept maps, the instructor can quickly evaluate how well students are prepared to provide needed nursing care (Abel & Freeze, 2006; Atay &

Karabacak, 2012; Chen et al., 2011; Moattari et al., 2014; Tseng et al., 2011). As the expectations of the concept maps became more detailed throughout the course, the majority of the students demonstrated improvement as the concept maps progressed which correlates with the assimilation theory. However, all faculty members agreed that concept maps made no difference in clinical preparedness compared to traditional nursing care plans and ultimately, overall critical thinking skills of this project group remained weak throughout the course.

### **Interpretation of Process**

Utilization of concept maps in the clinical area is promising in enhancing nursing students' understanding of patient problems and nursing interventions. Literature supports the use of concept maps to increase critical thinking ability. The overall process for this intervention was detailed and seamless. Benefits and challenges of concept maps were noted by both faculty and students. Though the Clinical Judgment/Critical Thinking in Nursing subsection of the ATI Proctored Fundamentals Assessment was less than the desired goal, overall performance on the assigned concept maps and clinical evaluation was satisfactory.

**Achievements.** The implementation of concept maps in this ADN program is a completely new intervention. Traditional nursing care plans have been used for years and while utilization of concept maps has been discussed in the past, they were never initiated. An overall achievement for this intervention is the development of guidelines and expectations for concept map construction, a grading rubric, and a concept map template that can be used or adjusted for any course in the ADN program.

**Recommendations for improvements.** The creation of concept maps requires a synthesis of past and current knowledge using the nursing process as a framework. It is possible that attempting this intervention with another group as originally designed may result in improved results as compared to the current group. However, it was suggested by the first year ADN faculty to implement the concept map in the second semester medical-surgical course, which occurs during the second 8-weeks of spring semester. This would allow for the foundational comprehension of the nursing process and nursing care plan development. An additional benefit of this recommended implementation is the concept maps would be used the entire 8-week course rather than being intertwined with the traditional nursing care plan throughout a 16-week course. Implementing the concept map in this manner may allow a better understanding of the construction and utilization of the map and minimize confusion between the two different styles of care planning.

**Plan for sustainability.** Future plans for this intervention includes integration in NUR 112, the second semester medical-surgical 8-week course of the ADN program. The concept map can be utilized as a weekly expectation and replace the traditional nursing care plan for the duration of the course. Upon integrating the concept map at this point, there is potential to include it during the second year of the program, either as the sole care plan format or in conjunction with the traditional nursing care plan. Students will have been exposed to both styles of care planning, so the plan to sustain utilization of concept maps during the second year in the ADN program is feasible.



## **Conclusion**

The lack of critical thinking among nursing students and new nursing school graduates is a concern nursing faculty must address. As learning environments and teaching methods require more ingenious approaches, nursing faculty must expound beyond traditional instructional methods to foster critical thinking, an essential component in nursing practice (Billings & Halstead, 2012). Literature supports the use of concept maps as an educational strategy to foster the development of critical thinking (Abel & Freeze, 2006; Atay & Karabacak, 2012; Chen et al., 2011; Hicks-Moore & Pastirik, 2006; P. Lee et al., 2013; Moattari et al., 2014; Tseng et al., 2011). Multiple studies have been conducted in varied educational settings but are limited in ADN programs, specifically early in the nursing program. Incorporating concept maps into the first year of the nursing curriculum may better enhance critical thinking development when compared to traditional nursing care plans alone. It is suggested to introduce concept maps to beginning level nursing students but after the first nursing course, where foundational knowledge is established.

## **Implications for Practice**

Concept maps are creative tools having the ability to be tailored and shaped into a variety of formats as individualized as the student who develops them. It is apparent that concept mapping has the potential to be an effective teaching strategy in nursing education (Abel & Freeze, 2006; Atay & Karabacak, 2012; Chen et al., 2011; Hicks-Moore & Pastirik, 2006; P. Lee et al., 2013; Moattari et al., 2014; Tseng et al., 2011). If concept maps are to be used for evaluation criteria, students should be given feedback on their maps through lectures, providing examples and instruction. Concept maps could be

useful in student preparation for clinical experiences through assisting in organizing data obtained for the clinical experience and then presented at clinical post-conferences.

Another strategy to help students develop their skill with concept mapping and critical thinking development is to incorporate concept mapping into classroom learning activities. For example, students can use concept mapping to analyze a case study provided by the instructor as it relates to current classroom content. This approach fosters discussion about the sorting of data, relationships among nursing diagnoses, missing data in the assessment, and problem identification for the patient.

From a faculty perspective, there are concerns regarding the use of concept mapping that must be considered prior to initiating their use in the nursing course. Faculty feedback on students' clinical concept maps is essential to facilitate maximal learning. Initially, this process will be time consuming, so faculty should incorporate this as part of their time management plan for the class or clinical. Despite the time-consuming nature, one of the best results of utilizing concept mapping is that it motivates and engages students in their learning. Additionally, quality improvement is necessary for the success of concept map utilization. Results from evaluation methods utilized in the nursing course will guide necessary revisions and modifications to the ongoing utilization of concept maps as a teaching strategy to enhance critical thinking, not only in the current ADN course, but also in subsequent courses. Fostering critical thinking early in the nursing program strengthens the potential to prepare better qualified nursing graduates with improved abilities to prioritize and manage patient care.

## References

- Abel, W. M., & Freeze, M. (2006). Evaluation of concept mapping in an associate degree nursing program. *Journal of Nursing Education, 45*(9), 356-364.
- Atay, S., & Karabacak, Ü. (2012). Care plans using concept maps and their effects on the critical thinking dispositions of nursing students. *International Journal of Nursing Practice, 18*(3), 233-239. doi:<http://dx.doi.org/10.1111/j.1440-172X.2012.02034.x>
- Billings, D. M., & Halstead, J. A. (2012). *Teaching in nursing: A guide for faculty* (4<sup>th</sup> ed.). St Louis, MO: Elsevier Saunders.
- Chen, S., Liang, T., Lee, M., & Liao, I. (2011). Effects of concept map teaching on students' critical thinking and approach to learning and studying. *Journal of Nursing Education, 50*(8), 466-469. doi:<http://dx.doi.org/10.3928/01484834-20110415-06>
- Harrison, S., & Gibbons, C. (2013). Nursing student perceptions of concept maps: From theory to practice. *Nursing Education Perspectives, 34*(6), 395-399. doi:<http://dx.doi.org/10.5480/10-465>
- Hicks-Moore, S., & Pastirik, P. (2006). Evaluating critical thinking in clinical concept maps: A pilot study. *International Journal of Nursing Education Scholarship, 3*(1).
- Hill, C. M. (2006). Integrating clinical experiences into the concept mapping process. *Nurse Educator, 31*(1), 36-39.

- Huang, Y., Chen, H., Yeh, M., & Chung, Y. (2012). Case studies combined with or without concept maps improve critical thinking in hospital-based nurses: A randomized-controlled trial. *International Journal of Nursing Studies, 49*(6), 747-754. doi: 10.1016/j.ijnurstu.2012.01.008
- Lee, W., Chiang, C., Liao, I., Lee, M., Chen, S., & Liang, T. (2013). The longitudinal effect of concept map teaching on critical thinking of nursing students. *Nurse Education Today, 33*(10), 1219-1223. doi:10.1016/j.nedt.2012.06.010
- Moattari, M., Soleimani, S., Moghaddam, N., & Mehbodi, F. (2014). Clinical concept mapping: Does it improve discipline based critical thinking of nursing students? *Iranian Journal of Nursing and Midwifery Research, 19*(1), 70-76.
- National Advisory Council on Nurse Education and Practice (NACNEP). (2008). *Meeting the challenge of the new millennium: Challenges facing the nurse workforce in a changing health care environment, sixth annual report*. Retrieved from <http://www.hrsa.gov/advisorycommittees/bhpradvisory/nacnep/Reports/sixthreport.pdf>
- Oermann, M., Poole-Dawkins, K., Alvarez, M., Foster, B., & O'Sullivan, R. (2010). Managers' perspectives of new graduates of accelerated nursing programs: How do they compare with other graduates? *Journal of Continuing Education in Nursing, 41*(9), 394-402. doi:10.3928/00220124-20100601-01
- Romeo, E. (2010). Quantitative research on critical thinking and predicting nursing students' NCLEX-RN performance. *Journal of Nursing Education, 49*(7), 378-386. doi:10.3928/01484834-20100331-05

Schuster, P. M. (2012). *Concept mapping: A critical thinking approach to care planning* (3<sup>rd</sup> ed.). Philadelphia, PA: F. A. Davis Company.

Spencer, C. (2008). Critical thinking in nursing: Teaching to diverse groups. *Teaching and Learning in Nursing, 3*(3), 87-89.

doi:<http://dx.doi.org/10.1016/j.teln.2008.02.001>

Tseng, H., Chou, F., Wang, H., Ko, H., Jian, S., & Weng, W. (2011). The effectiveness of problem-based learning and concept mapping among Taiwanese registered nursing students. *Nurse Education Today, 31*(8), e41-e46.

doi:10.1016/j.nedt.2010.11.020.

Toofany, S. (2008). Critical thinking among nurses. *Nursing Management, 14*(9), 28-31.

U. S. Department of Labor, Bureau of Labor Statistics. (2014). *Occupational outlook handbook, registered nurses*. (2014-15 ed.). Retrieved from

<http://www.bls.gov/ooh/healthcare/registered-nurses.htm>

Vacek, J. E. (2009). Using a conceptual approach with concept mapping to promote critical thinking. *Journal of Nursing Education, 48*(1), 45-48. doi:[http://](http://dx.doi.org/10.3928/01484834-20090101-11)

[dx.doi.org/10.3928/01484834-20090101-11](http://dx.doi.org/10.3928/01484834-20090101-11)

Wilgis, M., & McConnell, J. (2008). Concept mapping: An educational strategy to improve graduate nurses' critical thinking skills during a hospital orientation program. *Journal of Continuing Education in Nursing, 39*(3), 119-126.

doi:10.3928/00220124-20080301-12

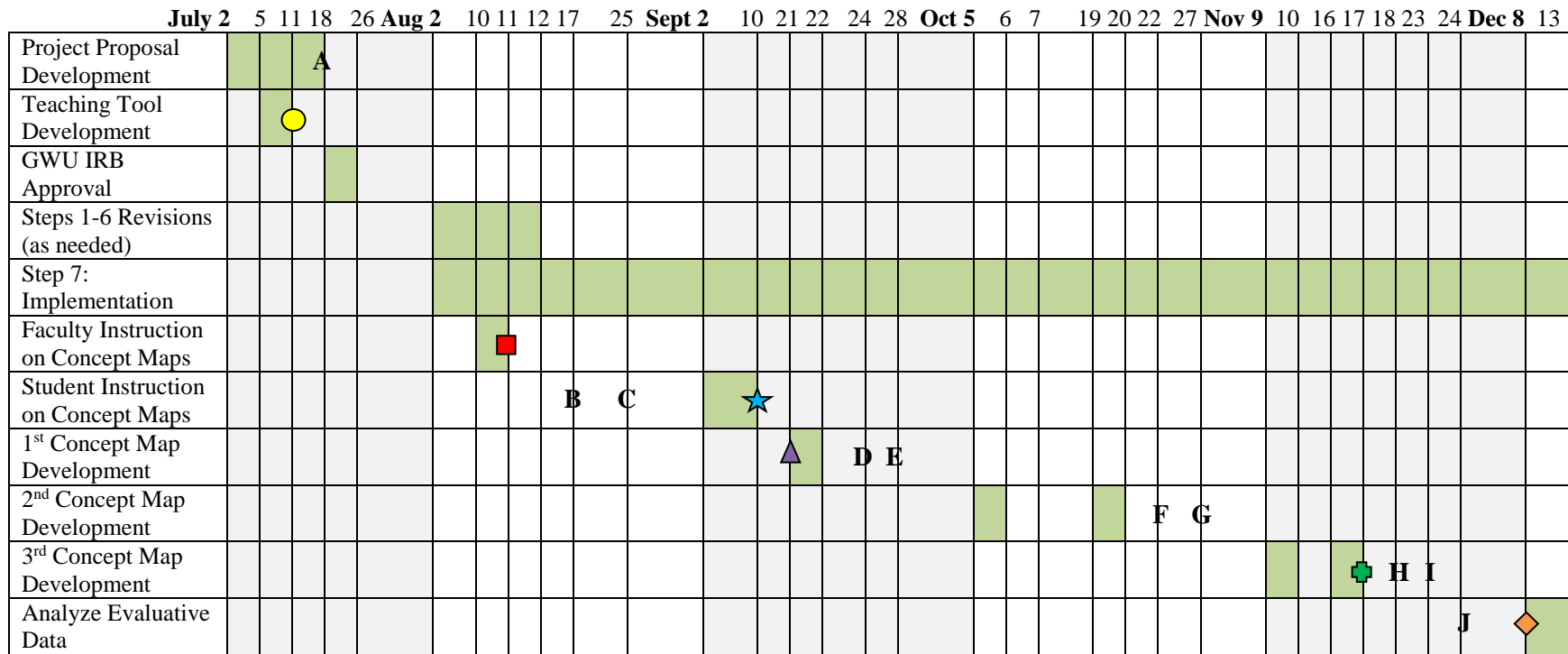
## Appendix A

### SWOT Analysis

<p><b>Strengths (of the ADN program)</b></p> <ul style="list-style-type: none"> <li>• Advanced educational level of ADN faculty</li> <li>• Longevity of ADN program – over 35 years</li> <li>• Accredited by the Accreditation Commission for Education in Nursing (ACEN)</li> <li>• Simulation lab</li> <li>• Nursing faculty committed to the education of nursing students</li> <li>• Division Chair of Health Programs and nursing faculty supportive of capstone project</li> <li>• Nursing faculty receptive to implementation of concept mapping and willing to incorporate into the curriculum</li> <li>• Great team work among faculty</li> <li>• Concept-based curriculum</li> </ul>	<p><b>Weaknesses (of the ADN program)</b></p> <ul style="list-style-type: none"> <li>• Costs of program (books, supplies, uniforms)</li> <li>• One large nursing lab (aside from Simulation lab) that has to be shared by multiple groups (ADN, PN, CNA)</li> <li>• New nursing faculty recently hired, some of which have minimal nursing education experience</li> <li>• Faculty have limited knowledge on concept map instruction and grading</li> </ul>
<p><b>Opportunities (for the ADN program)</b></p> <ul style="list-style-type: none"> <li>• Support from local healthcare facilities as clinical sites</li> <li>• Early recruitment – high school students interested in health careers</li> <li>• Online PN to ADN program beginning Fall 2015</li> <li>• Partnership with University of North Carolina at Wilmington – Regionally Increasing Baccalaureate Nursing (RIBN)</li> <li>• Community involvement – Wellness on Wheels program</li> <li>• Implementation of concept maps provides leadership and mentorship opportunities with other ADN programs</li> </ul>	<p><b>Threats (for the ADN program)</b></p> <ul style="list-style-type: none"> <li>• Rural setting</li> <li>• Competition from other schools for clinical sites</li> <li>• Financial constraints set forth by local and state funding</li> <li>• Recruiting qualified admission candidates in area</li> <li>• Recruiting qualified MSN prepared faculty for full-time and part-time employment</li> <li>• Insufficient nursing faculty salaries compared to other local community colleges and local healthcare facilities</li> </ul>

## Appendix B

### Gantt Chart



<b>A</b> - Submit Project Proposal to Committee Chair	<b>F</b> - 2 <sup>nd</sup> Concept Map due
<b>B</b> - First day of class	<b>G</b> - Feedback on 2 <sup>nd</sup> Concept Map
<b>C</b> - Clinical paperwork orientation	<b>H</b> - 3 <sup>rd</sup> Concept map due
<b>D</b> - 1 <sup>st</sup> Concept Map due	<b>I</b> - Feedback on 3 <sup>rd</sup> Concept Map
<b>E</b> - Feedback on 1 <sup>st</sup> Concept Map	<b>J</b> - ATI Proctored Fundamentals Assessment
Milestone 1 - Development of Teaching Tools	Milestone 4 - Begin Concept Map Implementation
Milestone 2 - Faculty Instruction on Concept Maps	Milestone 5 - Complete Concept Map Implementation
Milestone 3 - Student Instruction on Concept Maps	Milestone 6 - Analyze Evaluative Data

## Appendix C

### NUR 111 Clinical Evaluation Tool

	Midterm		Final	
	S	U	S	U
<b>II. Nursing Domain – The student will be able to internalize foundational principles of professional nursing practice to provide safe culturally competent, therapeutic care for individuals:</b>				
<ul style="list-style-type: none"> <li>• <b>Competently perform skills including physical assessments, caring nursing interventions, and nursing judgment.</b></li> </ul>				



## Appendix D

### NUR 111 Concept Map Grading Rubric

Criteria	Exceeds Expectations 3 points	Meets Expectations 2 points	Needs Improvement 1 point	Doesn't Meet Expectations 0 points	Score
<b>Content and Concepts</b>	Patient's initials, age, gender and admitting diagnosis identified. Key assessment data clearly noted. Concurrent health problems (medical history data) identified. Pertinent lab and diagnostic data, medications and treatments associated with patients admitting diagnosis identified.	Patient's initials, age, gender and admitting diagnosis identified. Key assessment data noted but not complete. Concurrent health problems (medical history data) identified. Pertinent lab and diagnostic data, medications and treatments associated with patients admitting diagnosis may or may not be identified.	Most content and concepts included but missing some required components or components are not clearly or accurately identified.	Effort made but missing most of the content and concept components. Components are not clearly or accurately identified.	
<b>Identification of Patient Problems</b>	3 or more general patient problems identified that represent patient's response to the medical diagnosis and correlate with assessment data. Supportive data noted for each problem.	At least 1 general patient problem identified that represent patient's response to the medical diagnosis and correlate with assessment data. Supportive data noted for each problem.	At least 1 general patient problem identified that may or may not represent patient's response to the medical diagnosis or correlate with assessment data. Supportive data may or may not be noted for each problem.	At least 1 general patient problem identified but does not represent patient's response to the medical diagnosis or correlate with assessment data. Supportive data not identified.	
<b>Nursing Diagnosis</b>	1 NANDA approved nursing diagnosis of high priority identified in correctly written 2 or 3 part format. Correlates with identified assessment data.	1 NANDA approved nursing diagnosis of high priority selected, but not written in correct format. Loosely correlates with assessment data.	Selected nursing diagnosis is either not NANDA approved, or is not written in correct format. May be little or no correlation with assessment data.	Selected nursing diagnosis is not NANDA approved, not written in correct format and does not correlate with assessment data.	
<b>Goal</b>	1 appropriately written (Specific, Measureable, Attainable, Realistic & Timed) goal for the identified nursing diagnosis.	1 realistic goal is identified, however it is either not patient specific or does not directly correlate with the nursing diagnosis. The goal is vaguely measureable and includes a timeframe.	1 goal is identified, however it is not realistic, is not patient centered, or does not correlate with the nursing diagnosis. It is vaguely measureable and may or may not include a timeframe.	No goal identified.	

## Appendix D (continued)

## NUR 111 Concept Map Grading Rubric

Criteria	Exceeds Expectations 3 points	Meets Expectations 2 points	Needs Improvement 1 point	Doesn't Meet Expectations 0 points	Score
<b>Interventions &amp; Rationales</b>	6 or more nursing interventions identified that directly correlate to achieving the desired goal and address the nursing diagnosis. Interventions are nursing specific, clearly delineate what the nurse is to achieve. Scientific rationale provided for each nursing intervention and clearly supports how the intervention will aide in achieving the desired goal.	At least 3 nursing interventions identified that directly correlate to achieving the desired goal and address the nursing diagnosis. The interventions are nursing specific, clearly delineate what the nurse is to achieve. Scientific rationale provided for each nursing intervention and clearly supports how the intervention will aide in achieving the desired goal.	At least 3 nursing interventions identified but may or may not directly correlate to achieving the desired goal and address the nursing diagnosis. The interventions may or may not be nursing specific or clearly delineate what the nurse is to achieve. Scientific rationale may or may not be provided for each nursing intervention or clearly supports how the intervention will aide in achieving the desired goal.	Less than 3 nursing interventions identified and do not directly correlate to achieving the desired goal or address the nursing diagnosis. The interventions are not nursing specific or clearly delineate what the nurse is to achieve. Scientific rationale is not provided for each nursing intervention.	
<b>Evaluation of Goal</b>	Goal is appropriately evaluated and includes data to support whether or not goal was achieved. Revisions or recommendation are included to help achieve the goal.	Goal evaluated but is missing data to support whether or not goal was achieved. Revisions or recommendation are included to help achieve the goal.	Goal evaluated but does not include data to support whether or not goal was achieved. Revisions or recommendation to help achieve the goal may or may not be included.	No goal evaluation identified.	
<b>Linking Data in Concept Map</b>	Patient problems appropriately linked (arrow, dotted line, etc.) to identify interrelatedness. Connections indicate superior organization / understanding of relationships. Student may show appropriate links between other pertinent patient information.	Patient problems linked (arrow, dotted line, etc.) to identify interrelatedness, but some incorrect connections are made. Student may or may not show appropriate links between other pertinent patient information.	There is a vague correlation identified between patient problems or patient problems are linked inappropriately.	No correlation is identified between specific patient problems.	
<b>Organization and Map Construction</b>	Well organized, in a logical format. Contains main concepts and is easy to follow. All components necessary to promote an overview of the patient are used.	Thoughtfully organized. Acceptable effort and easy to follow most of the time. Contains most of the main concept map components.	Somewhat organized but difficult to follow at times. Contains only a few of the main concept map components.	Choppy and confusing. Unable to follow and useless to patient care. Many concept map components missing.	

22-24 points = Excellent (Satisfactory)

18-21 points = Good (Satisfactory)

15-17 points = Acceptable (Satisfactory)

14 points or less = Unacceptable (Unsatisfactory)

Concept Map: #1 #2 #3

Grade: \_\_\_\_\_ S / U

Faculty: \_\_\_\_\_

## Appendix E Logic Model

