Strengthening Critical Thinking in the New Entry, New Graduate Registered Nurse Population

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Strengthening Critical Thinking in the New Entry, New Graduate Registered Nurse Population

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In partial fulfillment of the requirements for the Doctor of Nursing Practice Degree
Abstract

Background: Nursing students’ transition to professional practice is lengthy. Guidelines for best practices for nurse residency programs exist, but when guidelines are not followed, new nurses suffer from increased burnout, increased turnover, and worsening job satisfaction. These issues are tied to a lack of critical thinking and clinical reasoning skills, which also results in a lack of recognition of patient deterioration. Objective: To improve new nurse recognition of a deteriorating patient and institute a practice change through a Doctor of Nursing Practice (DNP) project. The project goal was to strengthen critical thinking and clinical reasoning in the specified population, thereby improving their recognition of a deteriorating patient. Method: The method was a pretest-posttest project design. The inclusion criterion was any NENGRN resident who started between July 1, 2021 and November 1, 2021. The sample size was 15. After the pretest, the initial concept mapping and problem-based learning intervention began the week of hire. Concept mapping of a deteriorating patient case study intervention occurred bi-weekly. In theory, this strengthens critical thinking, clinical reasoning, and self-confidence in the NENGRN population. Results: There was an overall increase in posttest scores when compared to pretest critical thinking scores. The overall increase in critical thinking scores was 7%. The Critical Care cohort had a larger increase in their scores when compared to the Acute Care cohort. There is enough evidence to suggest repeating the project with a larger population of participants to see if the same results can be achieved.

Keywords: transition to practice, readiness to practice, practice gap, nurse residency, critical thinking, clinical reasoning, new graduate nurse, transitional programs, nursing education, concept mapping, problem-based learning, case studies, patient deterioration, clinical deterioration, Lewin’s change theory, Knowles theory of adult education
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Strengthening Critical Thinking in the New Entry, New Graduate Registered Nurse Population

Background

Preparing New Entry, New Graduate Registered Nurse (NENGRN) for independent practice is a lengthy process. As these nurses begin their professional practice and transition from student nurses to professional nurses, they require specific educational support to be successful (Institute of Medicine [IOM], 2017; Murray et al., 2020). NENGRNs’ preparation for professional practice after graduation has been an issue for at least the last seventeen years. These preparation for practice rates have declined significantly. In a seminal article, del Bueno (2005) initially documented 33% of NENGRN were prepared for professional practice after graduation. In a subsequent article by Kavanagh and Szweda (2017), the rate dropped to 23% of NENGRN who were prepared for professional practice upon graduation. The most recent publication found the preparation rate is currently a startling 9% (Kavanagh & Sharpnack, 2021). Several possible reasons for this significant drop exist, some of which will be discussed within the background and introduction.

Nursing literature supports the use of residency programs to assist the NENGRN in their journey to being independent practicing nurses (IOM, 2017; Walsh, 2018). The National Academy of Medicine (NAM), previously known as the Institute of Medicine (IOM), also endorsed the use of residency programs and revised guidelines for these programs in 2017. The NAM guidelines defined and outlined best practices for instituting nurse residency programs into all types of healthcare settings (IOM, 2017). Residency programs, according to NAM, should be structured with robust, uniform curricula, which provides for the continued education of NENGRN using Quality and Safety Education for Nurses (QSEN) competencies (IOM, 2017;
QSEN, 2020). The NENGRN Transition-to-Practice (TTP) is strengthened and shortened when these guidelines are followed (IOM, 2017; Kavanagh & Sharpnack, 2021; Murray et al., 2020).

However, there is ample evidence these guidelines are not being followed, due to a significantly lengthening TTP gap (Huston et al., 2018; IOM, 2017; Kavanagh & Sharpnack, 2021). The TTP gap has been in existence for about five decades and has only expanded as the integration of technology has become more prevalent (Armstrong, 1974; Huston et al., 2018). Forneris and Fey (2018) addressed the need for higher order thinking in NENGRN due to the rapid advancement of bedside technology and the higher acuity of acutely ill hospitalized patients. These barriers to improving the TTP gap also have significant financial implications and patient safety considerations within the healthcare industry (Hickerson et al., 2016). The healthcare industry will continue to suffer from increased staff burnout, increased staff turnover, insufficient staffing, and decreased job satisfaction within the NENGRN population by not addressing the TTP gap (Africa, 2017).

Several studies on the NENGRN one-year turnover rate have been published, one of which reported turnover as high as 61% (Windey et al., 2015). The turnover rate, although a separate issue not being specifically addressed within this DNP project, plays an indirect role in strengthening critical thinking and clinical reasoning (Cochran, 2017). A well-structured, evidence-based residency program from six months to a year decreases the NENGRN one-year turnover rate by up to 85% (Trepanier et al., 2020). Separately evaluating retention within this group of nurses is pivotal to reducing their turnover rate. Casey et al. (2021) outlined the lived experiences of new graduate nurses and contributing factors which increased first-year turnover rates during the Covid pandemic. The new nurses who were interviewed regarding their TTP experience stated it was even more overwhelming to start their practice during the Covid
pandemic (Casey et al., 2021). The significance of this article involves understanding factors which contribute to increasing first-year turnover and is pivotal to improving the phenomenon.

One additional aspect of correcting the TTP gap is addressing and strengthening critical thinking and clinical reasoning skills (Kavanagh & Sharpnack, 2021). Nursing school teaches the NENGRN the knowledge needed to pass state nursing licensure tests and practice safely; however, the ability to translate knowledge to care for patients is lacking (Armstrong, 1974; Kavanaugh & Szweda, 2017). The skill of knowledge translation has only gotten weaker with newer nurses who have graduated and started practice during the Covid pandemic (Anton et al., 2021). Nursing educators have been trying to strengthen nursing student critical thinking without making an appreciable difference since the advent of QSEN competencies in 2005 (QSEN, 2020).

Addressing many of these concerns starts while the NENGRN are students within nursing programs. Many published nursing interventions have been successful in increasing critical thinking and clinical reasoning of nursing students. Some examples of these interventions are mindfulness, reflection, gamification, concept mapping, evidence-based designed nurse residency programs, and problem-based learning. These are only a few of many examples found through a literature search on strengthening critical thinking in nursing education.

The broad goal of this Doctor of Nursing Practice (DNP) project was to strengthen the critical thinking and clinical reasoning skills of the NENGRN participants. Improvement of these vital skills is one key aspect of creating successful TTP and lessening this same gap (Kavanagh & Sharpnack, 2021; Kavanagh & Szweda, 2017). Improving TTP within this DNP project was concentrated on NENGRN improvement of recognition of deteriorating patients. Concentration of improving recognition of deteriorating patients was chosen since all participants will be
starting employment in an acute care hospital setting. While recognition of deteriorating patients is not specifically taught in nursing school, NENGRN improvement of this skill is crucial to positive patient outcomes of acutely ill hospitalized patients (Anton et al., 2021; Brekke et al., 2019).

At this point, it is important to define critical thinking and clinical reasoning accurately and adequately, as they are pivotal themes in the DNP project. According to published nursing literature, critical thinking has many different definitions and has evolved over the last 40-50 years (Carvalho, Azevado, et al., 2017; Ludin, 2018). More recently, critical thinking in professional nursing was defined by the American Association of Colleges in Nursing ([AACN], 2008) as possessing "strong critical reasoning, clinical judgment, communication, and assessment skills" (p. 9). Currently, the definition has evolved to an abstract concept in which nurses take the knowledge they have learned and apply it to a patient situation to develop the appropriate response (Carvalho, Azevedo, et al., 2017; Zhang et al., 2017).

Clinical reasoning differs slightly from critical thinking. Clinical reasoning is the systematic process by which nurses collect and use clinical information to form nursing judgements (Liaw et al., 2018). Therefore, clinical reasoning is a prerequisite for developing critical thinking (Liaw et al., 2018). Both skills — clinical reasoning and critical thinking — are also prerequisites for developing proper clinical judgement (Kavanagh & Sharpnack, 2021).

Nursing educators agree: strengthening critical thinking and clinical reasoning skills is important, and nursing literature supports this belief; however, the approaches to achieving these goal are debatable (Carter, 2016). Many different interventions are available from which to choose in regard to strengthening critical thinking and clinical reasoning skills. Again, some of these interventions are mindfulness, reflection, gamification, concept mapping, problem-based
learning, and nurse residency programs. Most, if not all, of these interventions have been tested on nursing students. A few published studies have been conducted on new nurse graduates and strengthening critical thinking or clinical reasoning. Therefore, a broad goal of this project was to strengthen the critical thinking and clinical reasoning skills of the NENGRN. Strengthening these two skills is crucial to decreasing the TTP gap at the clinical site (Kavanagh & Sharpnack, 2021; Kavanagh & Szweda, 2017). Strengthening these two skills will also help develop nursing judgement (Kavanagh & Sharpnack, 2021). There is no other way to develop nursing judgment; it cannot be taught, and it is solely dependent upon having critical thinking and clinical reasoning (Kavanagh & Sharpnack, 2021).

This DNP project used concept mapping of deteriorating patient case studies to determine whether this combination of learning in regular intervals could improve the following in the NENGRN population: (a) critical thinking, (b) clinical reasoning, (c) situational awareness, and (d) recognition of early patient deterioration within an acute hospital environment. Case studies are one method frequently used in medical and nursing education for increasing situational awareness and improving critical thinking skills (Bowman, 2017). Case studies are a type of problem-based learning intervention and are also widely used in hospital settings as well (Breytenbach et al., 2017).

Additionally, nursing literature supports the use of concept mapping to strengthen critical thinking (Alfayoumi, 2019; Bressington et al., 2018; Garwood et al., 2018). Concept mapping is used almost exclusively in the Middle East and Eastern cultures to strengthen critical thinking in nursing education (Alfayoumi, 2019; Kharais & Saleh, 2020; Mohammadi et al., 2019; ). The DNP project intervention involved blending concept mapping with deteriorating patient case study scenarios as the educational intervention; this combination of interventions was not found
within published nursing literature. All DNP project participants collected information from the presented case study scenarios to complete the concept map. Having participants who completed the same maps allowed for a more accurate comparison and allowed for more proper assessment of improvement of critical thinking using the blended problem-based learning and concept mapping intervention.

**Problem Statement**

Several problems could be addressed with the NENGRN population at the clinical site. Any problem chosen requires an evidence-based solution. Primarily, there was evidence of underdeveloped and non-standardized curricula directed at strengthening NENGRNs’ critical thinking and clinical reasoning within the residency program at the proposed clinical site. Kavanaugh and Szweda (2017) concluded strengthening critical thinking leads to increased new graduate retention rates, new graduate job satisfaction, and improved patient safety. Therefore, strengthening critical thinking skills alone should reduce the TTP gap and decrease the first-year turnover rate (Kavanaugh & Szweda, 2017). Although residency programs are expensive to implement and maintain, when implemented according to NAM/IOM standards, they ultimately decrease hospital expenditures by positively impacting the first-year turnover rate (Walsh, 2018).

Not addressing the significant NENGRN first-year turnover rates will also negatively impact the future of nursing. The AACN extrapolates the nursing shortage could be as high as 175,900 each year from now through 2029 unless significant change happens (2020). These numbers were also calculated prior to the Covid pandemic, so the nursing shortage numbers will more than likely be higher than predicted for post Covid pandemic numbers. Both the Bureau of Labor Statistics and the AACN’s nursing shortages projections are significant; again, these
numbers were prior to Covid. More concerning is the Bureau of Labor Statistics’ projection of more severe shortages in the Southern United States (Zhang et al., 2018). Zhang et al. (2018) quoted the projected shortages per the Bureau of Labor Statistics’ for the Southeast alone at 248,964 by 2030 — a pre-Covid pandemic projection. This number was the largest of any of the four regions of the United States by almost 8,000 jobs (Zhang et al., 2018). These shortages lead to insufficient staffing in healthcare settings, which ultimately jeopardizes patient safety and results in worsening patient outcomes (AACN, 2020). Therefore, keeping the NENGRN practicing at the bedside will help to decrease the projected nursing shortage (Rush et al., 2019).

The problem statement for the project, therefore, is NENGRNs within the residency program at the proposed DNP project site demonstrate a lack of recognition of deteriorating patients and a lack of consistent deterioration patient education. To strengthen and improve this skill requires both clinical reasoning skills and critical thinking skills, which develop proper nursing judgement (Kavanagh & Sharpnack, 2021). Alfayoumi (2019) concluded strengthening critical reasoning leads to increased confidence in nurses and further improves their ability to correctly identify changes in patient conditions. Alfayoumi (2019) also stated by blending different types of teaching modalities, greater learning can be achieved. Knowles’ theory of adult learning (1998) supports Alfayoumi’s (2019) published assumptions on blending teaching modalities. Further development of clinical reasoning skills of nurses assists in improving patient safety (Murray et al., 2020). Although residency programs are expensive to implement and maintain, they ultimately decrease hospital expenditure by positively impacting the first-year turnover rate when nurse residency programs are implemented correctly (Walsh, 2018). Improving residency programs by instituting evidence-based learning activities will also

**Clinical Question**

As previously stated, the lack of critical thinking and clinical reasoning is one of the most significant problems when addressing TTP for the NENGRN, specifically at the DNP project site (Hickerson et al., 2016). The initial clinical question was: What can be done to strengthen critical thinking skills and clinical reasoning skills in the NENGRN population? As the project progressed, the researcher determined the focus of the clinical question needed to be narrowed, adjusted, and refined. Therefore, the final clinical question was: Can implementing concept mapping interventions in regular intervals strengthen critical thinking skills and clinical reasoning skills in the NENGRN population?

The topic of the DNP project focused on the NENGRN population’s recognition of a deteriorating patient. In general, properly implemented nurse residency programs help NENGRN transition smoothly into acute care practice settings such as hospitals (Huston et al., 2018). Creating an evidence-based residency program would ultimately be the gold standard to assist the NENGRN in thriving and becoming the best nurse possible (IOM, 2017). However, in the timeframe given for the DNP project, this is not feasible. Therefore, to improve the residency program at the DNP project site, the educational intervention was implemented to enhance and improve the NENGRN recognition of a deteriorating patient.

**Review of Literature**

Literature reviews are required by anyone wanting to implement evidence-based practice (EBP) projects. The clinical question being addressed by the review of the literature was: Can implementing concept mapping interventions in regular intervals strengthen critical thinking
skills and clinical reasoning skills in the NENGRN population? The Georgia State University School of Nursing librarian helped to determine search terms needed to find articles discussing interventions for critical thinking and clinical reasoning. With the assistance of the same librarian expert, a plan was devised and implemented to thoroughly search for appropriate articles to answer the clinical question. Several themes, which have been previously listed, emerged during the literature search, including the use of mindfulness, concept mapping, problem-based learning, case studies, and gamification. These interventions will be discussed below.

**Summary of Evidence Appraisal Model**

Instituting a change via EBP requires methodical planning and the use of appropriate tools to be successful. The Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) model is one of many used to appraise evidence (Dang & Dearholt, 2017). The JHNEBP tool is widely known and used by many nurses interested in instituting an EBP intervention, regardless of the setting (Christenbery, 2017). Dang and Dearholt (2017) identified three steps to using the JHNEBP tool: practice, evidence, and translation. These steps seem shorter and less complex than other EBP tools. They appear designed for either the rapid institution of an EBP project or to be used by novice researchers. As with any EBP project, the nurse must start with identifying a problem; defining known solutions to the problem through a literature search; and, using the knowledge gained through the literature search, implementing a solution to the clinical question (Schmidt & Brown, 2019).

**Search Strategy and Results**

The initial search terms used for the updated clinical question were critical thinking, clinical reasoning, transition to practice, nursing education, readiness to practice, new graduate nurses, and internship or residency programs. Secondary search terms used were problem-based
learning and concept mapping. The three primary databases searched using Georgia State University's portal were PubMed, CINAHL, and ERIC. PubMed and CINAHL are frequently used to gather evidence on nursing practice changes to institute EBP projects. The ERIC database houses education-based literature, which was searched for specific research regarding education theory. A chart showing the literature search strategy may be found in Appendix A.

Some searches, such as (MM "Transitional Programs/ED") OR (MM "New Graduate Nurses") OR (MM "Internship and Residency") in the CINAHL database, yielded 15,911 results. Adjusting the Boolean words and changing terms used to (MM "New Graduate Nurses") AND (MM "Critical Thinking") resulted in 27 articles, all of which were useful. Searching PubMed database using MeSH terms such as education, nursing, and clinical reasoning yielded articles related to critical thinking interventions. Using the MeSH term practice gap yielded 122 results, readiness to practice yielded 16 results, and transition to practice yielded 177 results. The PubMed results were obtained by limiting the search dates from 2017-2020.

Initial article inclusion criteria included any article focused on an intervention for strengthening critical thinking or clinical reasoning. Only articles published in English were reviewed. Any article which did not include an intervention to strengthen critical thinking or clinical reasoning or a measuring tool for critical thinking or clinical reasoning was excluded. The dates 2017-2020 were chosen to obtain the most recently published information on teaching strategies used to support and enhance critical thinking and clinical reasoning. In addition to the Georgia State University database searches, government and regulatory agencies were also searched to gather relevant information on the topic. The agencies searched were the IOM, the American Nurses Association (ANA), the Association for Nursing Professional Development (ANPD), the AACN, and Commission on Collegiate Nursing Education (CCNE). These
organizations all support the use of transition programs for the NENGRN. Additionally, the references of relevant journal articles yielded ten useful resources.

Initial searches in September and October 2020 in the PubMed and CINAHL databases yielded 485 relevant journal articles. The article abstracts aided in identifying those most relevant to the topic. Sixty-five duplicates were not used and 250 articles discarded due to their lack of relevance (i.e., did not include an intervention for strengthening critical thinking). This led to the identification of 170 sources used to assist in answering the clinical question. An additional eight articles were obtained for the use of understanding patient deterioration.

Once the themes of concept mapping and problem-based learning were identified as the most frequently used interventions for strengthening critical thinking and clinical reasoning, a secondary search was undertaken in PubMed and another ten articles were identified. The 188 articles were thoroughly examined using the Johns Hopkins appraisal tool (Dang & Dearholt, 2017). The articles not included were either not strong enough to include or were focused on educational theories and frameworks, which may support other aspects of the DNP project. The 30 articles appraised within the Evidence Matrix include: (a) two Level IA, (b) fifteen Level II, (c) ten Level III, and (d) three Level V articles. All articles used were obtained between the dates of September 25, 2020, and January 25, 2021.

Ongoing literature searches are required during DNP projects. These literature searches further expand the knowledge base of topics discussed within DNP projects. In January 2021, an additional literature search was undertaken after speaking to a concept mapping expert. This search focused on concept mapping as an educational intervention for teaching clinical signs of patient deterioration. PubMed and ProQuest databases were searched on January 12, 2021. The PubMed database was searched using the MeSH terms clinical deterioration AND educational
intervention. The search yielded 334 results, four of which were useful. The PubMed search used the MeSH term failure to rescue AND concept mapping OR educational intervention, which yielded 24 results, one of which was useful. ProQuest was also searched. The search terms concept mapping AND patient deterioration OR clinical deterioration were used. This search yielded 6,198 results. These results were further narrowed by selecting only peer-reviewed articles, limiting the date range to 2017-2021, and choosing only English-language articles. The narrowed search yielded 1,984 results, four of which were useful. This search ultimately added nine more articles to further understand how to use concept mapping of a specific patient condition.

With the assistance from the Georgia State University nursing librarian, another search took place on January 15, 2021. The Embase database was searched using the same terms above with zero results. When terms were expanded to see if any other results could be obtained, none were found. PubMed was further searched, and zero results were obtained when searching for concept map AND clinical deterioration OR disease progression. The Cochran database also yielded zero results using the same search terms. Limited findings were not surprising, since the author hypothesized there would be few, if any, results of published literature related to concept mapping of a deteriorating patient in a hospital or educational setting, especially since this skill is not routinely taught while in nursing school. A flow chart of the literature review can be found in Appendix B.

Literature Review Findings

Rush et al. (2019) asserted NENGRNs who participate in evidence-based designed residency programs better integrate into the healthcare culture of the facility and become more successful in practice. Data collected in the literature review suggest NENGRNs are less
prepared for TTP than previously studied cohorts (Kavanaugh & Szweda, 2017). Kavanaugh and Szweda (2017) further suggested nursing programs whose sole focus is licensure preparation do not sufficiently address critical thinking, and therefore, produce graduates who are unprepared for practice. Research from Murray et al. (2020) and Mangold and Crocket (2019) agree providing the NENGRN with a supportive environment in which to learn and effectively socialize to the healthcare culture produces nurses who can think critically. The literature supports the use of both concept mapping and problem-based learning strategies as useful interventions in the student nurse population. Therefore, to address the TTP gap and to strengthen critical thinking and clinical reasoning in the NENGRN population, these methods were utilized.

Mindfulness and reflection were less frequently seen as results in reviewed journal articles during the literature search. Both are educational interventions in which the student looks at themselves introspectively to assist in understanding concepts (Carvalho, Azevedo, et al., 2017; Zhang et al., 2017). These holistic approaches to learning can be used by anyone who wants to have a deeper understanding of themselves and their environment and often requires a mentor to be successful (Zhang et al., 2017). Students who are supported by a mentor achieve deeper learning (Zhang et al., 2017). As a learning intervention, mindfulness is not a complex process to grasp; however, it can take practice to perfect (Zhang et al., 2017). Participants in Zori’s (2016) study stated they found the reflection exercises helpful in the beginning; however, as the seven weeks of the program progressed, many found it uncomfortable to reflect on their weaknesses and even felt it could jeopardize their jobs.

Concept mapping is another type of educational intervention. It is used worldwide, especially in Asia and the Middle East, to teach critical thinking (Alfayoumi, 2019; Bressington,
et al., 2018; Bilik et al., 2020; Carvalho, Vitor, et al., 2017; Ghojazadeh et al., 2014; Mohammadi et al., 2019). Concept mapping helps to strengthen communication skills of nurses by allowing them to see the patient issue or diagnosis; these problems, once recognized, can be effectively and accurately verbalized to the physician (Murray et al., 2020).

A concept map is a visual picture of how medical diagnoses affect one another (Ghojazadeh et al., 2014; Mohammadi et al., 2019). A traditional concept map takes a patient condition, problem, diagnosis, or chief complaint and requires the student to link it to other existing health conditions, medications, and nursing interventions (Ghojazadeh et al., 2014). Ghojazadeh et al. (2014) explained the concept mapping process: The student starts by placing the patient and the main condition in a box in the center of the page. The student then writes other medical conditions the patient has around the center box and ties them to the initial problem and medications the patient takes. Nursing interventions are then linked to those other diagnoses listed around the center box. Concept mapping demonstrates how nursing interventions are linked to the diagnosis and how medications affect both the diagnosis and the nursing intervention (Bressington et al., 2018).

Yue et al. (2017) published the first meta-analysis of concept mapping. Their research concluded larger, higher quality studies needed to be conducted using specific and standardized measuring tools; however, when critical thinking was measured using specific tools, critical thinking was strengthened using concept mapping (Yue et al., 2017).

Another study was identified and included, although it was an older study, because the population was NENGRNs. Wilgis and McConnell (2008) conducted a small descriptive study using concept mapping with the NENGRN population. Because the study sample was only 14, it
was impossible to draw conclusive results; however, it was noted to be a cost-effective way to seemingly strengthen critical thinking in the NENGRN (Wilgis & McConnell, 2008).

Research conducted by Mohammadi et al. (2019) showed, when used early in the students' nursing education career, concept mapping strengthens critical thinking processes, which can then help develop proper nursing judgement. The act of practicing concept mapping of medical conditions lays the foundation for critical thinking by allowing students to repeatedly see how conditions, medications, and interventions interact with one another (Mohammadi et al, 2019).

Concept mapping is a viable intervention to strengthening critical thinking, particularly for visual learners (Bressington et al., 2018). Some students found concept mapping helpful when used in conjunction with debriefing after clinical rotations. Thus, combining concept mapping and debriefing assisted with solidifying medical diagnoses with nursing interventions. This allowed students to make links they would have otherwise missed (Alfayoumi, 2019; Bressington et al., 2018). Moreover, Odreman and Clyens (2020) found using concept mapping during a debriefing after a simulation exercise strengthened critical thinking in students. Concept mapping is a useful tool and can be combined with other interventions to strengthen critical thinking and clinical reasoning, which is a precursor to developing proper clinical judgement (Alfayoumi, 2019; Bilik et al., 2020; Bressington et al., 2018; Carter et al., 2016; Kavanagh & Sharpnack, 2021; Orique & McCarthy, 2015).

While concept mapping is visual, problem-based learning (PBL), yet another intervention, is experiential. PBL requires students to consider life-like problematic situations and find solutions (Orique & McCarthy, 2015). Many students find PBL useful due to the curious nature of humans. Gholami et al. (2016) reasoned when students use this approach,
critical thinking is improved and motivation for further learning is achieved. Carvalho, Vitor, et al. (2017) found when blending PBL with another critical thinking intervention, learning was strengthened even more. PBL requires students to be more active learners and often include others in their learning (Gholami, 2016).

Case studies are one type of PBL intervention (Carvalho, Vitor, et al., 2017). Case studies can be foundational to learning about rare or interesting patient conditions and can allow nurses to learn from mistakes made by others (Carter, 2016). Case studies assist nurses in applying what is learned in school to patient situations seen in clinical settings (Gholami et al., 2016). Many schools of nursing use PBL interventions to teach nursing concepts as it is foundational to adult education, according to Knowles’ theory of adult education (1998).

Lastly, while many adult learners find tactile learning valuable, younger adults, who grew up with technology, often find gamification a more useful learning strategy (McEnroe-Petitte & Farris, 2020). Gamification is an immersive and often kinesthetic educational strategy, which students with different learning styles can find beneficial (Erlam et al., 2018). It takes a creative instructor to use gamification in an educational setting (McEnroe-Petitte & Ferris, 2020). Some examples of gamification within nursing education are “puzzles, role-play, clickers, computers, tabletop, or card games” (McEnroe-Petitte & Farris, 2020, p. 61). For students who struggle to learn, games are an excellent way to connect active learning with didactic education (McEnroe-Petitte & Ferris, 2020).

With the emergence of simulation labs in many schools of nursing and hospital settings, it can be argued the simulation itself is gamification. Simulation learning uses advanced technology where a room is set up to mimic a medical environment (Erlam et al., 2018). A technologically advanced mannequin provides the simulation instructor with feedback from the
students participating in the learning exercise (Erlam et al., 2018). Simulations are meant to mimic real patient interactions and the simulation instructor should provide both positive and negative feedback to participating students (Erlam et al., 2018). Observationally, some hospitals have yet to incorporate simulation as an education strategy due to the immense cost and training needed to start a simulation lab. For those healthcare institutions who have adopted this educational intervention, simulation provides a safe way to practice cardiac and respiratory arrest training, bolsters interprofessional communication, and fosters team-work dynamics (Kim, 2018).

**Target Population**

After the extensive examination of nursing literature, the focus shifted to more of the specifics of the DNP project. The population of interest for the project was the NENGRN, regardless of RN entry-level education. The inclusion criteria for DNP project participants were any newly hired new graduate registered nurse who started employment at the clinical site between July 1, 2021, and November 1, 2021. The only exclusion criterion was any newly hired nurse who had worked as a registered nurse before and new graduate nurses who did not start between the hire dates.

The clinical site hires new graduate registered nurses in cohorts typically during February, July, late October, and early November. NENGRN cohorts are further segregated into Acute Care and Critical Care. Typically, Critical Care and Acute Care cohorts do not start on the same dates; however, due to hiring challenges related to the Covid pandemic, this practice changed during the Fall 2021 cohort at the clinical site. Historically, these groups of nurses were segregated because of their lengths of orientations; the Critical Care cohort received 16 weeks of orientation and Acute Care received 12 weeks of orientation and the two groups typically
finished orientation around the same time. The typical pre-pandemic large cohort sizes and multiple lengths posed some issues initially when considering the implementation; however, the issues were not as complex as initially thought. Generally, Critical Care starts mid-month in February, July and October and Acute Care starts two weeks later. The Critical Care cohort includes nursing specialties such as emergency care, intensive care (medical, post-surgical transplant, cardiovascular, organ recovery, and neurological) and cardiac step-down. The Acute Care cohort includes specialties such as medical-surgical, labor and delivery, newborn infant care (well-baby, intermediate, and neonatal intensive care), and general cardiac/telemetry patients.

Sample

The convenience sampling method was used for the DNP project, taken from the NENGRN who started employment at the clinical site between the July 1, 2021, and November 1, 2021, start dates. Clinical site recruitment of project participants took place between the first and fifth days of employment. The student in charge of the DNP project read a pre-approved recruitment script. This script was reviewed by Institutional Review Boards (IRB) at both the DNP student’s university and the hospital where clinicals took place. The purpose of the IRB is protecting human subjects who are potential participants in all types of research, including educational interventions and quality improvement projects, such as DNP projects (Lapid et al., 2019). The recruitment script included general information about the DNP project, the goals of the project, the length of time of participation including total projected time, and what was expected while they were participating in the project.

From the July 2021 Critical Care and Acute Care cohorts, there were a total of 115 newly hired new graduate registered nurses. Of the 115, 104 completed the consent form. Of the 104
who completed the consent form, 19 agreed to participate in the project. Of those 19, only six participants turned in all seven concept maps. These six were from the same service line and their educator allowed them a very small amount of time during their weekly classes to complete the concept maps. There were 56 NENGRNs who started employment at the clinical site for the Fall 2021 Critical Care and Acute Care cohorts combined. This number is significantly lower than the typical number who start during this time of the year.

During the Summer 2021 and the Fall 2021 cohorts, there were significantly higher numbers of NENGRN who could not start employment because they did not pass their RN licensure exam. There were 38 Critical Care cohort nurses who started employment on October 18th at the clinical site. Again, this number is significantly lower than the pre-pandemic numbers. Of the 38, 18 signed up to participate in the project. Of the 18 who signed up to participate, only two completed the DNP project. For the Acute Care cohort, there were 18 nurses who started employment. Of those 18, 14 signed up to participate in the project. Of the 14 who signed up to participate, seven of them completed the DNP project. In total, 51 NENGRNs agreed to participate in the DNP project and 15 participants completed the project. This means only 29% of participants who agreed to participate in the DNP project completed the project (Appendix C).

Due to the low Summer 2021 cohort participation, a university IRB amendment was filed. The hospital clinical site had previously signed a reliance agreement with the university. This means the university oversees the IRB and the hospital clinical site IRB relies on the university to ensure all rules and regulations are being followed. This IRB amendment was done because the researcher wanted to provide short ten-to-fifteen-minute virtual classes to assist those who were struggling with the concept maps. This option was added because it was felt this was another possible barrier why concept maps were not being submitted by participants.
Participants were not required to attend these virtual sessions. A few participants took regular advantage of the help sessions and at least three of the participants who completed the project said they would have given up without the help sessions.

Demographically describing the participants in any research study, quality improvement project, or DNP project is important to helping others replicate the study (Pickering, 2017). The researcher of the DNP project completed collecting data in January 2022. There were fifteen NENGRN participants who completed the DNP project. The demographic breakdown was: (a) 14 of the participants were female, one was male; (b) 13 were between the ages of 19-29, one was between the ages of 30-40, and one was between the ages of 40-50; (c) seven of the participants identified as Caucasian, seven identified as African American, and one identified as two or more races; (d) two of the project participants listed English as a second language And 13 listed English as their primary language; And (e) 12 project participants held Bachelor of Science in Nursing degrees and three held an Associate of Science in Nursing degree. A demographics chart can be found in the Appendix D.

Setting

The clinical site for the DNP project was an acute care hospital. The hospital is part of a large healthcare system located in a large metropolitan city in the southeastern United States. The hospital was a non-trauma facility with 643 beds, as of October 2021. The patient population is largely composed of chronically ill patients with acute exacerbations of their illnesses. These patients are also typically ill with more than one disease process and multiple co-morbidities, as well as pre/post-transplant patients. The hospital predominately specializes in cardiac, neurological, and transplantation of organs. However, the facility is not limited to those specialties.
Conceptual Framework

When undertaking evidence-based practice (EBP) projects such as a DNP project, one component of successful implementation and completion is providing the proper framework or frameworks. For this project, there were two frameworks — a change framework and an educational framework. The change framework was Lippitt’s theory and the educational framework was Knowles’ theory. Implementation using Lippitt's theory and Knowles' theory was imperative for project success and the project was foundationally tied to these theories.

Change in any form is difficult, but properly planned change can smooth the transition and lesson the chaos as it is happening (Young, 2019). When considering change within large healthcare institutions, proper planning is essential to successful implementation (Young, 2019). Lippitt’s Seven Stage Model of Change (Lippet et al., 1958) was the framework upon which the DNP project transpired at the clinical site. Properly teaching the NENGRN critical thinking and clinical reasoning skills was needed to assist in the smooth transition from student to professional practice. Malcolm Knowles' theory of adult learning (Knowles et al., 1998) assisted in transferring the essential skills with knowledge application to the NENGRN.

Change Theory

Lippitt’s Seven Stage Model of Change is an extension of Lewin’s change theory (Lippitt et al., 1958). Lippitt’s theory (1958) was appropriate as a framework for this project because it is not a linear theory, which mimics natural change. There are seven steps to Lippitt’s change theory (1958). Some of these steps mimic the nursing process, which made this theory more appropriate than other change theories. The first step is assessing the problem and determining a plan to fix the problem. The second step is evaluating human and monetary resources to ensure project success. The third step is self-reflection by the change agent to see if they are the proper
person for instituting the proposed change. The fourth step is to plan the small incremental changes to help ensure success. The fifth step is to inform and explain the role of personnel who are affected by the change. The sixth step is to facilitate open communication with those involved in the change to help move the change forward. The last step is for the change agent to incrementally remove themselves, thereby ensuring successful and permanent change (Lippitt et al., 1958). Translation of these steps into the necessary steps for the project required significant project planning and predicting potential problems and roadblocks. Knowing the steps is foundational, but proper application of these steps assists everyone affected by the change and makes the change smoother and less stressful (Young, 2019).

**Knowles’ Theory of Adult Learning**

Several frameworks were considered prior to deciding on Knowles’ (1998) theory of adult learning. Duchscher’s transition shock theory (2009) was relevant since understanding the phases of this theory can assist in the successful transition of the NENGRN population to independently functioning nurses (Murray et al., 2019). Kramer’s reality shock theory (1974) was also briefly considered for the way it explains the phases NENGRNs go through as they transition to professional practice. Lastly, Benner’s novice to expert theory (1982) was also contemplated because it effectively explains how all nurses obtain knowledge through practice. However, none of the previously listed theories were chosen because they did not adequately address how to effectively deliver critical thinking and clinical reasoning education and skill acquisition.

However, Knowles’ theory of adult learning (1998), also known as andragogy, addresses how adults absorb and integrate knowledge. Malcolm Knowles updated his theory several times over the years (Knowles, 1998). The 1998 version was used because it is the last version of this
theory before his death. Because this theory is based in the humanistic approach, it focuses more on behaviors and less on the thought processes of adults as they are learning (Mitchell & Courtney, 2005). The manner in which to appropriately teach information was fundamental and foundational to the project. Knowles (1998) stated adult learners acquire and incorporate information differently than younger learners; therefore, adults should be taught differently. The theory of andragogy makes assumptions about adult learners and has principles on which learning is based (Knowles, 1998). The basis of this theory revolves around the learner themselves (Feuer & Gerber, 1988). The foundation to Malcolm Knowles’ theory is situated among key assumptions: (a) adult learners are self-driven to learn, (b) adult learning is internal, (c) learning must be necessary and practical, (d) adults come to any learning experience with life lessons can assist in effective assimilation of the knowledge, and (e) knowledge is best integrated if the adult applies it to a problematic situation (Knowles, 1998). Andragogy also centers on specific principles: (a) learners must have an environment conducive to learner questions and free, open communication; (b) involvement of the learner in planning as much as possible allows for control of learning; (c) driven learners require internal reflection as this assists in developing critical thinking; (d) obtaining and identifying resources is key to successful adult learning; and (e) offering a supportive environment where learners feel free to evaluate how and why learning is taking place is most effective. Not understanding and applying these principles and assumptions of adult learning may have ensured project failure and the NENGRNs would not have developed the critical thinking and clinical reasoning skills needed for successful transition into independent professional practice.

Both frameworks were imperative for project success and the project was foundationally tied to both theories. Proper use of frameworks for any project are tied to project success.
Project Design

This DNP project had a simple project design: pre-test/post-test. The Critical Thinking Disposition Scale (CTDS) was used for both the pre-test and post-test and was foundational to the project design (Sosu, 2013). This short 11-question scale evaluates the critical openness and the reflective skepticism of participants. It uses a 5-point Likert scale in which one equals strongly disagree and five equals strongly agree. More information on the CTDS can be found in the implementation section of the paper. A copy of the CTDS tool can be found in Appendix E.

Methodology

As mentioned above, the project employed a pre-test/post-test design. The project started with obtaining consent from project participants. All NENGRNs hired for the Summer/Fall 2021 cohorts were required by hospital executives to attend the education on recognizing deteriorating patients. However, participation in the DNP project after the initial education was completely voluntary. After the pre-test was given to the cohort, the initial educational intervention on recognizing deteriorating patients occurred immediately afterward. This educational intervention reviewed signs and symptoms of patient deterioration, the five rights of clinical reasoning, and pertinent hospital policies and procedure related to patient deterioration. The initial education also consisted of exposing the NENGRN cohort to the DNP project. There was a small portion of the class focused on concept mapping as the DNP project educational intervention.

The executive committee of the hospital agreed the deteriorating patient education portion was vital to keeping patients safe, so they paid the NENGRNs to participate in this education class only. The NENGRN were not paid to participate in the DNP project, past the initial education on recognizing deteriorating patients. The educational intervention class was
Recognizing the Deteriorating Patient. There was no other compensation or incentivization for participants to join or complete the DNP project.

During the class, NENGRNs were asked to create two separate concept maps: one titled “Why did you become a nurse?” and the other titled “Where do you see yourself after the first year of employment within the field of nursing?” Using personal information helped to make the initial educational intervention relatable and less confusing, according to the concept mapping expert who was consulted (M. Bradshaw, personal communication, January 7, 2021). An IRB stamped copy of the consent form can be found in Appendix F. A copy of an example concept map can be found in Appendix G.

Throughout their residency, the participating members of both the Critical and Acute Care cohorts were given the same case studies of a deteriorating patient on a bi-weekly basis. The concept maps were visually the same every time, but the case study changed every two weeks, and the participants’ answers changed based on the case study. The concept maps focused on two aspects. The first was recognizing assessment data within the case studies on a patient who is deteriorating, and the second was learning the clinical site processes in assisting a patient who is deteriorating. The second was achieved by having the participants write in who they would notify when their patient was deteriorating and what they would expect the intervention to be to reverse the deterioration of the patient. These actions were key to helping NENGRNs think critically concerning what could possibly be happening to this patient and what they would anticipate being ordered based on their assessment data. This allowed the NENGRNs to practice their critical thinking skills in a safe environment without fearing making a mistake or missing something crucial, which could result in a patient death.
The orientation period for NENGRNs at the clinical site lasted 16 weeks for the Critical Care cohort and 12 weeks for the Acute Care cohort; therefore, the Critical Care cohort had seven concept maps and the Acute Care cohort had five. DNP project participants sent the concept maps electronically to the DNP student’s secured university email address. All concept maps were graded using a standardized rubric. Project participants received an email, after concept maps were returned, of a completed concept map and a short voice over explaining the rationales. After the last concept map was submitted, participants were asked to complete a final Qualtrics survey which combined the post-test and the short nine question demographic survey. The post-test used the same unaltered, validated CTDS critical thinking tool. Basic demographic data were collected after the post test. This demographic data included gender, age range, ethnicity, nursing degree type, primary language, and four questions asking the participant about the project itself and whether they found it helpful. There were two open-ended questions out of the four offered for those who wanted to give specific input. The purpose of collecting this demographic data was to determine the extent to which age or entry level education may have had any bearing on baseline critical thinking and clinical reasoning skills. The demographic questions can be found in Appendix H.

As previously stated, participants electronically sent the completed concept map to the DNP student in charge of the project. The DNP student was the only one who performed all aspects of the project. There were no others who were responsible for any aspect of the project. There were instances where expert advice or assistance was needed, but this only involved experts providing input. These same experts did not perform any tasks for the project.

Data were stored electronically on a single-user, password-protected desktop which was at the DNP student’s residence. All identifiable links to data were kept at the clinical site in a
locked office, of which only the student and their manager had access. Deidentified participant data were entered into a Microsoft Excel database. Some specific data were moved into SPSS to evaluate the statistics needed for the project. There was a total of 155 data points collected as part of the DNP project, which does not translate into the needed statistics. Most of the 155 data points were the individual squares of each concept map, which involved two separate data points: “Did the participant answer the question?” and “Was the answer correct?” The assessment data were transcribed word-for-word into the Excel database, just as the participant wrote it on their completed concept maps. This was also scored as previously described. There were no control groups within this DNP project.

Folders were given out during the first week of employment with printed copies of the consent form, example concept maps needed for the educational intervention on day five of employment, a pre-test critical thinking disposition scale, a printed copy of the PowerPoint educational materials, and two separate QR codes for an online consent form and the Qualtrics version of the critical thinking pretest. The folders differed slightly between the Summer 2021 and Fall 2021 cohorts. The folders for the Summer 2021 cohort were given out on Friday during their in-person class was projected on a large screen and education was delivered via WebEx. All education for the project was designed to be virtual via a WebEx platform due to the Covid pandemic. This education delivery and the folder contents were approved by both the university and hospital IRBs. However, two weeks before the Critical Care cohort started in July 2021, the clinical site decided the initial NENGRN education would be in person. It was unlikely for an IRB amendment to be filed and approved in time. Therefore, it was decided the education platform would stay virtual, but delivered in a live-class environment with two proctors to help pass out folders and collect data sheets for the project.
Folders for the Fall 2021 cohorts were given out on Monday during recruitment at the end of their first day of employment. This change happened for two reasons. The clinical site decided the local infectivity rate for Covid was too high to safely have in-person education, therefore it would be entirely virtual. Therefore, the Fall 2021 participants were allowed to access the education from home. Since there was a lack of participation in the Summer 2021 cohort, two QR codes for the pre-test and the consent form were added to the folders in case this was a barrier prohibiting any NENGRN from participating.

Participants had until the end of the initial class on day five of employment to determine whether they wanted to participate in the DNP project. This gave the potential participants time to review the consent form and receive the initial education on recognition of deteriorating patients before they needed to decide if they wanted to participate in the DNP project.

**Evaluation of Project Resources**

The clinical site utilizes nurse educators as direct patient care staff in almost all their units; the two exceptions are the emergency department and the Cardiovascular Intensive Care Unit (CVICU). These two nurse educators work full-time as educators and are rarely placed into staffing. The education department pays for 12 hours of any unit educator’s pay, and the other 24 hours of their time is paid by the unit in which they work. This is important to know and understand when it comes to teaching resident classes. Nurse residents are required to attend a few of the classes offered. These teaching responsibilities are typically shared by the nurse educators who work in those service lines. For example, the Rhythm Recognition course is one class where all ICU, critical care, and cardiac nurse residents are required to attend. In this two-day class, the first day is an eight-hour lecture day and the second day is a rhythm recognition test. The lecture course is divided into several bits so one educator is not
responsible for teaching the entire day. On testing days, three educators are typically scheduled to assist in grading the tests.

This strategy could also be used when implementing the idea for a critical thinking class for new nurse residents. The initial class can be taught in 60 to 90 minutes by a single educator. Then, the new nurse residents could come together every two weeks for a 15–30-minute class to review a case study, then concept map the case study as a group to help strengthen their critical thinking skills. Critical care nurse residents’ orientation is 16 weeks long and acute care residents’ orientation is 12 weeks long; as a result, there should be no need to add any FTEs for this specific business plan project. The possible foreseeable staffing challenges may be finding specific educators on specific days to teach the classes.

**Executive Summary**

This business plan involves creating an educational workshop for newly hired, new graduate registered nurses. This education is based on research and designed to help improve the critical thinking of the new graduate, newly hired registered nurses within the clinical site hospital. Research shows improving critical thinking in nurses improves patient outcomes (Herron, 2017). This plan is based on a Doctor of Nursing Practice (DNP) quality improvement project was implemented in July 2021. Classes like these are badly needed, according to research (Kavanagh & Szweda, 2017). Medical errors are listed as the third leading cause of death in the United States, costing between $4-20 billion per year, depending on the study (Melnyk et al., 2021). Research also shows hospitals in the US increased their safety and decreased the cost of medical injuries by $2.9 billion (Paavola, 2018).

This DNP project was designed to help combat medical errors, which are costing healthcare systems large amounts of money in legal fees, non-reimbursable diagnoses,
medication errors leading to longer hospital stays, etc. This education would require newly hired, new registered nurse graduates to participate in education to improve their recognition of deteriorating patients through strengthening of their critical thinking skills. To increase recognition of deteriorating patients and to also increase their critical thinking, students start with a pre-test to measure their baseline critical thinking. These students then attend a 90-minute initial workshop class on how to recognize a deteriorating patient and what protocols to follow to help these patients in need. This class would be mandatory for all new nurse graduates. There would then be short, regular workshops (a 15–30-minute class) every two weeks during their orientation, 16 weeks for Critical Care and 12 weeks for Acute Care. During the workshop education, nurse residents participate in a case study review and are provided a blank concept map to fill in. These case studies use real life, deidentified scenarios of deteriorating patients. Once the concept map is completed in class, it is reviewed and discussed. During the last workshop class, after completing the concept map, nurse residents are given a short post-test to measure whether their critical thinking has improved. The pre-test and post-test scores are compared. Giving these resident cohorts workshop class times together gives them meaningful interactions with other fellow new nurse graduates and allows them to feel more connected to each other, thereby increasing retention rates for these new employees (Urban & Barnes, 2020).

For the workshop, some basic equipment would be needed which the clinical site already has available for use. This equipment includes projectors, copiers, copier ink, and copy paper. There is ample classroom space on the clinical site campus. The biggest consideration needed for classroom space and usage would be the date, time, and the number of participants, especially if social distancing is still required due to the Covid-19 pandemic. As a healthcare system, the clinical site employs clinical educators. These educators are nurses who work in every clinical
area and assist with required updated and yearly education. These nurses could be utilized to assist in teaching these classes; alternatively, the nurse who supervises all the clinical educators could also assist in teaching these classes, since they teach various classes already.

**Vision Statement of Clinical Site**

As part of any business plan, it is important to understand the vision of a company. This plays a role in understanding what a company aspires to be (Baker et al., 2018). The vision of the selected clinical site is “We are transforming healthcare, creating a destination known for the best clinicians and a one-of-a-kind experience that always puts patients first.”

**Mission Statement of Clinical Site**

A mission statement is written to understand the purpose of a business and their current state (Baker et al., 2018). The mission statement for the clinical site is:

Our mission is healthcare marked by compassion and sustainable excellence in a progressive environment, guided by physicians, delivered by exceptional professionals, and inspired by the communities we serve. This mission is evidenced within our community benefit programs. Our purpose is to make a positive difference in every life we touch.

**Equipment Description**

Minimal equipment was needed for implementation of this business plan. The necessary equipment was already owned and maintained by the clinical site. The equipment needed included a copy machine, copier ink, projector, and paper. Some of this equipment was considered an asset and some of it was considered consumables; however, equipment has about a 5–8-year lifespan, so it was important to consider the expenses. The clinical site uses Lexmark CX825DE standing copiers. This copier uses high-yield ink cartridges. Paper was also required.
The clinical site purchases large volumes of paper on a regular basis and it was doubtful the small amount required for this class made an appreciable difference in the volume ordered. For the classroom, a projector was required. The projectors already owned by the clinical site were Epson PowerLite L250F Business Projectors. These projectors do not require bulbs to be changed. These bulbs last approximately 20,000 hours before they decrease by half. This tool was already owned and did not require purchasing. A list of expenses for the project can be found in Appendix I.

**Description of the Organization**

This education fit inside a department which already exists within the clinical site. The hospital system is a large healthcare organization which, at the time of writing, has 15 hospitals. Not included in this count are the physician offices, immediate care, quick care, urgent care, surgical centers, and others. Therefore, the structure of the organization is complex. The clinical site is the flagship hospital in this group because it was the first hospital in the group. It was founded in 1905 by Drs. Amster and McRae and was ahead of its time. Over the last 116 years, this entity has grown, changed, and flourished. There are executive teams for each hospital and there are executive teams for Clinical Site Healthcare Corporate (CSHC) as a system.

For the purposes of this project, the system-wide educational hierarchy is explained here. The budget will be owned and managed by CSHC because they own and manage the nurse residency budget. At the top of the chain is the System Executive Branch, followed by the Director of Clinical Education for CSHC system, the Executive Director of Nursing Practice and Governance, the Executive Director of Clinical Operations, the Clinical Education Coordinators (who report to the Director of Clinical Education, but also the Chief Nursing Officers for each hospital where they are based), and the Unit-Based Educators (who report directly to their unit
managers, but meet as a group to discuss education issues within each hospital). See Appendix J for a table of the educational hierarchy for the clinical site.

**Marketing Plan**

Marketing this plan would fit into the manner in which the clinical site resident program is already marketed to new graduate nurses. This would be an excellent addition and would possibly help attract other new residents since this education would bolster what the clinical site already does for these nurses. The current state for recruiting new nurses is the recruiters go to the different nursing schools and provide information on the system or hospital to the students, along with an explanation of the residency programs and what they can offer students as a resident nurse. This workshop should make the residency program more attractive because if it is implemented system-wide (not just in a single hospital), it would provide more structure to a somewhat fragmented program lacks structure. Currently, in the job market, a large portion of new hires are nurse residents or nurses who are new to a specialty. Finding nurses with experience can be difficult in a market in which the pandemic has devastated an already-stressed workforce.

**Financial Plan**

The largest recurrent financial cost is paying the nurses to attend the class. There are two separate cohorts of nurses who start three times a year. The Critical Care cohort orientation is 16 weeks and the Acute Care cohort is 12 weeks. Typically, pre-pandemic, about 140 nurses enrolled for each of the three resident start times a year — spring, summer, and fall. These 140 nurses are divided into Critical and Acute Care cohorts. For example, the Summer 2021 Critical Care cohort had 82 nurses and the Summer 2021 Acute Care cohort had 38 nurses. With this group as an example, the Critical Care cohort should have a total of 7 classes: one 90-minute
class and six 30-minute classes. The Acute Care cohort should have a total of 5 classes: one 90-minute class and four 30-minute classes. According to the website salary.com, the average pay for a new graduate nurse is $56,000; if a nurse works 36 hours per week, it calculates to $27 per hour. The instructor costs for a fiscal year would be $1440; this number was based on a very experienced nurse whose pay is $60 per hour. The Critical Care cohort, based on the average of 82 new graduate registered nurses, would cost $29,889 per fiscal year. For the Acute Care cohort, the cost per fiscal year would be $15,592.50. The cost per fiscal year for the education alone would be $46,931.50. This cost represents the start-up cost for implementing this project at the clinical site, since no other equipment needs to be purchased to begin. In a 2018 article by Paavola, data from the AHRQ was cited, stating US hospitals saved $2.9 billion by reducing medical errors. The Centers for Medicare and Medicaid Services (CMS) also drives this metric by not reimbursing payments to hospitals for specific events such as hospital-acquired central line and foley catheter acquired infections (CMS, 2020b).

Accounting and tracking of revenue and expenses is required. Baker et al. (2018) explained accrual accounting to track revenue and expenses. Revenue is recorded or tracked when money is earned. This project would not directly increase revenue, but it may save the hospital a significant amount of money by increasing patient safety and increasing government reimbursements by preventing some patient injuries or conditions. Expenses are accounted for when they are incurred. This way, once expenses are paid, they have already been accounted for and removed from the books. Accrual accounting also must be considered when it comes to depreciation of assets (Baker et al., 2018). According to Baker et al. (2018), depreciation of assets, except for land, are considered over the life of the asset. This means the life of the asset must be determined. Then a specific amount of money is subtracted from the purchase of the
equipment until the zero sum has been reached. However, this money is not considered income or revenue.

The cost of the equipment needs to be discussed here in this section. Copiers were priced for $4,484 (Lexmark, 2021). The color and black printer cartridges cost $1400 for four high-yield cartridges (Staples, 2021b). If properly maintained, these copiers last about eight years, according to the printer specifications (Lexmark, 2021). Depreciation of the equipment needs to be considered in the budget. This would mean a total of $560.50 can be subtracted yearly for the depreciation of the copier (Baker et al., 2018). The printer would be a depreciable asset while the printer cartridges, maintenance cost, and paper would be consumables. A carton of copy paper of 5,000 sheets is $48.99 (Staples, 2021a). The projector was priced on Staples.com for ones similar to those used at the clinical site. The Epson PowerLite L250F Business Projectors were priced at $1599.00 (Epson, 2021). There are no bulbs to replace using this projector and the manufacturer states it has “20,000 laser light hours” before the light starts to decrease by half (Epson, 2021). The average lifespan of this projector is eight years. So, this piece of equipment would depreciate $199.86 yearly over the eight years. See Appendix I for a list of all expenses for implementation of the project at the project site.

Inflation must also be considered as part of financial management, as prices for goods and services is never static. Large expenditure items do need to be considered yearly. Smaller equipment purchases like computer mice, keyboards, mouse pads, and electronics cables may need to be replaced more frequently and budgeting may need to be considered for this. On a regular basis, some equipment will need to be repaired or replaced such as laptops/computers, classroom furniture, building maintenance, projectors, and a large screen for the projector. These costs can be budgeted for and considered when it comes to inflation. These costs, since they are
large capital costs, are considered capital expenditures. For example, all computers and laptops may be upgraded on a regular eight-to-ten-year basis (Baker et al., 2018). When paying salaries or wages, inflation does not directly affect wages paid by a business; however, inflation does affect how much an earner can afford to purchase depending on the rate of growth of inflation (Forbes, 2019).

Some best business practices help to control the impact of inflation. According to the CMS fact sheet published in December of 2020, the US government — including federal, state, and local entities — paid a combined total of 45.1% of the cost of healthcare in 2019 (CMS, 2020a). This means almost half of healthcare income is now derived from government sources. This knowledge makes it more important than ever to control costs where possible in health systems. Having positive relationships with vendors can affect how much a business must pay for services. For example, having an established relationship with a business who maintains the copiers will help control costs in the long run. In general, healthcare corporations control costs by securing contracts with vendors so they can set their prices and control parts of their budgets (Forbes, 2019). It is not unusual to see products companies use change on a regular basis when looking for supplies needed to care for patients. This change is assuming the healthcare business found the same product for a cheaper price.

There are few fixed costs for this plan. One example is the rent or a “mortgage” on the building. The cost of printing materials could be a variable cost or a semi-variable cost. According to Baker et al. (2018), a semi-variable cost is one in which the cost only changes slightly and then stays the same for a little while, then change a little again later. Understanding this cost will require knowing whether the printers are owned or rented. If they are owned, then depreciation value would need to be determined. Variable costs include purchasing cost of paper
and ink to print student materials. Another variable cost includes paying a unit educator to teach the class; cost would depend on the number of nurse residents attending the class for each seasonal cohort. Not all unit educators are at the top of the pay scale for nurses. Some only have a few years of nursing experience. This would be a variable cost because all the unit-based educators are hourly wage earners within the clinical site hospital system. It would be a fixed cost if these positions are salaried. If the Clinical Education Coordinators teach the course, it would be considered a fixed cost, as they are salaried employees.

This plan for a live class is designed to help improve critical thinking of new graduate nurses. Improving critical thinking, according to research, improves clinical outcomes of patients. Since reimbursement is moving toward outcome-based payments, otherwise known as \textit{value-based care}, meeting these goals set by the US government is crucial to hospitals staying in business (CMS, 2020b).

\textbf{Implementation}

Implementation of the DNP project began on July 12, 2021, with the first Summer 2021 cohort — the Critical Care Cohort. The Acute Care cohort started two weeks later on July 26, 2021. These two cohorts were a typical pre-pandemic size and met in person due to the lower Covid rates at the time. The Fall 2021 cohorts were both significantly smaller than normal pre-pandemic sizes by at least half. This made potential sample sizes smaller than anticipated. Every cohort received the initial education on identifying a deteriorating patient scenario. The class included information taught to the participants on how to complete a version of a concept map. The Monday of their second week of hire, the first concept map was sent out and the cohort members were given a five-day deadline. The DNP student did allow for late concept maps to be turned in. Starting on July 19, 2021, concept maps were emailed to the DNP project participants.
They had five days to fill in the blanks of the concept map and electronically send the completed map back to the DNP student. Once a map had been submitted, the project participant would get a correctly completed map (created by the DNP student) and a rationale for why those answers were correct. The last day to collect project data was January 31, 2022. This same cycle was repeated for every Acute Care and Critical Care resident group. At the end of the project, a final post-test was sent out, along with a short, nine-question demographic survey. All the demographic surveys provided good feedback indicated the nurse residents found the education useful.

**Instrument/Tool**

Choosing a measurement tool involved a lengthy search. The most popular and foundational critical thinking tools have been developed by Facione and Facione. Their seminal work was published in 1992 and is available for commercial use; however, their measurement tool is extraordinarily long, containing 75 questions; the tool was also cost-prohibitive for a project with no funding. It was found many, if not most, critical thinking tools have been developed by their company and are proprietary and cost-prohibitive. Eventually, the Critical Thinking Disposition Scale (CTDS) by Sosu (2013) was discovered. It is 11 questions long and contains two sections: Critical Openness and Reflective Skepticism, both of which are crucial aspects of critical thinking (Sosu, 2013). The CTDS uses a 5-point Likert scale where 1 equals *strongly disagree* and 5 equals *strongly agree*. The total score for the Critical Openness portion is 35 points. The total score for the Reflective Skepticism is 20; therefore, the total for both sections and the entire disposition scale is 55 points. This scale is a short evaluation of critical thinking from the point of view of the person filling out the evaluation; therefore, it is subjective.
For the DNP project, the CTDS was kept in its original form, using the same 5-point Likert scale and word-for-word transcription into Qualtrics for the Fall 2021 cohort, since it was a completely virtual format. The tool was not changed in any way and all 11 questions were kept intact for use within the DNP project. The responses were calculated and compared to the score range provided in the instructions. The pre-test scores were compared to the post-test scores for all groups. The scores were then compared from the Critical Care and the Acute Care cohorts to see if a significant difference existed.

**Tool Validity**

Initially, the CTDS had 46 screening questions (Sosu, 2013). During its original evaluation, about half of those questions were eliminated due to poor wording or ambiguity. Another thirteen questions were eliminated because they were not statistically sound questions (Sosu, 2013). The tool’s validity was evaluated using two separate studies with a total sample size of 838 college students comprised of undergraduate and graduate level students enrolled in the college of education. The university where the study took place was not revealed within the published paper. The Cronbach’s alpha scale, or internal consistency, for this tool was 0.79. This high number was derived using the software Statistical Package for the Social Sciences (SPSS). Cronbach’s alpha measures reliability or consistency of the measurement tool questions (Sosu, 2013). Cronbach’s alpha is not a statistical test, but rather a coefficient of a validated tests reliability (Sosu, 2013).

**Intervention and Data Collection**

There were multiple data points considered for answering the question of whether critical thinking was increased by using this blended problem-based learning (PBL) intervention of concept mapping of deteriorating patient case studies. The pre-test scores of the CTDS, the
overall total score, the critical openness score, and the reflective skepticism scores were considered separately. Descriptive statistics were calculated based on these scores to evaluate the data for measures of central tendencies. Ideally a paired $t$-test would be performed, but the small number of participants who completed the project made it is impossible to make statistical inferences. The number of patient assessment data the participants got correct from the concept maps was also evaluated to determine trends. This was determined by reviewing what the participants recorded from the case studies they completed during the project participation. Their answers were evaluated by considering all the assessment data placed in the initial case study; if all the assessment data were not chosen by the participant, then it was marked as incorrect. Ideally, the number of correct assessment data collected from participants would improve over the duration of the project. The number of times concept maps were correctly completed was evaluated and used to help determine increased critical thinking.

**Evaluation and Components of Analysis of Project Results**

The university provided an expert who was an important individual during the statistical analysis process. She assists doctorate level students with her statistical expertise. She verified statistical tests were run for the DNP project. The statistical software SPSS was used to compute the measures of central tendency on the small set of completed data. Measures of central tendency include the mean, median, mode, and standard deviation (SD). These tests were conducted on the pre-test and post-test scores for the total CTDS score, the Critical Openness scores (CO), and the Reflective Skepticism scores (RS). The percentage of correct assessment data were also determined.
Statistical Tests

Data collection for the DNP project was completed January 31, 2022. The clinical question for this quality improvement process was, “Can implementing concept mapping interventions in regular intervals strengthen critical thinking skills and clinical reasoning skills in the NENGRN population?” To answer this clinical question, the plan was to compare the Critical Care cohort scores to the Acute Care cohort scores. There were enough participants with different backgrounds to assess Associate of Science in Nursing graduates and Bachelor of Science in Nursing graduates. Furthermore, most of the participants were of similar age groups, with several participants of two separate age groups, to determine if there was an appreciable difference between the groups.

The first part of the discussion involves the measures of central tendency. These measures include the mean, standard error, median, mode, standard deviation, maximum and minimum scores of the pre-test and post-test Critical Thinking Disposition Scale (CTDS) scores, and the two subsets which make up the total scores. The two subsets of CTDS are Critical Openness (CO) and Reflective Skepticism (RS). Measures of central tendency for the pre-test are shown in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Pre-Test Measure</th>
<th>CO</th>
<th>RS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean scores</td>
<td>27.53</td>
<td>17.40</td>
<td>44.93</td>
</tr>
<tr>
<td>Standard error</td>
<td>0.888</td>
<td>0.584</td>
<td>1.156</td>
</tr>
<tr>
<td>Median scores</td>
<td>28.00</td>
<td>18.00</td>
<td>46.00</td>
</tr>
<tr>
<td>Mode scores</td>
<td>28.00</td>
<td>20.00</td>
<td>41.00</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>3.440</td>
<td>2.261</td>
<td>4.479</td>
</tr>
</tbody>
</table>
Minimum/maximum
39.00/52.00
Standard deviation
4.48

Measures of central tendency for the post-test are shown in Table 2.

Table 2

Post-test Measures of Central Tendency

<table>
<thead>
<tr>
<th>Post-Test Measure</th>
<th>CO</th>
<th>RS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean scores</td>
<td>29.50</td>
<td>18.1667</td>
<td>47.73</td>
</tr>
<tr>
<td>Standard error</td>
<td>0.736</td>
<td>0.449</td>
<td>1.044</td>
</tr>
<tr>
<td>Median scores</td>
<td>29.00</td>
<td>19.00</td>
<td>47.00</td>
</tr>
<tr>
<td>Mode scores</td>
<td>27.00</td>
<td>16.00</td>
<td>45.00</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>2.850</td>
<td>1.740</td>
<td>4.044</td>
</tr>
<tr>
<td>Minimum/maximum</td>
<td></td>
<td></td>
<td>42.00/54.00</td>
</tr>
<tr>
<td>Standard deviation for minimum and maximum scores</td>
<td></td>
<td></td>
<td>1.83485</td>
</tr>
</tbody>
</table>

Please see Appendix K for a chart of the CTDS statistics.

One closed-answer question about the project was asked as part of the demographic data collected. The question was, “Do you feel the education will help you recognize a deteriorating patient sooner?” All fifteen participants answered yes to this question. There were two open-ended questions asked as part of the project demographic data. The first open-ended question was, “Do you feel the concept mapping education helped expand your critical thinking or clinical reasoning skills?” Six participants elaborated on why they felt concept mapping education was helpful. One participant wrote:
Yes, I think the scenarios require you to critically think about the steps you would take to treat the patients we may see in the ED. It requires knowledge about diseases processes as well as practical knowledge about hospital procedures and protocols.

Another participant wrote, “Yes! Even if I didn’t get everything correct, thinking through the steps that I would take, and identifying assessment data helped me to feel like I could at least anticipate some things in the patient’s case.” Yet another participant wrote, “Yes, because it helps us identify what is sick and what is not.” Still another wrote, “Yes, I feel the concept maps and case study scenarios helped me identify critical patients and use critical thinking to identify how to treat them.” The last one wrote, “Yes, but sometimes (a lot of the times) my steps were too broad or too focused and wrong.” Only one participant answered the second open-ended question “What if anything, would you change about the education provided?” The participant answered, “Maybe just that we be able to talk about it in person after completing the maps, but I understand it wouldn’t work with the study format.” These answers to the open-ended questions validated and verified, the participants found the education helpful in both an educational aspect and being able to translate the education to helping them to recognize patients who are deteriorating.

Results

Data collection for the overall project was completed on January 31, 2022, with statistical assistance followed closely thereafter. When the age ranges of the participants were viewed in light of the pre-test/post-test score differences, there was an interesting result noted. Thirteen of the fifteen participants were between the ages of 19-29. Their scores, when averaged, increased by three points from pre-test to post-test. There were two participants who were over the age of 29. Their scores only increased by 1.5 points on average, from pre-test to post-test. It is difficult
to conclude anything significant based on such a small sample size; however, it was interesting to note the younger group’s scores increased scores more than the older group. to start looking at possible trends. See Appendix L, M, and N for further representation of the results.

The main question asked was: “Was concept mapping in regular intervals able to increase critical thinking skills and clinical reasoning skills in the NENGRN population” by the end of their orientation? Even with the small sample size, the answer was yes. One score stayed the same and two others decreased, but the other twelve increased, with an overall positive change in scores by 9%. All the project participants stated they felt the education helped them in their bedside practice.

Although this DNP project had a very small number of participants, it demonstrated concept mapping could work to increase critical thinking and clinical reasoning in NENGRN in their nursing practice. This is an initial step in proving it on a small scale. However, a project with a larger number of participants would be required to confidently state this educational intervention is statistically significant in helping to increase critical thinking and clinical reasoning. It would also be advantageous to see if there is a measurement tool for clinical reasoning to help evaluate both separately. Nursing literature has an abundance of articles supporting the use of concept mapping globally in nursing education to strengthen critical thinking skills in nursing students (Mohammadi et al., 2019). Only one published article was located in which the researcher evaluated critical thinking in a new graduate population and using concept mapping; it was published in 2008.
Discussion

Barriers and Lessons Learned

The Covid pandemic made this project more difficult to implement than it might have been otherwise. The clinical site frequently changed from in-person to virtual several times. The constant changing was due to the local Covid positivity rate, so it was very unpredictable and somewhat frustrating. Due to IRB constraints, the researcher decided to stay with a virtual format since Covid rates fluctuated so frequently. The clinical site tried to change it several times after the IRB application was approved. There was brief consideration of filing an IRB amendment; however, it was decided there was not enough time to go through the process, so the format remained virtual. At least one participant who completed the project stated they would have preferred to have had it in person.

Several participants provided feedback. They thought the concept maps were confusing. The concept maps were not changed during the project; however, they will be adjusted for future use in teaching new graduates, at the request of a specific unit at the clinical site. Adjusting the concept map may allow for a clearer picture of how new graduates think, as well as making it less confusing. Instead of having two places for them to enter what they thought a provider would order, replacing one with a differential diagnosis will allow educators to see what the student thought was wrong with the patient. If it is vastly wrong, then the educator can help to adjust the student’s thinking and explain why the student’s response was wrong. The middle row was also adjusted. It was changed to whom they would call and what resources they would need. This change will assist in continually reinforcing whom to call and why. This knowledge will be crucial when the new graduate completes orientation.
Buy-in for the project was also a barrier. Only two educators within the clinical site demonstrated buy-in for the project. There was no manager or director buy-in for the project. The two educators gave their students a small amount of their regular class time, less than fifteen minutes, to complete their maps and send them back in. Those participants who were offered class time to fill out the concept maps had a significantly higher participation in the project. Over 90% of those with a small amount of class time given to complete the maps completed the project. Those who completed the project stated they found the education helpful and relatable to their jobs. Those who were doing the project without class time support did not complete the project and this was 71% of those who signed up to participate, since there was only a 29% project completion rate. There were no participants who were required to complete the project. All participation was voluntary. In the future, it will be suggested to implement either hybrid or in-person class to ensure both participation and acquisition of knowledge. A hybrid implementation would help those who are not on-site participate without driving in for a short 15–30-minute class. NENGRNs would be encouraged to attend at least one in-person class; as education and nursing literature says, it will help NENGRN create more bonds within their cohort, which increases their retention, and they are less likely to leave prior to completing their first year of employment (Kavanagh & Szweda, 2017).

**Future Implications for Nursing**

From this small project, it is not easy to offer concrete suggestions to improve ASN and BSN education. However, during this project, the researcher found blending problem-based learning and concept mapping did seem to make the learning more relatable to participants. Therefore, making this type of education part of new graduate educational programs could be beneficial. Any time educators can blend different types of learning, more learners will find it
valuable because it will appeal to different learning styles (Knowles, 1998). One example would be to have kinesthetic learning opportunities while using case studies to better engage hands-on learners. Hands-on learning overwhelmingly increases learning retention, according to Knowles (1998).

While discussing the topic of education, hospitals and schools of nursing need to form and maintain partnerships. These partnerships, according to nursing literature, would improve relationships and all staff and administration to find ways to strengthen opportunities so both parties can benefit (Cochran, 2017). It will ultimately improve the caliber of nurses caring for patients because the transition from student to practicing nurse would be more seamless. It would also decrease the TTP according to nursing literature (Kavanagh & Sharpnack, 2021).

Critical thinking and clinical reasoning are vital tools for the NENGRN to possess. These tools will help keep patients safer, help reduce medical errors, and ultimately improve hospital expenditures (Kavanaugh & Szweda, 2017). Strengthening their TTP and shortening this ever-expanding gap may lead to decreased first-year turnover rates, improve job satisfaction, and potentially decrease burnout (Africa, 2017). Starting nursing practice amidst a global pandemic has strained NENGRNs; their lived experiences and coping mechanisms are seemingly ineffective (Casey et al., 2021). Giving the NENGRN additional educational support could improve this lived experience and improve their coping skills.

This DNP project was undertaken because there was an extensive lapse in cohesive education for all NENGRNs who start employment at the clinical site. Although the numbers of data were small, the researcher believes there was a positive outcome from the DNP project. Project results were shared with the executive committees, hospital educator committees, and
hospital educator nursing executives across the system in hopes to make a positive change in NENGRN education to help bring it in more of alignment with IOM/NAM standards.
References


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https://www.doi.org/10.1037/t62781-000


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https://doi.org/https://doi.org/10.1016/j.mnl.2019.06.001


Appendix A

Literature Search Strategy

<table>
<thead>
<tr>
<th>Search Criteria</th>
<th>Key Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years/Language</td>
<td>2017-2020/English</td>
</tr>
<tr>
<td>Key Search Terms Used</td>
<td>critical thinking, clinical reasoning, transition to practice, nursing education, readiness to practice, new graduate nurses, and internship or residency programs</td>
</tr>
<tr>
<td>Age of Subjects</td>
<td>&gt;18</td>
</tr>
<tr>
<td>Search Engines</td>
<td>Google Scholar, Georgia State University Library</td>
</tr>
<tr>
<td>Databases</td>
<td>PubMed, CINAHL, ERIC, Embase, Cochran</td>
</tr>
<tr>
<td>Professional Organizations</td>
<td>National League for Nursing (NLN)</td>
</tr>
<tr>
<td>Government &amp; Regulatory Agencies</td>
<td>Agency for Healthcare Research and Quality (AHRQ)</td>
</tr>
<tr>
<td></td>
<td>American Association of Colleges in Nursing (AACN)</td>
</tr>
<tr>
<td></td>
<td>Center for Medicare and Medicaid Services (CMS)</td>
</tr>
<tr>
<td></td>
<td>Institute of Medicine/National Academy of Medicine (IOM/NAM)</td>
</tr>
<tr>
<td></td>
<td>Quality, Safety, Education in Nursing (QSEN)</td>
</tr>
</tbody>
</table>
Appendix B

Flowchart of Literature Review

Search Criteria & Key Words Identified

Electronic Databases Searched: Embase, Cochran, Eric, PubMed, CINAHL

375 screened for relevance

188 chosen for further appraisal

31 chosen for project appraisal
Appendix C

Project Completion Versus Participants Who Signed Consent Forms

COMPLETED VERSUS TOTAL CONSENTED PARTICIPANTS OF DNP PROJECT

- Acute Care: 7 Completed, 22 Total Consent
- Critical Care: 8 Completed, 29 Total Consent
## Appendix D

Demographic Data of All Project Participants

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Characteristic</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>14</td>
</tr>
<tr>
<td>Age Range</td>
<td>19-29</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>30-40</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>40-50</td>
<td>1</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Caucasian</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Two or more races</td>
<td>1</td>
</tr>
<tr>
<td>Degree</td>
<td>Bachelor of Science in Nursing</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Associate of Science in Nursing</td>
<td>3</td>
</tr>
</tbody>
</table>
Appendix E

Critical Thinking Measurement Tool

### Critical Thinking Disposition Scale

All items utilized a 5-point Likert-type response scale (1 = strongly disagree, 5 = strongly agree). Please choose an answer to the questions below.

<table>
<thead>
<tr>
<th>Critical Openness</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I usually try to think about the bigger picture during a discussion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I often use new ideas to shape (modify) the way I do things.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I use more than one source to find out information for myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am often on the lookout for new ideas.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I sometimes find a good argument that challenges some of my firmly held beliefs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It's important to understand other people's viewpoint on an issue.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is important to justify the choices I make.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reflective Skepticism</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>I often re-evaluate my experiences so that I can learn from them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I usually check the credibility of the source of information before making judgements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I usually think about the wider implications of a decision before taking action.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I often think about my actions to see whether I could improve them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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Appendix F

IRB Stamped Consent Form for DNP Project

Georgia State University
Informed Consent

Title: Strengthening Critical Thinking in the New Entry, New Graduate Registered Nurse Population
Principal Investigator: Dr. Lisa Cranwell-Bruce
Student Principal Investigator: Kristie L. Richardson

Introduction and Key Information
You are invited to take part in a research study. It is up to you to decide if you would like to participate in the study.
The purpose of this study is to see if using concept mapping of deteriorating patient case studies on a regular basis will improve critical thinking in new graduate registered nurses.
Your role in the study will last 12 weeks for acute care residents and 16 weeks for critical care residents (in other words: the length of your residency orientation)
You will be asked to do the following: review a case study every 2 weeks and place the information in a concept map. Once the concept map is completed, you will send it electronically to the researcher.
Participating in this study will not expose you to any more risks than you would experience in a typical day.
This study is not designed to benefit you. It is hoped the research project educational intervention will improve your recognition of deteriorating patients which should in theory improve your critical thinking.
Overall, we hope to gain information to see if concept mapping of case studies in regular intervals will strengthen critical thinking.

Purpose
The purpose of the study is to see if concept mapping of case studies of deteriorating patients in regular intervals will improve critical thinking. You are invited to take part in this research study because you are a New Entry, New Graduate Registered Nurse hired in the timeframe of the study. A total of 250 people will be invited to take part in this study.

Procedures
If you decide to take part, you will be asked to click the link at the bottom of this form

- All research will take place via Piedmont Atlanta Hospital secured Web-Ex platform
- Web-Ex invitations will only be sent to your secured Piedmont email
- You will receive a Qualtrics link to take a pretest questionnaire which is 11 questions long (should take less than 20 min). This will be anonymous.
- You will get an invitation before day 5 of employment to the Web-Ex class.
- Your name will be visible to other participants in the class. Piedmont Atlanta requires cameras to be off and students to be muted unless you are asking a question.
- In the initial class you will be asked to create 2 concept maps about yourself as part of the educational intervention. Then as a group we will create 3 more practice concept maps on case studies of deteriorating patients (this should take about 45 min).

Version Date: 05/13/2021

IRB NUMBER: H21549
IRB APPROVAL DATE: 05/27/2021
• The following Monday you will be emailed a case study to concept map. You will have 5 days to complete the concept map and send it back to the researcher (it should take about 30 min to complete).
• You will be sent a new case study every 2 weeks during the length of your orientation; 12 weeks for acute care new graduates and 16 weeks for critical care graduates for a total 5 case studies to concept map for acute care and 7 for critical care (total time for all concept maps to be created should be around 3.5 hours for critical care cohort and 2.5 hours for acute care cohort).
• If you are interested in general feedback on the case studies, every Friday evening that case studies are sent out. It is optional for you to listen to this. It will be less than 5 min long.
• Once you complete the last concept map you will be given the same questionnaire which is 11 questions long as a post-test via Qualtrics (should take less than 20 min)
• Fill out a short demographic information form (5 to 10 min).
• Acute care graduates total time 5 hours 30 min.
• Critical care graduates total time is 6 hours 45 min.

Future Research
Researchers will remove information that may identify you and may use your data for future research. If we do this, we will not ask for any additional consent from you.

Risks
In this study, you will not have any more risks than you would in a normal day of life. As previously discussed, other participants will be able to see your name in the initial Web-Ex class. The student PI will be able to identify your concept maps by your email address. De-identified concept maps may be stored on the student PI private password protected Piedmont computer. No injury is expected from this study, but if you believe you have been harmed, contact the research team as soon as possible. Georgia State University and the research team have not set aside funds to compensate for any injury.

Benefits
This study was not designed to directly benefit you. There may be no benefits to you. You may benefit from learning how to use concept mapping in the clinical setting. The data obtained may be of future benefit to nurse educators by introducing concept mapping to assist nurses with critical thinking in the clinical setting. It is hoped the research will improve your recognition of deteriorating patients which will possibly improve your critical thinking and your clinical reasoning skills. Overall, we hope to gain information to see if concept mapping of case studies in regular intervals will strengthen critical thinking and/or clinical reasoning skills, thereby improving nursing education strategies.

Alternatives
If you choose not to participate in this study you will have other alternative educational opportunities offered/required by your clinical nurse manager based on the department you are assigned.

Voluntary Participation and Withdrawal

Version Date: 05/13/2021
You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. You may refuse to take part in the study or stop at any time. This will not cause you to lose any benefits to which you are otherwise entitled. Not participating in this quality improvement project will not change or alter your statues as a nurse resident in any way.

Confidentiality
We will keep your records private to the extent allowed by law. The following people and entities will have access to the information you provide:

- Dr. Lisa Cranwell-Bruce and Kristie L. Richardson, MSN, RN
- GSU Institutional Review Board
- Office for Human Research Protection (OHRP)

The study data collected will be stored on the student’s PI work computer at the location of the study. It is single person use and password-protected, in a locked office. This office is only accessed by the student PI and her direct supervisor. De-identified data from Qualtrics will be shared only with the members of the study (faculty PI and co-PI). Anything printed, including completed consent forms, will be stored in a secured locked cabinet on the campus of Piedmont Atlanta inside the locked office, and electronic data will be deleted after it is printed. Consent forms will be provided electronically via Qualtrics. You will be asked to email a copy of the completed consent map to the student PI Georgia State University email address. There will be no collection of IP addresses in an attempt to link study participants to data. You should be aware that data sent over the Internet or email may not be secure. When we present or publish the results of this study, we will not use your name or other information that may identify you. When presenting findings or publishing works there will be no identifying information listed. Test scores of the pre-and-posttests will be used as part of the research. Any concept maps created by you could also be used as part of the research and may be published. If any identifying information has been incidentally collected it will be destroyed. After completion of the study, no email addresses will be retained for further contact. No data will be collected when sending feedback via google link. You will not be able to ask further questions or get any further feedback once you receive the bi-weekly feedback for that concept map.

Contact Information
Contact Dr. Lisa Cranwell-Bruce, DNP, RN at 404-413-1189 or lcranwellbruce@gsu.edu and Kristie L. Richardson, MSN, RN at krichardson52@student.gsu.edu or 470-223-2822

- If you have questions about the study or your part in it
- If you have questions, concerns, or complaints about the study.

The IRB at Georgia State University reviews all research that involves human participants. You can contact the IRB if you would like to speak to someone who is not involved directly with the study. You can contact the IRB for questions, concerns, problems, information, input, or questions about your rights as a research participant. Contact the IRB at 404-413-3500 or irb@gsu.edu.

Version Date: 05/13/2021

IRB NUMBER: H21549
IRB APPROVAL DATE: 05/27/2021
Consent
We will give you a copy of this consent form to keep.

If you are willing to volunteer for this research, please begin the pre-test by clicking the Qualtrics link provided.
Mr. A. is a 72 y.o. who was admitted from the ED about 45 min ago with abdominal pain which started last night at 10pm. He has a working IV, a 20g in his right forearm. He has NG 125 cc/hr infusing without difficulty. His pain is 9/10, it doesn’t radiate, he has + rebound tenderness, and + for nausea. About 20 min ago he became sweaty, diaphanous, and started vomiting again. When you enter his room to check him in you find him with pain at 9/10, rapid, shallow respirations, + bilateral breath sounds, + for shortness of breath, rigid abdomen on palpation, and minimally responsive to voice (semi-conscious). PMH of asthma and left knee replacement surgery 2 years ago. When he arrived to the unit the patient care tech recorded vitals of BP 130/90, HR 130 b.p.m, temp 99.5, sat 90% on RA, pain 7/10. You reassess his vitals BP 70/50, HR 130, R 34, temp 98.3, sat 87%, pain 9/10.
Appendix H

Demographic Survey Used for DNP Project

Demographic Survey for Strengthening Critical Thinking in the New Entry, New Graduate Nurse Population

1. How do you identify yourself?
   a. Male
   b. Female
   c. Other
   d. Prefer not to answer

2. What is your age?
   a. 19-29
   b. 30-40
   c. 40-50
   d. 50+
   e. Prefer not to answer

3. What is your ethnicity?
   a. Caucasian
   b. African-American
   c. Latino or Hispanic
   d. Asian
   e. Native American
   f. Native Hawaiian or Pacific Islander
   g. Two or More
   h. Other/Unknown
   i. Prefer not to answer

4. Degree Type
   a. Associates of Science in Nursing
   b. Bachelor's of Science in Nursing
   c. Other
   d. Prefer not to answer

5. Is English your primary language?
   a. Yes
   b. No
   c. Prefer not to answer

6. Was this education helpful to you as a new nurse?
   a. Yes
   b. No
   c. Prefer not to answer
7. Do you feel the education will help you recognize a deteriorating patient sooner?
   a. Yes
   b. No
   c. Prefer not to answer

8. Do you feel the concept mapping education helped expand your critical thinking or clinical reasoning skills?

9. What, if anything, would you change about the education provided?
## Appendix I

Expense Table

<table>
<thead>
<tr>
<th>Expense</th>
<th>Cost</th>
<th>Depreciation Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Instructor Cost</td>
<td>$1440</td>
<td>n/a</td>
</tr>
<tr>
<td>Annual critical care cohort class attendance cost</td>
<td>$29,889</td>
<td>n/a</td>
</tr>
<tr>
<td>Annual acute care cohort class attendance cost</td>
<td>$15,592.50</td>
<td>n/a</td>
</tr>
<tr>
<td>Lexmark copier</td>
<td>$4484</td>
<td>$560.50/yearly</td>
</tr>
<tr>
<td>Lexmark high yield ink</td>
<td>$1400</td>
<td>n/a</td>
</tr>
<tr>
<td>Paper (per box)</td>
<td>$48.99</td>
<td>n/a</td>
</tr>
<tr>
<td>Projector</td>
<td>$1599</td>
<td>$199.86/yearly</td>
</tr>
<tr>
<td>Total cost</td>
<td>$54,453.49</td>
<td>Total depreciations $760.36</td>
</tr>
</tbody>
</table>
Appendix J

CSHC System-Level Education Department Hierarchy

<table>
<thead>
<tr>
<th>Department Title</th>
<th>Direct Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSHC Executive team</td>
<td>Reports to Board of Directors</td>
</tr>
<tr>
<td>Director of Clinical Education CSHC system</td>
<td>Reports to CSHC executive team</td>
</tr>
<tr>
<td>Executive Director of Nursing Practice and Shared Governance</td>
<td>Reports to CSHC System Chief Nursing Officer</td>
</tr>
<tr>
<td>Executive Director of Clinical Operations</td>
<td>Reports to CSHC System Chief Nursing Officer</td>
</tr>
<tr>
<td>Clinical Education Coordinators (one for each hospital)</td>
<td>Reports to both the Director of Clinical Education and to each hospital’s Chief Nursing Officer</td>
</tr>
<tr>
<td>Unit Based Educators (one for each nursing unit in each hospital)</td>
<td>Reports directly to unit managers, but meets as a group within each hospital</td>
</tr>
</tbody>
</table>
### Appendix K

Critical Thinking Disposition Scale Score Statistics

<table>
<thead>
<tr>
<th>Statistics</th>
<th>pretest_total</th>
<th>pretest_CO</th>
<th>pretest_RS</th>
<th>Post_total</th>
<th>post_CO</th>
<th>post_RS</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
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<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>44.9333</td>
<td>27.5333</td>
<td>17.4000</td>
<td>47.7333</td>
<td>29.5333</td>
<td>18.2000</td>
</tr>
<tr>
<td>Std. Error of Mean</td>
<td>1.15662</td>
<td>0.88837</td>
<td>0.58391</td>
<td>1.04411</td>
<td>0.73593</td>
<td>0.44934</td>
</tr>
<tr>
<td>Median</td>
<td>46.0000</td>
<td>28.0000</td>
<td>18.0000</td>
<td>47.0000</td>
<td>29.0000</td>
<td>19.0000</td>
</tr>
<tr>
<td>Mode</td>
<td>41.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>28.00</td>
<td>20.00</td>
<td>45.00</td>
<td>27.00</td>
<td>16.00&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>4.47958</td>
<td>3.44065</td>
<td>2.26148</td>
<td>4.04381</td>
<td>2.85023</td>
<td>1.74028</td>
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<tr>
<td>Minimum</td>
<td>39.00</td>
<td>21.00</td>
<td>14.00</td>
<td>42.00</td>
<td>26.00</td>
<td>16.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>52.00</td>
<td>33.00</td>
<td>20.00</td>
<td>54.00</td>
<td>34.00</td>
<td>20.00</td>
</tr>
</tbody>
</table>

<sup>a</sup> Multiple modes exist. The smallest value is shown
Appendix L

Critical Thinking Disposition Scale Scores for Pre-test/Post-test Total Scores
Appendix M

Critical Thinking Disposition Scale Differences in Pre-test & Post-test Scores
Appendix N

Participant Answers for Number of Correct Assessment Data

Chosen from Completed Concept Maps

![Number of Correct Assessment Data from Completed Concept Maps](image)