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Analyzing Concept Mapping Integration Into a BSN Curriculum Using the H-PEPSS Survey

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This doctoral project, directed and approved by the candidate's committee, has been accepted by the College of Graduate and Professional Studies of Abilene Christian University in partial fulfillment of the requirements for the degree

Doctor of Nursing Practice

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School of Nursing

Analyzing the Outcomes of Concept Mapping Integration Into a BSN Curriculum Using the H-PEPSS Survey

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by

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Dedication

Thank you to my family for providing support, compassion, and love throughout this process. This degree is as much yours as it is mine. The enduring and continual love regarding my educational progress and career represents our family's strength. Thank you to my chair and committee members for your continued patience, knowledge, professionalism, and support throughout this process. I am forever grateful to you.

Acknowledgments

"We are the music makers, and we are the dreamers of the dream."

– Author William Edgar O'Shaughnessy

Pursuing any advanced academic degree requires a supportive team to complete the journey. In the beginning, 2 years sounded incredibly brief, but the long days required the same energy and determination to gain the joy of achievement. Words are not enough to express the value of each team member, with many applauding this last and final degree in nursing. Thank you to the committee members and chairs who supported every step while providing the paving stones one by one until each was set perfectly and mortared. Thank you, Dr. Faisal Aboul-Enein, Dr. Sandra Cleveland, and Dr. Theresa Naldoza; your guidance allowed what seemed impossible to achieve at times. Thank you to Ms. Cheryl Day for sharing each challenge as an opportunity for more significant outcomes. Thank you to the fall class of 2022; your participation in this project is appreciated. Your willingness to trust this project and your continued involvement during each week of instruction allowed you to gain the necessary knowledge, skills, and abilities to become stronger practicing nursing professionals. Thank you to the institutions for providing educational opportunities of this magnitude to occur within the classroom dedicated to curricular enhancements.

Abstract

Background: This project's foundational focus was on improving nursing students' preparedness for their profession and patient care. Data supports that nursing graduates face challenges at the patient bedside, which often cause injury or harm. These deficits are known as preparation-to-practice, failure-to-rescue, and transition-to-practice gaps that occur despite the integration of preceptorship and residency programs. Through the integration of concept mapping into an established curriculum, an analysis of student patient safety perceptions in a pre- and postsurvey was completed. Method: This quality improvement project received approval from the institutional review board. The project was a quasi-experimental, nonrandomized, single-blinded design measuring first-semester student patient safety perception using a pre- and postsurvey. The data collection tool was the Health Professional Education in Patient Safety Survey, a 44-item Likert design. The student sample sizes included presurvey (N = 52) and postsurvey (N = 37) first-semester adult health students. An independent means t test analyzed the data using the Statistical Package for Social Sciences 27. A p-value of < .05 determined data significance. Cohen's d-independent sample effect size was 0.91. The independent t test of equality of means determined the data significance of 64 items. Results: Two hypothesis statements were focused on patient safety awareness improvements. Of the 64 data points, 53 survey items met data significance, while 11 items failed to meet data significance. The Health Professional Education in Patient Safety Survey tool represented the essential quality standards for improving the preparation-to-practice gaps noted in the literature. Conclusion: Overall, the items of nonsignificance revealed specific areas dedicated to improvements in a baccalaureate nursing education curriculum that directly impact safe patient care. These areas focus on communication, recognizing adverse events, and hand hygiene practices.

Keywords: concept mapping, BSN nursing students, clinical care plans, clinical reasoning, concept maps, concept mapping, content analysis, entry-level competency, mind mapping, novice nurses, nursing curriculum, nursing education, patient safety, preparation-to-practice gap, self-efficacy

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Chapter 1: Introduction

Florence Nightingale, the founder of the initial nursing care protocols, established the value of observation, interpretation, and implementation of actions in response to patients deteriorating conditions. Today, nursing education curriculums incorporate Nightingale's initial protocols to include the nursing process focusing on assessment, nursing diagnosis, planning, implementation, and evaluation (Tanner, 2006). The nursing process represents the foundational tools necessary to educate nursing students on holistic care values while developing advanced clinical processing skills. However, recent data reveals that nursing students and graduates lack the essential clinical reasoning skills in application and patient care performance (Hunter & Arthur, 2016; Kavanagh & Szweda, 2017; Tanner, 2006). This project analyzed methods dedicated to implementing processes and strategies to improve these performance gaps while focusing on improving patient safety outcomes through curriculum modifications.

Problem Identification

The literature supported baccalaureate nursing students entering the nursing practice as new graduates lack the clinical reasoning skills necessary to perform safely at the bedside (Dickison et al., 2019; Gonzalez, 2018; Hunter & Arthur, 2016; Jessee & Tanner, 2016; Kavanagh & Szweda, 2017; Liou et al., 2016). Unfortunately, despite demonstrating competency according to National Council Licensure Examination (NCLEX) exam board scores, these nurses are deficient in the skills necessary to meet graduate nursing expectations (Alfayoumi, 2019; Chen et al., 2011; Levett-Jones et al., 2010; Mohamed Bayoumy & Albeladi, 2020; Powers et al., 2019; Purling & King, 2012). Despite the student success in obtaining registered nurse (RN) licensure, postgraduation performance indicates a preparation-to-practice gap between education expectation and clinical practice (Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017;

Levett-Jones et al., 2010; Liou et al., 2016; Powers et al., 2019). The rationale related to this phenomenon indicates that while nursing students are skilled in answering exam questions, they cannot assimilate the patients changing conditions accurately, timely, and safely perform at the bedside (AlMekkawi & El Khalil, 2020; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Mohamed Bayoumy & Albeladi, 2020; Powers et al., 2019; Purling & King, 2012). The practice phenomenon is known as the failure-to-rescue theory (AlMekkawi & El Khalil, 2020; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Mohamed Bayoumy & Albeladi, 2020; Powers et al., 2019; Purling & King, 2012). A disconnect of this nature in a profession where the patient care continuum is a priority represents an essential missing cornerstone of nursing practice that is vital for patient safety standards (Hunter & Arthur, 2016; Jensen, 2013). A pivotal opportunity exists for nursing education programs to accept the challenges of developing meaningful curriculum standards that evaluate clinical reasoning and bridging the preparation-to-practice gaps while creating competent and safe bedside nursing professionals. The value of these approaches starts at the entry-level of a baccalaureate school of nursing (BSN) education (Mohamed Bayoumy & Albeladi, 2020). It is essential to evaluate the nursing education curriculum to meet the state boards of nursing expectations while preparing students to assume their roles as nursing professionals upon graduation.

Background: Patient Safety Concerns

A retiring nurse represents an experience that is not easily replaceable, as the expertise requires years of patient care that graduate nurses do not possess. Nursing clinical demands require educational preparation for the new graduates to assume independent and competent care and become integral members of their patient care team upon hire (AlMekkawi & El Khalil, 2020). The literature emphasized that baccalaureate graduates were ill-equipped to take charge in

an emergent situation due to the lack of clinical reasoning abilities to promote safe patient decisions. According to Benner's novice-to-expert theory, this performance phenomenon classifies the nurse's inability to determine the appropriate proactive care based on the stage of their nursing career development (AlMekkawi & El Khalil, 2020; Chism, 2016; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Liou et al., 2016; Powers et al., 2019; Purling & King, 2012). However, the observed deficits are not the fault of the graduates, but unfortunately, these graduates begin their careers deflated due to potentially antiquated curriculum standards.

Hospitals often extend residency or nursing preceptorship programs to assist in standardized practice transitions upon hiring graduate nurses. The preceptorship program design provides transitional practice processes lasting between 3 to 13 weeks, with an average of 9.8 weeks dedicated to transitioning graduate nurses into independent team members (Powers et al., 2019). Nursing graduates are introduced to the essential skills for their specialty during their preceptorship or residency programs but often with steep learning curves involving limited critical thinking and application opportunities. These postgraduate development programs are designed to provide nurses with specialized learning approaches in their selected field of patient care. However, these programs are expensive for hospital organizations, costing $49,000 to $92,000 per new graduate (Powers et al., 2019). Unfortunately, despite the hospital's dedication to the new graduate education, most nurses lack hospital magnetism, with 25% resigning from their roles after their first practice year (Powers et al., 2019). The rationale for these departures includes burnout, lack of preparation for their position, elevated performance expectations, unstable support systems, and patient healthcare complexities (Purling & King, 2012). The education of graduate nurses represents an expensive proposition for hospitals to bridge the gaps

between educational preparation into competent clinical practice. Improving these gaps requires nursing education programs to revitalize their nursing curriculum programs to meet the advancing healthcare needs of today's patients.

Research Location

The project occurred at a teaching and medical institution in Southeast Texas, founded in 1881, with the school of medicine providing the early indoctrination of medical science education. In 1890, the nursing school at the institution offered its first classes with a continued focus on program expansion and meeting the educational cornerstones for nursing students and their patients. Today this institution provides schooling in medical, nursing, health profession specialties, and biomedical sciences while offering baccalaureate, master's, and doctoral degrees across the programs.

As a BSN faculty member and an alum of the nursing school, it is understood how the mission, vision, and values represent an integral portion of the educational curriculum provided to all enrolled students. These values mirror the historical progress observed since the first nursing courses in 1890. The academic curriculum focuses on the transformational demands of today's technology and the advancing career dynamics necessary for graduated nursing professionals across all degree programs. Although essential for the graduate nursing professional, the nursing skills and expectations observed by Florence Nightingale no longer meet today's basic patient care demands. The nursing school understands the value of forecasting tomorrow's demands as technology and patient care surpass expectations. The institution approval letter for the research conduct is in Appendix A.

Project Innovation

The pathway to developing transformational leaders begins with educators who create innovative methods to alter educational pedagogies while surpassing the NCLEX examination standards. In August 2018, nursing faculty at the study institution was introduced to the Apple Certified Teacher program with a designated focus on creating active learning environments across the curriculum. The hosting university developed the Innovative Learning Environment Accelerating Discovery (ILEAD) program, with the first iPad distribution among first-semester students beginning with the summer 2019 student cohort. The goal of the ILEAD program included integrating apple technology while improving student engagement with their educational resources and course content and maintaining a dedication to creating competent BSN nursing professionals. In 2023, the next-generation NCLEX standards will expand the intensity of the board exams while meeting the increasing demands for today's nursing graduates' clinical reasoning and critical thinking abilities. The partnership of concept mapping and the next-generation NCLEX board exam standards represents an optimal time to explore active learning strategies in the curriculum.

Concept mapping allows faculty to integrate the nursing process components within all curriculum realms. Students visualize content through concept mapping approaches by creating effective planning and implementation strategies dedicated to clinical reasoning learning strategies. One area where concept mapping improves clinical reasoning and safe practice occurs through patient care planning approaches. Literature supports the utilization of concept mapping compared to the current linear care plans, which segregate patient data among multiple pages while providing a limited visual representation of the concepts essential for clinical reasoning development and patient care (Cook et al., 2012; McDonald et al., 2018; Schuster, 2000).

Concept mapping integrates patient care data into a meaningful and visual learning experience within a single working document while enhancing student learning and clinical reflection regarding their patient, concept, and nursing process continuums (Cook et al., 2012; McDonald et al., 2018; Schuster, 2000). Students today were exposed to technology in most cases during their youth; therefore, visual learning is a method that engages these students with their educational concepts.

The hosting university's immersive and integrated iPad technology program yields positive learning opportunities for students to create concept mapping plans using applications such as SimpleMind+, acquired through Apple (SimpleMind App, 2020). Additionally, Microsoft offers mind mapping software, including Mind Map Touch and Power Mind Map. Recently, the Miro organization has offered active mind mapping web-based software for data integration (i2e Consulting, 2016; Miro, 2021). Therefore, as faculty, exploring these concept mapping options throughout the curriculum is necessary to expand student engagement opportunities with the concepts throughout each learning phase (Alfayoumi, 2019; Herron, 2017). These opportunities include didactic, simulation lab, and clinical to incorporate transformative and progressive learning across the curriculum (Alfayoumi, 2019; Herron, 2017).

Since beginning the iPad program, faculty have initiated learning opportunities by expanding the iPad technology into the classroom, simulation lab, and clinical learning environments. The active learning integrations have demonstrated positive outcomes based on the course reviews from the first-semester students since the 2018 initiation. However, further qualitative measurements are necessary to determine if the concept mapping integration achieves the desired clinical reasoning skills and patient safety core competencies essential for meeting the professional clinical spectrum expectations. The clinical partners associated with the

placement of the nursing students express a continued weakness in clinical reasoning processing skills, communication, and the assessment of patient safety concerns despite progressive NCLEX scores of 94% in 2015 compared to 99% in 2019.

The current NCLEX pass rates support the institution's innovative successes, yet the clinical partners' suggestions reflect continued clinical performance weaknesses. Although the institution graduates are respected as high-quality nursing professionals, these graduates remain deficient in the clinical reasoning skills necessary to promote patient care wellness and safety protocols. These weaknesses are substantiated by the literature indicating alterations in the curriculum are essential for improving professional gaps known as failure-to-rescue, preparation-to-practice, and transition-to-practice (AlMekkawi & El Khalil, 2020; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Liou et al., 2016; Mohamed Bayoumy & Albeladi, 2020; Powers et al., 2019; Purling & King, 2012). Gonzalez (2018) and Kavanagh and Szweda (2017) reported that 28% of the graduate nurses surveyed were unsafe to practice due to an inability to recognize life-altering assessment alterations. The idea of this project proposal examined if concept mapping supported advancing clinical reasoning skills and improved safe patient outcomes by reducing the phenomenological gaps noted within the graduated nursing professionals and clinical practice as documented in the literature.

Theoretical Support

The novice-to-expert theory by Patricia Benner supports the focus of this project. The project support was addressed based on the capabilities of the graduate nurse and the importance of curriculum enhancements throughout the student nursing education. The novice-to-expert theory focuses on the abilities of nursing professionals from graduate level to expert based on the perceived knowledge and years of experience. The application of this theory and this project was

directly associated with patient safety based on clinical reasoning and the proactive thinking abilities of nurses within each of the performance levels. The following paragraphs support these differences.

Postgraduation Outcomes

Graduate nurses enter their professional roles with limited independent patient care experiences and often at the Benner theory's novice level. According to Patricia Benner, the novice-to-expert theory outlines the expectations of nurses toward improving their nursing skills through patient experiences and the guidance of preceptorship and residency programs (Bowen & Prentice, 2016; Dickison et al., 2019; Herron, 2017; Kavanagh & Szweda, 2017; Kelly & Mcallister, 2013). Nursing education focuses on preparing nurses for general practice with the expectation that their employer will decrease the gaps essential for the nurse's selected specialty, including advancing the clinical reasoning and judgment for patient care advocacy (AlMekkawi & El Khalil, 2020; Dickison et al., 2019). Graduate nurses are novices in their fields and require ongoing developmental mentorship to guide them through each patient care phase to develop growth potential and quality assessment standards (Blum, 2010; Chism, 2016).

The nurse advances through Benner's five development phases, beginning as a novice and progressing through advanced beginner, competent, proficient, and expert levels (Blum, 2010). The theory presents an evident dynamic that appropriately applies to the graduate nurse's ability to perform proactively at the bedside, beginning at the early developmental stage of their nursing careers (Chism, 2016). Upon hiring new graduates, hospitals typically offer a residency program or a nursing preceptorship with an immersive educational focus on practice transitions and developing the educational opportunities that aid the new graduate's growth potential. However, in most cases, the preceptorship lacks substance, failing to elevate the graduate nurse's

potential from the novice level (Bowen & Prentice, 2016; Dickison et al., 2019; Herron, 2017; Kavanagh & Szweda, 2017; Kelly & Mcallister, 2013; Levett-Jones et al., 2010; Powers et al., 2019; Purling & King, 2012). Most preceptor programs are between 3 to 13 weeks, with an average span of 9.8 weeks dedicated to the transition of the nursing graduate into an independent nursing team member (Powers et al., 2019). Nursing graduates are provided developmental opportunities during their residency and preceptorship programs to expand clinical reasoning skills related to their specialty. Unfortunately, integrated steep learning curves and limited clinical exposures to practical clinical reasoning scenarios fail to enhance development during these educational opportunities.

Active BSN Student Education

Benner's novice-to-expert theory also applies to student development, beginning with acceptance into nursing school. The foundational development courses focus on the novice skills necessary for performing clinically at the bedside while also focusing on the enriching content designed to enhance the clinical reasoning processes that lead to safe practice (Blum, 2010; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Mohamed Bayoumy & Albeladi, 2020). According to Benner's theory, the entering students are at the novice level of their education and careers. Students are exposed to advanced, intuitive, or expert-level processing skills throughout their nursing education (Blum, 2010; Tanner, 2006). However, passive learning strategies provide limited concept assimilation opportunities leading to the failure-to-rescue phenomenon among new graduates. Nursing institutions and their faculty are responsible for delivering consistent clinical reasoning activities across the curriculum, with dedicated milestone analysis occurring within each progressive semester (Blum, 2010; Gonzalez, 2018; Herron, 2017; Mohamed Bayoumy & Albeladi, 2020). Patient care institutions lack the resources to

bridge the gaps with the current preceptor and residency programs for entry-level nursing professionals. These statements are further evidenced by the lack of magnetism following the first year in the profession, with 25% of new nurses citing ill-preparedness for the patient care challenges. Therefore, nursing curriculum standards must be revised to meet the health demands of today's complex patients.

At the educational level, multimodal opportunities expose students to clinical reasoning with concept mapping applications and inquiry-based learning methods that improve content assimilation (Akinsanya & Williams, 2004; All & Havens, 1997; All & Huycke, 2007; All et al., 2003). Three focus areas must occur for the development of clinical reasoning to occur. These factors include (a) the ability to assimilate new data, (b) the integrative ability for the development of conceptual hierarchies, and (c) the elimination of rote learning activities, all of which are achieved through concept mapping integration (All & Havens, 1997; All & Huycke, 2007; All et al., 2003; Chen et al., 2011; Garwood et al., 2018). Concept mapping is the cornerstone of creating advanced clinical reasoning skills and the first step in bridging performance weaknesses.

Multiple learning opportunities in academia enhance students' growth processes in their professional careers. These activities include lab simulation, clinical, unfolding case studies, didactic active learning approaches, and concept exam reviews rather than question reviews (All & Havens, 1997; Gerdeman et al., 2013; Taylor & Wros, 2007). Students who are challenged to think critically in the educational setting will adapt professionally to the patient care complexities they will face in their careers. Additionally, students who are provided with learning opportunities to formulate concept maps for exam preparation, study groups, and think-

aloud sessions foster clinical reasoning skills in conjunction with content immersion (All et al., 2003; Banning, 2008; Gerdeman et al., 2013; Lee et al., 2016).

Concept mapping presents multiple opportunities to expand the students' competency throughout their education and professional practices. Additionally, concept mapping provides nursing students the opportunities to broaden their novice knowledge throughout their academic tenure for promotion into experienced novices with advanced clinical reasoning skills upon graduation (Aein & Aliakbari, 2017; Akinsanya & Williams, 2004; Atay & Karabacak, 2012; Bilik et al., 2020; Garwood et al., 2018; Gerdeman et al., 2013). As supported by the literature, Benner's novice-to-expert theory represents an assimilation of knowledge not limited to the practicing nursing professionals but also applies to the nursing student's advancing critical thinking processes for promoting safe and holistic patient care.

Clinical Reasoning Model

The literature reviews supported clinical reasoning development by integrating concept mapping to decrease the preparation-to-practice gap for promoting safe practicing nurse clinicians at the bedside. Graduate nurses are ill-prepared for their roles postgraduation (Carvalho et al., 2017; Dickison et al., 2019; Gonzalez, 2018; Kavanagh & Szweda, 2017; Liou et al., 2016). The innovation of clinical reasoning develops over time and requires exposure to alternating thinking processes (Gonzalez, 2018; Jessee & Tanner, 2016; Orban et al., 2017). The clinical reasoning model depicts the eight assimilation processes necessary for students to assimilate patient assessment, lab, and medical data while creating accurate decisions regarding the patient's altering conditions (Levett-Jones et al., 2010; Liou et al., 2016). These processes include (a) patient situation, (b) assessment, (c) process of information, (d) problem identification, (e) goal, (f) implementation, (g) outcome evaluation, and (h) reflection while

mirroring the five unique attributes of the nursing process (Levett-Jones et al., 2010; Liou et al., 2016). The clinical reasoning model allows students an opportunity for reflection and evaluation, which further exemplifies active learning applications by allowing the advancing thinking skills necessary for their success.

The clinical reasoning model was developed based on exposure to patient care experiences through continual feedback and reflection loops in the student's education. The overall cycle involves an integrated and consistent immersion of experiences through each stage while utilizing multiple applications to achieve success (Carvalho et al., 2017). The support for the clinical reasoning model is based on the integration of five rights that drive concept assimilation. These defining elements include (a) right cue, (b) right patient, (c) right time, (d) right action, and (e) right reason for assuming the essential patient care for developing assessment alternations safely (Levett-Jones et al., 2010, pp. 517–519). Nursing students require continual exposure to the altering patient care dynamics early in their academic careers to support patient safety efforts and clinical reasoning development (Levett-Jones et al., 2010; Liou et al., 2016). The clinical reasoning activities permit the students to bridge the preparation-to-practice gaps early in their educational practice and at the beginning of their professional careers. In conjunction with the acceptance of professional progression, the clinical reasoning model allows student nurses to gain confidence in their practice while proactively addressing their patient's altering dynamics and integrating theory and model applications (Dickison et al., 2019).

Nature of the Project

The literature review supported the utilization of concept mapping activities to improve the phenomena in clinical performance known as preparation-to-practice, failure-to-rescue, and transition-to-practice gaps in nursing clinical practice as the causation for direct patient safety

errors. Additionally, the literature supported that gap observations occur based on ineffective data assimilation throughout a student's nursing education. Therefore, a measurement tool, the Health Professional Education in Patient Safety Survey (H-PEPSS), examines patient safety performance measures based on consistent data assimilation within an educational environment (Ginsburg, Castel et al., 2012; Ginsburg, Tregunno et al., 2012). Ginsburg, Castel et al. (2012) conducted two focus studies addressing the importance of integrating the essential clinical concepts necessary for quality improvement initiatives. Throughout the student's continual immersion in clinical reasoning, health education students are provided the tools to enhance patient safety and preparedness across each educational setting.

The H-PEPSS survey is a 44-item Likert scale design focusing on six specific competencies students often experience in clinical settings. These clinical competencies and patient safety initiatives focus on (a) culture, (b) inter-collaborative teams, (c) communication, (d) safety protocols, (e) recognition of human and environmental elements, and (e) adverse event recognition (Ginsburg, Castel et al., 2012). Ginsburg, Tregunno et al. (2012) utilized a one-way analysis of variance (ANOVA) for a cross-sectional longitudinal evaluation of 1,779 medical students, 2,196 nursing students, and 521 pharmacy students. The ANOVA report from Dr. Ginsburg's survey suggested that an increased emphasis was needed in the health education professional curriculums on patient safety across all six surveyed domains (Ginsburg, Tregunno et al., 2012). The survey represents a student's perception of patient safety initiatives; therefore, they may exhibit greater or less confidence than observed in their practice settings.

The measurement tool and PICOT question focused on the nursing student's growth in clinical reasoning using the H-PEPSS survey distribution focusing on patient safety perceptions. The prospective student sample represented 130 to 150 students and approximately one-quarter

of the total school population of 550 to 600 nursing students. The sampling period occurred at the beginning and the end of the surveyed semester. Student identities remained confidential with a single-blinded research and data analysis process approved by the institutional review board (IRB) for this project.

Lastly, the survey examined the student's perception of patient safety competence at the entry to practice phase of their education (Ginsburg, Castel et al., 2012). Analyzing the student's assessment at the beginning of their nursing education is essential to determine entry-level patient safety confidence levels. Appendix B supplies the approval of the H-PEPSS tool for this project's utilization from Dr. Liane Ginsburg on April 12, 2021. Appendix C provides a copy of the H-PEPSS tool as created by Dr. Liane Ginsburg.

PICOT Question

"Does concept mapping integration into a BSN course curriculum support the development of clinical reasoning skills and patient safety perception in BSN first-semester nursing students?" The population (P) represented BSN nursing students, the intervention (I) represented concept mapping, the comparison (C) of pre- and postsurvey evaluations, and outcomes (O) to determine if patient safety focuses through clinical reasoning skills improved based on student performance measures following concept mapping interventions and (T) through a single semester analysis.

The hypothesis included a null and an alternative hypothesis statement to address the data analyzed for this project. These statements included:

H_0: The postsurvey scores following a semester integration of concept mapping *will not* improve the student's patient safety perceptions.

H_1: The postsurvey scores following a semester integration of concept mapping *will* improve the student's patient safety perceptions.

The research was a quantitative approach to assess if clinical reasoning skills improve through concept mapping integration throughout a designated semester. The pre- and postsurvey analysis using the selected H-PEPSS format will determine if patient safety awareness among the student population occurred. The study implementation occurred within a single-semester evaluation of first-semester students.

Problem Significance and Purpose

The BSN program is committed to student education within continual concepts across the curriculum while actively engaging in safe clinical practice measures. The American Association of Colleges of Nursing Essentials of Baccalaureate Education focuses on developing a generalist nursing professional (Powers et al., 2019). The nursing specialties such as critical care represent areas of patient care that require advanced practice nursing skills, which the generalist practicing nurse often lacks upon graduation (AlMekkawi & El Khalil, 2020; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Mohamed Bayoumy & Albeladi, 2020; Powers et al., 2019; Purling & King, 2012). Approximately 25% of graduate nurses gravitate toward these patient specialty areas despite the baccalaureate curriculum design focused on the care of the adult medical or surgical patient or the generalized patient (Powers et al., 2019).

Critical patient care specialties require an advanced practice nurse for these high-acuity patients. Nurses who assume these roles must possess advanced clinical reasoning skills, which graduate nursing professionals lack in both readiness and role performance (AlMekkawi & El Khalil, 2020; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Liou et al., 2016; Powers et al., 2019; Purling & King, 2012). It is understandable why the

professional role expectations far exceed the generalized and educationally prepared graduate nurse. In critical care areas, patients are often unstable; therefore, it is the nurse's responsibility to discern when subtle status changes indicate progressive patient instability (AlMekkawi & El Khalil, 2020; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Liou et al., 2016; Powers et al., 2019; Purling & King, 2012). Unfortunately, a graduate nurse will incorrectly analyze these subtle changes and fail to address an opportunity to assume a proactive role in the patient's care (AlMekkawi & El Khalil, 2020; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Powers et al., 2019; Purling & King, 2012). Educational institutions and partnering hospital organizations are responsible for bridging the expectations of the graduated nursing professionals.

Hospital organizations partner with BSN programs to outline clinical reasoning development objectives within the nursing and clinical curriculums while focusing on graduate nurse proficiency evaluations. The Institute of Medicine (IOM) urges organizations to adhere to these patient safety evaluations (as cited in Kohn et al., 2000). Medical errors represent the third leading cause of death among hospitalized patients, with an estimated 44,000 to 98,000 affected lives each year (Kavanagh & Szweda, 2017; Kohn et al., 2000). There is an urgency related to these statistics and the ineffective preparedness of nurses at the bedside.

Based on the national hospital statistics dated between 2012–2015 that surveyed an estimated 5,000 new graduate nurses, there was a noted urgency to eliminate the determined practice gaps. The survey results revealed that 8% of the nurses were considered safe practitioners compared to 2005 data indicating a 35% safety occurrence (Kavanagh & Szweda, 2017). The performance statistics show alarming results regarding patient care. Evidence-based data suggested that from 2011 to 2015, an average of 23.2% of graduate nurses were inept when

determining if an urgent or altering change in their patients occurred or if the nurses were unable to create an effective plan of care regarding the patient's situational alterations (Kavanagh & Szweda, 2017). Additionally, reports revealed that an average of 54.4% of new graduates are unprepared to manage a patient status change requiring urgent patient care management skills (Kavanagh & Szweda, 2017). In summary, graduates who failed to follow the acceptable and expected nursing practice protocols were between 1,160 and 2,720 out of the 5,000 evaluated in this study (Kavanagh & Szweda, 2017). These staggering outcomes reflect 2011 and 2015 data; however, the information further supports the continued problems observed today within the clinical settings.

The data further substantiated the importance of educational preparation before practice to prevent unacceptable and inexperienced patient safety complications for hospitalized patients. The historical value of observations indicates when the errors and the suggestions to improve patient care practices were initially discovered. Nurses are responsible for critically analyzing data and implementing effective proactive decisions regarding patient care, as supported by the 2000 IOM report (as cited in Kohn et al., 2000). However, closing the preparation-to-practice gap requires enhanced nursing education curriculums to begin the cyclic clinical reasoning processes necessary for safe patient care delivery (AlMekkawi & El Khalil, 2020; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Powers et al., 2019; Purling & King, 2012).

Definition of Key Terms

Care plans. Care plans represent nursing learning tools based on the nursing process, including assessment, nursing diagnosis, planning, implementation, and evaluation. Care planning examines the student's ability to process the patient data toward achieving the highest outcome quality (Hipfner et al., 2017).

Clinical judgment. Tanner (2006) defines clinical judgment to include the following five criteria: (a) nursing knowledge, (b) patient knowledge, (c) unit culture and protocols, (d) the ability of the nurse to assimilate the patient data, and (e) practice reflection. Combining these distinct criteria allows the nursing professional to provide optimal patient care outcomes. Clinical reasoning and clinical judgment are often utilized within the same context.

Clinical reasoning. Clinical reasoning represents advanced thinking skills utilized by nursing professionals for making competent and proactive clinical decisions for their patients. The skills development begins in nursing school with an increased immersion into the concepts, the nursing process, and the creation of the most effective care plans for their patients (Rochmawati & Wiechula, 2010). Graduate nurses, upon graduation, are inept in these skills in response to inadequate patient assessment assimilation (Alfayoumi, 2019).

Concept mapping. Concept mapping represents visual applications utilizing the nursing process to organize patient care data focused on nursing students' advanced thinking abilities (Mammen, 2016). Concept mapping was created in 1972 by Joseph Novak at Cornell University for information assimilation in children's education (Cañas & Novak, 2009).

Critical thinking. Critical thinking is a valuable nursing skill utilizing the nursing process toward analyzing the most effective interventions and evaluation of the patient ongoing dynamic alterations (Papathanasiou et al., 2014). In the context of this study, critical thinking incorporates assessment assimilation that establishes patient care standards in an emerging event. Clinical reasoning, critical thinking, and clinical judgment are often used interchangeably in research.

Scope and Limitations

The limitations of this project focused on the progressive incorporation of concept mapping within a BSN curriculum with first-semester students during a single semester. The data limitations did not provide statistically significant results due to the student's exposure to the concept mapping exercises over a semester. Secondly, the survey form of the selected measurement tool limited data significance. The students may choose what they feel is the correct response without considering their honest viewpoints. The H-PEPSS survey distribution occurred in a pre- and postsurvey. All enrolled students participated in the concept mapping exercises regardless of their enrollment in the survey and research. The student's participation in the study did not directly correlate with their course performance or outcomes.

Each semester, the nursing school faculty focused on concept delivery and active learning strategies; therefore, the first-semester students represented the only known cohort actively immersed in concept mapping approaches. As a researcher in this project, I was also the assistant professor in the first-semester adult health course the participating students were enrolled. Therefore, hiring a research assistant for student consent and survey collection prevented potential bias. For this study, the examined data included a presurvey, postsurvey, and consent process; however, the curriculum was not altered regardless of student participation.

Lastly, any conflict of interest was minimized through the volunteer support of an assistant researcher responsible for educating the students on the quality improvement project, collecting the student's consent forms, and providing the pre- and postsurvey distribution to the students who were enrolled in the study. There was no outside funding provided for this project, and the participants did not receive any stipends or financial reimbursements for their participation.

Chapter Summary

The data provided educational institutions with opportunities to review their current educational curriculums to determine where modifications were necessary to improve the clinical reasoning processes of safe patient care. Baccalaureate nursing programs must initiate educational applications that challenge the status quo of nursing education. The American Association of Colleges of Nursing (AACN) Essential VII addresses patient safety and predictive factors that directly impact the clinical patient and population health standards (Dearmon et al., 2011). The academic modifications must incorporate innovative learning strategies within the current curriculum standards to include essential thinking strategies for students to develop advanced preparation following graduation (Cook et al., 2012; Dearmon et al., 2011).

Students learn based on unique styles, including tactile, audio, visual, or multimodal preferences; therefore, it is the professor's responsibility to focus on each learning style throughout the curriculum (Akinsanya & Williams, 2004; All & Havens, 1997; Billings & Halstead, 2012). This process ensures that each student can perform within their preferred learning strategies for effective concept assimilation and application (Akinsanya & Williams, 2004; Billings & Halstead, 2012). Therefore, each clinical, lab, or didactic experience must reflect on the content connections rather than content presentations (Billings & Halstead, 2012). The inclusion of case studies provided an advanced clinical reasoning approach for concept assimilation and clinical reasoning development (Billings & Halstead, 2012). The transformation of passive to active delivery of concepts emphasizes student engagement and promotes progressive thinking processing abilities (Billings & Halstead, 2012). Cross-linking the data occurred through concept mapping while increasing student learning opportunities for data assimilation and practice (Aein & Aliakbari, 2017; Alfayoumi, 2019; Bradshaw et al., 2021).

Evidence suggests that the inclusion of concept mapping provides effective student engagement with meaningful learning activities that inspire inquiry and assimilation within each element of their education and learning styles (All & Havens, 1997; Atay & Karabacak, 2012; Bilik et al., 2020; Bradshaw et al., 2021). Meaningful learning occurs because of (a) the occurrence of concept assimilation using varied cognitive reasoning approaches, (b) the hierarchical placement of concepts within a mapping strategy, and (c) enforcing the assimilation of concepts over memorization for promoting deeper versus linear learning (All & Havens, 1997). Students are assigned content-rich resources. However, a student who fails to prepare for a learning activity utilizing only the assigned resources will obtain minimal knowledge assimilation throughout their education (All & Havens, 1997; Herron, 2017; Kelly & Mcallister, 2013). Educational alterations in content delivery throughout the curriculum should be dedicated to improving the graduated nursing professional's clinical reasoning outcomes for safe and proactive patient care. The modifications in education represent a necessary benchmark for institutions to develop solutions focused on increasing the competency standards for safe practicing nursing graduates (Kelly & Mcallister, 2013).

The utilization of concept mapping creates positive learning opportunities for students to connect concepts without analyzing each idea as a separate entity (Akinsanya & Williams, 2004; Billings & Halstead, 2012; Bradshaw et al., 2021). Concept mapping requires inquiry, research, and learning concepts within a safe practice arena while enhancing clinical reasoning approaches (Akinsanya & Williams, 2004). The diagramming activities permit students to participate in concept assimilation activities, including pathophysiology, pharmacology, or assessment data explicitly related to a case study, a simulation activity, or an active learning lesson (Bradshaw et

al., 2021). The assortment of exercises is limitless regarding the learning applications within the concept mapping dynamic.

In conclusion, the literature review supports the necessary improvements in clinical reasoning skills in BSN graduate nurses. The methodology supporting concept mapping permits students to begin the assimilation process by analyzing the patient data, learning the concepts, and through case study analysis early in their education. BSN programs are integral in developing competent and safe practicing nursing professionals. Therefore, in conjunction with innovative pedagogies, education, and clinical practice, concept mapping represents the key to creating a seamless transition from student to practitioner while bridging the preparation-to-practice gaps for proactive and safe practicing nursing students and graduates.

Chapter 2: Literature Review

The literature review supported the PICOT question selected for this project. The PICOT question was, “Does concept mapping integration into a BSN course curriculum support the development of clinical reasoning skills and patient safety perceptions in BSN first-semester nursing students?” The data analysis resulting from the observed outcomes assisted the hosting institution with establishing nursing curriculum modifications. According to the literature, concept mapping is valued for creating expanded clinical reasoning skills in nursing students. The study supported the importance of concept mapping in bridging the nursing care deficits observed in graduate nurses with global possibilities.

Literature Search Methods

The search engines for the literature utilized in this review included the education-supporting institution Doctor of Nursing Practice (DNP) database, CINAHL, and PubMed. The key terms included *BSN nursing students*, *clinical care plans*, *clinical reasoning*, *concept maps*, *concept mapping*, *content analysis*, *entry-level competency*, *mind mapping*, *novice nurses*, *nursing curriculum*, *nursing education*, *patient safety*, *preparation-to-practice gap*, and *self-efficacy*.

The articles within this review expanded the years between 2003 and 2019. Currently, approximately 80 articles met the search criteria for this research. There were articles in this literature review outside the 5-year acceptance range. The expanded date range occurred for two reasons. The first reason was that concept mapping represents an educational tool with an extensive utilization history. Joseph Novak developed concept maps in 1972 during a research endeavor at Cornell University (Novak & Cañas, 2006). Therefore, reviewing older articles to determine the outcome results from previous educational research areas was necessary.

Secondly, research articles within the 5-year acceptance for research were limited based on the designated search criteria. Therefore, an expansion of data outside the acceptable date ranges was necessary. The systematic literature reviews supported that additional research was essential for determining concept mapping intervention effectiveness within a nursing curriculum. The data also yielded the opportunity to expand the research focus to formulate conclusions regarding clinical reasoning developments in nursing students and concept mapping integration into the curriculum.

Lastly, the articles noted in this literature review included clinical judgment, critical thinking outcomes, and clinical reasoning. It is important to note that clinical reasoning represents a single level of performance and expected education excellence for graduate nursing students. Therefore, the review of clinical judgment and critical thinking outcomes exploration requires evaluation to determine efficacy concerning the next level of nursing excellence. Benner's novice-to-expert theory, a second performance tool, engages with clinical reasoning, patient care advocacy, and experience in determining the nurse's patient care proficiency.

Theoretical Framework

Benner's novice-to-expert theory applies to graduate nursing professionals and student development upon entering a nursing career. However, the development of the essential skills for quality patient care standards begins with the foundational courses. These courses focus on the novice skills necessary for nursing student performance at the clinical bedside while also engaging enriching curriculums designed to enhance the clinical reasoning processes (Blum, 2010; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Mohamed Bayoumy & Albeladi, 2020). According to Benner's theory, the entering students are at the novice level of their education. Students are exposed to advanced, intuitive, or expert-level processing skills

throughout their nursing education (Blum, 2010; Tanner, 2006). However, passive learning strategies provide limited concept assimilation opportunities and consequently lead to the development of the failure-to-rescue phenomenon among new graduates. Nursing institutions and faculty must provide consistent clinical reasoning activities across the curriculum with continuous analysis regarding the learning activity and the impact on clinical reasoning skills and student development (Blum, 2010; Gonzalez, 2018; Herron, 2017; Mohamed Bayoumy & Albeladi, 2020). Graduating learning outcomes focus on competent nursing professionals who demonstrate preparedness to perform safely at the bedside with limited preceptorship guidance and proactive clinical reasoning abilities. The nursing graduate must exceed the expectations of the generalist practicing nurse to meet the needs of today's complex patients with increasing acuity status.

Literature Review

The literature review included three specific categories based on article significance and the project design. These categories included education implementation, student engagement and reflections, and advanced thinking strategies.

Education Implementation

Schuster (2000) focused on process improvements regarding the traditional care plan and nursing student-learning efficacy regarding critical thinking and clinical reasoning performance at the bedside. This article represented a directive for nursing faculty regarding product integration of concept mapping activities into curriculum programs with a primary focus on the nursing process, including assessment, nursing diagnosis, planning, implementation, and evaluation. Concept mapping initiation focused on improving student thinking strategies and time management planning. In contrast, linear care plans promoted a lack of efficiency in both

time and student engagement with their patient and their learning. The integral connection of concepts in each nursing educational setting requires concept mapping, advanced critical thinking, and clinical reasoning skills (Schuster, 2000). Graduate nurses lack competence regarding patient care in elevated acuity situations; therefore, developing these competency skills must begin at the educational level and concept mapping integration (Schuster, 2000).

Akinsanya and Williams (2004) focused on the value of concept mapping in conjunction with inquiry-based learning approaches and health education continuums across the curriculum. Concept mapping supports the students thinking and reasoning developments if employed early in their education with continual advances and sustained exposure. In the United Kingdom in 1986, the Project 2000 Report focused on specific criteria expected of nursing professionals. These areas included student–learner approaches, which altered the current learner–employee education or preceptorships often offered to new graduate nurses (Akinsanya & Williams, 2004). The project also focused on the creation of holistic patient-centered care. The terms are standard in the everyday realms of patient care in 2021, but in 2000 the words indicated a complete role reversal for nursing students and their future profession. A demand for curriculum alternations became a focus on meeting the outcomes in the Project 2000 Report.

Additionally, the challenges of providing an enriching nursing curriculum with increasing cohort sizes represent a consistent dynamic regarding patient-centered care advocacy and an innovative approach to educational opportunities. Consequently, the 1975 concept mapping approach introduced a means of meeting each of the Project 2000 Report initiatives while also creating an enriching curriculum. Concept mapping and application assignments gave the nursing students the visual components necessary to merge known patient data with patient status changes while assuming essential patient care approaches (Schuster, 2000). Lastly,

incorporating student self-assessment and inquiry expanded their conceptual knowledge with reflection regarding their learning potential. These integrated reflection opportunities encouraged students to focus on their clinical reasoning approaches while developing critical thinking methods. Consequently, using concept mapping, the data supported integration in both theory and application with a learning tool that focuses on inquiry and visualization.

Tseng et al. (2011) examined the effect of problem-based learning (PBL) and concept mapping to analyze critical thinking skill development. The longitudinal quasi-experimental design used experimental (n = 51) and control (n = 69) groups with pre–posttest analysis utilizing a convenience sample of 120 baccalaureate nursing students (Tseng et al., 2011). Each student participated in a 6-month analysis period consisting of three phases. The phases included (a) baseline analysis with pretesting, (b) posttesting analysis following course completion, and (c) a 6-month follow-up analysis to determine the long-term effectiveness of critical thinking skills (Tseng et al., 2011). G*Power Version 3.0 determined a 98-person sample size requirement with ANOVA analysis for quality data examination results (Tseng et al., 2011). The National Council in Taiwan approved the research project (Tseng et al., 2011).

The critical thinking evaluation tool analyzed 10 items using the Critical Thinking Scale (CTS). Each item measured on the Likert scale included a scoring system from one (*never*) through six (*always*; Tseng et al., 2011). The Cronbach's alpha coefficient was 0.93, and the related alpha was 0.94, while the test–retest variability coefficient was 0.92 (Tseng et al., 2011). The student self-directed learning scale (SDLS) tool used a 10-item questionnaire based on the identical Likert scale scoring. A third analysis tool, the Student Performance in PBL Tutorial Questionnaire (SPIPTSQ), used a 24-item questionnaire following the same Likert scale.

The experimental group method included 14 weeks and 42 hours of a scenario analysis approach following a concept mapping education. In contrast, the control group received standard lecture modules in nursing education courses. The experimental group achieved statistically significant effects due to problem-based learning and the incorporation of concept mapping. The statistical data analysis tools included a *t*-test comparison, an Analysis of Covariance (ANCOVA) for variance observation, and a testing hypothesis *p*-value of < .05 for significance.

The pretesting results aligned among all three sets of analysis data (CTS, SDLS, and SPIPTSQ) with *p*-values of < .05. The posttesting results of CTS, SCLS, and SPIPTSQ revealed vital data significance with *p*-values of < .05. The 6-month posttesting showed that CTS and SDLS supported data significance with a *p*-value of < .05 (Tseng et al., 2011). The SPIPTSQ, however, is not significant, with a *p*-value of .085 (Tseng et al., 2011). These scores revealed that nursing students benefited from concept mapping with considerable improvement in critical thinking development. The results introduced two new student-learning approaches into the literature review: PBL and concept mapping. Additional information was necessary to determine if concept mapping or PBL significantly influenced the observed student achievements.

Yadav and Mohammad (2019) focused on the value of concept mapping for nursing students' comprehension of arterial blood gas (ABG) analysis. Addressing a conceptual topic related to nursing skills and the effects of concept mapping in concept assimilation represented an essential thinking methodology. The article described a randomized clinical trial utilizing the pretest and posttest methods with fourth-year nursing students using a probability sample technique (Yadav & Mohammad, 2019). Sixty nursing students accepted participation in the research proposal. A lottery assignment placed the students into experimental or control groups

(Yadav & Mohammad, 2019). The student's prior exposure to concept mapping included 53% of the experimental group and 33% of the control group. The researchers did not define the exposure differences between the experimental and the control groups. However, information in the study suggested that the participants in the experimental group used concept mapping within the learning activity. In contrast, the control group received the standard instruction regarding ABG analysis. The pre- and posttest data analysis used the SPSS Version 20 software (Yadav & Mohammad, 2019).

The results revealed a mean of 3.96 between the pre- and posttest results for the experimental group and a mean of 2.57 for the posttest scores comparing the experimental and control group (Yadav & Mohammad, 2019). These results revealed that concept mapping provided positive student learning and assimilation outcomes. The researchers did not disclose the measurement tool for this product; therefore, the reliability and variability are not specified. The study occurred in India in Uttar Pradesh; thus, the rules of engagement for research studies may have varied. The researchers determined that there were no conflicts of interest regarding the conduct of this study.

Kaddoura et al. (2016) focused on acquiring critical thinking abilities through concept mapping in baccalaureate nursing students. Students enrolled in pathophysiology and pharmacology participated in this study. The volunteer sample population of 83 nursing students received random assignments in either an experimental (concept mapping integration and didactic learning) or control (didactic learning only) group, with 42 students in each group (Kaddoura et al., 2016). An introduction to concept mapping education allowed students an opportunity to understand the intervention before research initiation (Kaddoura et al., 2016). The study applied the Helsinki Declaration of Human Rights with IRB approval from the

Massachusetts College of Pharmacy and Health Sciences (MCPHS) University with participation randomization of identification codes to maintain confidentiality.

The method included 14 handwritten concept maps per week with faculty input following each assignment submission, while the control group received traditional course support. The Health Education Systems, Inc. (HESI) Critical Thinking Exam administration measured student critical thinking skills in both the experimental and the control groups for pretest and posttest comparisons. The SAS 9.4 software analyzed student performance using descriptive statistics, independent *t* tests, and chi-square analysis. The pretest scores for the experimental group were 795.9 (*SD* 43.18) and for the control group 811.7 (*SD* 49.13), with a *p*-value of .12 (Kaddoura et al., 2016). In comparison, the posttest scores for the experimental group were 880.0 (*SD* 48.73) and for the control group 836.9 (*SD* 54.97) with a *p*-value of .0003 (Kaddoura et al., 2016). The mean for each group was 84.15 (*SD* 50.79) for the experimental group and 25.24 (*SD* 54.33) for the control group, with an overall *p*-value of < .0001 (Kaddoura et al., 2016). The analysis revealed data significance for integrating concept mapping into the nursing curriculum with increased sustainability of critical thinking and clinical reasoning skills. Kaddoura et al. (2016) stressed that the study references a small population sample with a possibility of skewed results. A larger student sample was necessary for future analysis and data integration to determine the correlation between concept mapping and critical thinking skills.

Student Engagement and Reflections

Wheeler and Collins (2003) utilized a quasi-experimental evaluation of critical thinking with a pretest and posttest integration based on concept mapping. The research incorporated a randomized convenience sampling method with a population of 76 second-semester nursing students (Wheeler & Collins, 2003). The male and female students were equally divided among

the experimental and control groups. Students were enrolled in adult health, pediatric nursing, maternity, and psychiatric nursing for seven and one-half weeks (Wheeler & Collins, 2003). The students enrolled in adult health and pediatric nursing courses received instructions on concept mapping and clinical preparation activities in the experimental group (Wheeler & Collins, 2003). A third of the students enrolled in the pediatric nursing course participated in the clinical preparation activity (Wheeler & Collins, 2003). Students enrolled in the maternity and psychiatric nursing courses and the remaining two-thirds of the students enrolled in the pediatric course participated in clinical preparation activities using the traditional linear care plan as the control group (Wheeler & Collins, 2003). The California Critical Thinking Skills Test (CCTST) tool compared the student outcomes in a pre- and posttest format. The examination elements included analysis, evaluation, inference, deductive reasoning, and inductive reasoning components (Wheeler & Collins, 2003, p. 342). An internal reliability test for the CCTST was $\alpha = 0.91$ and concurrent validity of $r = .66$ *and* $p < .001$ (Wheeler & Collins, 2003).

Comparison of the pretest scoring for the control and experimental groups did not differ significantly. The experimental group's mean was 23.59, and the control group's mean was 3.28, extracting a total mean of 23.46 (Wheeler & Collins, 2003). The ANCOVA yielded a significant *F* value for each administered pretest. Compared to the pretest, the experimental group's posttest scoring suggested statistically substantial increases occurred because of the concept mapping intervention. However, statistical significance was not determined by analyzing the experiment and control group posttest scores (Wheeler & Collins, 2003).

Specific differences occurred in the testing instrument's inference areas between the experimental and control groups, reporting a negative mean difference following posttesting scoring (Wheeler & Collins, 2003). Overall, the total mean comparison between the pre- and

posttest scores increased from 17.10 to 17.79 (Wheeler & Collins, 2003). The pre- and posttest assessments failed to ascertain a statistically significant outcome. A failure to reject the null hypothesis occurred. Wheeler and Collins (2003) addressed the study limitations, including the CCTST exam potentially lacking the sophistication necessary to detect the unique critical thinking differences between the utilization of the concept mapping versus the care plan development activities.

Student participants completed a survey following the research activity. They expressed value regarding the concept mapping activity as an essential tool dedicated to integrated learning (Wheeler & Collins, 2003). The process of concept linking (mapping activity) versus data placement (care planning) exhibited educational value in meeting the essential nursing student academic competencies. Wheeler and Collins (2003) suggested that additional studies were necessary and that they should include a longitudinal evaluation to determine student response regarding the application of concept mapping.

Hinck et al. (2006) performed a quasi-experimental study of 23 nursing students enrolled in a community-health baccalaureate course utilizing a pre–posttest evaluation comparing concept mapping to care planning. The research examined if concept mapping increased concept integration for quality patient care outcomes. Faculty members and students participated in a concept mapping education session before the initiation of the study. Additionally, participating students had prior knowledge of care planning from previous courses before initiating the study. The student-dedicated experimental group created concept maps instead of traditional care plans during their community clinical rotations. The concept mapping focused on integrated patient care concepts and patient status alterations throughout their clinical rotation. Reviewers randomly evaluated the student mapping submissions during every first and seventh week using

the following criteria: (a) main health concern, (b) nursing diagnosis, (c) prioritization, (d) data support, (e) goals, (f) interventions, (g) patient education, and (h) integration of concepts with grading rubric evaluation score between one and four with a maximum grade of 20 (Hinck et al., 2006, p. 26). Additionally, to maintain scoring reliability, all the concept maps were reviewed by two separate reviewers using identical scoring parameters.

The SPSS 12.0 reviewer analyzed the data with a paired *t*-test scoring. The final evaluation revealed a significant increase in student performance with each concept mapping submission *(t* = -3.01, *df* = 22, *p* = .006; Hinck et al., 2006). Additionally, student survey responses reflected improvements in clinical thinking, preparation-to-practice improvement, complex patient conditions, and enhanced learning experiences. The scoring processes and the student reflections supported the value of concept mapping in community health clinical settings. These findings further supported the positive influence of concept mapping applications within the educational curriculum.

Gerdeman et al. (2013) utilized a concept mapping rubric based on Tanner's clinical judgment model to examine baccalaureate nursing students' critical thinking development. Eight second-semester nursing students provided consent for participation in the concept mapping exercises. The students participated in 12-hour shifts of clinical rotations for 6 weeks. The students were familiar with concept mapping activities from their previous semester courses. The students engaged with patient care weekly while integrating the concept mapping tool into their care planning. The initial mapping activity included group participation and an individual concept mapping activity for the next 5 weeks (Gerdeman et al., 2013). A 30-minute debriefing activity followed by weekly concept mapping exercises encouraged feedback, student engagement, prioritization of patient care, and intervention protocols based on the primary

patient concerns (Gerdeman et al., 2013). The student patient care experiences included chronic obstructive pulmonary disorder (COPD), myocardial infarction (MI), diabetes mellitus (DM), and renal failures (Gerdeman et al., 2013). After each debriefing activity, the students evaluated their concept maps utilizing Tanner's clinical judgment model based on the four critical thinking development phases. The phases included noticing, interpreting, responding, and reflecting, with evaluations noted as *excellent*, *good*, *marginal*, and *poor* (Gerdeman et al., 2013).

Following the 6-week clinical activity, results included 75% of the students confirming the exercise provided a more remarkable development of thinking rather than "simply identifying" the primary patient problem (Gerdeman et al., 2013). The rubric assisted 75% of the students in evaluating their concept maps compared to the overall patient care planning, interventions, and assessment phases. In comparison, only 50% of the students felt the rubric assisted them in organizing essential patient data (Gerdeman et al., 2013). The learning style preferences for 75% of the students affirmed that the rubric results satisfied the preferred learning style methods (Gerdeman et al., 2013). Sixty-two percent of students felt the concept mapping activities assisted them with prioritizing patient care (Gerdeman et al., 2013). In comparison, 82% of the students felt their patient care communication skills improved overall (Gerdeman et al., 2013). The small comparison sample size included eight students. A larger clinical group is suggested for a more extensive sample study. The study encouraged additional support for concept map curriculum integration based on the student perspectives indicated in this study.

Advanced Thinking Strategies

Atay and Karabacak (2012) conducted a control group design with 80 students enrolled in their first- and second-year baccalaureate nursing program to analyze the effects of concept

mapping on critical thinking development. The randomized student sample consisted of experimental (concept mapping) and control (linear care plans) groups in a pre–posttest design. The research analysis tool, the California Critical Thinking Disposition Inventory (CCTDI), analyzed the student population's critical thinking attributes using SPSS software with a *t*-test analysis. The CCTDI tool measured six areas of concept map development, including (a) truth-seeking, (b) open-mindedness, (c) analysis, (d) systematicity, (e) self-confidence, and (f) inquisitiveness (Atay & Karabacak, 2012). The experimental group received education on concept mapping before the study initiation. Ethically, the study adhered to all requirements according to the Helsinki Declaration of Human Rights (Atay & Karabacak, 2012).

The CCTDI results showed the pretest mean scores for both groups were statistically equal with a *p*-value of > .05. In contrast, the analysis of the posttest score revealed statistical significance based on a *p*-value of < .05. The reliability included values of $f = 90.73$ and *p*-value of < .05 (Atay & Karabacak, 2012). The research conclusion supported a hypothesis rejection, thus further supporting the importance of concept mapping and student critical thinking development.

Alfayoumi (2019) focused on improving the student's clinical reasoning skills using a quasi-experimental design. Forty second-year semester students participated in the research using a consecutive sampling process. The data collection included student observations and questionnaires based on the "General Clinical–Reasoning Behavior Scale, Independence in Clinical–Reasoning, and Clinical–Judgment scales" based on observed concept mapping activities (Alfayoumi, 2019, p. 40). The study focused on whether concept mapping and concept-based learning integration improved the baccalaureate nursing students' clinical reasoning and clinical judgment skills. The design method included experimental and control groups with a pre-

and posttest to determine the implementation's efficacy. The experimental and control groups received the concept-mapping and concept-based learning strategies. The experimental group comparison focused on applying the knowledge within a clinical setting, while the control group integrated the knowledge using theory-based applications (Alfayoumi, 2019). The study adhered to all ethics and research requirements deemed necessary by the University of Student Research. Additionally, researchers created a numbering system for protecting student identity.

The testing analysis occurred in multiple phases using parametric and nonparametric procedures supporting outcomes focusing on improved clinical reasoning skills across the sample population (Alfayoumi, 2019). The alpha determination for statistical significance was 0.05 (Alfayoumi, 2019). The resulting data determined the student perceptions of academic success based on the pre- and posttest results, revealing a pretest mean for the control group of 1.37 and 1.53 and the experimental group of 1.9 and 2.18 (Alfayoumi, 2019). The Shapiro-Wilk test's data analysis examined the control group outcomes with a reported *p*-value of $< .001$ (Alfayoumi, 2019). The Wilcoxon signed rank tests for the experimental group reported a *z*-score of -2.236 and a *p*-value of .025 (Alfayoumi, 2019). The researchers also examined the clinical instructor's observations of the student's clinical reasoning and clinical judgment skills of student performances.

The alpha significance of .05 supported that clinical reasoning and clinical judgment improved across both groups. However, the data comparison between the control and experimental groups lacked transparency. The researchers supported continual evaluations of concept mapping approaches and clinical reasoning developments integrating larger population samples to achieve increased knowledge and insight regarding student performance and competency measures.

McDonald et al. (2018) measured the effects of a manufactured concept mapping software, Concepto-Plan, with linear care plans and the effectiveness of clinical reasoning and critical skills development in nursing education. The comparison evaluation between the concept mapping software and linear care plans addressed the benefits of implementing the educational tool into nursing school education. Based on clinical reasoning and critical thinking developments, the concept mapping process provided a visual engagement with the patient data within a functional one-page diagram (McDonald et al., 2018).

The Concepto-Plan design was based on nursing student queries through focus group interviews. The student suggestions included time management, client-centered care, and student engagement with their assignments (McDonald et al., 2018). Although detailed, linear care plans provide students with fill-in-the-blanks, an unfortunate loss of meaning exists within those blanks. This process diverts the value of the student's time while losing the opportunity to engage with the patient's data. The nursing school curriculum represents the beginning stages for students to understand the importance of patient data analysis, beginning with the nursing process and thinking like a nurse. Therefore, although this report addressed a commercially prepared concept mapping product, it is essential to understand that linear care plans do not prepare students as practicing nurses. This antiquated learning tool prohibits the development of enhancing the critical analysis necessary for clinical reasoning development (McDonald et al., 2018). The article addressed no conflicts of interest bias, and IRB was not applicable for completing this study.

Chapter Summary

This literature review covered multiple years due to the historical approaches utilized through concept mapping, specifically in nursing school education. The data analysis in each

article supported the value concept mapping offers for critical thinking and clinical reasoning development in nursing students across all education levels. Clinical reasoning skills allowed students to acquire proactive patient care assimilation abilities while increasing performance competencies as graduate nursing professionals at the bedside (Alfayoumi, 2019). Consequently, nurses who lack ineffective reasoning skills cannot perform at the bedside during urgent and emergent situations. Therefore, nursing educators must adhere to new graduate nursing challenges to create meaningful curriculums dedicated to student success. Concept mapping is an educational tool for developing clinical reasoning for students to assimilate patient data to promote patient safety. This paper examined the effects of concept mapping integration into nursing curriculums while evaluating the effects on patient safety. Nursing education institutions are responsible for providing enriching curriculums that proactively encourage the assimilation of patient data. Therefore, the literature supported concept mapping as an active learning tool for establishing advanced thinking strategies among nursing students.

Chapter 3: Research Method

This chapter explores this project's methodology related to implementing concept mapping as an active learning tool within an existing curriculum and analyzing safe practice standards for first-semester nursing students. As guided by the literature review, concept mapping represented an emerging educational tool for expanding clinical reasoning, clinical judgment, and critical thinking attributes necessary for nursing students (Alfayoumi, 2019; Chen et al., 2011; Garwood et al., 2018; Yadav & Mohammad, 2019). Therefore, evaluating each component related to this project and the standards required for successful implementation is essential.

Project Foundation

Integrating quantitative improvements within a nursing curriculum requires consistency based on the institution's mission, vision goals, values, culture, and policy innovation. Nursing education must also consider the accreditation agencies and the board of nursing guidelines regarding current standards when integrating active learning curriculum strategies dedicated to process improvements. Nursing education represents a delicate balance of active and passive learning strategies to enlighten the clinical reasoning practices of the student population while maintaining quality educational platforms. Additionally, nursing schools are responsible for keeping apprised of the quality standards of the hospitals, clinics, and ambulatory centers that work collaboratively with the institution for clinical placement and hiring nursing graduates. Lastly, nursing education programs are measured by the NCLEX pass rates and the professional qualities of safe practicing nurses at the bedside. Nursing institutions must ensure that each education component matches the board of nursing testing blueprint. Collaborating with these

entities represents a valuable partnership dedicated to nursing education and patient care advocacy.

Theoretical Support

Benner's novice-to-expert-theory supported the student's development of clinical reasoning approaches and integration of the foundational development courses in nursing education. The collaboration of educational skills and enriching curriculums, including active learning integration, enhance students' clinical reasoning development (Blum, 2010; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Mohamed Bayoumy & Albeladi, 2020). According to Benner's theory, first-semester students are respectively at the novice level of their education. The students, throughout their education, are exposed to advanced, intuitive, or expert-level processing skills (Blum, 2010; Tanner, 2006). However, passive learning strategies provide limited engagement with the educational concepts and assimilation opportunities necessary for bridging the failure-to-rescue phenomena observed among new nursing graduates.

Nursing institutions and faculty must provide consistent clinical reasoning activities across the curriculum, analyze each semester's development of clinical reasoning skills among the students, and focus on patient safety outcome awareness (Blum, 2010; Gonzalez, 2018; Herron, 2017; Mohamed Bayoumy & Albeladi, 2020). Lastly, focusing on the goals and visions of graduate nurse expectations included performing safely at the bedside with limited preceptorship guidance while demonstrating expanded clinical reasoning abilities that exceed the novice expectations outlined by Patricia Benner. A graduate nurse with a generalized knowledge of practice no longer meets the protocols for today's high-acuity patients.

Stakeholders

The stakeholders for the project included the deans, associate deans, assistant deans, associate and assistant faculty, students, the supporting host community, and educational institutions. Additionally, the hosting institution received funding from the State of Texas and maintains a joint fiscal responsibility to the hospital system associated with the university. IRB approval was received for this project with the provision of guidelines for supporting ethical and quality research initiatives throughout the campus. Lastly, the supporting institutions supported the project outcomes dedicated to improving the skills of nursing students and graduates.

Purpose

The literature provided essential support regarding the project focus in terms of bridging the preparation-to-practice gaps, transition-to-practice gaps, and failure-to-rescue phenomena observed in nursing students and graduate nursing professionals (AlMekkawi & El Khalil, 2020; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Liou et al., 2016; Mohamed Bayoumy & Albeladi, 2020; Powers et al., 2019). Clinical reasoning represents an essential element missing in nursing students and graduates. Novice nursing students and graduates are approaching their careers underprepared to anticipate their patient's progressive healthcare needs, ultimately leading to patient injury and increased hospital costs. The current unbalance between curriculum and career expectations present challenges not only for patients but also for interprofessional relationships where communication skills may also be lacking (AlMekkawi & El Khalil, 2020; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Liou et al., 2016; Mohamed Bayoumy & Albeladi, 2020; Powers et al., 2019). Consequently, patient safety concerns exist regarding the nursing student's inability to assimilate the patient data due to ineffective clinical reasoning abilities. Therefore, the

development of clinical reasoning begins with the education of first-semester nursing school students.

Concept mapping is an educational tool that has the potential to develop clinical reasoning skills in nursing students. However, the device alone is not enough. The students must also be exposed to patient care scenarios that challenge their comfort zones by utilizing patient data to create proactive nursing interventions rather than reactive latent responses to the patient's changing conditions (Graber et al., 2020). It begins with curriculum integration of learning strategies that stretch the imagination beyond PowerPoint and passive lectures but incorporate learning tools that bring the patient into the classroom (Graber et al., 2020). One of these strategies includes concept mapping integration.

Project Design

The design for this project focused on the PICOT question, which examined the effects concept mapping had when integrated into a BSN course curriculum regarding the development of clinical reasoning skills and patient safety perceptions in nursing students. Faculty are provided multiple opportunities to incorporate active learning strategies into the course curriculum using iPad technology and concept mapping software. However, a single exposure to concept mapping is insufficient for evaluating first-semester students in the initial stages of data assimilation abilities. Consistent exposure throughout a semester is necessary for the practical evaluation of data and assimilation processes regarding patient care (Gerdeman et al., 2013; Kaddoura et al., 2016).

The PICOT question for this study addressed the following: "Does concept mapping integration into a BSN course curriculum support the development of clinical reasoning skills and patient safety perception in BSN first-semester nursing students?" The population (P)

represented BSN nursing students, the intervention (I) represented concept mapping, the comparison (C) of pre- and postsurvey evaluations, and outcomes (O) to determine if patient safety focuses through clinical reasoning skills improved based on student performance measures following concept mapping interventions and (T) through a single semester analysis.

The project was a quantitative, nonrandomized, quasi-experimental design focused on concept mapping integrated learning strategies. The H-PEPSS was a 44-item Likert scale used to analyze student patient safety perceptions with a pre- and postsurvey design (Ginsburg, Castel et al., 2012). An independent means *t*-test analysis determined the data significance of the student responses. The survey focused on safe practice applications that mirrored the standards for nursing students and graduates driven by the nursing curriculum, the NCLEX testing blueprint and Quality and Safety Education for Nurses (QSEN) competencies. The approval letter from Dr. Ginsburg and a copy of the H-PEPSS tool are included in Appendices B and C.

The Hypothesis Statement

The two hypothesis statements for this project represent the following:

Null: H_0—The postsurvey scores following a semester integration of concept mapping *will not* improve the student's patient safety perceptions.

Alternative: H_1—The postsurvey scores following a semester integration of concept mapping *will* improve the student's patient safety perceptions.

Resources and Product Integration

The project required limited resources as the supporting institution provided the necessary iPad and Apple technology for this quality improvement project. All first-semester students received iPad orientation through the school of nursing multi-media lab within the first weeks of the assigned class, lab, and didactic activities. The iPad remains a part of the student's

educational supplies until they graduate or withdraw from the program. The educational institution preinstalled the free concept mapping applications onto the iPad. Students also received education on the software through multiple integration opportunities offered throughout the semester. Lastly, the faculty received instructions on the iPad and application devices before their utilization in the educational environments from designated Apple-certified educators.

Methodology Appropriateness

At the educational level, there are multiple opportunities to expose students to clinical reasoning developments using concept mapping applications and inquiry-based learning methods involving in-depth content assimilation (Akinsanya & Williams, 2004; All & Havens, 1997; All & Huycke, 2007; All et al., 2003). Three essential processes must occur for the development of clinical reasoning to begin. These phases included (a) the development of new concept assimilation, (b) the development of conceptual hierarchies, and (c) the elimination of rote learning accomplished through concept mapping integration (All & Havens, 1997; All & Huycke, 2007; All et al., 2003; Chen et al., 2011; Garwood et al., 2018).

This project included learning activities such as simulation, clinical, unfolding case studies, didactic active learning approaches, web-automated response systems, and exam reviews to focus on the concepts (All & Havens, 1997; Gerdeman et al., 2013; Taylor & Wros, 2007). The students also experienced independent opportunities to create concept maps for exam preparation, study groups, and think-aloud sessions, which also assisted in advanced clinical reasoning skills in conjunction with content immersion (All et al., 2003; Banning, 2008; Gerdeman et al., 2013; Lee et al., 2016).

Concept mapping provides multiple opportunities to expand student competencies throughout their education and professional practices (Aein & Aliakbari, 2017; Akinsanya &

Williams, 2004; Atay & Karabacak, 2012; Bilik et al., 2020; Garwood et al., 2018; Gerdeman et al., 2013). Lastly, concept mapping allows students to focus on their skill sets while developing quality patient care standards through visual association and application.

Feasibility and Appropriateness

The project utilized resources currently made available to the students for educational purposes. The university-assigned iPads were preinstalled with the operative applications necessary to participate in the project proposal, including the SimpleMind application software. The student-assigned iPads were an integral part of their educational program and not a result of this project.

Dr. Liane Ginsburg approved the H-PEPSS tool for this project without any proposed fees or charges. As the primary researcher for this project, I converted the H-PEPSS tool into an electronic format using the Microsoft Office Forms application and posed no additional costs. Additionally, no outside funding was received for this project.

A research assistant was responsible for conducting the consent process, the presurvey, and the postsurvey for me. The research assistant held all data until the conclusion of the participating semester and final course grades were posted. There were not any associated fees with this agreement. Additionally, any de-identified data collected during this project was stored in a secure university drive under my name. The university owned the data in case access was needed at a future date. The online graduate school provided this storage system for doctoral student research data, supported by the university's information technology (IT) department for security purposes and kept for the minimum required time according to IRB guidelines.

Students utilized their iPads, computers, or personal phones for survey participation with anonymous programmed responses. The printed consent was provided to the students before

completing the survey. The project timeline (see Appendix D) outlined the process guidelines used for this project. The research assistant collected the consent forms and the presurvey data within the first 3 weeks of the course. The educational content information for the course was delivered face-to-face, with six-foot social distancing followed consistently. The students completed the pre- and postsurveys using the QR coding provided by the Microsoft Office Forms platform. Appendix E is an example of the Microsoft Office form version of the H-PEPSS tool used for this project.

IRB Approval and Process

IRB approval occurred through the supporting educational institution. Additionally, the hosting institution required a secondary IRB approval before conducting the study. The Collaborative Institutional Training Initiative (CITI) IRB training met the requirements for both institutions. Please reference Appendix F for these approval letters.

Interprofessional Collaboration

The interprofessional collaboration component of this project represented an essential component in the survey analysis, content delivery, and clinical experience, with a distinct focus on patient care. The value of interprofessional collaboration was integrated within the QSEN competencies and served as the means for creating the knowledge, skills, and attitudes dedicated to student and patient outcomes (Quality and Safety Education for Nurses, 2020). Additionally, the quadruple aim theory included four quality outcomes dedicated to eliminating professional silos and promoting quality care standards. These areas included (a) improved patient outcomes, (b) decreased operating and patient care costs, (c) improved patient care experiences, and (d) improved clinical experience (Bachynsky, 2019). The National Institute of Medicine (formerly IOM) selected the quadruple aim theory as the basis for developing a complete package

dedicated to healthcare collaboration. The H-PEPSS survey integrates these incentives with a patient safety focus, including culture, interprofessional teams, communication, safety risk management, and professional responsibilities (Ginsburg, Castel et al., 2012).

An organization, its patients, healthcare members, and financial budgets must be maintained for integrity and alignment of the quadruple aim theory to occur within any institution (Bachynsky, 2019). The project design encouraged students to integrate patient care across the professions while developing consistent and accurate patient care plans. However, first-semester students learned the basics of nursing while also growing the advancing thought processes dedicated to patient care. The students witnessed the nurses as drivers of interdisciplinary care while indirectly affecting interprofessional teamwork. The collaboration of nursing educational institutions and the value of clinical partnerships are pivotal in creating prepared nursing professionals for today's patients and those of tomorrow.

Practice Setting for Evidence-Based Practice

The study occurred at a nursing institution in Southeast Texas, west of the Mississippi River. The nursing institution accepts 500 to 600 students annually, with three academic semesters beginning during each academic year. The institution provides a 16-month BSN program beginning with junior-level admissions. Before acceptance into the program, students must complete 60 hours of nursing prerequisite courses from community colleges, universities, or dual-credit courses in high school. The overall student demographics regarding age, previous degrees, career, and financial need vary throughout each cohort. The approval letter from the institution to conduct this research is found in Appendix A.

Target Population and Recruitment

The nursing school admits 110 to 140 students each semester as college juniors in the fall, spring, and summer, with 15 weeks of didactic, lab, and clinical education per semester outlined by the Texas Board of Nursing. The first-semester students are enrolled in 13 credit hours, including adult health assessment, foundations of adult health, introduction to nursing, and pathophysiology. About 5%–10% of the students enrolled each semester in the foundations of adult health course are students who previously attended the course. These students elected course withdrawal, were unsuccessful in the class, or opted for a leave of absence in a previous semester. The number of students actively enrolled at the nursing institution represents 500–600, depending on the semester.

The first-semester student enrollment for the foundations of adult health course is between 110 and 140. The student participants for this project were enrolled in the fall 2021 semester. The students who volunteered to participate in the project were enrolled in the fall 2021 foundations of adult health course. They also received informed consent about the project and completed the pre- and postsurveys using the H-PEPSS document as outlined and documented on the presented timeline in Appendix D.

The study participants excluded from the sampling population included students under 18 years of age. It is rare, but occasionally, the nursing institution will enroll students under the age of 18 because of high school dual credit completion. Since any participant under 18 years old is a member of the vulnerable population, these students were ineligible for survey participation (Macha & McDonough, 2012). Another student exclusion included any previous participants in the program due to course withdrawal, a leave of absence, or course failure. The exclusion of this student population prevented bias from me based on the preexisting knowledge of the student. It

also eliminated potential student bias with these students obtaining prior content knowledge. Lastly, any student enrolled in another study was also excluded from project participation.

The sampling population began with 140 students, with one withdrawing from the program within the first 2 weeks. The 140 students were introduced to the project and survey process once the informed consent was completed. Students were not required to participate in the study. All enrolled students received the same instruction regardless of their involvement in the study. Additionally, the sample population decreased by about 25% between the presurvey and postsurvey because of study withdrawal, course withdrawal, a leave of absence, course failure, or program withdrawal which was atypical.

Consent Process

The students completed a paper consent form before completing the pre-H-PEPSS survey. The student participant's identity remained confidential by utilizing the following criteria: (a) the last two digits of a parent's cell number, (b) the last two digits of the current year, and (c) the last two digits of their student identification. The project introduction and consent process occurred during the third week of didactic content. Any de-identified data collected during this project was stored in a secure university drive under my name. The university will own the data in case access is needed at a future date. This storage system is provided by the online graduate school for doctoral student research data and supported by the university's IT department for security purposes and kept for the minimum required time according to IRB guidelines.

Any student excluded from the research was provided instructions through verbal and written statements during the recruitment and consent phases. I, as the primary researcher, was not present during the consent collection, the pre- or postsurvey, to prevent any conflict of

interest or potential coercion. The exclusion of the participants occurred during the consent process and the pre- and postsurvey collection processes. A research facilitator collected the consent and survey documents. The institutional consent forms are found in Appendix G and Appendix H.

Study Risks

The participants who consented to the study were subjected to minimal risk for harm or injury before, during, and after the survey pre- and postperiods. Participation and the impact on course grades were not correlated with this project. Course success or nonsuccess was solely based on student performance regardless of consented study participation. On average, the pre- and postsurvey took 12–15 minutes per survey. The consent and the surveys were collected before the dedicated course lecture at the faculty's request. Examining the pre- and postsurvey results did not occur until the student's final grades were posted for the semester. The student involvement in the study was strictly voluntary. The concept mapping intervention activities were identical across the student cohort, as the research design did not include experimental and control group randomization. Regardless of survey participation, each student enrolled in the course received the same interactive educational experiences.

Study Benefits

There were not any direct benefits offered to the student participants. The study focused on process improvements based on the survey outcomes for future semesters. Therefore, the participant's survey responses will assist with developing active learning strategies and implementation efforts within the nursing curriculum. Additionally, the community and the clinical partners will benefit from the skills, abilities, and knowledge the students acquired because of the integration of learning strategies across multiple patient care spectrums.

Instrument: Health Professional Education in Patient Safety Survey (H-PEPSS)

The data obtained from the H-PEPSS survey analyzed first-semester students' perceptions of their abilities regarding patient safety in both the classroom and clinical scenarios (Ginsburg, Castel et al., 2012; Ginsburg, Tregunno et al., 2012). These quality indicators represent appropriateness for the study focus of this project. The survey categories included the following topics with a Likert scale level of s*trongly disagree*, *disagree*, *neutral/unsure*, *agree*, and *strongly agree* in both classroom and clinical settings based on the leading stem "I feel confident in what I learned about …" (Ginsburg, Castel et al., 2012):

A. Learning about specific patient safety content areas:
    I. Clinical Safety (four items)
    II. Culture of Safety (four items)
    III. Working in Teams with Other Professionals (six items)
    IV. Communicating Effectively (three items)
    V. Managing Safety Risks (three items)
    VI. Understanding Human and Environmental Factors (three items)
    VII. Recognize, Respond to, and Disclose Adverse Events and Close Calls (four items)
B. How broader patient safety issues are addressed in health professional education (seven items)
C. Comfort speaking up about patient safety (three items)
D. Demographic information (six items)

Data Collection and Management

The H-PEPSS survey was converted to an electronic document using the Microsoft Office Forms platform for anonymous submission of the pre- and-postsurveys. A sample survey document is provided in Appendix E with QR coding access. Additionally, a coding system was integrated to protect the student's identity using the following criteria: (a) the last two digits of a parent's cell number, (b) the last two digits of the current year, and (c) the last two digits of the student identification. An assistant researcher, who was not associated with the course, initiated the consent process, the presurvey, and the postsurvey activities to prevent any conflict of interest or coercion by me. I reviewed the data once the pre- and postsurvey phases were complete, and the student course grades were recorded as the official and final repository of course grades. There was a potential for bias and perceived coercion occurrence if the data was reviewed before the conclusion of the course. There were 59 collected consents, 54 completed presurveys, and 40 postsurveys after the data collection period.

Timeline

The study began once IRB approval was received from the supporting educational institutions (see Appendix F). Additionally, before beginning their participation in the project, all students received their university-assigned iPads, orientation to the devices, and the installation of required applications on the iPads. The study introduction, participation consent, and the presurvey were presented to the students on the third week of the content delivery and before any lecture activities for the most significant potential student participation. Appendix G and Appendix H provide information related to these consent forms. Students could agree to participate or decline study participation at that time. The concept mapping process included time for student development and understanding throughout the project participation (Gerdeman

et al., 2013; Kaddoura et al., 2016). Therefore, collecting the presurvey early in the semester was necessary to provide the most accurate results between the pre- and postsurvey submissions.

All students in the first-semester cohort, regardless of study participation, received identical educational immersion in concept mapping since the project was not an experimental and control study design. The postsurvey evaluation occurred during the last week of class and before the course final, the 13th week of course instruction. In summary, the data collection began on week three, introduction to concept mapping began during week two and continued throughout the 15-week semester. The postsurvey data collection occurred on week 13 and before the final examination. A timeline of the sampling events is available in Appendix D.

Data Significance, Power, and Estimated Sample Size

A *p*-value of < .05 was selected to determine data significance. Documentation from Dr. Ginsburg's research in 2012 defined an effect size of 0.50 and a power of 0.80 (Ginsburg, Castel et al., 2012; Ginsburg, Tregunno et al., 2012). The sample size for this project was 34 student participants using the G*Power 3.1.9.7 estimator (Heinrich-Heine-Universität Düsseldorf, 2020). Data analysis occurred through SPSS 27 software using independent *t*-score approaches.

Analysis Plan

The data codebook created 64 data points for the pre- and postsurvey submissions from the 44-item Likert H-PEPSS survey. The Microsoft Office Forms compiled the data into an Excel spreadsheet, which required conversion from alpha to numeric data analysis using the SPSS 27 software program. The data was organized based on the Likert scale of the H-PEPSS form with categories of data including nominal, ordinal, and scale data as appropriate (Ginsburg, Castel et al., 2012; Pallant, 2020). An independent *t*-test analysis between two dependent means analyzed the data between the pre- and postsurvey submissions using SPSS 27.

Chapter Summary

The outcomes of this study will assist the school of the nursing institution in determining how students view safe practicing standards at their current education level. The clinical partners of the nursing school institution meet quarterly to discuss the student's performances as nursing students and as graduates entering the profession. Although the clinical partners praise the students' and graduates' skills and abilities, the partners desire the institution to improve clinical reasoning development among the students. These educational improvements will promote quality patient safety standards not only for the students and graduates but also for the patients who are assigned to their care. In addition, the data findings support nursing education institutions must promote integrated curriculums of active learning strategies to accelerate students and graduates as confident reasoners of clinical data toward promoting proactive patient care advocacy. This project will assist the nursing institution in understanding how students perceive their patient performance while also analyzing the impact the integration of concept mapping provides to the curriculum.

Chapter 4: Results

The results of this project represent a curriculum redesign proposal for improving nursing student preparedness during their education and into their nursing profession.

NCLEX Standards

The state boards of nursing and the National Council of State Boards of Nursing (NCSBN) are moving toward redefining how baccalaureate nursing students think about patient care (National Council of State Boards of Nursing [NCSBN], 2019, 2021, 2022). Students are entering the professional careers of nursing with the passing of NCLEX boards but cannot perform safely at the bedside. Gaps, known as preparation-to-practice, failure-to-rescue, failure-to-recover, and transition-to-practice, represent increasing concerns across the continuum of safe patient care among graduate nursing students (Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Liou et al., 2016; Powers et al., 2019; Purling & King, 2012). These gaps represent unsafe nurse practice standards that fail to promote proactive care at the bedside.

The residency and preceptorship programs often fail to bridge these gaps as the necessary knowledge, skills, and abilities essential to nursing practice are often lacking in graduate nurses. Therefore, NCSBN is changing how educators promote the advancing thinking skills of the baccalaureate nursing student. The Board of Nursing (BON) initiated examination changes scheduled for spring 2023. The examination questions mirror the experiences observed in direct patient care with advancing critical thinking attributes (NCSBN, 2022). Concept mapping integration into the curriculum can improve students' thinking about patient data while enhancing their clinical reasoning skills at the bedside.

Purpose of the Project

The integration of concept mapping into the nursing curriculum, as supported by the literature, has the potential to eliminate or reduce the preparation-to-practice, transition-to-practice, and failure-to-rescue gaps currently observed in nursing students and graduate nursing professionals. The development of clinical reasoning begins with the nursing education curriculum and first-semester nursing students (AlMekkawi & El Khalil, 2020; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Liou et al., 2016; Mohamed Bayoumy & Albeladi, 2020; Powers et al., 2019). The value of clinical reasoning represents an essential element missing in nursing students and graduates across the globe. Novice nursing students and graduates are ill-prepared to anticipate their patient's emerging needs, leading to patient injury and increased hospital costs. The current educational formula fails to create challenging interprofessional relationships that are essential for patient care advocacy while unraveling the quadruple aim components (AlMekkawi & El Khalil, 2020; Gonzalez, 2018; Herron, 2017; Kavanagh & Szweda, 2017; Levett-Jones et al., 2010; Liou et al., 2016; Mohamed Bayoumy & Albeladi, 2020; Powers et al., 2019). Consequently, patient safety concerns exist regarding the student's inability to assimilate the patient data due to ineffective clinical reasoning abilities.

Nursing students must be exposed to patient care scenarios that challenge their comfort zones by utilizing patient data to create proactive nursing interventions rather than reactive latent responses to the patient's changing conditions (Graber et al., 2020). It begins with curriculum integration of learning strategies that stretch the imagination beyond PowerPoint and passive lectures but incorporate learning tools that bring the patient into the classroom (Graber et al., 2020). One of these strategies includes concept mapping integration.

This project design was developed with an insight into introducing improvement standards for an antiquated nursing educational delivery system for nursing students. The first step focuses on improving safe patient outcomes based on a single intervention within the academic curriculum. Concept mapping is not a new intervention in education; however, for nursing education, it provides a means for supporting learning engagement as a visual attribute across the curriculum (Wittmann-Price et al., 2013). The value of a concept-driven curriculum in conjunction with concept mapping integration allows students to examine each content point thoroughly using each level of Bloom's taxonomy with visual linking of essential patient information (Wittmann-Price et al., 2013). Additionally, patient safety represents a consistent thread across multiple applications, including QSEN, the NCLEX testing blueprint, and the content mastery series for nursing education examinations (Hinkle et al., 2022). Therefore, concept mapping, patient safety, and student education represent consistent quality standards dedicated to improving patient outcomes throughout the BSN curriculum. The project is dedicated to determining the effects concept mapping has on developing a student's clinical reasoning through patient safety perceptions when integrated into a first-semester nursing course curriculum.

Discussion of Demographics

The overall participant demographics for this quality improvement project focused on first-semester students enrolled in a foundations of adult health course. The students included those who recently graduated high school to those seeking a second degree. Each cohort's talents, experiences, and knowledge create the necessary diversification that nursing requires. The collected data of the cohort participants represented a range of student ages and degree

statuses, outlined in Table 1. The students participating in the research were female and between the ages of 19–24, with a noted diversification of earned degrees.

Table 1

Student Demographics Pre- and Postsurvey Data

Student data	Presurvey (*n* = 52)	Postsurvey (*n* = 37)
Age		
19 to 24 years old	46	33
25 to 30 years old	6	4
Education		
High School Graduate	14	7
Associate Degree	18	13
Bachelor's Degree	20	17

Note. During the postsurvey phase of the project, there was one leave of absence, five program withdrawals, and seven course withdrawals.

The G*Power estimator configured with a power of 0.80 revealed a required sample size of 34 participants for the study. The presurvey participants included 52 student participants. The postsurvey included 37 participants. Five students' data were removed from the collected samples due to ineligibility criteria, including age, previous student status, and participation in another study. Identifying these students was based on three filtering questions, which included (a) what is your age, (b) are you currently participating in another study, and (c) were you a previous participant in this course?

The student identity was protected with a six-digit number for both the presurvey and the postsurvey; however, the students failed to provide consistency with number identification between the pre- and postsurvey data collection. The student coding system included the

following criteria: (a) the last two digits of a parent's cell number, (b) the last two digits of the current year, and (c) the last two digits of their student identification. Therefore, the paired *t* test could not be utilized as only three students were pairable on the data review. The independent *t* test was initiated to analyze the means data between the presurvey and the postsurvey responses instead of the planned paired student perceptions.

The difference in student participation between the presurvey and postsurvey was attributed to a leave of absence, withdrawals from the study, program withdrawals, and course withdrawal from two surveys. The semester began with 140 students, including five repeating students. However, at the time the postsurvey was conducted, there was one leave of absence, five course withdrawals, and seven program withdrawals. Two students opted to withdraw from the study before the postsurvey. The students across the cohort participated in concept mapping activities in clinical and didactic settings for 10 weeks. The presurvey began on September 30, 2021. The study was concluded on December 2, 2021, with a postsurvey collection before the last course lecture and the final exam.

Data Analysis

The data analysis for this project used the SPSS 27 program using an independent *t*-test sample analysis comparing the means between the presurvey and postsurvey data. The H-PEPSS tool developed by Dr. Liane Ginsburg provided the foundational tool for the study. The H-PEPSS is a 44-item Likert scale focusing on patient safety perceptions using clinical and didactic case scenarios. The survey focus areas include (a) clinical safety, (b) culture of safety, (c) interprofessional team building, (d) safety risk management, (e) human and environmental factors, (f) recognizing adverse events, and (g) communication with interprofessional teams (Ginsburg, Castel et al., 2012). The H-PEPSS Likert scale survey used five categories: *strongly*

disagree, disagree, neutral/unsure, agree, and *strongly agree*. Each ranking was categorized with a numerical value between one and five for mean scoring values. A value of five was assigned to *strongly agree*, with values decreasing to *strongly disagree* with a value of one. The study maintained the proposed projected design without any alterations.

The mean outcome across the survey categories showed performance improvements between pre- and postsurvey submissions. The survey results, included below, indicate data significance regarding the student perceptions of patient safety care (see Table 2). The mean scores between the pre- and postsurvey in the classroom and clinical analysis showed improvement in each measured category. The most significant improvements occurred in the "speaking up in adverse situations" category, with a documented presurvey mean score of 2.98 compared to the postsurvey mean score of 3.80. The presurvey occurred before the students began clinical rotations; therefore, the improvements may be related to these experiences and the consistent exposure to effective communication across the professions. A second noticeable improvement occurred between the pre- and postsurvey category "patient safety issues in education," with a presurvey mean of 3.53 and a postsurvey mean of 4.17. The students participated in Team Strategies and Tools to Enhance Performance and Patient Safety (TEAMSTEPPS), an interprofessional education (IPE) curriculum enhancement course introduced during the fall 2021 semester, which may have contributed to the increasing means in these areas.

Table 2

Contrast Between Presurvey and Postsurvey Outcomes

Survey outcomes as analyzed by the student's perceptions of safety awareness				
Survey Components	Presurvey Questions Based on Classroom Perspectives (*n* = 52)	Postsurvey Questions Based on Classroom Perspectives (*n* = 37)	Presurvey Questions Based on Clinical Perspectives (*n* = 52)	Postsurvey Questions Based on Clinical Perspectives (*n* = 37)
Section 1: *I feel confident in what I learned about?*				
Clinical Safety	4.10	4.40	4.04	4.53
Culture of Safety	4.00	4.19	3.77	4.37
Interprofessional Teams	3.65	4.12	3.49	4.24
Communication	4.15	4.27	3.82	4.31
Safety Risk Management	3.31	4.02	3.37	4.24
External Factors	3.53	4.03	3.48	4.31
Recognize Adverse Events	3.41	4.03	3.40	4.14
Section 2 Safety Issues: Education	Presurvey (*n* = 52) 3.53		Postsurvey (*n* = 37) 4.17	
Section 3 Speaking Up: Adverse Situations	Presurvey (*n* = 52) 2.98		Postsurvey (*n*= 37) 3.80	

The PICOT question for this study stated: Does concept mapping integration in a BSN course curriculum support the development of clinical reasoning skills and patient safety perception in first-semester students? The population (P) represented BSN nursing students, the

intervention (I) represented concept mapping, the comparison (C) of pre- and postsurvey evaluations, and outcomes (O) to determine if patient safety focuses through clinical reasoning skills improved based on student performance measures following concept mapping interventions and (T) through a single semester analysis, which, in this case, was the fall 2021 semester. In addition to the PICOT question, two hypothesis statements were developed. The null hypothesis H_o stated concept mapping integration into the BSN curriculum *would not improve* patient safety perceptions. The alternative hypothesis H_1 stated that concept mapping integration in the BSN curriculum *would improve* student patient safety perceptions.

Although comparing the mean in both the classroom and clinical settings indicated improvement between the pre- and postsurveys, the independent *t*-test sample analysis provides additional data related to each category of the H-PEPSS survey. Eleven subcategories out of 63 failed to meet data significance with a *p*-value of < .05, as determined through Levene's test for equality of variance significance and the *t* test for the equality of means two-tailed significance. The two-step analysis determines whether Levene's *t* test met the *p*-value < .05 for data significance. If the *p*-value was satisfied, then equal variances were not assumed. The second measure occurred with the *t* test for equality of means focusing on data significance based on a two-tailed analysis. The two-tailed measure for data significance was based on the *p*-value of < .05. The 11 subcategories that failed to reject the null focused on patient safety, hand hygiene, patient advocacy, and communication across all patient care areas.

The *clinical* perception regarding hand hygiene reflects Levene's significance of 0.006, supporting the designated *p*-value of < .05. However, the independent *t* test fails to support the desired *p*-value with a two-tailed significance of 0.164. The remaining areas that lacked significance include classroom focus areas. The classroom safety component did not meet data

significance with Levene's significance with a value of 0.0679, while the *t* test for equality of means two-tailed significance test was 0.087. Although these categories do not satisfy data significance, it does reflect that a level of improvement occurred based on the student perceptions. There are opportunities for additional educational implementation in these areas to improve these outcomes. Table 3 provides a summary of these results. Appendix I and Appendix J demonstrate a complete data review of each analyzed category.

Table 3

Independent t *Test for Equality of Means Data Analysis of Nonsignificant Results*

Levene's Test for Equality of Variances				*t* test for Equality of Means						
Survey question	Variances	*F*	Sig.	*t*	*df*	Sig. (2-tailed)	*MD*	*SE*	Lower	Upper
Clinical Safety Classroom	Equal variance assumed	0.172	0.0679	-1.732	87	0.087	-0.335	0.194	-0.72	0.049
Clinical Safety Classroom Hand Hygiene	Equal variances assumed	0.108	0.744	-0.505	87	0.615	-0.08	0.157	-0.392	0.233
Culture Safety Classroom Workplace Design	Equal variances assumed	0.014	0.905	-0.374	87	0.71	-0.0769	0.2058	-0.4861	0.3322
Culture Safety Classroom Speaking Up	Equal variances assumed	0.004	0.947	-0.553	87	0.582	-0.105	0.1899	-0.4824	0.2724
Culture Safety Classroom Environmental Support	Equal variances assumed	0.768	0.383	-0.061	87	0.951	-0.0094	0.1526	-0.3126	0.2939
Working Teams Classroom Patient Advocacy	Equal variances assumed	0.042	0.838	-0.679	87	0.499	-0.131	0.194	-0.516	0.253
Communication Classroom Patient Communication	Equal variances assumed	0	0.986	-1.012	87	0.314	-0.152	0.15	-0.45	0.146
Communication Classroom Provider Communication	Equal variances assumed	0.002	0.968	-0.689	87	0.493	-0.131	0.191	-0.511	0.248
Communication Classroom Adverse Events	Equal variances assumed	1.683	0.198	-0.377	87	0.707	-0.066	0.175	-0.414	0.282
Human and Environmental Factors Roles Classroom	Equal variances assumed	0.833	0.364	-0.653	87	0.515	-0.131	0.2	-0.529	0.267
Clinical Safety Clinical Hand Hygiene	Equal variances not assumed	7.839	0.006	-1.404	86.964	0.164	-0.164	0.117	-0.397	0.068

Note. These specific categorical questions presented insignificant findings in the student cohort, as these subcategories did not satisfy the *p*-value of < .05 for data significance.

The remaining items are *classroom*-focused areas, including hand hygiene with a two-tailed significance of 0.615, workplace design at 0.71, speaking up at 0.582, environmental support at 0.951, patient advocacy at 0.499, patient communication at 0.314, provider communication at 0.493, adverse events at 0.707, and human and environmental roles at 0.515. These subcategories reference focus areas not sufficiently stressed in the current didactic delivery. Therefore, the data support that further educational implementation is necessary for the classroom regarding these topics. Importantly, these areas represent quality improvement standards that meet the QSEN safety quality initiatives and the safe and effective care testing standards for NCLEX (NCSBN, 2021; Quality and Safety Education for Nurses, 2020). Therefore, these noted areas of nonsignificance represent essential areas for dedicated improvement for future cohorts and the opportunity for future research.

These findings indicate that increased educational integration is necessary on the topics primarily focused within the classroom settings. Unfortunately, addressing these areas with the strict utilization of concept mapping is unrealistic. Formulating communication skills is an essential skill for promoting patient advocacy and patient safety. The unique interaction between healthcare professionals is rarely experienced in the classroom; therefore, curriculum enhancement strategies are necessary to improve these outcomes. Hand hygiene represents another component that is difficult to address with concept mapping. However, based on these findings, there was a lack of significance in both the classroom and clinical settings.

The conceptual areas for educational improvement included communication, interprofessional teams, and recognizing adverse events. Ironically, these areas support the observed preparation-to-practice gaps supported by the literature. According to the literature, students require further re-enforcement of these skills within the curriculum in conjunction with

concept mapping, simulations, skill demonstrations, case studies, concept learning, and teach-back sessions. The literature supports the utilization of multiple methods to improve these weaknesses with advanced clinical reasoning utilizing multiple educational approaches (Gill et al., 2019; Hung & Lin, 2015; Kaddoura et al., 2016).

The study results support the clinical reasoning model applications, including process examinations, cue identification, data analysis, and implementation roles. The model focus and the concept mapping integration practices indicated that students improved in multiple areas except in the 11 categories noted previously. Within these 11 subcategories, the student performance and development of clinical reasoning abilities failed to show improvement within both the classroom and clinical settings, according to the H-PEPSS results. However, in the remaining 52 subcategories, that data significance was met with a p-value < .05 through the independent means t-test analysis. Appendix I and Appendix J detail the data analyzed for the 63 subcategories outlined within the H-PEPSS pre- and postsurvey tool as identified.

The areas that showed significant improvements and satisfied the p-value of < .05 included the clinical areas focused on patient safety awareness. These noted improvements may not relate to the concept mapping activities but are based on first-hand experiences. However, it is possible that concept mapping did assist with the notable improvement as students integrated patient safety and the nursing process within the data collection and diagramming activities. Table 4 demonstrates the areas of noted data significance.

Table 4

Survey of Data Significant Subcategories of the H-PEPSS Results

Subcategory		*p*-value < .05	
		Levene's *t* test (variances assumed)	Significance determination 2-tailed *t* test
Classroom	Infection Control	0.325	0.040
	Safe Medication	0.846	0.031
	Hospital Organization	0.909	0.010
	Working Team Dynamics	0.282	0.001
	Interprofessional Conflict	0.416	0.033
	Classroom Debriefing	0.112	0.010
	Patient Engagement	0.515	0.032
	Managing Safety Risk	0.098	0.001
	High-Risk Safety Situations	0.684	0.004
	Human & Environmental Technology	0.879	0.001
	Adverse Events Close Call Disclosure	0.928	0.046
	Close Call Recognition	0.515	0.000
	Harm Reduction	0.293	0.015
	Close Call Timely Analysis	0.425	0.003
Clinical	General Safety	0.218	0.000
	Infection Control	0.241	0.000
	Safe Medication	0.518	0.007
	Speaking Up	0.554	0.001
	Environmental Support	0.904	0.020
	Working Team Dynamics	0.684	0.000
	Interprofessional Conflict	0.062	0.000
	Patient Communication	0.414	0.008
	Provider Communication	0.261	0.006
	Adverse Event Communication	0.382	0.012
	Adverse Events Close Calls	0.772	0.000
	Adverse Events and Disclosure	0.710	0.014
	Close Calls Timely Analysis	0.428	0.001
Education	Preceptor Consistency	0.780	0.000
	Interdisciplinary Teams	0.274	0.003
	Patient Safety Integration	0.319	0.010
	Communication with Adverse Events	0.695	0.000
	Communication of Unsafe Events	0.529	0.000

Note. *p*-value < .05.

The items represent the most significant data findings based on pre- and postsurvey data analysis. Levene's test determined whether equal variances were based on whether the data met the *p*-value < .05. If the *p*-value of Levene's test was > .05, then the variances were assumed. The 2-tailed *t* test determined a significant finding if the *p*-value < .05 was satisfied. By analyzing each subcategory, areas of noted weaknesses and strengths represented essential indicators for improving the preparation-to-practice gaps supported within the literature. The improvements documented in these areas are significant for creating curriculum enhancements necessary for safe patient care at the bedside. The analysis also provided additional data that met the *p*-value < .05, but the changes were not as substantial as those presented in Table 4. Table 5 reveals the categories that met data significance with minimal differences between the pre- and postsurvey analysis.

Table 5

H-PEPSS Data Analysis of Minimal Significance p-*Value < .05*

Subcategory		Variances assumed	Levene's *t* test	Significance determination 2-tailed *t* test
Classroom	Working Teams Decision Making	X	0.120	0.016
	Safety Risk Recognition	X	0.098	0.001
	Environmental Workflow	X	0.058	0.007
Clinical	Workplace Design Culture		0.049	0.001
	Hospital Organization Culture		0.012	0.000
	Working Teams Debriefing		0.007	0.000
	Working Teams Patient Engagement	X	0.112	0.004
	Working Teams Clinical Decisions	X	0.139	0.000
	Working Teams Patient Advocacy		0.012	0.000
	Safety Risk Recognition	X	0.078	0.000
	Safety Risk and Implementation	X	0.092	0.001
	Safety and High-Risk Situations	X	0.085	0.000
	Human and Environmental Roles		0.006	0.000
	Workflow	X	0.090	0.000
	Close Calls and Harm Reduction	X	0.125	0.000
Education	Scope of Practice	X	0.140	0.006
	Reporting Adverse Events	X	0.151	0.001
	Education Foundational Skills	X	0.189	0.004
	Interval Process Integration	X	0.111	0.000
	Negative Repercussion Communication	X	0.062	0.003

The significant data findings in Tables 4 and 5 indicate additional areas assessed by the H-PEPSS tool about essential student skills in patient care. Communication, working with interprofessional teams, and recognizing and implementing safety measures during high-risk situations represent quality improvement measures the nurses must develop throughout their education and careers. Continued engagement with these components is essential for improving the proactive and clinical reasoning skills necessary for safe patient care.

Therefore, when evaluating both the null and alternative hypotheses, it is necessary to analyze the effects of the survey categories in both the statistically significant and statistically insignificant categories. Each survey category is essential for developing a curriculum dedicated to clinical reasoning improvements and decreasing the preparation-to-practice gaps cited within the literature. In reviewing the null and alternate hypotheses, 11 areas failed to satisfy the *p*-value < .05. Therefore, the null hypothesis was accepted, while the alternate hypothesis was rejected. The findings, as discussed, represent weaknesses in the student's ability to discern safe practice in these specific focus areas.

However, reviewing the 53 remaining subcategories, the data represents areas that meet data significance as the student's perceptions of these areas improved between the pre- and postsurveys. The null hypothesis was rejected, while the alternative hypothesis was accepted since the *p*-value < .05 was statistically significant. The findings in these results represent quality indicators that show improvement within the essential areas dedicated to communication and recognizing adverse events. Table 6 outlines the hypothesis analysis for the null and alternative statements. Appendix I demonstrates the data in each analyzed category and subcategory of the H-PEPSS pre- and postsurvey reporting nonsignificant findings.

Table 6

Hypothesis Analysis

Hypothesis	Categories (*p*-value > .05) (*n* = 11)	Categories (*p*-value < .05) (*n* = 53)
H_0—The postsurvey scores following a semester integration of concept mapping will not improve student patient safety perception	Accept	Fail to Reject
H_1—The postsurvey scores following a semester integration of concept mapping will improve student patient safety perception	Fail to Reject	Accept

Reliability and Validity

Cronbach's alpha reliability score supports the internal reliability consistency of the H-PEPSS scale through SPSS 27 analysis, which reported 0.984 on the items evaluated and formatted in Microsoft Forms. The reliability measurement is within the zero to one parameter and ranks as a reliable scale for the performance of repeatable and consistent outcomes (Heavey, 2018; Pallant, 2020). The convergent validity of the H-PEPSS tool supports multiple research approaches, including Dr. Ginsburg's research.

One article supported the reliability factor > 0.85 with an increased validity regarding the wide range of patient safety focusing on all levels of competence for 732 senior undergraduate nursing students (Chen et al., 2019). A second comparative study analyzed undergraduate nursing students in Cyprus (*n* = 243) and Greece (*n* = 367). The analysis outcomes revealed increased patient safety perceptions in the classroom (*m* = 4.0) versus the clinical (*m* = 3.7). The validity of the study outcomes supported the patient care knowledge gaps observed by the literature were based on inadequate preparation among nursing students (Dimitriadou et al., 2021).

A third study on 50 Iranian nursing students was a quasi-experimental presurvey and postsurvey design implementing the H-PEPSS tool. The data reported postsurvey areas of weakness in patient safety management and communication safety based on an ANOVA repeated measures analysis (Torkaman et al., 2020). Lastly, Ginsburg, Tregunno et al. (2012) provided validity among multiple healthcare professional practices based on their patient safety perceptions across the categories of the H-PEPSS measurement tool. A sample population included schools of medicine (n = 814), nursing (n = 2,196), and pharmacy (n = 521) who completed the survey (Ginsburg, Tregunno et al., 2012). The study showed relative weakness in cultural care, teamwork, and risk management. These areas further support academia's value toward improving patient safety content across all medical preparatory curriculums (Ginsburg, Tregunno et al., 2012). These observations further support the convergent validity of the H-PEPSS measurement tool as an appropriate and supportive tool for this project.

Project Limitations

The project focused on understanding the students' patient safety perceptions following 10 weeks of concept mapping integration within a BSN curriculum. The H-PEPSS tool was used in the pre- and postsurvey collection of data. The student participants in the study were protected from me (the primary researcher), who was also blinded by hiring an assistant researcher throughout each data collection phase. The students were asked to protect their identity with six numbers for completing the H-PEPSS survey. However, the students did not use the same numbers for each survey. Therefore, instead of analyzing the student's independent perceptions, it was necessary to explore the group mean for each pre- and postsurvey category.

Additionally, the student perceptions regarding patient safety represented a study limitation. It was difficult to determine if the students needed to answer the survey correctly

instead of recording their perceptions of patient safety with accuracy. Therefore, an experimental and control design is necessary to compare the observed outcomes. An experimental study would also be appropriate to compare the results of first- and fourth-semester students to determine if their patient safety perceptions improved throughout an observed semester.

Lastly, potential inconsistencies occurred with the students' concept mapping experiences as an established course intervention. However, there was limited control over the quality of the conceptual linkages across each faculty member. Therefore, an experimental and control group design would allow the researcher to analyze the student's patient safety perceptions between concept mapping and linear care plans. The experimental and control groups could be limited to 34 students in each randomized group.

Chapter Summary

The study produced significant data supporting that concept mapping improves the student's patient safety perceptions throughout a 10-week study examination. Therefore, the H_o hypothesis that postsurvey results would report that the concept mapping did not improve the patient safety perceptions was rejected. Additionally, the alternative hypothesis stating that postsurvey results would agree that concept mapping did improve the student patient safety perceptions was accepted. The alternative hypothesis was supported significantly throughout the data with the 11 outliers, which failed to satisfy the p-value < .05. Therefore, the alternative hypothesis was rejected while the null was accepted.

The sample population included a presurvey group (n = 52) and a postsurvey group (n = 37) of first-semester baccalaureate students. The G*Power effect size was set at 0.80 and further supported by Cohen's d independent sample size report stating an effect size of 0.91 averaged across the presurvey and postsurvey data responses. The data was statistically significant with

the independent *t*-test analysis except for the 11 outliers. These 11 areas represent noted improvement areas between the presurvey and postsurvey but failed to meet data significance with a *p*-value < .05 within the curriculum's classroom and clinical content areas. The weakness in these areas was attributed to how concept mapping was represented within these specific focus points and the student's direct association with these areas. However, the overall data significance of the remaining data points was supported through the independent *t*-test analysis. The data was based on the independent mean analysis of pre- and postsurvey outcomes.

Chapter 5: Discussion, Conclusions, and Recommendations

The project was designed to assist students with developing advanced critical thinking skills throughout their tenure as nursing students and into their professional careers as safe nursing practitioners with the utilization of concept mapping as one tool to achieve academic success.

Timing

The timing of this project marks a pivotal moment in nursing education, with the introduction of the next-generation NCLEX examinations beginning in spring 2023 (NCSBN, 2019). Concept mapping represents an integral component in the NCSBN clinical judgment model, which includes Bloom's taxonomy, the nursing process, and the individual and environmental factors that directly impact a student's developmental thinking and reasoning abilities that directly affect patient safety (NCSBN, 2021). Although this project focused on developing clinical reasoning, throughout the integration of this project, the nursing process, interactive case studies, and data assimilation represented the basis for this concept mapping intervention. Tanner (2006) addressed clinical judgment as evolving into five phases. The phases included (a) nursing knowledge, (b) knowing the patient, (c) the development of the patient care situation, (d) the utilization of multiple thinking approaches dedicated to patient outcomes, and (e) reflection of the events and the actions which develops clinical reasoning (Tanner, 2006). These steps mirror the NCSBN clinical judgment model, which incorporates the six phases based on the patient's needs and the clinical decisional outcomes (Tanner, 2006). Therefore, the data contains improvements based on the participating cohort's presurvey and postsurvey means.

Interpretation and Inference of the Findings

The findings represent a pivotal report for curriculum integration related to concept mapping approaches and the noted areas of weakness perceived across the surveyed student sample populations. The reported results were based on student perceptions regarding patient safety, while the areas with insignificant findings mirror the reports from the clinical partners associated with the testing organization. The most significant focus improvements were on communication and interprofessional teamwork initiatives. Surprisingly, there was a distinct difference between the classroom and the clinical outcomes across all areas except hygiene, which noted weaknesses in both the classroom and clinical perceptions. The knowledge obtained from the survey represents valuable data for baccalaureate programs as focus areas, especially with the NCLEX next-generation examination guidelines. The observed communication insignificant findings potentially result from COVID-19 and the virtual learning environments the students experienced during the pandemic. However, nursing educators must focus on these perceived patient safety awareness factors to enhance their curriculum and student performance in patient care.

The Implication of Analysis for Leaders and Organizations

Academia and nursing education are evolving around multiple moving targets as the COVID variants directly impact the students. The value of the results gained from this research allows educational institutions and organizations to develop improvement processes dedicated to student curriculum improvements and hospital residency programs for revitalization. The QSEN competencies and the board of nursing exams represent the quality education standards necessary for students to break the preparation-to-practice gaps before graduation. Nursing institutions cannot maintain a status quo curriculum as students will continue to fail to address their patient's

needs proactively. Applying clinical reasoning and concept mapping can assist with student skill development. The data obtained from this research was dedicated to patient safety improvements. A nursing professional is first a student; therefore, curriculum improvement represents a pivotal component resulting from this research toward decreasing the preparation-to-practice gaps noted within the literature. Additionally, nurses experience growth during their practice, as described by Benner's novice-to-expert theory.

Recommendations for Future Research and Implications

The concept mapping integration utilized for this research replaced the linear care planning tool in the first-semester foundations of adult health course. Concept mapping represents an active learning engagement tool that engages students with their patient and educational content. Concept mapping increases the student's critical thinking for improving patient safety in nursing education and after graduation. The concept mapping applications require academic development among faculty and adjunct faculty members before project implementation. The first-semester students and faculty at the study institution acquired the necessary training before study initiation. The current project design allowed students to benefit from the concept mapping integration within the classroom and clinical experiences. It was essential for each student to receive consistent feedback regarding the concept mapping experiences. Therefore, it is recommended that future studies incorporate small group concept mapping experiences to determine intervention effectiveness.

Extraneous factors may have impacted the students' clinical reasoning development and patient safety perceptions. These factors included clinical patient exposure experiences, lab and simulation experiences, multiple active learning approaches, polling activities, and knowledge from other courses. A solution for controlling these extraneous factors for a suggested research

approach is a recommendation to organize a focused group of students using an experimental study comparing concept mapping to traditional linear care plans is appropriate. The benefit of controlling the implementation environments will provide a dedicated focus on concept mapping and linear care plans to determine if differences occur between the presurvey and postsurvey results between the two implementations.

The project required the acquisition of an assistant researcher to collect student consent and survey responses. As the first-semester students' primary researcher and assistant professor, it was necessary to acquire an assistant researcher to prevent any research bias or coercion. The assistant researcher was not associated with the students or the course. It was essential not to discuss the project individually with the students or initiate questions as the researcher. The student identity was protected with data coding; however, despite these student protections, possibilities existed for student identification, which posed a threat to the students to participate in the study or answer the survey questions correctly instead of truthfully. The data collected was based solely on student perceptions, which could have swayed the students not to answer truthfully. I did not review the data results until the student's permanent grade records were released for the course. These processes further protected the student's identities and any bias related to their participation by the primary researcher.

Lastly, the students created a six-digit code to complete the pre- and postsurveys to protect their identity during the research. The purpose of the code was to provide anonymous responses by the students and analyze the data using paired *t*-test analysis. Unfortunately, the students failed to use the same identification number; therefore, these actions did not allow for a pairing analysis. As an alternative, an independent *t* test using a comparison of means analyzed the data based on the pre- and postsurvey scores of the participating students. As a suggestion for

additional research, it is essential to integrate a coding system that allows the pairing of the participant performance to measure any alterations in the student perceptions rather than the group. The analysis revealed improvements across multiple categories between the pre- and postsurveys. It would be interesting to determine how the students perceived their individual improvements with the paired *t*-test analysis.

In conclusion, the project represents future research potential to determine the impact of concept mapping on the student's clinical reasoning abilities. The first recommendation would be creating an experimental and control group-designed study using concept mapping and traditional care planning with a focused observational with a pre- and postsurvey approach. A student requires time to work through concept mapping and care planning; therefore, a signal exposure will not provide reliable results. Additionally, further research must include dedicated consistency with data labeling and student pre- and postsurvey participation for a pairing of the data instead of analyzing overall group means per category. Lastly, evaluating the effects of concept mapping on patient safety awareness and clinical reasoning requires longitudinal data, including the evaluation of students throughout their nursing school tenure or a study comparing first-semester and fourth-semester pre- and postsurvey outcomes. The H-PEPSS tool provides quantifying information essential for further curriculum enhancements in clinical and classroom settings for safe patient care development opportunities.

Project Alignment With DNP Essentials

The AACN for the DNP graduate indicates eight essentials applicable to earning the DNP degree (American Association of Colleges of Nursing [AACN], 2006). The essentials design focuses on creating advanced practice nurses across all specialties while enhancing their knowledge, skills, and abilities and creating nursing leaders. As an assistant professor at a

nursing institution, I know these essentials are necessary to ensure quality patient and organizational outcomes. The first essential addresses the science related to the practice of patient care (AACN, 2006). In academia, patient care is pivotal in providing experience through the hands and hearts of our students. This project addresses this essential by creating prepared nurses through integrating science applications and concepts focused on quality patient safety standards at the bedside.

The second essential focuses on organizational leadership dedicated to quality improvement (AACN, 2006). Teamwork and dedicated leadership are vital for improving infrastructure and patient care outcomes. This quality improvement project focused on the results of first-semester BSN students regarding clinical reasoning approaches and patient safety awareness. The project meets the standards for Essential III through data analysis and research processes dedicated to enhancing the scholarship of nursing and research-based inquiry (AACN, 2006).

The fourth standard focuses on informatics and technology for improving patient care outcomes (AACN, 2006). Technology represented a significant component of this project in initiating concept mapping in the classroom and clinical settings using internet approaches that drive clinical reasoning. Additionally, the H-PEPSS survey was converted to an electronic format for collecting student responses. The ACCN (2006) states that electronic media and technology provide efficacy within academic settings to promote the necessary knowledge, skills, and abilities required for the elected nursing specialty.

The research findings are dedicated to improving the preparation-to-practice gaps in nursing graduates through advanced clinical reasoning practices and promoting proactive patient care at the bedside. The clinical reasoning model addresses the platform for this research,

encouraging the students to evaluate, process, and implement and reflect on the patient data presented in each facet of their education, including didactic, simulation lab, and clinical experiences. These components meet the goals dedicated to Essential V regarding aligning a framework that facilitates healthcare outcomes (AACN, 2006).

Communication, patient safety, and interprofessional collaboration are vital components in healthcare roles. Patient care does not occur among silos but through teamwork. The AACN (2006) states that the value of healthcare relies on the multi-tiered environment of the knowledge and skills of professionals to accomplish safe, timely, effective, and equitable patient-centered care. The quadruple aim theory further addresses the importance of providing equitable and intercollaborative patient care dedicated to quality outcomes (Bachynsky, 2019; Institute for Healthcare Improvement [IHI], 2009). This project addresses these components while also meeting the quality indicators addressed in Essential VI.

AACN's (2006) Essential VII focuses on the value of clinical preparation to improve the overall population's health. The meaning of clinical preparation focuses on health promotion and reducing health risks through preventative and proactive measures (AACN, 2006). This quality improvement project addressed two populations: the students and the patients. The project focused on improving how students analyze patient data to promote the highest level of patient care. Unfortunately, nursing students are unprepared to provide safe and effective care to their patients, causing harm that is often preventable. Fortunately, proactive thinking and clinical reasoning provide nurses with the safety net necessary for today's complex patients. The preparation-to-practice gaps noted in the literature support the need for clinical prevention and proactive patient care strategies at the bedside. Through the advanced development of clinical reasoning, nursing students can provide care to their patients safely and with confidence.

AACN (2006) Essential VIII focuses on the DNP advanced practice role provided through their specialty and continual education. The enriching educational experiences focused on multiple practice specialties, including academia. The quality improvement project focused on the student's ability to negotiate the unique complexities of each patient encounter. The DNP professional guides the students thinking processes to determine the most optimal decisions regarding their patients with dedication. Concept mapping assists the students with developing advanced clinical reasoning processes dedicated to their patient encounters. Through patient assessments, lab analysis, and medication administration, students rely on the guiding hand of an experienced nurse to begin developing the knowledge necessary for safe patient care and the basis for this project.

Chapter Summary

The data outcomes were surprising considering the academic student performance in the course. There were 35 students, one-third of the cohort, who failed, withdrew, or assumed a leave of absence from the course. The results obtained data significance that further supports a need for improvements in nursing education while opening opportunities for curriculum enhancements. A perceived weakness in the research included the inability to analyze the pre- and postsurvey results using the projected paired *t*-test analysis. The students who participated in the study failed to use the same six-digit number between the two tests. Quality control measures are necessary to ensure that each student survey participant remains consistent with their identity coding. Therefore, an independent *t*-test analysis compared the means between the pre- and postsurveys instead of analyzing the matched pairs for each student regarding their safety perception between the two surveys.

The research identified areas for focused curriculum improvements regarding how the students think while also focusing on revising content delivery in the classroom and clinical environments. Integrating concept mapping into nursing curriculums focuses on content areas that require improvements in the student's thinking and analysis processes based on clinical and classroom experiences. The student's engagement within the curriculum represents an active learning process that alters the status quo and entices quality over quantity to make the crucial differences that nursing academia requires today. It is time for nursing educators to think differently about content delivery methods. Closing the preparation-to-practice gap represents an essential patient safety continuum and relies on the student's performance as future nursing professionals.

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Appendix A: School of Nursing Letter of Approval

I am pleased to have the opportunity to support [redacted] in the conduct of her [redacted] DNP project at [redacted] School of Nursing (SON).

Her project, *Analyzing the Outcomes of Concept Mapping Integration into a BSN Curriculum Using the H-PEPSS Survey*, examines the integration of an active learning strategy (concept mapping) into our BSN curriculum. The study uses pre and post surveys to assess the effects of concept mapping on clinical reasoning development measured by a patient safety survey, H-PEPSS. The information gained from this study will allow [redacted] to develop educational curriculum standards as a direct result of this quality initiative.

[redacted] is a rising nurse leader at [redacted] and a role model for students. We support her initiative to obtain a DNP degree and her project. She is working with our Research Innovation and Scientific Excellence (RISE) Center Team to develop the materials needed to conduct the survey at [redacted] including IRB protocol documents.

Sincerely,

Appendix B: Approval Letter for Utilization of the H-PEPSS

Thank you for your email. You are welcome to use the H-PEPSS in your research purpose and use [it] as laid out in your email.

The version we published in BMJQ&S is the final version. There is the full version and the reduced item set based on the factor analytic work.

There are also two other sections on the survey related to comfort of speaking up and other aspects of PS in the training environment (plus demographics). You can use or adjust as you like recognizing the scale properties may change if you edit any of the H-PEPSS items (that reflect the PS competency areas).

You can see the full 2010 generic survey here: http://www.yorku.ca/patientsafety/H-PEPSS/H- PEPSS_Generic_2010.pdf

A guide to reductions following the factor analytic can be found in the index BMJQS paper available at: https://qualitysafety.bmj.com/content/qhc/21/8/676.full.pdf?with-ds=yes

There is no formal administration or scoring guide, but you can see details of how we did this in both the index paper (link above) and the second paper available at: https://qualitysafety.bmj.com/content/22/2/147

Regarding acknowledgement [sic], we would simply ask for proper citation of our work in anything you write, present, or publish.

Appendix C: H-PEPSS Survey

Health Professional Education in Patient Safety Survey (H-PEPSS; Ginsburg, Castel et al., 2012)

Health Professional Education in Patient Safety Survey (H-PEPSS)

Questionnaire Instructions:

1. This survey takes approximately 12 minutes to complete
2. This survey seeks the **perspectives of students** in the health professions on the ways in which patient safety is addressed in health professional education.
3. The survey asks about **clinical safety issues** (e.g. hand hygiene, transferring patients, medication safety) but also **system issues that effect safety** (e.g. aspects of the organization, management, or the work environment including policies, resources, communication and other processes)
4. The survey is seeking your **perceptions** and **opinions** only. There are no right or wrong answers. Indicate the extent to which you agree or disagree with each question statements. If you are unsure whether you agree or disagree, mark "neutral".
5. This survey is completely **anonymous**. No one will know whether you have chosen to participate or what your individual answers are. Completion of the survey is entirely voluntary, though we do hope you will take this opportunity to help provide the student perspective on this important issue.

Research funded by the Canadian Patient Safety Institute (CPSI) and York University

Patient Safety: The pursuit of reduction and mitigation of unsafe acts within the health care system, as well as the use of best practices shown to lead to optimal patient care outcomes.

SECTION 1: Learning about specific patient safety content areas

Here we ask about 7 areas that have to do with keeping patients safe. We would like to know about the extent to which you feel confident about what you learned in each of these areas. We ask you to think about both your classroom and clinical practice setting experiences—and evaluate them separately.

	...in the classroom					...in clinical settings				
	strongly disagree	disagree	neutral / unsure	agree	strongly agree	strongly disagree	disagree	neutral / unsure	agree	strongly agree
Clinical safety: *"I feel confident in what I learned about..."*										
1. safe clinical practice in general	○	○	○	○	○	○	○	○	○	○
2. hand hygiene	○	○	○	○	○	○	○	○	○	○
3. infection control	○	○	○	○	○	○	○	○	○	○
4. safe medication practices	○	○	○	○	○	○	○	○	○	○
Culture of safety: *"I feel confident in what I learned about..."*										
5. the ways in which health care is complex and has many vulnerabilities (e.g. workplace design, staffing, technology, human limitations)	○	○	○	○	○	○	○	○	○	○
6. the importance of having a questioning attitude and speaking up when you see things that may be unsafe	○	○	○	○	○	○	○	○	○	○
7. the importance of a supportive environment that encourages patients and providers to speak up when they have safety concerns	○	○	○	○	○	○	○	○	○	○
8. the nature of systems (e.g. aspects of the organization, management, or the work environment including policies, resources, communication and other processes) and system failures and their role in adverse events	○	○	○	○	○	○	○	○	○	○
Working In Teams with Other Health Professionals: *"I feel confident in what I learned about..."*										
9. team dynamics and authority/power differences	○	○	○	○	○	○	○	○	○	○
10. managing inter-professional conflict	○	○	○	○	○	○	○	○	○	○
11. debriefing and supporting team members after an adverse event or close call	○	○	○	○	○	○	○	○	○	○
12. engaging patients as a central participant in the health care team	○	○	○	○	○	○	○	○	○	○
13. sharing authority, leadership, and decision-making	○	○	○	○	○	○	○	○	○	○
14. encouraging team members to speak up, question, challenge, advocate and be accountable as appropriate to address safety issues	○	○	○	○	○	○	○	○	○	○
Communicating Effectively: *"I feel confident in what I learned about..."*										
15. enhancing patient safety through clear and consistent communication with patients	○	○	○	○	○	○	○	○	○	○
16. enhancing patient safety through effective communication with other health care providers	○	○	○	○	○	○	○	○	○	○
17. effective verbal and nonverbal communication abilities to prevent adverse events	○	○	○	○	○	○	○	○	○	○
Managing Safety Risks: *"I feel confident in what I learned about..."*										
18. recognizing routine situations and settings in which safety problems may arise	○	○	○	○	○	○	○	○	○	○
19. identifying and implementing safety solutions	○	○	○	○	○	○	○	○	○	○
20. anticipating and managing high risk situations	○	○	○	○	○	○	○	○	○	○
Understanding Human and Environmental Factors: *"I feel confident in what I learned about..."*										
21. the role of human factors such as fatigue, competence that effect patient safety	○	○	○	○	○	○	○	○	○	○
22. safe application of health technology	○	○	○	○	○	○	○	○	○	○

	...in the classroom					...in clinical settings				
	strongly disagree	disagree	neutral / unsure	agree	strongly agree	strongly disagree	disagree	neutral / unsure	agree	strongly agree
23. the role of environmental factors such as work flow, ergonomics, resources, that effect patient safety	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Recognize, Respond to and Disclose Adverse Events and Close Calls: *"I feel confident in what I learned about...*										
24. recognizing an adverse event or close call	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
25. reducing harm by addressing immediate risks for patients and others involved	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
26. disclosing the adverse event to the patient	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
27. participating in timely event analysis, reflective practice and planning in order to prevent recurrence	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

SECTION 2: How broader patient safety issues are addressed in health professional education

	strongly disagree	disagree	neutral / unsure	agree	strongly agree
28. As a student, the scope of what was "safe" for me to do in the practice setting **was very clear** to me	❍	❍	❍	❍	❍
29. There is consistency in how patient safety issues were dealt with by different preceptors in the clinical setting	❍	❍	❍	❍	❍
30. I had sufficient opportunity to learn and interact with members of interdisciplinary teams	❍	❍	❍	❍	❍
31. I gained a solid understanding that **reporting** adverse events and close calls can lead to change and can reduce reoccurrence of events	❍	❍	❍	❍	❍
32. Patient safety was well integrated into the overall program	❍	❍	❍	❍	❍
33. Clinical aspects of patient safety (e.g. hand hygiene, transferring patients, medication safety] were well covered in our program	❍	❍	❍	❍	❍
34. "System" aspects of patient safety were well covered in our program (e.g. aspects of the organization, management, or the work environment including policies, resources, communication and other processes)	❍	❍	❍	❍	❍

SECTION 3: Comfort speaking up about patient safety

	strongly disagree	disagree	neutral / unsure	agree	strongly agree
35. In clinical settings,discussion around adverse events focuses mainly on system-related issues, rather than focusing on the individual(s) most responsible for the event	❍	❍	❍	❍	❍
36. In clinical settings, reporting a patient safety problem will result in negative repercussions for the person reporting it	❍	❍	❍	❍	❍
37. If I see someone engaging in unsafe care practice in the clinical setting,, I feel safe to approach them	❍	❍	❍	❍	❍

SECTION 4: Demographic information

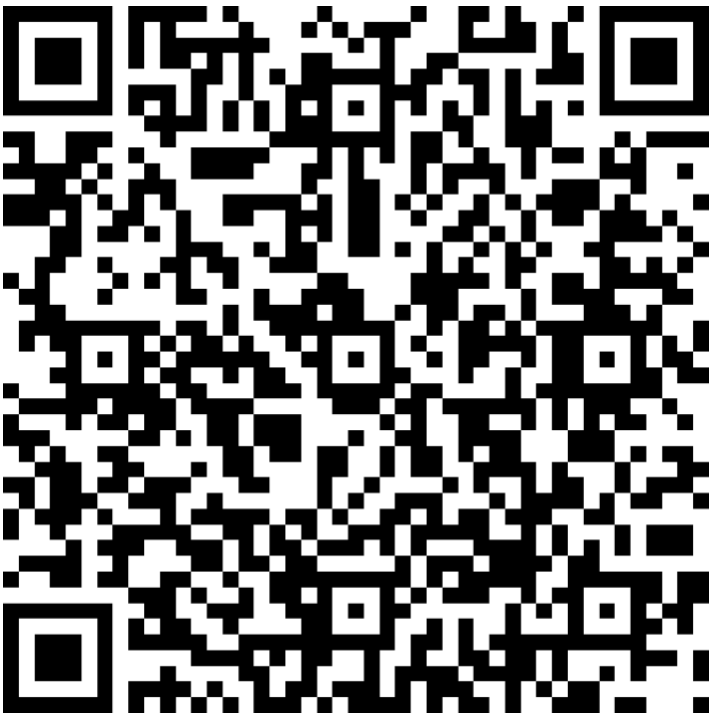
39. Health professional program	**40. Program stage**	**41. Previous degrees / diplomas (check all that apply)**	**42. Age group:**	**43. Gender:**	**44. Did you have training in a clinical setting prior to this program?**
❍ RN Nursing ❍ LPN/RPN Nursing ❍ Pharmacy ❍ OT ❍ PT ❍ Medicine ❍ Other:_____	❍ I am currently in year ___ of a ___ year program ❍ I have recently completed a ___ year program	❍ High school diploma ❍ Community college diploma ❍ Bachelors degree ❍ Masters degree ❍ PhD	❍ <21 ❍ 21-25 ❍ 26-30 ❍ 31-40 ❍ 41-50 ❍ >50	❍ Female ❍ Male	❍ Yes ❍ No

Appendix D: Project Timeline

Date of Completion	Planning	Project Planning Preimplementation	Implementation	Evaluation
Before the Implementation Semester	Approval for survey utilization (March–April 2021) Complete and receive approval from IRB and acquire assistant researcher (September 2021)			
Before the Implementation Semester	Meet with stakeholders and course faculty for support (September 2021)	N/A	N/A	N/A
Before the Implementation	Planning meeting (timing, tools, survey, and implementation strategies include MML (September 2021)	N/A	N/A	N/A
Beginning of Semester	N/A	Introduction of the project to first-semester students; Obtain consent (September 2021)	Collect participating students' presurvey results during the first week of education (September 2021)	N/A
During the Implementation Semester	N/A	N/A	Integration of concept mapping strategies into the curriculum of first-semester students (September–December 2021)	N/A
Week 13 of the Semester	N/A	N/A	Collect participating students' postsurvey evaluations (December 2021)	N/A
End of the Implementation Semester	N/A	N/A	N/A	Analyze the pre- and postsurvey data (December 2021–March 2022)
Final Phase	N/A	N/A	N/A	Report findings–delimited results posted to website (December 2021); Submit findings at STTI Conference (October 2022); Submit paper for publishing (November 2022)

Appendix E: H-PEPSS QRC Access

(Ginsburg, Castel et al., 2012)



H-PEPSS Survey Link

Appendix F: IRB Approval Letters

[redacted]

Dear [redacted]

On behalf of the Institutional Review Board, I am pleased to inform you that your project titled "Analyzing the outcomes of concept mapping integration into a BSN curriculum using the H-PEPSS Survey",

(IRB# 21-106)is exempt from review under Federal Policy for the Protection of Human Subjects.

If at any time the details of this project change, please resubmit to the IRB so the committee can determine whether or not the exempt status is still applicable.

I wish you well with your work.

Sincerely,

[redacted]

Additional Approvals/Instructions:

The following are all responsibilities of the Primary Investigator (PI). Violation of these responsibilities may result in suspension or termination of research by the Institutional Review Board. If the Primary Investigator is a student and fails to fulfil any of these responsibilities, the Faculty Advisor then becomes responsible for completing or upholding any and all of the following:

- If there are any changes in the research (including but not limited to change in location, members of the research team, research procedures, number of participants, target population of participants, compensation, or risk), these changes **must be approved by the IRB prior to implementation**.
- Report any protocol deviations or unanticipated problems to the IRB promptly according to IRB policy.
- Should the research continue past the expiration date, submit a Continuing Review Form, along with a copy of the current consent form and a *new* Signature Assurance Form approximately 30 days before the expiration date.
- When the research is completed, inform the Office of Research and Sponsored Programs. If your study is Expedited or Full Board, submit an Inactivation Request Form and a *new* Signature Assurance Form. If your study is Exempt, Non-Research, or Non-Human Research, email orsp@acu.edu to indicate that the research has finished.
- According to ACU policy, research data must be stored on ACU campus (or electronically) for 3 years from inactivation of the study, in a manner that is secure but accessible should the IRB request access.
- It is the Investigator's responsibility to maintain a general environment of safety for all research participants and all members of the research team. All risks to physical, mental, and emotional well-being as well as any risks to confidentiality should be minimized.

For additional information on the policies and procedures above, please visit the IRB website http://www.acu.edu/community/offices/academic/orsp/human-research/overview.html

or email orsp@acu.edu with your questions.

Exempt Categories

Category 1: Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are **all of the following**:

i. not likely to adversely impact students' opportunity to learn required educational content
ii. not likely to adversely impact the assessment of educators who provide instruction

Category 2: Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if **at least one of the following criteria is met**:

i. the information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;
ii. any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or
iii. the information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).

Category 3: Research involving benign behavioral interventions and collection of information from an adult subject through verbal or written responses (including data entry) or audiovisual recording if the subjects prospectively agrees to the interventions and information collection**, and **at least one of the following criteria are met**:

i. the information is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;
ii. any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation;
iii. the information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).

Category 4: Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if **at least one of the following criteria is met**:

i. the identifiable private information or identifiable biospecimens are publicly available;
ii. information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;
iii. the research involves only information collection and analysis involving the investigator's use of identifiable health information when that use is regulated under HIPAA, for the purposes of "health care operations" or "research" as those terms are defined at 45 CFR 164.501 or for "public health activities and purposes" as described under 45 CFR 164.512(b);
iv. the research is conducted by, or on behalf of, a Federal department or agency using government-generated or government-collected information obtained for nonresearch activities.

Category 5: Research and demonstration projects that are **all of the following**:

i. conducted or supported by a Federal department or agency, or otherwise subject to the approval of department or agency heads (or the approval of the heads of bureaus or other subordinate agencies

that have been delegated authority to conduct the research and demonstration projects)

ii. designed to study, evaluate, improve, or otherwise examine public benefit or service programs, including procedures for obtaining benefits or services under those programs, possible changes in or alternatives to those programs or procedures, or possible changes in methods or levels of payment for benefits or services under those programs.

iii. published (prior to commencing the research involving human subjects) on a publicly accessible Federal website or in such other manner as the department or agency head may determine

Category 6: Taste and food quality evaluation and consumer acceptance studies, if **at least one of the following is true**:

i. wholesome foods without additives are consumed.

ii. a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

[redacted]

29-Sep-2021

MEMORANDUM

TO: [redacted]

FROM:

RE: Exempt from IRB Review

IRB #: IRB # 21-0241

Submission Number: 21-0241.002

TITLE: Analyzing the Outcomes of Concept Mapping Integration in a BSN Curriculum Using the H-PEPSS Survey

The [redacted] Institutional Review Board (IRB) reviewed the above-referenced research project and determined this request met the criteria for exemption from review by the IRB in accordance with the 45 CFR 46.104. This determination was made on **29-Sep-2021**.

Further review of this project by the IRB is not required unless the protocol changes in the use of human subjects. In that case, the project must be resubmitted to the IRB for review. Please inform the IRB when this research project is completed.

If you have any questions, please do not hesitate to contact the IRB office via email at IRB@utmb.edu.

Exemption Category

Category 2

Appendix G: Hosting University Consent Form

The University XXXX Minimal Risk Consent Form

Protocol Title: **Analyzing the Outcomes of Concept Mapping Integration Into a BSN Curriculum Using the H-PEPSS Survey**

IRB Number: **21-0241**

Principal Investigator: XXXXX

Why am I being asked to take part in this research study?
You are being asked to take part in this study because, as a BSN student at University XXXX, your participation will assist the university in the development of curriculum for creating successful learning opportunities.

Study Summary:
The study focus examines the inclusion of concept mapping, an active learning strategy, to analyze the effects on clinical reasoning development measured by a patient safety survey, H-PEPSS, in a pre- and postsurvey activity. The information gained from this study will allow University XXXX to develop educational curriculum standards. As a participant in this study, key concepts and educational delivery is provided throughout the curriculum. There is minimal risk as a participant in the study regarding course performance, grades, or any physical or bodily harm. The study will not jeopardize your course participation.

The following are things you should know about this research study:

- The purpose of the study is to analyze student outcomes in reference to patient safety using a pre-and postsurvey during a semester at the University XXXX School of Nursing Program. Ideally, the first and fourth semesters represent the focus groups.
- If you choose to participate, you will be asked to attend classes, participate in the course activities as assigned, and complete a pre- and postsurvey at the beginning and at the completion of the focus semesters. The survey participation is the only extra request related to your participation. This study will take 15–20 minutes for each survey (pre- and post) as there are not any additional requirements or expectations as a survey participant.
- Participants of this study should not experience risks or discomfort as the intervention is designed to enhance the student learning experience. If a participant is offended by one of the survey questions, it is important to address these concerns with the researcher. All potential precautions have been examined to eliminate any offensive wording and experiences.
- The study will not provide any monetary benefits.
- Taking part in this research study is voluntary. You are not required to participate, and you can stop at any time.
- Participation in this study is not correlated with course performance including grades, assignments, or activities.

Please take your time to read this entire form and ask questions before deciding if you want to take part in this research project.

DETAILED RESEARCH CONSENT

What is the purpose of this research study?
The purpose of this study is to examine the student perceptions pertaining to patient safety utilizing a pre- and postsurvey collection tool.

How many people will take part in this study?
About 300 to 350 BSN students are expected to take part in this study at the University XXXX School of Nursing.

What procedures are involved as part of this research study?
If you agree to take part, you will be asked to sign this consent form and complete the following surveys. Students who elect to participate in the survey will complete a 15–20-minute presurvey at the beginning of the elected semester and a 15–20 minute postsurvey at the conclusion of the semester. There are not any other expectations, and participation in this study will not impact your grade in the class either way.

What are the possible risks of choosing to participate in this research study?
There is minimal risk of any harm because of study participation. The data that is recorded is designed to remove any identifying personal information involving your participation or the data collected because of your participation. Your course grades will not be affected because of study participation.
Anytime information is collected, there is a potential risk of loss of confidentiality. Every effort will be made to keep your information confidential; however, this process cannot be guaranteed.

What are the potential benefits of participating in this research study?
There are not any direct benefits to you because of survey participation. The results from the study will assist the faculty at University XXXX School of Nursing in modifying course objectives as determined by the results.

Will I be reimbursed for participating in this research study?
There will be no reimbursement for participation in this study.

Is there an alternative treatment or procedure?
The alternative is **not** to participate in the study.

If I agree to take part in this research study, can I be removed from the study without my consent?
Yes. The researchers may decide to take you off this study if:

- The sponsor cancels the research.
- You are unable to keep appointments or to follow the researcher’s instructions.
- The researchers believe that participation in the research is no longer safe for you.

How will my information be protected?
All results obtained in this study will be kept confidential and only available to the research study team. Your individual information will not be reported, only the results of all participants as a group.

Information you provided on the survey form will be stored separately from any course-related academic records. The data will not be reviewed until after the semester is concluded and grades are submitted.

How will my privacy be protected?
We have rules to protect information about you. Federal and state laws and the federal medical Privacy Rules also protect your privacy. By signing this form, you provide your permission, called your "authorization," for the use and disclosure of information protected by the Privacy Rule.

The research team working on the study will collect information about you through the survey tool only. This includes things learned from the procedures described in this consent form.

People outside of University XXXX may need to see or receive your information for this study. Examples include government agencies (such as the Food and Drug Administration), safety monitors, other sites in the study, and companies that sponsor the study.

We cannot do this study without your authorization to use and give out your information. You do not have to give us this authorization. If you do not, then you may not join this study.

We will use and disclose your information only as described in this form; however, people outside University XXXX who receive your information may not be covered by this promise or by the federal Privacy Rule. We try to make sure that everyone who needs to see your information keeps it confidential, but we cannot guarantee that your information will not be re-disclosed.

The use and disclosure of your information have no time limit. You may revoke (cancel) your permission to use and disclose your information at any time by notifying the principal investigator of this study by phone or in writing. If you contact the principal investigator by phone, you must follow up with a written request that includes the study number and your contact information. The principal investigator's name, address, phone, and information are on page one of this consent form.

If you do cancel your authorization to use and disclose your information, your part in this study will end, and no further information about you will be collected. Your revocation (cancellation) would not affect information already collected in the study or information we disclosed before you wrote to the principal investigator to cancel your authorization.

Who can I contact with questions about this research study?
If you have any questions, concerns, or complaints before, during, or after the research study, or if you need to report a research-related injury or bad side effect, you should immediately contact

the principal investigator: XXXXX (XXX) XXX-XXXX or, if after normal office hours at (XXX) XXX-XXXX or via email at XXXXXXX@XXX.edu.

This study has been approved by the University XXXX Institutional Review Board (IRB). If you have any complaints, concerns, input, or questions regarding your rights as a subject participating in this research study or you would like more information about the protection of human subjects in research, you may contact the IRB Office, at (XXX) XXX-XXXX or irb@XXXX.edu.

Do I have to participate?
Your participation in this study is completely voluntary. You may refuse to participate or stop your participation in this research study at any time without penalty or loss of benefits to which you are otherwise entitled.

CONSENT TO PARTICIPATE:
The purpose of this research study, the procedures to be followed, and the risks and benefits have been explained to you. You have been given the opportunity to ask questions, and your questions have been answered to your satisfaction. You have been told who to contact if you have additional questions. By signing this form, you are confirming that you have read this consent form and voluntarily agree to participate as a subject in this study.

Signature of Subject	Date

Using language that is understandable and appropriate, I have discussed this project and the items listed above with the subject.

Signature of Person Obtaining Consent	Date and Time of Consent Obtained

Printed Name of Person Obtaining Consent

Appendix H: University Consent Form

University XXXX Participant Research Consent

Introduction: Analyzing the Outcomes of Concept Mapping Integration Into a BSN Curriculum Using the H-PEPSS Survey

The study focuses on concept mapping, an active learning strategy, analyzing the effects of clinical reasoning development measured by a patient safety survey in an H-PEPSS pre- and postsurvey activity. The data from this study will allow University XXXX to include concept plans as an active learning tool in the Foundations of Adult Health (Adult I) course. As a student in this course, you will be provided with learning tools that focus on improved learning outcomes. As a student, there is minimal risk to you as a participant in the study, including negative results regarding course performance, grades, or any physical or bodily harm. The study focuses on outcomes and will not jeopardize your course participation.

You are invited to take part in this research study. This form provides important information about the study, including the risks and benefits to you as a potential participant. Please read this form carefully and ask the researcher any questions you may have about the study. You can ask questions about the research and any risks or benefits you may experience. You may also wish to discuss your participation with other people, such as your family doctor or a family member.

Your participation in this research is voluntary. You may refuse to participate. You have the right to stop your participation at any time, for any reason, and without any penalty, injury, or loss of benefits that are related to this study.

PURPOSE & DESCRIPTION: You are being asked to participate in this study because, as a BSN student at University XXXX, your participation will assist the university in the creation of course changes and new learning opportunities.

If you agree to participate in this study, you will attend two visits with the study staff throughout the 15–16 weeks of the first-semester program. Each visit will take approximately 30 minutes for each visit. During the visits, you will complete a consent, a presurvey, and a postsurvey.

University XXXX supplies the iPad to complete the study with all applications for study participation loaded onto the iPad. There are not any expenses related to this study or as a participant. The surveys are provided without any cost to you.

RISKS & BENEFITS: There are minimal risks as a participant in this research study. The risks are not serious. There is a possibility the following risks are possible and the seriousness of those risks:

a) Wording: The wording in the consent and the surveys may be hurtful or offensive. All possible occurrences and removal of these risks are reviewed and eliminated to limit the possibility of these risks. Therefore, the risks are minimal with limited seriousness.
b) Identity: Every effort has been made to remove any identifiable information from the surveys. However, there is a chance your identity may be discovered. The identity may

be revealed because of voluntary submission, or the data is submitted so that your identity becomes known. These occurrences are rare and are nonserious risks pertaining to your participation.

c) Grades: Your course grades and participation in this study are separate. The course grades and outcomes are not related to study participation. The study participation is related only to the study participation. Therefore, grades will not be affected because of this study participation. Therefore, the effect on the grades is a minimal and nonserious risk.
d) Intimidation or Coercion: There is a risk for coercion due to study participation and the faculty presence within the Foundations of Adult Health (Adult I) course. All steps have been taken to ensure the limited risk of intimidation, including confidential study participation in the study. Your participation will be anonymous, with a coded identity only known to you. There is a minimal risk of intimidation from faculty. Faculty will not review the consent, presurvey, and postsurvey results until all final grades are submitted to the final repository for course grades. Therefore, if you feel uncomfortable during this study, do not hesitate to contact the course faculty for program withdrawal. The student's identity is protected throughout this study. Therefore, the risk for intimidation or coercion is nonserious.

There are not any direct benefits to you for participating in this study. As a participant in this study, you will benefit from learning activities throughout the semester. The iPad, as a loan, is provided to you regardless of your study participation. The learning objectives, course outcomes, didactic, clinical, and lab experiences will mirror those not enrolled in the study. The data gained from this study and your assistance will assist faculty in creating future course learning opportunities. Additionally, as a participant in the study, you will receive the following:

a) The necessary iPad software programs that encourage nursing knowledge and application of concepts.
b) Study tools applicable outside of the classroom, including tutoring, study groups, and note-taking.
c) Students will receive learning tools appropriate for each course within the curriculum.

The researcher cannot guarantee that you will experience any personal benefits resulting from this study.

ALTERNATIVE PROCEDURES: This section is not applicable to this study.

PRIVACY & CONFIDENTIALITY: Any information you provide will be confidential to the extent allowable by law. Identifiable data may have to be shared with individuals outside of the study team, including the Abilene Christian University (ACU) Institutional Review Board members or University XXXX School of Nursing staff. Otherwise, all attempts will be made to maintain your confidentiality. Your identity will be replaced with a series of numbers to protect your student identity. These measures include creating six numbers, including (a) the last two digits of a parent's cell phone number, (b) the last two digits of the current calendar year, and (c) the last two digits of the student's identification number. Additionally, this same format will follow through each phase of the document collection, including (a) the consent, (b) the presurvey, and (c) the postsurvey.

Lastly, the researcher will not review the consent, presurvey, and postsurvey until all grades for the course are submitted to the final repository of course grades. All information provided will be kept by the assigned assistant researcher throughout the semester.

The surveys are completed through the Microsoft Forms application and approved by the University XXXX School of Nursing to maintain confidentiality. The program is protected without any violation of FERPA disclosures. The surveys are stored in the University XXXX SharePoint, and password secured. The primary risk with this study is a breach of confidentiality. The steps outlined above are designed to minimize the risk. We will not be collecting any personal identification data during the survey.

COLLECTION OF IDENTIFIABLE PRIVATE INFORMATION OR BIOSPECIMENS: This section does not apply to this study.

COMPENSATION FOR INJURY: This section does not apply to this study.

CONTACTS: If you have questions about the research study, the lead researcher XXXXXXX. If you are unable to reach the lead researcher or wish to speak to someone other than the lead researcher, you may contact the assistant researcher: XXXX. If you have concerns about this study, believe you may have been injured because of this study, or have general questions about your rights as a research participant, you may contact ACU's Chair of the Institutional Review Board.

FERPA AUTHORIZATION: Due to steps taken to protect the student's identity, there is not an approval request for FERPA authorization since the student's grades are not associated with this study. If a student voluntarily releases their grades, this action is not a requirement for this study. The study is not reviewing grades or student success in the course. The survey data examines the student's perception of patient safety unrelated to the course curriculum or grading criteria.

There is a potential sample size of 130–150 students in the first semester who may participate in this study, with an estimated sample size of 34 students.

There may be unexpected risks associated with your participation in this study, and some of those are minimal. We will notify you if any such risks are identified throughout the study or affect your willingness to participate.

Student Withdrawal:

a) Study Withdrawal: If a student withdraws from the study, the data collected will be removed for evaluation, but their course enrollment and participation are not affected. The student will remain enrolled in the course.
b) Student Course Withdrawal or Leave of Absence: If a student withdraws from the course or assumes a leave of absence from the system, the student data will be discarded from the final study results. Their course grades will reveal if the student withdraws from the course or assumes a leave of absence, their data will be discarded for evaluation. The

student who chooses a course withdrawal or leave of absence, then the student is not eligible for continued study participation.

c) Exempt Students: Any student under 18 years of age does not qualify for study participation currently. Additionally, any student who was a previous course participant will be screened during the consent process and will not be eligible to participate in the study as a means of protecting the student from bias or coercion.
d) Early Study Completion: The study may be ended early. For example, the survey may end if a participant no longer meets study requirements, the researchers believe it is no longer in the participant's best interest to continue the study, a participant does not follow the instructions provided by the researchers, or the data collection occurs earlier than expected. You will be contacted by the researchers and given further instructions if any of these events occur.

Voluntary Participation: Student participation in this study is voluntary. Students enrolled in the study will not have any costs or monetary benefits associated with this study participation. The student may withdraw from the study at any time. The student will receive the same education, learning tools, and iPad learning skills regardless of their participation in the study.

Please let the researchers know if you are participating in any other research studies at this time.

Consent Signature Section

Please sign this form if you voluntarily agree to participate in this study. Sign the consent only after you have read all the information provided within this document and all your questions have been answered to your satisfaction. You should receive a copy of this signed consent form. You do not waive any legal rights by signing this form.

Please click the button below if you voluntarily agree to participate in this study. Please click after you have read all the information provided in this document and your questions have been answered to your satisfaction. If you wish to have a copy of this consent form, you may print the consent now. You do not waive any legal rights by consenting to this study.

_____	_____	_____
Printed Name of Participant	Signature of Participant	Date
_____	_____	_____
Printed Name of Person Obtaining Consent	Signature of Person Obtaining Consent	Date

Appendix I: Independent *t*-Test Analysis: Nonsignificant Findings

Table I1

Independent t*-Test Analysis: Nonsignificant Findings*

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Clinical Safety Classroom	Equal variance assumed	0.172	0.0679	-1.732	87	0.087	-0.335	0.194	-0.72	0.049
	not assumed			-1.668	66.422	0.1	-0.335	0.201	-0.737	0.066
Clinical Safety Classroom Hand Hygiene	Equal variances assumed	0.108	0.744	-0.505	87	0.615	-0.08	0.157	-0.392	0.233
	Equal variances not assumed			-0.502	75.962	0.617	-0.08	0.158	-0.395	0.236
Culture Safety Classroom Workplace Design	Equal variances assumed	0.014	0.905	-0.374	87	0.71	-0.0769	0.2058	-0.4861	0.3322
	Equal variances not assumed			-0.366	71.321	0.716	-0.0769	0.2104	-0.4963	0.3425
Culture Safety Classroom Speaking Up	Equal variances assumed	0.004	0.947	-0.553	87	0.582	-0.105	0.1899	-0.4824	0.2724
	Equal variances not assumed			-0.548	75.237	0.585	-0.105	0.1915	-0.4865	0.2765
Culture Safety Classroom Environmental Support	Equal variances assumed	0.768	0.383	-0.061	87	0.951	-0.0094	0.1526	-0.3126	0.2939
	Equal variances not assumed			-0.059	66.239	0.953	-0.0094	0.1585	-0.3258	0.3071
Working Teams Classroom Patient Advocacy	Equal variances assumed	0.042	0.838	-0.679	87	0.499	-0.131	0.194	-0.516	0.253
	Equal variances not assumed			-0.684	79.716	0.496	-0.131	0.192	-0.514	0.251

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Communication Classroom Patient Communication	Equal variances assumed	0	0.986	-1.012	87	0.314	-0.152	0.15	-0.45	0.146
	Equal variances not assumed			-1.015	78.38	0.313	-0.152	0.15	-0.449	0.146
Communication Classroom Provider Communication	Equal variances assumed	0.002	0.968	-0.689	87	0.493	-0.131	0.191	-0.511	0.248
	Equal variances not assumed			-0.691	78.637	0.491	-0.131	0.19	-0.51	0.247
Communication Classroom Adverse Events	Equal variances assumed	1.683	0.198	-0.377	87	0.707	-0.066	0.175	-0.414	0.282
	Equal variances not assumed			-0.366	68.519	0.716	-0.066	0.18	-0.426	0.294
Human and Environmental Factors Roles Classroom	Equal variances assumed	0.833	0.364	-0.653	87	0.515	-0.131	0.2	-0.529	0.267
	Equal variances not assumed			-0.634	68.831	0.528	-0.131	0.207	-0.543	0.281
Clinical Safety Clinical Hand Hygiene	Equal variances assumed	7.839	0.006	-1.331	87	0.187	-0.164	0.123	-0.41	0.081
	Equal variances not assumed			-1.404	86.964	0.164	-0.164	0.117	-0.397	0.068

Note. These specific categorical questions presented the greatest weakness in the student cohort as these areas did not satisfy the *p*-value of < .05 for data significance.

Appendix J: Independent Samples *t*-Test Analysis Results

Leven's Test for Equality of Variances and Independent *t* test for Equality of Means

Table J1

Independent Samples t-*Test Analysis Results*

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	Sig.	t	*df*	Sig. (2-tailed)	*MD*	*SE* Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Clinical Safety Classroom in General	Equal variances assumed	0.172	0.679	-1.732	87	0.087	-0.335	0.194	-0.72	0.049
	Equal variances not assumed			-1.668	66.422	0.1	-0.335	0.201	-0.737	0.066
Clinical Safety Classroom Hand Hygiene	Equal variances assumed	0.108	0.744	-0.505	87	0.615	-0.08	0.157	-0.392	0.233
	Equal variances not assumed			-0.502	75.962	0.617	-0.08	0.158	-0.395	0.236
Clinical Safety Classroom Infection Control	Equal variances assumed	0.98	0.325	-2.088	87	0.04	-0.382	0.183	-0.746	-0.018
	Equal variances not assumed			-2.065	74.408	0.042	-0.382	0.185	-0.751	-0.013
Clinical Safety Classroom Safe Medication	Equal variances assumed	0.038	0.846	-2.188	87	0.031	-0.394	0.18	-0.752	-0.036
	Equal variances not assumed			-2.242	83.64	0.028	-0.394	0.176	-0.743	-0.044
Culture Safety Classroom Workplace Design	Equal variances assumed	0.014	0.905	-0.374	87	0.71	-0.0769	0.2058	-0.4861	0.3322
	Equal variances not assumed			-0.366	71.321	0.716	-0.0769	0.2104	-0.4963	0.3425

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Culture Safety Classroom Speaking Up	Equal variances assumed	0.004	0.947	-0.553	87	0.582	-0.105	0.1899	-0.4824	0.2724
	Equal variances not assumed			-0.548	75.237	0.585	-0.105	0.1915	-0.4865	0.2765
Culture Safety Classroom Environmental Support	Equal variances assumed	0.768	0.383	-0.061	87	0.951	-0.0094	0.1526	-0.3126	0.2939
	Equal variances not assumed			-0.059	66.239	0.953	-0.0094	0.1585	-0.3258	0.3071
Culture Safety Classroom Hospital Organization	Equal variances assumed	0.013	0.909	-2.622	87	0.01	-0.527	0.201	-0.9265	-0.1275
	Equal variances not assumed			-2.558	70.318	0.013	-0.527	0.2061	-0.938	-0.1161
Working Teams Classroom Team Dynamics	Equal variances assumed	1.173	0.282	-3.298	87	0.001	-0.612	0.186	-0.98	-0.243
	Equal variances not assumed			-3.314	79.012	0.001	-0.612	0.185	-0.979	-0.244
Working Teams Classroom Interprofessional Conflict	Equal variances assumed	0.669	0.416	-2.168	87	0.033	-0.511	0.236	-0.979	-0.042
	Equal variances not assumed			-2.169	77.88	0.033	-0.511	0.236	-0.98	-0.042
Working Teams Classroom Debriefing	Equal variances assumed	2.576	0.112	-2.641	87	0.01	-0.642	0.243	-1.126	-0.159
	Equal variances not assumed			-2.702	83.297	0.008	-0.642	0.238	-1.115	-0.17

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Working Teams Classroom Patient Engagement	Equal variances assumed	0.428	0.515	-2.174	87	0.032	-0.375	0.172	-0.717	-0.032
	Equal variances not assumed			-2.261	85.999	0.026	-0.375	0.166	-0.704	-0.045
Working Teams Classroom Decision Making	Equal variances assumed	2.464	0.12	-2.452	87	0.016	-0.508	0.207	-0.92	-0.096
	Equal variances not assumed			-2.501	82.598	0.014	-0.508	0.203	-0.913	-0.104
Working Teams Classroom Patient Advocacy	Equal variances assumed	0.042	0.838	-0.679	87	0.499	-0.131	0.194	-0.516	0.253
	Equal variances not assumed			-0.684	79.716	0.496	-0.131	0.192	-0.514	0.251
Communication Classroom Patient Communication	Equal variances assumed	0	0.986	-1.012	87	0.314	-0.152	0.15	-0.45	0.146
	Equal variances not assumed			-1.015	78.38	0.313	-0.152	0.15	-0.449	0.146
Communication Classroom Provider Communication	Equal variances assumed	0.002	0.968	-0.689	87	0.493	-0.131	0.191	-0.511	0.248
	Equal variances not assumed			-0.691	78.637	0.491	-0.131	0.19	-0.51	0.247
Communication Classroom Adverse Events	Equal variances assumed	1.683	0.198	-0.377	87	0.707	-0.066	0.175	-0.414	0.282
	Equal variances not assumed			-0.366	68.519	0.716	-0.066	0.18	-0.426	0.294

Survey Categories	Variances	Levene's Test for Equality of Variances		*t*-test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Managing Safety Risk Safety Recognition Classroom	Equal variances assumed	2.798	0.098	-3.486	87	0.001	-0.701	0.201	-1.1	-0.301
	Equal variances not assumed			-3.526	80.658	0.001	-0.701	0.199	-1.096	-0.305
Managing Safety Risk Implementing Safety Classroom	Equal variances assumed	1.486	0.226	-3.316	87	0.001	-0.685	0.207	-1.096	-0.274
	Equal variances not assumed			-3.311	77.256	0.001	-0.685	0.207	-1.097	-0.273
Managing Safety Risk in High-Risk Situations Classroom	Equal variances assumed	0.167	0.684	-2.961	87	0.004	-0.726	0.245	-1.213	-0.239
	Equal variances not assumed			-2.93	74.625	0.005	-0.726	0.248	-1.22	-0.232
Human and Environmental Factors Roles Classroom	Equal variances assumed	0.833	0.364	-0.653	87	0.515	-0.131	0.2	-0.529	0.267
	Equal variances not assumed			-0.634	68.831	0.528	-0.131	0.207	-0.543	0.281
Human and Environmental Technology Classroom	Equal variances assumed	0.023	0.879	-3.362	87	0.001	-0.715	0.213	-1.138	-0.292
	Equal variances not assumed			-3.299	72.159	0.002	-0.715	0.217	-1.147	-0.283
Human and Environmental Factors Workflow Classroom	Equal variances assumed	3.687	0.058	-2.747	87	0.007	-0.62	0.226	-1.068	-0.171
	Equal variances not assumed			-2.797	82.276	0.006	-0.62	0.222	-1.06	-0.179

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Adverse Events and Close Calls Recognition Classroom	Equal variances assumed	0.427	0.515	-3.963	87	0	-0.815	0.206	-1.225	-0.406
	Equal variances not assumed			-3.928	75.17	0	-0.815	0.208	-1.229	-0.402
Adverse Events and Close Calls Harm Reduction Classroom	Equal variances assumed	1.12	0.293	-2.492	87	0.015	-0.489	0.196	-0.879	-0.099
	Equal variances not assumed			-2.479	76.273	0.015	-0.489	0.197	-0.882	-0.096
Adverse Events and Close Calls Disclosure Classroom	Equal variances assumed	0.008	0.928	-2.028	87	0.046	-0.484	0.239	-0.958	-0.01
	Equal variances not assumed			-2.019	76.446	0.047	-0.484	0.24	-0.961	-0.007
Adverse Events and Close Calls Timely Analysis Classroom	Equal variances assumed	0.643	0.425	-3.106	87	0.003	-0.666	0.214	-1.092	-0.24
	Equal variances not assumed			-3.109	77.897	0.003	-0.666	0.214	-1.092	-0.239
Clinical Safety Clinical in General	Equal variances assumed	1.539	0.218	-3.833	87	0	-0.663	0.173	-1.007	-0.319
	Equal variances not assumed			-4.046	86.979	0	-0.663	0.164	-0.989	-0.337
Clinical Safety Clinical Hand Hygiene	Equal variances assumed	7.839	0.006	-1.331	87	0.187	-0.164	0.123	-0.41	0.081
	Equal variances not assumed			-1.404	86.964	0.164	-0.164	0.117	-0.397	0.068

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	Sig.	t	*df*	Sig. (2-tailed)	*MD*	*SE* Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Clinical Safety Clinical Infection Control	Equal variances assumed	1.395	0.241	-3.851	87	0	-0.64	0.166	-0.971	-0.31
	Equal variances not assumed			-4.086	86.971	0	-0.64	0.157	-0.952	-0.329
Clinical Safety Clinical Safe Medication	Equal variances assumed	0.422	0.518	-2.789	87	0.007	-0.486	0.174	-0.833	-0.14
	Equal variances not assumed			-2.906	86.179	0.005	-0.486	0.167	-0.819	-0.154
Culture Safety Clinical Workplace Design	Equal variances assumed	3.973	0.049	-3.314	87	0.001	-0.5936	0.1791	-0.9496	-0.2375
	Equal variances not assumed			-3.455	86.223	0.001	-0.5936	0.1718	-0.9351	-0.252
Culture Safety Clinical Speaking Up	Equal variances assumed	0.353	0.554	-3.434	87	0.001	-0.5977	0.1741	-0.9437	-0.2517
	Equal variances not assumed			-3.491	81.966	0.001	-0.5977	0.1712	-0.9383	-0.2571
Culture Safety Clinical Environmental Support	Equal variances assumed	0.015	0.904	-2.371	87	0.02	-0.3862	0.1629	-0.7099	-0.0624
	Equal variances not assumed			-2.436	84.098	0.017	-0.3862	0.1585	-0.7015	-0.0709
Culture Safety Clinical Hospital Organization	Equal variances assumed	6.664	0.012	-4.295	87	0	-0.8129	0.1892	-1.189	-0.4367
	Equal variances not assumed			-4.524	86.921	0	-0.8129	0.1797	-1.17	-0.4557

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Working Teams Clinical Team Dynamics	Equal variances assumed	0.167	0.684	-4.186	87	0	-0.785	0.188	-1.158	-0.412
	Equal variances not assumed			-4.18	77.27	0	-0.785	0.188	-1.159	-0.411
Working Teams Clinical Interprofessional Conflict	Equal variances assumed	3.564	0.062	-4.307	87	0	-0.954	0.222	-1.395	-0.514
	Equal variances not assumed			-4.456	85.269	0	-0.954	0.214	-1.38	-0.528
Working Teams Clinical Debriefing	Equal variances assumed	7.646	0.007	-3.568	87	0.001	-0.778	0.218	-1.211	-0.344
	Equal variances not assumed			-3.748	86.814	0	-0.778	0.207	-1.19	-0.365
Working Teams Clinical Patient Engagement	Equal variances assumed	2.578	0.112	-2.948	87	0.004	-0.559	0.19	-0.936	-0.182
	Equal variances not assumed			-3.098	86.827	0.003	-0.559	0.181	-0.918	-0.2
Working Teams Clinical Decision Making	Equal variances assumed	2.233	0.139	-3.679	87	0	-0.716	0.195	-1.103	-0.329
	Equal variances not assumed			-3.778	83.996	0	-0.716	0.19	-1.093	-0.339
Working Teams Clinical Patient Advocacy	Equal variances assumed	6.639	0.012	-3.436	87	0.001	-0.651	0.19	-1.028	-0.275
	Equal variances not assumed			-3.627	86.978	0	-0.651	0.18	-1.008	-0.294

Survey Categories	Variances	Levene's Test for Equality of Variances		*t*-test for Equality of Means						
		F	Sig.	t	*df*	Sig. (2-tailed)	*MD*	*SE* Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Communication Clinical Patient Communication	Equal variances assumed	0.675	0.414	-2.718	87	0.008	-0.425	0.156	-0.735	-0.114
	Equal variances not assumed			-2.762	81.834	0.007	-0.425	0.154	-0.73	-0.119
Communication Clinical Provide Communication	Equal variances assumed	1.281	0.261	-2.841	87	0.006	-0.528	0.186	-0.897	-0.159
	Equal variances not assumed			-2.924	84.403	0.004	-0.528	0.181	-0.887	-0.169
Communication Clinical Adverse Events	Equal variances assumed	0.773	0.382	-2.563	87	0.012	-0.505	0.197	-0.896	-0.113
	Equal variances not assumed			-2.612	82.528	0.011	-0.505	0.193	-0.889	-0.12
Managing Safety Risk Safety Recognition Clinical	Equal variances assumed	3.175	0.078	-4.539	87	0	-0.886	0.195	-1.273	-0.498
	Equal variances not assumed			-4.687	84.974	0	-0.886	0.189	-1.261	-0.51
Managing Safety Risk Implementing Safety Clinical	Equal variances assumed	2.899	0.092	-3.583	87	0.001	-0.735	0.205	-1.143	-0.327
	Equal variances not assumed			-3.691	84.598	0	-0.735	0.199	-1.132	-0.339
Managing Safety Risk in High-Risk Situations	Equal variances assumed	3.026	0.085	-4.276	87	0	-0.966	0.226	-1.415	-0.517
	Equal variances not assumed			-4.468	86.43	0	-0.966	0.216	-1.396	-0.536

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Human and Environmental Factors Roles Clinical	Equal variances assumed	8.059	0.006	-4.102	87	0	-0.786	0.192	-1.167	-0.405
	Equal variances not assumed			-4.339	87	0	-0.786	0.181	-1.146	-0.426
Human and Environmental Technology Clinical	Equal variances assumed	1.049	0.309	-4.811	87	0	-0.951	0.198	-1.344	-0.558
	Equal variances not assumed			-4.923	83.309	0	-0.951	0.193	-1.335	-0.567
Human and Environmental Factors Workflow Clinical	Equal variances assumed	2.945	0.09	-3.819	87	0	-0.74	0.194	-1.125	-0.355
	Equal variances not assumed			-3.927	84.283	0	-0.74	0.188	-1.114	-0.365
Adverse Events and Close Cass Recognition Clinical	Equal variances assumed	0.084	0.772	-4.029	87	0	-0.858	0.213	-1.281	-0.435
	Equal variances not assumed			-4.058	79.633	0	-0.858	0.211	-1.279	-0.437
Adverse Events and Close Calls Harm Reduction Clinical	Equal variances assumed	2.406	0.125	-4.163	87	0	-0.786	0.189	-1.161	-0.411
	Equal variances not assumed			-4.291	84.703	0	-0.786	0.183	-1.15	-0.422
Adverse Events and Close Calls Disclosure Clinical	Equal variances assumed	0.139	0.71	-2.511	87	0.014	-0.588	0.234	-1.054	-0.123
	Equal variances not assumed			-2.509	77.468	0.014	-0.588	0.235	-1.055	-0.121

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Adverse Events and Close Calls Timely Analysis Clinical	Equal variances assumed	0.633	0.428	-3.335	87	0.001	-0.693	0.208	-1.106	-0.28
	Equal variances not assumed			-3.325	76.788	0.001	-0.693	0.208	-1.108	-0.278
Education Safe Scope of Practice	Equal variances assumed	2.216	0.14	-2.845	87	0.006	-0.55	0.193	-0.935	-0.166
	Equal variances not assumed			-2.927	84.384	0.004	-0.55	0.188	-0.924	-0.177
Education Preceptor Consistency	Equal variances assumed	0.078	0.78	-4.337	87	0	-0.781	0.18	-1.139	-0.423
	Equal variances not assumed			-4.329	77.174	0	-0.781	0.18	-1.14	-0.422
Education Interdisciplinary Team Interactions	Equal variances assumed	1.214	0.274	-3.063	87	0.003	-0.684	0.223	-1.128	-0.24
	Equal variances not assumed			-2.994	70.992	0.004	-0.684	0.228	-1.14	-0.228
Education Reporting Adverse Events	Equal variances assumed	2.1	0.151	-3.339	87	0.001	-0.735	0.22	-1.173	-0.298
	Equal variances not assumed			-3.412	83.038	0.001	-0.735	0.216	-1.164	-0.307
Education Patient Safety Integration	Equal variances assumed	1.004	0.319	-2.622	87	0.01	-0.493	0.188	-0.867	-0.119
	Equal variances not assumed			-2.661	81.482	0.009	-0.493	0.185	-0.862	-0.124

Survey Categories	Variances	Levene's Test for Equality of Variances		*t* test for Equality of Means						
		F	**Sig.**	**t**	***df***	**Sig. (2-tailed)**	***MD***	***SE* Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Education Patient Safety Foundation Skills Integration	Equal variances assumed	1.754	0.189	-2.944	87	0.004	-0.532	0.181	-0.892	-0.173
	Equal variances not assumed			-3.064	86.054	0.003	-0.532	0.174	-0.878	-0.187
Education Interval Process Integration	Equal variances assumed	2.587	0.111	-3.777	87	0	-0.72	0.191	-1.099	-0.341
	Equal variances not assumed			-3.869	83.549	0	-0.72	0.186	-1.091	-0.35
Communication Safety Adverse Events	Equal variances assumed	0.154	0.695	-4.135	87	0	-0.781	0.189	-1.156	-0.405
	Equal variances not assumed			-4.151	78.802	0	-0.781	0.188	-1.155	-0.406
Communication Safety in Clinical Negative Repercussions	Equal variances assumed	3.573	0.062	-3.11	87	0.003	-0.813	0.262	-1.333	-0.293
	Equal variances not assumed			-3.013	68.259	0.004	-0.813	0.27	-1.352	-0.275
Communication Safety Unsafe Practices	Equal variances assumed	0.4	0.529	-4.216	87	0	-0.85	0.202	-1.25	-0.449
	Equal variances not assumed			-4.332	84.112	0	-0.85	0.196	-1.24	-0.46