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Using unfolding case studies in a traditional classroom setting to enhance critical thinking skills in pre-licensure Bachelor of Science Nursing students

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Using Unfolding Case Studies in a Traditional Classroom Setting to Enhance Critical Thinking Skills in Pre-Licensure Bachelor of Science Nursing Students

by

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Dedication

This dissertation is dedicated to God. Lord, at first I thought that the pursuit of my doctoral degree was for me, however, over-time the true meaning of obtaining my PhD manifested. Five years into my journey, I recognized that I was completing one more of your assignments. My past and current personal/educational experiences (positive and negative) was growing, shaping, and preparing me to serve you as I served others. I thank you for choosing me as a vessel to fulfill your most precious assignment, which is to use my testimonies (personal/educational) as a platform to give you the glory as I motivate, mentor, and elevate those who are experiencing similar life and educational challenges. Moreover, through your grace and mercy I was able to starve my distractions and feed my focus. Thus, through hard work, dedication, sacrifice, and perseverance my accomplishments were and are still predicated on staying prayerful and faithful to your word.

God, thank you for planting the seed of perseverance deep inside of me and for feeding and hydrating me with the following scriptures: “no weapon formed against you shall prosper, lean not unto your own understanding, and a woman that kneels before God can stand before anyone.” The nourishment of your promises allowed my seed of perseverance to take root, which gave me the strength to stand firm on your words when I wanted to quit. Lord thank you for trusting me, loving me, and believing in me when I did not believe in myself. At the end of my life’s journey I pray that when I see you, I will hear you say…. well done my daughter, well done.

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Abstract

Nursing education reform is needed for today's generational mix of pre-licensure nursing students to prepare them to effectively care for clients' ever-evolving healthcare needs. This mixed-methods, quasi-experimental study was designed to measure if the use of unfolding case studies (UCS) in a traditional classroom setting (TCS) would (a) enhance critical thinking skills of the experimental group more than the control group as measured by the Health Science Reasoning Test (HSRT), (b) explore if course content examinations were higher in the experimental group versus the control group, (c) explore the perceptions of a subset of Bachelor of Science Nursing (BSN) pre-licensure students to determine if the use of multimodal learning (visual, auditory, reading, and kinesthetic) opportunities throughout UCS improved CTS in the classroom setting, clinical setting, and preparing for course content exams and, (d) explore if the above-mentioned subset of BSN students perceived greater engagement during the learning process. A convenience sample ($N = 70$) of BSN pre-licensure students participated in the quantitative portion of this research study. A subset of BSN pre-licensure students ($n = 8$) from the experimental group volunteered for a 1-hour focus group session. Quantitative data results showed no statistical significance between the experimental and control groups' HSRT overall and subscale scores ($p > .05$) and only a statistical significance for Exam I ($p < .05$). Qualitative data from participants' verbatim showed nursing faculty should use multimodal learning opportunities throughout UCS in the TCS because this pedagogy fostered classroom engagement and development/enhancement of CTS through evolving client scenarios.

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Chapter I: Introduction

Client clinical needs in today's healthcare settings necessitate that pre-licensure nursing students (Diploma Nurse, Associate Degree in Nursing [ADN], and Bachelor of Science in Nursing [BSN]) develop effective critical thinking skills (CTS) during their program of study (Centers for Disease Control and Prevention [CDC], 2014; National Academies of Sciences, Engineering, and Medicine [NASEM], 2016; National Council of State Boards of Nursing [NCSBN], 2018). Pre-licensure nursing students do not yet hold a state license (registered nurse [RN]) to practice independently in any healthcare setting. According to Insight Assessment (2019), CTS begin with inductive reasoning, which prompts the learner to infer probable conclusions from acquired facts/details based on case studies, prior experience, and patterns of behavior. After learners analyze facts/details, they need to synthesize the information. Once the information is synthesized, learners can apply appropriate nursing interventions based on deductive reasoning skills (i.e., conclusions that have a high probability to be wrong based on facts and details) and evaluate client outcomes.

The high-level of CTS that stakeholders (clients and their families, insurance companies, and, healthcare organizations, etc.) expect pre-licensure nursing graduates (i.e., candidates who are eligible to sit for the National Council Licensure Examination for RNs [NCLEX-RN]) to have is predicated on the critical decision-making skills they learn as pre-licensure nursing students (NCSBN, 2018). Critical thinking skills should not only prepare pre-licensure nursing graduates to pass the NCLEX-RN, but more importantly, prepare them to provide safe care for clients once they enter into clinical practice (NASEM, 2016; NCSBN, 2018). The extent to which positive client healthcare needs are achieved is highly dependent upon the level of CTS that pre-licensure nursing graduates have once they have passed the NCLEX-RN (Grossenbacher

& Kappel, 2018; Kavanaugh & Szweda, 2017). The NCSBN (2018) describes client healthcare needs as (a) safe and effective care, (b) health promotion and maintenance, (c) psychosocial integrity, and (d) physiological integrity, as well as six subcategories within the four healthcare needs categories (a) management of care, (b) safety and infection control, (c) basic care and comfort, (d) pharmacological and parenteral therapies, (e) reduction of risk potential, and (f) physiological adaptation. Thus, pre-licensure nursing graduates must know how to effectively use CTS with every client encounter to provide safe and effective care to meet clients' ever-evolving healthcare needs (NASEM, 2016; NCSBN, 2018, 2019).

Upon passing the NCLEX-RN examination, entry-level RNs must be prepared to effectively use CTS in a variety of healthcare settings (CDC, 2014; NASEM, 2016; NCSBN, 2019). The NCSBN (2020a) defined entry-level RNs as having 0-12 months of independent clinical experience. Healthcare settings include, but are not limited to, hospitals (short-term stay), nursing homes, skilled nursing facilities, physician offices, urgent care centers, outpatient clinics, and home healthcare agencies (long-term stay; CDC, 2014). Simply put, the high-level of CTS that entry-level RNs must use to effectively meet the healthcare needs of clients in all healthcare settings makes it extremely important for pre-licensure nursing students to learn how to enhance their critical thinking while attending nursing school (CDC, 2014; NASEM, 2016; NCSBN, 2018). Accordingly, stakeholders have strongly recommended that nursing faculty utilize active-teaching methods that enhance CTS for pre-licensure nursing students (Commission on Collegiate Nursing Education [CCNE], 2018; Higher Learning Commission [HLC], 2020; NASEM, 2016; NCSBN, 2019). Adkins (2018) and Hyun, Ediger, and Lee (2017) stated that active-teaching methods promote student engagement during the learning process and stimulate the development and enhancement of CTS.

Problem-based learning (PBL) is one form of an active-teaching method in which pre-licensure nursing students take an active role in their learning to solve complex real-world clinical scenarios by using concept mapping (Barrett, 2014; Garwood, Ahmed, & McComb, 2018; Hsu, Pan, & Hsieh, 2016; Kanter & Massough, 2015), case studies (Cone et al., 2016; Gholami et al., 2016; Kaddoura, Van-Dyke, & Yang, 2016; Orique & McCarthy, 2015), and unfolding case studies (UCS; Bryant, 2016; Carter & Welch, 2016; O'Rourke & Zerwic, 2016), just to name a few. This active role helps pre-licensure nursing students develop and enhance CTS even before they enter into clinical practice (Carter & Welch, 2016; Gholami et al., 2016; Kaddoura et al., 2016).

Even though some PBL active-teaching methods have been shown to develop and enhance CTS in pre-licensure nursing students (Gholami et al., 2016; Kaddoura et al., 2016), nursing faculty are constantly challenged to keep students engaged, particularly in the traditional classroom setting (TCS), demands that faculty continue to find better ways to improve pre-licensure nursing students' CTS before they practice as entry-level RNs (NASEM, 2016; NCSBN, 2019). This need for better ways to increase CTS is supported by Grossenbacher and Kappel (2018), who reported that 65% of RN nursing errors were directly related to poor CTS in clinical settings. Therefore, pre-licensure nursing students must have more opportunities throughout their nursing education to develop and enhance their CTS, especially in the TCS where lecture continues to be the primary mode of instruction (Accreditation Commission for Education in Nursing [ACEN], 2019; CDC, 2014; NASEM, 2016; NCSBN, 2018, 2019).

In addition to the ongoing demand for improved active-teaching methods that promote student engagement to enhance CTS, there are also concerns about how best to teach today's generational mix of pre-licensure nursing students (ACEN, 2019; CCNE, 2018; HLC, 2020;

National League for Nursing [NLN], 2016a). To illustrate, the NLN (2016b) reported age statistics on the following programs in the United States: diploma programs enrolled 51.1% of students below the age of 25; 27.4% were between the ages of 26-30; 14.7% were between the ages of 31-40; 5.7% were between the ages of 41-50; and 1% were between the ages of 51-60. Associate Degree in Nursing programs' age statistics showed 37.4% of their students were below the age of 25; 25.2% were between the ages of 26-30; 25.4% were between the ages of 31-40; 9.5% were between the ages of 41-50; 2.5% were between the ages of 51-60; and 0.2% were over the age of 60. Seventy-five percent of BSN students were below the age of 25; 12.4% were between the ages of 26-30; 8.7% were between the ages of 31-40; 3.2% were between the ages of 41-50; 0.6 % were between the ages of 51-60; and 0.1% were above the age of 61. The above data demonstrates the broad age ranges of all pre-licensure nursing students no matter the type of nursing program. Although this researcher's study only addresses BSN pre-licensure nursing students, it is helpful to see the variety of pre-licensure nursing students ages who are enrolled in three different RN programs, as different generations have different ways in which they learn (Adobe, 2016; Hart, 2017). Thus, nursing faculty need to appreciate the heterogeneity of today's pre-licensure student populations as they teach students to think critically (Adobe, 2016; Cilliers, 2017; Hart, 2017; McCurry & Martins, 2010; Mitchell, 2012; McKenna, Copnell, Butler, & Lau, 2018).

Baby boomers and Generations X, Y, Z all have distinct preferences or predilections for their learning (Adobe, 2016; Cilliers, 2017; Hart, 2017; McCurry & Martins, 2010; Mitchell, 2012). To illustrate, baby boomers were born between the years 1945 and 1965, which was during the hierarchical teaching and learning era (Cilliers, 2017; Mitchell, 2012). The autocratic classroom gave the teacher explicit power to determine what the student should learn, and

students of this era did not have the option to question the authoritative figure (Hart, 2017; Mitchell, 2012). Generation X students were born between the years 1965 and 1979; during this era, rigid teaching styles started to dissipate, classroom sizes were smaller, and learning began to focus on student-centered activities that helped learners solve real-world problems (Cilliers, 2017; Hart, 2017). Generation Y students were born between the years of 1980 and 1995, which was during the technology era; their technological expertise often exceeds the average knowledge of their nursing faculty, and they tend to learn best through visual and hands-on (kinesthetic) opportunities (Cilliers, 2017; Hart, 2017; McCurry & Martins, 2010). Generation Z students, who were born after 1995, prefer to learn through kinesthetic experiences as they solve real-world problems (Adobe, 2016; Cilliers, 2017).

One way to support diverse learning needs of students is for nursing faculty to plan for multimodal learning opportunities, which entails using visual, auditory, reading, and kinesthetic (VARK) sensory modalities to help students learn new information (Alkhasawneh, 2013; Prithishkumar & Micheal, 2014; Wagner, 2014). Combinations of VARK promote learning across different generations and are seen as beneficial to students who have multimodal learning needs (Bhagat et al., 2015; Fleming, 1995; Wagner, 2014). This need for learning diversity creates an additional demand for a broad repertoire of active-teaching methods; as such, nursing faculty must adjust their teaching methods, in the TCS, to meet the multimodal learning needs of current pre-licensure nursing students (ACEN, 2019; HLC, 2020; NLN, 2016a).

Opportunities to enhance CTS are important for all pre-licensure nursing students. However, as mentioned above, this research study focuses on enhancing, and in some cases developing, CTS in BSN pre-licensure students in the TCS. The remainder of this chapter addresses the problem statements, background, purposes and goals of the research study,

justifications and significance of the research study, conceptual frameworks, and hypotheses and assumption of the research study.

Problem Statements

In today's healthcare settings, there are heightened concerns about pre-licensure nursing students' ability to synthesize theoretical knowledge in clinical settings even after passing the NCLEX-RN, which is known as the theory-clinical competency gap (Baxter, 2007; Benner, 2012, 2015; Burns & Poster, 2008; CDC, 2013; Greenway, Butt, & Walthall, 2019; Grossenbacher & Kappel, 2018; NASEM, 2016). The theory-clinical competency gap has been a concern in nursing education for more than two decades (Benner, 2012; Landers, 2000). One attempt to bridge the theory-clinical competency gap is to provide pre-licensure nursing students with opportunities to learn how to begin to think like a RN in the TCS (Carter & Welch 2016; Day, 2011; Huston et al., 2018; Voldbjerg, Grønkjaer, Sørensen, & Hall, 2016). Stakeholders such as NASEM (2016) and NCSBN (2019) recommend that new active-teaching methods be created and/or current methods be modified to teach pre-licensure nursing students how to apply new knowledge to clients' clinical situations in real-time using CTS; furthermore, the improved methods should be in the TCS, where foundational knowledge is often first encountered.

It is known that critical thinking is promoted when pre-licensure nursing students are engaged in their learning (Wagner, 2014). Hence, in addition to the need for new and modified active-teaching methods, another challenge with helping pre-licensure nursing students develop and enhance their CTS is related to student engagement during the learning process (Hart, 2017; NLN, 2019; Wagner, 2014). Active-teaching methods must engage pre-licensure nursing students in the TCS long enough and intensely enough for them to learn how to critically think

and problem-solve through clients' evolving healthcare needs (Bastable & Kitchie, 2014; Carter & Welch & Welch, 2016; NCSBN, 2019; Wagner, 2014).

Background

More than 10 years ago, Grossman and Valiga (2009) stated, "Sadly, many nurses are not prepared for the role that they will assume in acute care institutions, home care, or other settings, and they become overwhelmed all too quickly" (p. 24). Since that time, client healthcare needs have become increasingly complex (American Nurses Association [ANA], 2015; CDC, 2013; NASEM, 2016). To counter the problem, pre-licensure nursing students must have learning opportunities in the TCS to analyze subjective data (e.g., what the client states the problem is and associated symptoms) and objective data (e.g., laboratory values, vital signs, knowledge of disease processes) in a real-time clinical scenario. Providing real-time clinical scenario learning opportunities can help prepare pre-licensure nursing students for their upcoming entry-level RN role as critical decision-makers (Billings, Kowalski, & Reese, 2011; Day, 2011; Gray-Miceli, Aselage, & Mezy, 2010; Mills et al., 2014; Wagner, 2014; West, Usher, & Delaney, 2012). The next several pages briefly address client healthcare needs and three aspects of PBL: concept mapping, case studies, and unfolding case studies (UCS).

Client Healthcare Needs

Nursing education reform is needed for today's pre-licensure nursing students to try to prepare them to make critical decisions in unpredictable and rapidly changing healthcare settings (NASEM 2016; NCSBN, 2018). Furthermore, educational reform is necessary because Americans who are diagnosed with multiple disease processes are living longer with complex comorbidities (CDC, 2013; CDC, 2019b). Comorbidities such as heart disease, neurological diseases, and HIV/AIDS are some of the most prevalent disease processes that require entry-

level RNs to use astute CTS no matter the healthcare setting (CDC, 2013; CDC, 2019a; Kavanagh & Szweda, 2017; Nania, 2019; NCSBN, 2018). For example, from 1991 to 1995, 550,000 people were diagnosed with HIV and 56% died within 2 years of their diagnosis (Bradley-Springer, Stevens, & Webb, 2010). Today, thanks to medical advancements, deaths resulting from HIV/AIDS have decreased to below 5% (CDC, 2016; CDC, 2019a; Nania, 2019). Individuals diagnosed with HIV/AIDS are not only living longer but have a variety of comorbidities that include, but are not limited to, hypertension, coronary heart disease, and neurological diseases (CDC, 2016, 2019a). Consequently, entry-level RNs must be able to use CTS to assess multiple patient conditions appropriately, implement effective nursing interventions, and properly evaluate patient outcomes (CDC, 2019b; NASEM, 2016; NCSBN, 2019).

The number of individuals with multiple chronic comorbidities is projected to reach 171 million in the United States by the year 2030 (CDC, 2013; Mattke, Mengistu, Klautzer, Sloss, & Brook, 2015). Moreover, clients in today's healthcare settings suffer from multiple complex health conditions that require more complicated treatments (CDC, 2019a; CDC, 2019b; Mattke et al., 2015). As a result, there are heightened concerns about the CTS of entry-level RNs and their ability to effectively care for clients with multiple complex diseases in a variety of healthcare settings (Grossenbacher & Kappel, 2018; NASEM, 2016). Treating multiple complex diseases requires more thinking outside the box, synthesis of information, and customizing of nursing interventions to avoid complications associated with standardized approaches to care (ACEN, 2019; NASEM, 2016; NCSBN, 2019). Thus, nursing faculty continue to be challenged to develop new and or modify active-teaching methods that prepare current/future pre-licensure

nursing students for the increasing complexity of nursing care they will need to provide in clinical practice (ACEN, 2019; Grossenbacher & Kappel, 2018; NASEM, 2016; NCSBN, 2019).

Active-Teaching Methods: Problem-Based Learning

Since the mid-2000s, the American Association of Colleges of Nursing (AACN, 2008) has recommended that nursing faculty design active-teaching methods that teach pre-licensure nursing students CTS. In an attempt to meet AACN (2008) recommendations, intentional and purposeful integration of PBL active-teaching methods have been used where students are presented with a client problem scenario that require CTS to assess, diagnose, plan, implement, and evaluate nursing care. There are many forms of PBL; some of the most common are concept mapping (Barrett, 2014; Brune, 2014; Hsu et al., 2016; Yue, Zhang, Zhang, & Jin, 2017), case studies (Dutra, 2013; Kaddoura et al., 2016; Kantar & Massouh, 2015), and UCS (Billings et al., 2011; Carter & Welch & Welch, 2016; Day, 2011; Yousey, 2013).

Concept mapping. Concept mapping has been used in the TCS and in the hospital setting since the late 1990s (All & Havens, 1997; Baugh & Mellott, 1998). With this method of teaching, pre-licensure nursing students collect data from an in-class client scenario and/or from client assessments completed in the hospital setting and then use diagrams, as opposed to linear outline formats, to make connections between multiple subjective/objective client data (Bressington, Wong, Lam, & Chien, 2018; Chan, 2017; George, Geethankrishnan, & D'Souza, 2014). The goal is for the pre-licensure student to recognize relation among the data and then organize and analyze data to develop and enhance his/her CTS **(**Barrett, 2014; Bastable & Kitchie, 2014; Kaddoura et al., 2016; Lanz & Davis, 2017).

Case studies. Case studies have been used "to highlight a concept or set of concepts and as a break from lecture while the content is demonstrated by a story about a client" (Day, 2011 p.

449). Case studies provide pre-licensure nursing students with opportunities to develop and enhance CTS in the TCS by illuminating clinical situations based on clients' subjective and objective data. Students then use subjective/objective data to explore, examine, and synthesize client data to determine if proposed nursing interventions will lead to positive and/or negative healthcare outcomes (Gray-Miceli et al., 2010).

There are, however, key elements missing from concept mapping and case studies during the learning process (Carter & Welch & Welch, 2016; Day, 2011; Johnson & Flagler, 2013; McCormick, Romero de Slavy, & Fuller, 2013; Yoder-Wise, 2004). Concept mapping and case studies do not allow students to discuss how they would apply nursing interventions in real-time as they would in the clinical setting. Learning activities that allow for real-time discussions regarding nursing interventions are crucial for the development and enhancement of pre-licensure nursing students' CTS (Billings et al., 2011; Cole, Graves, & Turner, 2018; Insight Assessment, 2019; West, Usher, & Delany, 2012). In efforts to provide students with additional opportunities to develop and enhance CTS, case studies evolved into another form of PBL known as UCS.

Unfolding case studies. An unfolding case study is an active-teaching method that allows nursing faculty to gradually present an evolving client case in flexible segments (Day, 2011; Hong & Yu, 2017; Johnson & Flager, 2013). Day (2011) stated that the most effective learning happens when pre-licensure nursing students can unpack client scenarios and solve problems in real-time, as they would in different healthcare settings. Additionally, UCS allow pre-licensure nursing students to make inferences and decisions before all of the client information is available, which mimics the rigor of real-world clinical conditions where RNs must provide nursing interventions with partial data (Hong & Yu, 2017; Johnson & Flagler,

2013). By using UCS as an active-teaching method, nursing faculty can present evolving complex client scenarios during one or more class periods or over the course of a semester to capture thinking dynamics of nursing interventions in real-time, in the TCS.

Just as important, the use of UCS in a TCS allows nursing faculty and pre-licensure nursing students to engage in reciprocal dialogue. Reciprocal dialogue is a form of formative evaluation and reveals critical thinking accuracy and/or errors in students' problem-solving abilities that would not otherwise be obvious with concept mapping and case studies (Day, 2011; Johnson & Flager, 2013; McCormick et al., 2013). Reciprocal dialogue also allows nursing faculty to give feedback in real-time as pre-licensure nursing students hypothetically manage evolving client healthcare needs, thus, assisting pre-licensure nursing students with the development and enhancement of CTS in the safety of a TCS (Day, 2011; Wagner, 2014).

It is important to note that UCS are traditionally used in high-fidelity simulation (HFS) and/or in low-fidelity simulation (LFS) skill laboratories. In HFS and LFS skill laboratories, complex client scenarios are unfolded, and in this particular nursing educational arena, pre-licensure nursing students are able to problem-solve and implement nursing interventions in real-time (Jefferies, 2007; Meakim et al., 2013; Mills et al., 2014; Moyer, 2016). High-fidelity simulation enables pre-licensure nursing student interaction and engagement using computerized client simulators and/or standardized patients, and in LFS, students role-play with static manikins and medical-related props (Meakim et al., 2013). Unfolding case studies have been used in HFS/LFS to develop and enhance CTSs in students, yet Grossenbacher and Kappel (2018) and Kavanagh and Szweda (2017) surmised that entry-level RNs must be better prepared to recognize and implement quality care for clients with complex disease processes and that training needs to begin earlier in nursing education programs. As a result, using UCS in the TCS

may further develop and enhance CTS in pre-licensure nursing students (AACN, 2008; ACEN, 2020; CCNE, 2018; HLC, 2020; NCSBN, 2016).

It should be pointed out that students verbatim from two qualitative studies reported that pictures of patients' disease processes and student engagement were essential for their learning. (Chan, 2017; Hudson & Carrasco, 2017). To illustrate, in a study by Chan (2017), participants were asked to create concept maps after analyzing a client case scenario. The concept maps consisted of students sketching pictures that artistically and creatively depicted a clients' disease process and treatment of the disease process. The above researcher reported that more than half the participants stated that the pictures appealed to their learning style. In another study by Hudson and Carrasco (2017), BSN pre-licensure student participants recommended that nursing faculty move class lectures to the online environment and use class time to teach them how to think like a RN. The use of class time to teach pre-licensure nursing students to solve client healthcare problems collaboratively would help prepare them for what is expected of them when they begin to practice as entry-level RNs (NASEM, 2016; NCSBN, 2019; NLN, 2019). Thus, nursing faculty have two challenges with attempting to transform nursing education. First, they must efficiently use active-teaching methods to develop and enhance CTS in the TCS (Day, 2011; NASEM, 2016; NCSBN, 2019 NLN, 2019). Second, pre-licensure nursing students with multimodal learning needs must be engaged in the learning process before the development and enhancement of CTS can take place (Cassum & Gul, 2017; D'Souza, Isac, Venkatesaperumal, Nairy, & Amirtharaj, 2014; Wagner, 2014). Accordingly, nursing faculty must explore and/or develop active-teaching methods that engage pre-licensure nursing students as new and complex course content are presented so the development and enhancement of CTS can take place in the TCS (Cassum & Gul, 2017; D'Souza et al., 2014).

Purposes and Goals of the Research

The first purpose of this research study was to incorporate the active-teaching method, UCS (independent variable) in the TCS. A second purpose was to integrate multimodal learning opportunities utilizing VARK throughout UCS in a TCS. The goals of the research were threefold. The first goal was to measure whether or not the use of UCS in a TCS would enhance the CTS of BSN pre-licensure students with a validated tool; the second goal was to explore whether students who were exposed to UCS in the TCS demonstrated stronger academic performance in classroom course content examinations; and the third goal was to explore the perceptions of a subset of BSN pre-licensure students to determine if the use of multimodal learning opportunities utilizing VARK throughout UCS and improved CTS in the classroom setting, clinical setting, and preparing for course content exams and to explore if they perceived greater levels of engagement during the learning process.

Justifications and Significance of the Research

This research was justified for two reasons. First, the literature reflects that there are very few existing research studies using UCS in the TCS. Second, there were no research studies in nursing exploring BSN pre-licensure students' perceptions of multimodal learning opportunities throughout UCS and the improvement of CTS in the classroom setting, clinical setting, and preparing for course content exams; and exploring if they perceived greater levels of engagement during the learning process. This research study is significant because quantitative and qualitative data results can add to the body of knowledge in nursing education, specific to whether use of UCS in the TCS can help develop and enhance CTS in BSN pre-licensure nursing students. Additionally, this research study provides a foundation that can be replicated and expanded upon in developing evidenced-based, active-teaching methods for different educational

levels (diploma, ADN, and BSN) of pre-licensure nursing students who have multimodal learning needs.

Conceptual Frameworks

The researcher has chosen to draw from the works of Peter Facione (1990) and Paulo Freire (1993) to support the concepts of critical thinking and emancipatory pedagogy for this research study. The choice of these highly respected scholars is predicated upon the researcher's professional experience with critical reasoning and problem-solving; this includes 10 years of theoretical and clinical experience teaching pre-licensure nursing students, coupled with 22 years of collective experience as a staff nurse, preceptor, scrub nurse, and board-certified adult clinical nurse specialist in areas of nursing, such as medical/surgical intensive care units, and pre-operative/intra-operative/post-operative/cardiac catheterization, electrophysiology, interventional radiology, neurology, and vascular laboratories. The researcher's complex clinical experiences necessitated the use of high-level CTS to teach pre-licensure nursing students and RNs (with more than 12 months of clinical experience), both of whom required multimodal learning opportunities to learn how to critically think in fast-paced healthcare settings. The professional roles mentioned above have shaped the researcher's beliefs on *how* pre-licensure nursing students with multimodal learning needs can begin to develop and enhance CTS in a TCS, a goal that is supported by the works of both scholars. The concepts of both scholars are discussed below.

Critical Thinking (Facione)

For over a decade, there have been discussions on how best to develop and enhance CTS in students (Facione, 1990; Facione, Facione, & Giancarlo, 2000; Scheffer & Rubenfeld, 2000). In the view of Facione et al. (2000), critical thinking dispositions are directly correlated to students habitually having an intrinsic drive to engage in their learning as they consistently think through and work at solving problems. Facione (1990) also outlined clear recommendations for educators to create an environment of learning where "students should be encouraged to be curious, to raise objections, ask questions, and point out difficulties in the instructors' position" (p. 19). In the well-known Delphi executive report, 46 experts who had extensive experience in critical thinking instruction participated in six rounds of questions discussing components that constituted a critical thinker. The researchers found that development and enhancement of critical thinkers are based upon the above described critical thinking dispositions (Facione, 1990). Moreover, Facione (1990) believed that instructors should incorporate students' experiences into teaching instruction to help students understand theoretical rationales and concepts (Facione, 1990).

Scheffer and Rubenfeld's (2000) Delphi study provided a consensus statement on the 10 habits of the mind (confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance, and reflection) and seven cognitive skills (analyzing, applying standards, discrimination, information seeking, logical reasoning, predicting, and transforming knowledge) that nurses, and thereby pre-licensure nursing students, need for critical thinking. Implications from their study revealed that nursing faculty should design critical thinking learning activities that develop and enhance the habits of mind and cognitive skills. It has been almost three decades since Facione (1990) outlined

specific strategies that educators can use in efforts to develop and enhance CTS in a TCS, and it has been over one and half decades since Scheffer and Rubenfeld (2000) introduced the 10 habits of the mind and seven cognitive skills of critical thinking to nursing education. Yet the nursing education literature still shows a gap in the evidence for active-teaching methods that create learning environments that support the recommendations of Facione (1990) and Scheffer and Rubenfeld (2000). This gap in the evidence for active-teaching methods that develop and enhance CTS for today's population of pre-licensure nursing students with multimodal learning needs strengthens this researcher's rationale for exploring the use of UCS in a TCS.

Emancipatory Pedagogy (Freire)

Although multiple scholars have been instrumental in the evolution of educational reform, Freire's (1993) philosophy of education is well known for dialogical teaching, as he believed that "without dialogue there is no communication, and without communication there can be no true education" (p. 93). Freire (1993) also believed that educators should create a classroom environment that enables a sense of community so that students are motivated to engage during the learning process, which maximizes the learning experience. D'Souza et al. (2014) defined student engagement as students' willingness to participate actively in the class or clinical setting. D'Souza et al. (2014) also found a clear link between student engagement and active-learning when faculty incorporated realistic learning activities. Freire (1993) believed that education should hold a place in a democratic society, and those citizens should have the right to develop self-empowerment in efforts to stimulate critical consciousness. Thus, educational pedagogies should allow students to have an active role in their learning and be encouraged to ask questions and respectfully challenge the way nursing course content is presented in the TCS (Freire, 1993; Hudson & Carrasco, 2017).

Freire's dialogical teaching beliefs and student engagement are evident in some current nursing education pedagogies, particularly in PBL approaches such as concept mapping and case studies, which provide opportunities for intermittent dialogue between students and nursing faculty during the learning process. However, UCS promote continuous reciprocal dialogue between nursing students and nursing faculty, which has the propensity to maximize learning in the TCS (Day, 2011; Freire, 1993; Hong & Yu, 2017). Moreover, UCS can stimulate robust reciprocal dialogue, which engages students as they learn; thus, leading to more opportunities for BSN pre-licensure multimodal learners to develop and enhance CTS in the TCS (Day, 2011; Hong & Yu, 2017; Wagner, 2014).

Hypotheses and Assumption of the Research Study

There were two hypotheses for the quantitative portion of this study. First, the researcher hypothesized that the BSN pre-licensure students who participated (experimental group) in the active-teaching method, UCS in the TCS, would have increased CTS as measured the Health Science Reasoning Test (HSRT) posttest scores. The second hypothesis the BSN pre-licensure experimental group would have higher course content exam scores than the equivalent course content exam scores achieved by the control group.

Qualitative research utilizes assumptions rather than hypotheses. The assumption for this portion of the study was that focus group participants from the experimental group would provide positive feedback on how the use of multimodal learning opportunities utilizing VARK throughout UCS improved their CTS in the classroom setting, clinical setting, and preparing for course content exams; and that they perceived greater levels of engagement during the learning process.

Summary

The existing challenges with teaching today's pre-licensure nursing students how to critically think, in the TCS in efforts to prepare them to provide safe clinical care in a variety of healthcare settings (ACEN, 2020; CCNE, 2018; HLC, 2020; NASEM, 2016; NCSBN, 2019). Multiple stakeholders from accrediting bodies to boards of nursing have strongly recommended that nursing education by reformed to deal with the named challenges in this chapter (AACN, 2008; CCNE, 2018; NCSBN, 2019). Moreover, in this chapter, the problem statements, background, purposes and goals, justification and significance, and conceptual frameworks were briefly outlined along with the research hypotheses and assumption being explored with this mixed-methods research study. In the subsequent portions of this dissertation, Chapter II will present the literature review. Chapter III will describe the methods used for this research study. Chapter IV will delineate the results of the study, and in Chapter V, discussion and recommendations for future nursing educational research studies will be outlined.

Chapter II: Review of Literature

Clients' evolving healthcare needs (basic care and comfort, pharmacological and parenteral therapies, reduction of risk potential, and physiological adaptation) are major catalysts that drive change in how pre-licensure nursing students are taught during their program of study (NCSBN, 2019). Clients are living longer with multiple comorbidities, which are projected to increase in complexity in the future (CDC, 2013; NSAEM, 2016; NCSBN, 2018). Therefore, effective active-teaching methods are needed in the TCS that teach pre-licensure nursing students (who learn differently) how to think critically so that they are prepared for their entry-level RN roles (ACEN, 2019; Benner, 2012, 2015; CCNE, 2018; HLC, 2020; NASEM, 2016).

To reiterate from Chapter I, induction, deduction, analysis, inference, and evaluation are important high-level CTS that pre-licensure nursing students must achieve to effectively meet the evolving healthcare needs of clients in a variety of healthcare settings (Insight Assessment, 2019; NASEM, 2016; NCSBN, 2019). Consequently, stakeholders in the United States have recommended for over 20 years that nursing faculty use active-teaching methods to engage pre-licensure nursing students during the learning process so that they are attentive enough to learn how to critically think in the TCS (ACEN, 2019; CCNE, 2018; HLC, 2020; NCSBN, 2018). In efforts to meet stakeholders' recommendations, PBL active-teaching methods, such as concept mapping and case studies have been used in the TCS in efforts to develop and enhance CTS in the TCS. Equally important, UCS have recently been used in the TCS, but are generally used in HFS/LFS laboratories to develop and enhance CTS for pre-licensure nursing students.

Although concept mapping and case studies have been used in the TCS for almost 20 years, there are still concerns about the level of CTS that RNs demonstrate in the clinical setting (Grossenbacher & Kappel, 2018; Institute of Medicine [IOM], 2001). For instance, 19 years ago, a groundbreaking 2001 report from the Institute of Medicine (now the National Academies of

Sciences, Engineering, and Medicine) estimated that 7,000 clients suffered injury or died from medication errors, and 34% of those errors were linked to medications administered by RNs. In a more recent study, Grossenbacher and Kappel (2018) reported that RNs were accountable for up to 65% of clinical errors, many of which were related to the ineffective use of CTS. The literature from both of the abovementioned research studies on RN errors did not specify if entry-level RNs (diploma, ADN, BSN) or more experienced RNs were included in the statistical data. Nevertheless, as an indication that education may influence the competent practice of RNs, in a review of literature on disciplinary actions against RNs, Delgado (2002) reported that RNs whose highest level of education was an associate degree were disciplined more often than those who had attained a bachelor's degree.

Data outcomes from the IOM (2001) and Grossenbacher and Kappel (2018) showed a 17-year ascending trajectory of medication and/or clinical errors performed by RNs. This ascension further supports the crucial need for pre-licensure nursing students to have more active-learning opportunities to develop and enhance CTS, especially in the TCS where lecture is still the main mode of instruction (ACEN, 2019; NASEM, 2016; NCSBN, 2019). While researching evidence-based active-teaching methods that can be used in the TCS, it is important for researchers to consider the learning needs of today's pre-licensure nursing student population who have multimodal learning needs (Chicca & Shellenbarger, 2018; Eckleberry-Hunt & Tucciarone, 2011; Schwieger & Ladwig, 2018; Seemiller & Grace, 2017; Shatto & Erwin, 2016). This attention is important because there are at least four generations of pre-licensure nursing students who are enrolled in BSN programs (NLN, 2016b). To illustrate, 75% of pre-licensure nursing students enrolled in BSN programs are below the age of 25, while 12.4% are 26-30,

8.7% are 31-40, 3.2% are 41-50, and 0.6% are 51-60, with 0.1% of the population above the age of 60 (NLN, 2016b).

Lumping students into one group or another simply by generation is not fully accurate but it is useful in order to appreciate the different multimodal learning styles of generational cohorts. Students from Generations Z and Y were born during the technology era, and their technological expertise often exceeds the average knowledge of their nursing faculty (McCurry & Martins, 2010; Seemiller & Grace, 2017; Schwieger & Ladwig, 2018; Shatto & Erwin, 2016). Moreover, Generation Z students prefer to learn through storytelling and problem-solving real-world clinical situations instead of by traditional lecture (Chicca & Shellenbarger, 2018; Seemiller & Grace, 2017). Generation X students were born during the era when rigid teaching styles started to dissipate, classroom sizes became smaller, and learning began to focus on student-centered activities. Baby boomers were born in a time of hierarchical teaching and learning. That era's autocratic classroom gave the teacher explicit power to determine what the student should learn, and students did not have the option to question the authoritative figure (Mitchell, 2012).

Currently, baby boomers who are less than 1% of nursing students, make up 72% of nursing faculty, which could have an impact on how today's pre-licensure nursing students are taught (ANA, 2015). The literature suggests that some nursing faculty born in the baby boomer era teach as they were taught: a teacher-centered style that promotes learning algorithms and does not allow students to actively learn (Bastable & Kitchie, 2014; McCurry & Martins, 2010). Eleven years ago, the AACN (2008) stated that personal attributes of nursing faculty, no matter their age, have an impact on how pre-licensure nursing students are taught. Therefore, the AACN (2008) recommended that all nursing faculty use evidenced-based active-teaching methods that

are student centered to meet the learning needs of multimodal learners, and not force their own learning styles upon students.

A question that remains central to nursing education is: *How* do nursing faculty of all ages successfully engage today's generational mix of pre-licensure nursing students to effectively teach CTS in the TCS? As preparation for an exploration of this question, this researcher has completed an in-depth and extensive literature review that will focus on several points, which include (a) evolving client healthcare needs, (b) professional organizations that influence pre-licensure nursing education, (c) how the shortage of nursing effects client care, (d) educational paths to registered nurse licensure, (e) critical thinking in nursing education, (f) teacher-centered versus student-centered instruction, (g) active-teaching methods, (h) summation of key ideas, (i) tools to measure pre-licensure nursing clinical competencies and critical thinking skills, (j) active-teaching method research studies to teach critical thinking, and (k) the focus of this mixed-methods research study.

Evolving Client Healthcare Needs

As previously mentioned, the evolving healthcare needs of clients primarily drive change in how pre-licensure nursing students are taught; in short, when the healthcare needs of clients evolve, the clinical roles of RNs must evolve as well (NCSBN, 2018; 2019). The ever-changing clinical roles of RNs make it imperative for nursing faculty to use evidenced-based active-teaching methods in the TCS so that current and future pre-licensure nursing students can develop and enhance their CTS before entering into clinical practice (NCSBN, 2018). History has illustrated the need to adapt nursing education to the evolving healthcare needs of clients. Below, the researcher provides a brief historical overview on how the evolving healthcare needs

of clients affect the roles of entry-level RNs, thus directing how pre-licensure nursing students should be taught while attending nursing school.

Client Needs in the Nineteenth Century

The evolving healthcare needs of clients have been the driving force behind nursing education reform (ACEN, 2020; HLC, 2020; NCSBN, 2018). As an historical example, Florence Nightingale, one of the most cited nursing scholars in literature, had a significant and positive impact on the nursing profession. Nightingale volunteered to care for sick and wounded soldiers who served in the Crimean War (1853–1856) and observed that soldiers were acquiring infectious diseases (morbidity) and then dying (mortality) at an alarming rate (as cited in Dingwall, Rafferty, & Webster, 1989). She theorized that the leading cause of death was not directly related to the soldiers' wounds, but instead to the neglected hygiene of the soldiers and the horrendous sanitary conditions of the environment (as cited in Judd & Sitzman, 2014). To test her theory, Nightingale and other nurses used effective hand hygiene while caring for soldiers (Dingwall et al., 1989; Judd & Sitzman, 2014). Moreover, they tended to the hygiene of the soldiers by thoroughly cleaning the barrack floors, walls, and beds and providing soldiers with adequate natural air and sunlight and fresh clean water (Dingwall et al., 1989; Judd & Sitzman, 2014). Nightingale collected statistical data to document the results of her nursing care and found that the number of soldier morbidities and mortalities drastically dropped within months. As a result of this nursing care, the environmental theory emerged and is defined as any external conditions that effect the life and development of an organism that suppress or contribute to disease and death (Medeiros, Enders, & Lira, 2015). The environmental theory has been used as a reference point in nursing history and has influenced the trajectory of nursing education; the result was that pre-licensure nursing students must learn how to provide effective

nursing care to clients to improve healthcare outcomes (Dingwall, et al., 1989; Judd & Sitzman, 2014). More details on how pre-licensure nursing students are being educated to meet the evolving healthcare needs of clients will be discussed in more detailed below.

Client Needs in the Twentieth Century

Client healthcare needs continued to evolve in the twentieth century; for example, the branch of public health nursing evolved, in part, from the outcomes on health from two world wars, and there were advances on how to identify and prevent causative factors of disease processes that led to serious illnesses and death (CDC, 1999; Girvin & Maxwell, 2018). A poignant discovery during the 20th century was the link between cigarette smoking and lung cancer. During the 1930s, lung cancer was extremely rare (4.9 per 100,000), but by the 1990s, there was a significant rise in lung cancer cases (75.6 per 100,000; CDC, 1999, 2011). The rise in individuals diagnosed with lung cancer was attributed to the increasing popularity of smoking cigarettes, as in the mid-1960s smoking cigarettes was viewed as socially acceptable (CDC, 1999). In fact, physicians and nurses smoked in client care areas, unaware of how the carcinogens would negatively affect clients' already compromised health (American Academy of Nursing, 2015; Andrews, 1983; Longo et al., 1998). During the 1990s, epidemiology reports showed that smoking was also linked to cardiovascular disease, cerebral vascular accidents (CVAs), and respiratory disorders such as chronic obstructive pulmonary disease (chronic bronchitis and emphysema; CDC, 1999, 2011).

Exercise and diet. In the 1990s, the National Center for Health Statistics [NCHS] (1994), utilizing data from Healthy People 2000, is a public health project science-based government agency that establishes national objectives and sets 10-year benchmarks for improving the health of all Americans. Data from Healthy People 2000 identified lifestyle and

environmental factors as the leading cause of chronic diseases, disabilities, and mortalities. National Center for Health Statistics (1994) reported that exercise and diet were the top two modifiable risk factors that could improve quality of life and help individuals live longer. In fact, individuals who were consistent with physical activity were at a lower risk of developing colon cancer and cardiovascular accidents (NCHS, 1994). Americans were encouraged to engage in regular physical activity for at least 20 minutes a day to prevent and manage comorbidities such as heart disease, hypertension, type 2 diabetes, osteoporosis, obesity, and psychological problems such as depression and anxiety. National Center for Health Statistics (1994) also encouraged Americans to read food labels in efforts to make better nutritional choices that were low in sodium and saturated fats, as poor nutritional habits were contributing to negative healthcare outcomes. For example, clients already diagnosed with comorbidities and who did not eat properly or engage in regular physical activity were at an increased risk for a myocardial infarction and uncontrolled hypertension, which could lead to cardiovascular accidents. The influence on nursing education was that nurses were educated on how to effectively assess clients' lifestyle choices and teach them healthy eating and exercise regimens.

Increasing chronic illness. Toward the end of the twentieth century, the NCHS (1994) reported a dramatic decrease in client mortalities. The average life expectancy of individuals increased from 47.3 years during the 1900s to 76.8 years in 1998. As expected, the number of Americans who were diagnosed with multiple comorbidities required more complex treatment during the 1900s due to Americans living longer in the twentieth century (CDC, 2013). As a result, the level of nursing care that entry-level RNs needed to provide during the last decades of the 20th century became more complex.

Client Needs in the Twenty-First Century

Some healthcare concerns from previous centuries are evident today. As an example, cigarette smoking continues to have detrimental health effects on the public, as in the early years of the 21st century, smoking was allowed in restaurants and on college campuses (Borders, Xu, Bacchi, Cohen, & SoRelle-Miner, 2005; CDC, 2011; Fee & Brown, 2004; NCHS, 2012). Epidemiologic studies discovered that smoking not only had a monumental negative impact on the health of the smoker, but individuals who were exposed to secondhand smoke were being diagnosed with heart and respiratory diseases. Thus, the effects of smoking that have led to heart and respiratory diseases has continued to increase the number of individuals who need care in a variety of healthcare settings (CDC, 2011; NCHS, 2012).

Exercise and diet remained the top two health priorities identified by the NCHS (2012); thus, Americans were encouraged to add weightlifting to their exercise regimen and increase their level of activity to 30 minutes a day. Moreover, Americans are encouraged to make better nutritional choices, with an additional recommendation to limit food portions to decrease the incidence of obesity (CDC, 2019c). As reported in Healthy People (2020), in the past decade, the incidence of obesity increased across all age groups, which effected the progress in eliminating health disparities in the United States. Historically, it has been recognized that smoking cessation, consistent physical exercise, and healthy nutritional habits result in Americans living longer (CDC, 2019c; NCHS, 2012). Consequently, the level of care that clients need requires pre-licensure nursing students to learn how to provide quality care to those who are diagnosed with multiple comorbidities as well as recognize clinical events that can lead to negative healthcare outcomes (NCBSN, 2019).

Professional Organizations That Influence Pre-Licensure Nursing Education

Past, current, and future evolving healthcare needs of clients continually influence the clinical roles of entry-level RNs. The evolving healthcare needs of clients influence the way pre-licensure nursing students are educated; thus, they should be prepared to assist clients toward optimal health and wellness in healthcare settings (ANA, 2015; NLN, 2020). However, during the early years of nursing education, the level of education for pre-licensure nursing students was inconsistent, and there were no defined professional nursing standards (ANA, 2015; NCSBN, 2019; NLN, 2020). The rise in professional organizations that govern RN licensure and practice have affected the standards of nursing education, which will be discussed below.

National League for Nursing/American Nurses Association/Nurse Practice Act

The National League for Nursing was established in 1893 and was the first organization that had a phenomenal impact on nursing education and the nursing profession (NLN, 2020). Formerly known as the American Society of Superintendents of Training Schools for Nurses and the National League of Nursing Education, the now National League for Nursing developed and administered the first hand-written state board test pool examination for nursing RN licensure to test pre-licensure nursing candidates on how they recognized and hypothetically applied appropriate nursing interventions to clients' clinical situations (NLN, 2020). The American Nurses Association was founded in 1896 and is another prestigious organization that was instrumental in managing the state board test pool examination for licensure before the NCSBN took control of the professional nursing licensure exam (ANA, 2015). The NCSBN revised and renamed the licensure exam to the NCLEX-RN. The first Nurse Practice Act (NPA) was enacted in 1903 in North Carolina to protect the title of the RN and improve the practice of nursing (Michigan Department of Licensing and Regulatory Affairs, 2019). The overarching goal for the

above-mentioned organizations is to ensure that the evolving healthcare needs of clients are met by assessing the clinical competence of pre-licensure nursing graduates before they enter into clinical practice.

National Council of State Boards of Nursing

The National Council of States Boards of Nursing, founded in 1978, is a nonprofit governmental entity that establishes standards for pre-licensure nursing education programs. The NCSBN grants approval for academic institutions to open schools of nursing, sets the scope of practice and standards of safe client care, and is in control of disciplinary actions against RNs when the health and safety of clients have been adversely affected (Michigan Department of Licensing and Regulatory Affairs, 2019; NCSBN, 2018). To keep up with the evolving healthcare needs of clients, the NCSBN (2018) conducts a practice analysis every 3 years to mimic the evolving healthcare needs of clients and seeks expert opinions from the NCLEX Examination Committee to ensure that the rigor of the NCLEX-RN exam aligns with the clinical expectations of entry-level RNs. The NCSBN (2018) allocates specific percentage ranges to each of the four major client healthcare need categories (mentioned in Chapter I), which include (a) safe and effective care (26%-38%), (b) health promotion and maintenance (6%-12%), (c) psychosocial integrity (6%-12%), and (d) physiological integrity (38%-62%). Thus, pre-licensure nursing candidates are tested more critically on their essential knowledge skills and abilities by evaluating how they would effectively prioritize and implement nursing interventions for a more complex client base.

NCLEX-RN revision examples. As mentioned above, the NCLEX-RN has changed every 3 years to mimic the evolving healthcare needs of clients; thus, the way pre-licensure nursing candidates are tested has continued to change. To illustrate, many test items from the

April 1, 2013 test plan were written “at the application or higher levels of cognitive ability which requires more complex thought processing” (NCSBN Detailed Test Plan, 2013, p. 4). Multiple-choice options for questions with a single correct response had been the primary testing format. However, in the 2016-2019 version of the exam, additional question formats were added in the hopes of better evaluating the CTS of pre-licensure nursing candidates. For example, the 2016-2019 exam added multiple-response items that require pre-licensure nursing candidates to select two or more responses and correctly mark one or more areas on a picture or graph. Additionally, candidates were challenged to select correct options after listening to an audio clip and choose rank-order answers based on how a practicing RN would prioritize client care (NCLEX-RN Detailed Test Plan, 2013). Successfully passing the exam is supposed to denote that pre-licensure nursing candidates have the required CTS to care effectively for the evolving healthcare needs of clients (NCSBN, 2019). Alarmingly, Kavanagh, and Szweda (2017) reported that only 23% of entry-level RNs who pass the NCLEX-RN have the ability to deliver competent care. To obtain their data, Kavanagh and Szweda (2017) used a performance-based development system to identify the critical thinking learning needs of entry-level RNs (ADN and BSN). The performance-based development system used video vignettes and clinical situations to assess clinical judgment competency. Participants (N = 5000) were required to free-text responses and did not have the option of answering questions using the multiple-choice format. Within a 5-year period, the researchers gathered data from 140 nursing programs in 21 states. Kavanagh and Szweda (2017) reported that 23% of entry-level RNs were not safe to practice independently in the clinical setting and only 54% were able to recognize a change in a client’s condition; however, those who could recognize a change in a client’s condition were unable to implement appropriate nursing interventions to manage the healthcare needs of clients.

In the past, NCLEX-RN test plans changed every 3 years; however, the new Next Generation NCLEX-RN test plan is expected to be introduced in 4 years after the last NCLEX-RN (2016-2019), which will be in 2023. If things progress as planned, candidates will be presented with case studies to be tested more critically on their ability to do the following (a) recognize cues (client signs and symptoms), (b) analyze cues (probable client needs, concerns, or problems), (c) prioritize hypotheses (urgency, time-management, complexity of care, risk, etc.), (d) generate solutions, (e) take action (prioritize and implement nursing interventions), and (f) evaluate client outcomes (NCSBN, 2018). Test items will include the following question formats (a) extended drag and drop, (b) extended multiple-response, (c) enhanced drag and drop, and (d) cloze (drop-down choices). Each format will be used to measure candidates' CTS using case studies that depict real-life clinical situations. It is important to note that cloze questions will be set up to mimic UCS as candidates will have to analyze subjective and objective client information, anticipate clinical needs, and hypothetically apply nursing interventions that will lead to positive healthcare outcomes. Descriptions of the above testing formats will require pre-licensure nursing students to have more opportunities to learn how to think more critically in the TCS (NCSBN, 2018). Thus, nursing faculty will be obligated and challenged to research active-teaching methods that prepare pre-licensure nursing candidates to pass the new NCLEX-RN, which should demonstrate that they could be safe and effective entry-level RNs in healthcare settings.

Institute of Medicine (IOM): Patient-Centered Care

The IOM (1999) is another organization that has been instrumental in nursing education, as the landmark report *To Err is Human: Building a Safer Health System* revealed that a vast number of clinical errors performed by healthcare professionals resulted in clients' injuries or

death. Consequently, in the early 2000s, the IOM (2001) addressed the future challenges of healthcare systems and identified the following five core competencies that must be met by all healthcare professionals (a) patient-centered care, (b) interdisciplinary teamwork, (c) evidence-based practice, (d) utilization of information, and (e) continuous quality improvement. This researcher will focus on patient-centered care, as this competency is directly linked to the healthcare needs of clients that were outlined by the NCSBN (2019). To illustrate, healthcare professionals such as RNs should be able to provide patient-centered care, as defined by the IOM (2001):

> Identify, respect, and care about patients' differences, values, preferences, and expressed needs; relieve pain and suffering; coordinate continuous care; listen to, clearly inform, communicate with, and educate patients; share decision-making and management; and continuously advocate disease prevention, wellness, and promotion of healthy lifestyles, including a focus on population health. (p. 4)

Higher Learning Commission: Regional Accreditation

Schools of Nursing (Diploma, ADN, and BSN) are subject to the accreditation standards of the Higher Learning Commission (HLC). The HLC (2020) is an independent agency that assesses whether 2-year or 4-year academic institutions have met their stated missions, goals, and program outcomes before granting and reaffirming accreditation. Accreditation from the HLC is mandatory and grants accreditation to academic institutions at the regional level through three pathways (standard pathway, open pathway, and Academic Quality Improvement Program pathway). Each pathway requires all academic institutions to go through a comprehensive quality review to ensure they are continuing to meet the criteria for accreditation and federal compliance

requirements (HLC, 2020). No matter the pathway, each academic institution must meet the following five criteria to remain accredited:

> 1) Mission: the institution's mission is clear and articulated publicly; it guides the institution's operations; 2) integrity: ethical and responsible conduct—the institution acts with integrity; its conduct is ethical and responsible; 3) teaching and learning: quality, resources, and support-the institution provides quality education, when and however its offerings are delivered; 4) teaching and learning: evaluation and improvement-the institution demonstrates responsibility for the quality of its educational programs, learning environments, and support services, and evaluates their effectiveness for student learning through processes designed to promote continuous improvement; 5) institutional effectiveness, resources, and planning-the institution's resources, structures, processes, and planning are sufficient to fulfill its mission, improve the quality of its educational offerings, and respond to future challenges and opportunities. (HLC, 2020, p. 2-5)

Commission on Collegiate Nursing Education: National Accreditation

The Commission on Collegiate Nursing Education (CCNE; 2018) is a specialized professional national accrediting agency that focuses on how academic institutions prepare students for their roles in professional and occupational fields. The CCNE aims to ensure that undergraduate BSN programs, graduate programs (master's degree in nursing, advance practice nurses, and Doctorate of Nursing practice), and post-BSN programs deliver a quality nursing education through continuous improvement that leads to effective professional nursing practice and socially responsive citizens (CCNE, 2018). Accreditation by the CCNE is a voluntary process. Professional and occupational programs seeking to obtain and/or maintain accreditation

from this agency must meet the following four standards (a) program quality: mission governance, (b) program quality: institutional commitment and resources, (c) program quality: curriculum and teaching and learning practices, and (d) program effectiveness: assessment and achievement of program outcomes (CCNE, 2018).

The driving force behind accreditation is to demonstrate to the public, other academic organizations, and potential employers that educational institutions have met and continue to meet the high level of educational standards needed to effectively care for the complex needs of society (CCNE, 2018; HLC, 2020). Many professional organizations have an impact on nursing education and have at some point in nursing education history recommended that nursing faculty continue to find evidence-based active-teaching methods to develop and enhance CTS of pre-licensure nursing students during their program of study (HLC, 2020; NASEM, 2016; NCSBN, 2018).

The development and enhancement of CTS are extremely important because RNs must be prepared to deliver quality patient-centered care in a variety of healthcare settings; however, there are barriers that challenge RNs with providing the kind of quality care that clients require. One major barrier is the nursing shortage (ANA, 2015). The number of Americans currently being treated and the number of Americans that will need treatment in the future will continue to grow (CDC, 2013). As mentioned in Chapter I, chronic comorbidities are projected to reach 171 million by the year 2030, which will further affect the roles of RNs (CDC, 2013). In the next section, the researcher will briefly explain how the understaffing of RNs leads to negative client healthcare outcomes.

How the Shortage of Nurses Affects Client Care

Nursing shortages have been shown to have a negative effect on client healthcare outcomes (Haddad & Toney-Butler, 2019). In fact, in 2012 over 8 years ago, Frith, Anderson, Tseng, and Fong reported that medication errors increased by 18% when RN staffing was decreased by 20%. Wiltse-Nicely, Sloan, and Akien (2013) recognized that insufficient numbers of RNs to fill staffing positions resulted in practicing RNs managing higher patient loads, which negatively affects client health outcomes. Disturbingly, in the United States, the shortage of RNs will be compounded in the future because it is projected that by 2022, five hundred thousand RNs will retire, resulting in a lack of personnel to fill positions necessary to meet clients' evolving healthcare needs (ANA, 2019). Thus, it is estimated that 1.1 million RNs would need to be hired by 2022 to properly address the nursing shortage in the United States (ANA, 2019). Unquestionably, probability of insufficient RN staffing makes it even more critical for pre-licensure nursing students to have more opportunities to develop and enhance CTS before they enter into clinical practice (Green, 2018; NCSBN, 2019; Shekelle, 2013).

The expectation is for nursing faculty to prepare pre-licensure nursing students for their evolving roles in a variety of healthcare settings (NCSBN, 2018; NLN, 2012). It is important to note that there are different ways that one can earn a professional nursing license. The different paths of nursing education affect how pre-licensure nursing students are educated during their program of study, and thus affecting the level of care clients receive. Educational paths on how to become an RN will be discussed below.

Educational Paths to Registered Nurse Licensure

As noted above, there is a dire need to address the nursing shortage. At this time, there are three separate educational paths to become a RN: the oldest version is a hospital-based

diploma program, the second is an ADN program obtained at a community college, and the third is a BSN program obtained at a university. These pre-licensure nursing options will be described in more detail below, but it is important to note that almost 10 years ago, the IOM (2010) set a goal to graduate enough entry-level BSN-prepared nurses to increase the current nursing workforce by 80% by the year 2020. The Robert Woods Foundation (2015) reported an increase in the number of BSN graduates from 53% in 2012 to 61.5% in 2014, which is partly due to associate degree nurses returning to school to earn their BSN (RN-to-BSN). Graduating more BSN-prepared students is important because the NLN (2012) stated that entry-level BSN-prepared RNs are more capable of managing complex patient care than entry-level ADN-prepared RNs who are educated to perform procedures and do not have the appropriate education to make the complex decisions required to meet the evolving healthcare needs of clients. Below, the researcher will briefly describe the three educational paths to nursing: diploma, ADN, and BSN. All three paths result in the pre-licensure nursing graduates being qualified to sit for the NCLEX-RN.

Diploma Nurse Programs

Pre-licensure nursing students can complete a diploma program in 18-24 months. According the NLN (2014), the distribution of diploma programs varies by region, which include 3% in the west, 24% in the south, 60% in the Midwest, and 13% in the north Atlantic (NLN, 2014). The NLN (2014) reported that diploma candidates who pass the NCLEX-RN work in a variety of healthcare settings such as hospitals, nursing homes/extended care facilities, academic education programs, home healthcare settings, public or community healthcare settings, and non-ambulatory care settings.

In the early years of the RN profession, the diploma nurse received task-oriented education through hospital-based nursing schools. They worked long hours, and their services were based on the needs of the hospital instead of the needs of clients. Although the diploma-prepared nurse can provide some nursing care for clients, the NLN (2012) has stated that diploma programs do not meet the standards of nursing practice, as they lack the theoretical knowledge needed to adequately deliver quality nursing care.

World War II led to the immense need for RNs in and around the war zone. Professional nurses who worked in hospitals were recruited to care for the wounded, resulting in a nationwide nursing shortage (Moyer, 2016). Additionally, major advancements in the medical field to treat complex surgical and medical diseases coupled with the number of Americans with health insurance required hospitals to expand to properly house and care for an increased volume of patients (Mahaffey, 2002; NLN, 2012). Because of the increased number of patients needing care, nursing education reform came about later in the twentieth century to find new ways to educate pre-licensure nursing students (NLN, 2012). Thus, a quick remedy was proposed to increase the amount of practicing entry-level RNs in healthcare systems. The dire need for entry-level RNs to care for clients led to the induction of ADN programs (Mahaffey, 2002).

Associate Degree in Nursing Programs

Two-year ADN programs at a community or junior college were initiated to counter the nursing shortage (Mahaffey, 2002). The ADN pre-licensure nursing student education was geared more toward procedures instead of using effective CTS with each patient encounter (NLN, 2012; Mahaffey, 2002). Additionally, the ADN programs were put in place to increase the amount of practicing nurses until enough 4-year BSN students could be educated (IOM, 2010).

Bachelor of Science in Nursing Programs

Strides were made during the 1960s, 1990s, and early 2000s to graduate RNs who received a 4-year BSN degree from a university and by 2017, 777 RN-to-BSN and 782 BSN pre-licensure nursing students were enrolled in accredited programs in the United States (AACN, 2019). The increased number of BSN-prepared RNs was seen as a benefit to the public, as it was argued that the BSN nurse was educated to integrate theoretical knowledge and apply learned knowledge to the clinical setting to promote positive healthcare outcomes (IOM, 2010). Thus, during the twentieth century, there was a call for the entry-level RN to be educated at the BSN level instead of the ADN level (Judd & Sitzman, 2014).

Fast-forward to the twenty-first century, and the dichotomy between the ADN and BSN-prepared nurse's ability to effectively care for the evolving healthcare needs of clients continues to be a major topic of discussion (Judd & Sitzman, 2014). To protect the safety of patients, nursing faculty must re-evaluate how to develop and enhance CTS for pre-licensure nursing students regardless of the path an individual chooses to become an RN. As mentioned previously, in efforts to ensure that academic institutions have met and continue to meet the high-level of educational standards needed to effectively care for the evolving needs of clients, accrediting bodies such as the HLC and CCNE hold nursing programs accountable to the community of interest by ensuring pre-licensure nursing programs have mission statements, goals, and learning outcomes that are appropriate to prepare students to fulfill their expected roles upon graduation. Learning outcomes such as critical thinking has been discussed in educational arenas for more than 30 years (Anderson & Krathwohl, 2001; Facione, 1990; Scheffer & Rubenfeld, 2000); in the next section the researcher will briefly discuss the most recognized scholars that have been instrumental in defining critical thinking in academia.

Critical Thinking in Nursing Education

There have been many definitions of critical thinking in nursing education. In this section, the researcher will illuminate top scholars who have been cited in the literature as making a significant contribution to the concepts of critical thinking that are being used in nursing education today. Thus, critical thinking definitions from Bloom (1956), Scheffer and Rubenfeld (2000), and Facione (1990) will be outlined.

Bloom's Taxonomy/Anderson and Krathwohl

Originally, the concepts of critical thinking were based on the higher cognitive domains (application, analysis, synthesis, and evaluation) of Bloom's (1956) taxonomy and defined as the mental ability to comprehend, analyze, synthesize, and evaluate learned knowledge. According to Bloom (1956), lower levels of thinking include students who memorize main ideas and students who use comprehension to gather and interpret facts. However, the application domain indicates that students can apply what has been learned to solve a problem. Analysis, the next level higher, requires students to use learned knowledge to recognize patterns and determine if a problem exists. With synthesis, students use learned knowledge to problem-solve a situation in a new way. Evaluation calls for students to gather relevant information and use assessment skills to determine if an outcome has been met. In the early 2000s, Anderson and Krathwohl (2001) revised Bloom's taxonomy (applying, analyzing, and evaluating) and added creating, which is aimed at the student's ability to create new knowledge. Bloom's (1956) taxonomy and revised taxonomy (Anderson & Krathwohl, 2001) have been used in educational research to improve CTS in nursing and in other disciplines (Dutra, 2013; Magas et al., 2017).

Facione

Facione's (1990) well-known Delphi research study (mentioned in Chapter I) examined the meaning of critical thinking with 46 expert panelists from philosophy, educational, social science, and physical science departments. The expert consensus of core CTS necessary to be effective critical thinkers includes interpretation, analysis, inference, evaluation, explanation, and self-regulation.

With interpretation, individuals are able to categorize, decode, and explain the significance to data, situations, and events. Interpretation is also used to assess and recognize a problem and use factual knowledge to describe the perceived problem without being biased (Facione, 1990, Facione & Facione, 1996). Moreover, interpretation is instrumental in clarifying meaning by restating what a person said with different words and clarifying facial expressions or gestures to ensure that the listener understands the meaning.

With analysis, individuals can identify a problem and find multiple ways in which a problem can be solved. Inference enables an individual to assess available evidence to draw conclusions and predict the most likely outcome. The CTS of interpretation, analysis, evaluation, and inference must be present in order for an individual to explain how they arrived at a conclusion. Thus, with explanation, an individual can describe, justify, and defend the reasoning for their conclusion. Self-regulation is considered the most important critical thinking skill of all, as this kind of reasoning allows an individual to improve on their CTS by reflecting on their ability to accurately interpret, analyze, infer, evaluate, and explain how they arrived at a conclusion (Facione, 1990, Facione & Facione, 1996).

Scheffer and Rubenfeld

Scheffer and Rubenfeld (2000) researched what critical thinking meant in the field of nursing. This international study began with an expert panel of nurses (N = 86) from nine countries and 23 states. These experts provided their perspectives on the question "What skills and habits of the mind are the core of critical thinking of nurses in any setting: practice, education, and research?" (Scheffer & Rubenfeld, p. 354). Five rounds of analyses and 2 years later, with 51 experts remaining, Scheffer and Rubenfeld (2000) identified 10 habits of the mind and seven cognitive skills that are associated with effective critical thinkers in nursing. The 10 habits of the mind include (a) confidence, (b) contextual perspective, (c) creativity, (d) flexibility, (e) inquisitiveness, (f) intellectual integrity, (g) intuition, (h) open-mindedness, (i) perseverance, and (j) reflection. These 10 habits of the mind are characteristics that RNs must have to in order to effectively use CTS in clinical practice (Scheffer & Rubenfeld, 2000). The seven cognitive skills of critical thinking were described as, (a) analyzing, (b) applying standards, (c) discrimination, (d) information seeking, (e) logical reasoning, (f) predicting and, (g) transforming knowledge (Scheffer & Rubenfeld, 2000). According to Scheffer and Rubenfeld (2000), RNs should reflect on their CTS to determine how the 10 habits of the mind and their cognitive skills influence their nursing practice. Additionally, in nursing education, active-teaching methods should be designed so that pre-licensure nursing students can develop and/or enhance their 10 habits of the mind and seven cognitive skills by demonstrating how they would use CTS to think through a client case scenario.

The scholars highlighted above have been instrumental in defining critical thinking in both non-nursing educational arenas and in nursing education. However, active-teaching methods that incorporate their recommendations have not always been available in the TCS,

which strengthens the researcher's rationale for using UCS in the TCS to enhance CTS. The ways in which active-teaching methods have been used in the past and their present use in the TCS are discussed below.

Teacher-Centered Versus Student-Centered Instruction

There have been continuous calls to improve how pre-licensure nursing students are taught to ensure that they are qualified to provide safe care to the public (ANA, 2015; NCSBN, 2018). Thus, in this section, the researcher will compare and contrast how twentieth century teaching methods had to change in the twenty-first century to meet the evolving healthcare needs of clients.

Teacher Centered: Passive Learning

During the twentieth century, lecture was the dominant traditional teaching method used to teach complex theoretical concepts to pre-licensure nursing students in the TCS (Chao, Brett, Wiech, Norton, & Levine, 2012). Traditional teaching methods such as lecture are teacher-centered where it is assumed that the teacher is the expert; thus, predetermining what and how students should learn (Freire, 1993). Moreover, the teacher-centered approach, known as passive learning, forces students to take copious notes and memorize (lower-level thinking) information without having opportunities to process complex theoretical nursing concepts to truly learn what was being taught (Chao et al., 2012; Lauver et al., 2009; Yuan et al., 2010).

The lecture only format was the dominant method to teach theoretical concepts in the TCS (Bastable & Kitchie, 2014; Chao et al., 2012; Zarifsanaiey, Amini, & Saadat, 2016). Lecture was seen as an advantage because it allowed nursing faculty to teach foundational nursing material in a concise and logical manner (Bastable & Kitchie, 2014; Chao et al., 2012; Zarifsanaiey, et al., 2016). Furthermore, lecture methods during this era proved to be beneficial

in conveying concepts that prepared pre-licensure nursing students to efficiently care for clients in twentieth century healthcare settings.

Early in the twenty-first century, research showed that passive learning did not help to develop and enhance the CTS that are necessary for entry-level RNs' evolving roles to adequately care for clients with evolving healthcare needs (NCSBN, 2018; Page & IOM, 2004). More specifically, passive learning in the twenty-first century failed to prepare pre-licensure nursing students to effectively recognize and implement appropriate care for the evolving healthcare needs of clients (Page & IOM, 2004). To illustrate, in the early part of the twenty-first century, a seminal report from Page and IOM (2004) surmised that more hospitalized patients died annually from medical errors than from "motor vehicle accidents, breast cancer, or AIDS" (p. 26). Medical errors caused by preventable adverse events (PAEs) are associated with unanticipated errors occurring within multiple areas of a hospital (system level) and performance of unsafe acts at the individual level (Page & IOM, 2004). In efforts to reduce the number of PAEs at the individual level, the IOM, NCSBN, ANA, and NLN recommended that nursing faculty conduct research and use evidence-based active-teaching methods that are student-centered to effectively develop and enhance CTS for pre-licensure nursing students before they entered into clinical practice.

Student Centered: Active Learning

As originally stated, past nursing courses primarily consisted of lecture-style teaching. However, based on the evolving healthcare needs of clients, stakeholders have advised nursing faculty to use active-teaching methods instead of the traditional lecture format. This change from teacher centered teaching to student-centered teaching was thought to better engage pre-licensure nursing students during the learning process, and fostering critical thinking (HLC, 2020;

NCSBN, 2018; Page & IOM, 2004). Thus, nursing faculty began using evidenced-based active-teaching methods to engage pre-licensure nursing students in the learning process in efforts to develop and enhance CTS in the TCS (Day, 2011; NCSBN, 2018).

As previously stated, active-teaching methods such as concept mapping and case studies, used in the TCS and UCS have been used in HFS and LFS for the past two to three decades to provide pre-licensure nursing students with opportunities to develop and enhance CTS. However, there are still concerns with the level of CTS that entry-level RNs have achieved to effectively care for clients in a variety of healthcare settings (NCSBN, 2018). Hence, nursing faculty are called to conduct empirical research, once again, to explore active-teaching methods that develop and enhance CTS for today's population of pre-licensure nursing students who learn differently.

Multimodal learning styles. Generations Z, Y, X, and baby boomers are currently enrolled in pre-licensure nursing programs, and all have different ways in which they learn (Chicca & Shellenbarger, 2018; McCurry & Martins, 2010; Mitchell, 2012; NLN, 2016b; Seemiller & Grace, 2017; Shatto & Erwin, 2016). It is important to note that details of learning preferences from each generational group were discussed in Chapter I. Moving forward, since it is known that today's population of pre-licensure nursing students have different learning styles, nursing faculty must find effective ways to use current, modify, or create new evidenced-based active-teaching methods that successfully teach CTS in a class of pre-licensure nursing multimodal learners. As mentioned in Chapter I, multimodal learning opportunities require nursing faculty to use visual, auditory, reading, and when possible, kinesthetic (VARK) approaches to engage different types of learners (Prithishkumar & Micheal, 2014). There are some active-teaching methods that use one, two, and sometimes three modes of VARK in a TCS.

However, the literature does not address active-teaching methods that can use all four modes of VARK in a TCS. For example, to teach complex nursing material to pre-licensure nursing students with multimodal learning styles, nursing faculty often use PowerPoint presentations and embed content-related pictures because this form of teaching appeals to the visual learner who prefers the use of images to understand new information. Auditory learners learn best through listening to lectures and with participating in group discussions (Alkhasawneh, 2013; Pirithishkumar & Micheal, 2014). Learners who prefer reading and writing learn best through reading textbooks and taking lecture notes, and kinesthetic learners best understand information through tactile representation of information (Prithishkumar & Micheal, 2014). However, the literature does not provide empirical research on active-teaching methods that provide the kinesthetic learner with opportunities to learn complex course content in a TCS.

Usually, all four modes of VARK are used in on-campus skills laboratories (HFS/LFS) or off-campus clinical settings where pre-licensure nursing students work with real clients. However, the use of all four modes of VARK in a TCS may be another way to address the learning needs of today's population of pre-licensure nursing students with multimodal learning styles. Moreover, incorporating all four modes of VARK throughout an UCS may be one way to effectively engage pre-licensure nursing students during the learning process so that they are attentive enough to develop and enhance CTS in the TCS. It is important to note that there are some challenges with creating unfolding client scenarios that incorporate all four modes of VARK in the TCS, and those challenges will be discussed below.

Challenges with engaging multimodal learners in the traditional classroom setting. Nursing faculty are challenged with knowing how to engage today's pre-licensure nursing students with multimodal learning styles in the TCS to develop and enhance students CTS. One challenge is that some nursing faculty teach as they were taught (ANA, 2015). Thus, it is

essential for nursing faculty to reflect on their own style of teaching and self-evaluate to determine if they are using techniques that they learned from their instructors, or if they incorporate active-teaching methods better suited to teach a classroom of multimodal learners (Bastable & Kitchie, 2014; Wagner, 2014). Additionally, nursing faculty must have confidence with using active-teaching methods that incorporate multimodal teaching opportunities in the TCS to engage pre-licensure nursing students who all have multiple ways of learning (Prithishkumar & Micheal, 2014; Wagner, 2014).

Data from the NLN (2016b) showed that pre-licensure nursing students who are age 30 or younger encompass a large portion of the pre-licensure nursing student population, as 78.5% of pre-licensure nursing students who are age 30 or younger are enrolled in diploma programs, 62.6% are enrolled in ADN programs, and 87% are enrolled in BSN programs. Therefore, most lectures will be comprised of Generations Z and Y students who would rather have learning experiences that involve them in the learning process to effectively prepare them to problem-solve through real-world situations (Adobe, 2016). As a result, nursing faculty who wish to use UCS in the TCS must have the confidence and the time to create one or more UCS that integrate VARK opportunities for nursing topics that will be covered throughout a semester, which can last up to 15 weeks. Time constraints are seen as a challenge with creating a rigorous complex UCS, as most faculty have other administrative responsibilities that do not allow for the time-intensive development of UCS (Day, 2011; Wagner, 2014).

Benefits of engaging multimodal learners in the traditional classroom setting. There is a level of engagement that pre-licensure nursing students must have during the learning process; benefits of engagement are related to students being attentive to develop and enhance CTS in the TCS (Wagner, 2014). Thus, the classroom setting should enable a sense of community in which

pre-licensure nursing students and nursing faulty come together in dialogue in efforts to develop and enhance CTS. Dialogical teaching involves an epistemological relationship. Freire (1993) interpreted dialogue as having two dimensions: “reflection and action, in such radical interaction that if one is sacrificed—even in part—the other immediately suffers” (p. 87). Jensen (1998) argued that “we are biologically wired for language and communicating with one another” (p. 102). He further proposed that student-to-student discussions allow time for free association in efforts to create relevance when learning new material. Chickering and Gamson (1987) argued that engagement is an important part of the learning process and stated,

> Learning is not a spectator sport. Students do not learn much just by sitting in classes listening to teachers, memorizing pre-packed assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences, apply it to their daily lives. They must make what they learn part of themselves. (p. 5)

Therefore, active-teaching methods should incorporate multimodal learning opportunities that engage students in developing and enhancing a level of CTS that are applicable to real-world evolving clinical scenarios. Active-teaching methods that have been used in nursing education will be discussed below.

Active-Teaching Methods

Many studies have examined PBL active-teaching methods such as concept mapping, case studies, and UCS that develop and enhance CTS for pre-licensure nursing students. However, a growing body of literature is still calling for nursing faculty to develop and or modify active-teaching methods that will be applicable to the general population of today’s current pre-licensure nursing students (AACN, 2008; ACEN, 2020; CCNE, 2018; HLC, 2020; Onyon, 2012).

Problem-Based Learning: Brief Explanation

Almost 20 years ago, PBL active-teaching methods were instrumental in enhancing CTS. In fact, PBL "encourages self-conducted, individualized learning and thereby also the students' own responsibility for learning, and also supports the personal and professional growth of the student" (Ehrenberg & Haggblom, 2007 p. 68). PBL is also a student-centered active-teaching method utilized to guide students to problem-solve through real-life situations as they collaborate with others within the classroom (Ehrenberg & Haggblom, 2007; Svinicki, 1999). According to Svinicki (1999), PBL learners must be able "to solve problems that are similar in nature and complexity to the real thing" (p.15). Active-teaching methods that have been instrumental with PBL learning strategies include, concept mapping, case studies, and UCS, which will be discussed below.

Concept mapping: Brief explanation. As stated in Chapter I, during the 1990s, concept mapping was used in nursing education (All & Havens, 1997; Baugh & Mellott, 1998). This active-teaching method allowed the learner to identify and connect relevant concepts that can be applied to a client scenario, in the TCS (Orique & McCarthy, 2015). Additionally, concept maps allowed the learner to identify, organize, and analyze key assessment data findings in a client scenario to determine appropriate nursing interventions (Orique & McCarthy, 2015). Thus, concept mapping has been known to help promote and evaluate CTS in nursing education (Kaddoura, et al., (2016). However, concept mapping alone was not deemed appropriate to promote adequate CTS for nursing students (Daley, Morgan, & Beman2016; Orique & McCarthy, 2015).

Case studies: Brief explanation. Nursing faculty have used case studies in the TCS as a form of PBL that engages and challenges nursing students to analyze problems based on real-life

client clinical scenarios. According to Baumger-Henry (2005), case studies give students opportunities to practice communication skills and actively learn as they problem-solve through a client's case. Moreover, students are able to learn appropriate assessment skills in the safety of a classroom setting. Furthermore, DeYoung (2003) stated that case studies allow faculty to use open-ended questions that develop and enhance CTS. Therefore, during a case study, students can analyze important subjective and objective data from a clients' scenario. Analysis and synthesis of data will allow students to draw conclusions on how they would respond to a client problem (Baumber & Henry, 2005). Case studies are active-teaching methods that are used to engage students so that they are actively involved with solving complex clinical problems that mimic the rigor of real-world client situations. However, this particular teaching method does not allow for reciprocal dialogue, nor does it allow the learner to unfold known and unknown clinical outcomes that a patient might experience in a real clinical setting (Day, 2011; Johnson & Flagler, 2013; Yousey, 2013). Thus, UCS were derived from case studies and will be discussed in the next section.

Unfolding case studies. An unfolding case study is a nursing pedagogy that presents parts of a patient's case over time to allow students to interact and problem-solve patient situations that are unpredictable to the learner (Johnson & Flagler, 2013; Yousey, 2013). Day (2011) stated that the most effective learning happens when nursing students are able to unfold client scenarios and solve problems in real time as they would in healthcare settings. The use of UCS in a TCS can prepare nursing students to problem-solve simple to complex client scenarios in the safety of the classroom setting (Azzarello & Wood, 2006; Carter & Welch & Welch, 2016; Day, 2012). Furthermore, Azzarello and Wood (2006) stated that "unfolding cases offer a practical method for capturing the dynamic nature of situational mental models and revealing

significant errors in students' problem-solving cognitions that would not otherwise be obvious" (p. 10).

Use of UCS provides opportunities for pre-licensure nursing students to make inferences and decisions before all of the patient information is available, mimicking real world practical experiences where RNs must act with partial data (Carter & Welch & Welch 2016; Johnson & Flagler, 2013; Yousey, 2013). For example, nursing faculty coach and encourage pre-licensure nursing students to develop and enhance CTS by exploring clients' subjective and objective data (Carter & Welch, 2016; Johnson & Flagler, 2013; Yousey, 2013). However, at times, the aforementioned subjective and/or objective data may not be available; thus, pre-licensure nursing students must learn how to recognize patient signs/symptoms, appropriately assess, prioritize, and implement effective care for the client presented in the case study (Day, 2011). With UCS, nursing faculty and students engage in problem solving together, with each prompting the other to delve further into the case (Day, 2011).

Unfolding case studies are typically used in HFS and/or HLFS laboratories. However, almost 9 years ago, the push for nursing education reform has led nursing researchers to look at UCS as a potential active-teaching method to develop and enhance CTS in a TCS (Day, 2011; NCSBN, 2018). Unfolding Case Studies are unique teaching methods that assist learners in developing the CTS required to be safe competent entry-level RNs (Day, 2011; NCSBN, 2018). Unfolding Case Studies are also active-teaching methods that will allow nursing faculty to incorporate multiple learning opportunities utilizing VARK to enhance CTS, in TCS. However, there has been limited research studies that have measured how or if UCS develop and enhance CTS.

Review of Key Ideas

Above the researcher has outlined how the evolving healthcare needs of clients, professional organizations, the nursing shortage, research on critical thinking, the differences between teacher-centered versus student-centered instruction, and different active-teaching methods have driven education reform. The need for reform requires nursing faculty to seek evidence-based active-teaching methods that efficiently develop and enhance CTS in pre-licensure nursing students (ACEN, 2020; Benner, 2015; CCNE, 2018; HLC, 2020; NASEM, 2016; NCSBN, 2018). Although active-teaching methods are used in the TCS, there is a clear gap in the literature that supports the use of active-teaching methods to develop and enhance CTS in pre-licensure nursing students who have multimodal learning needs. Tools that have been used in nursing education to measure clinical competencies and CTS in pre-licensure nursing students will be discussed in the next section.

Tools to Measure Pre-licensure Nursing Clinical Competencies and Critical Thinking Skills

For many years, stakeholders have required pre-licensure nursing students to develop and enhance CTS while attending nursing school (ACEN, 2019; CCNE, 2018; HLC, 2020; IOM, 2010). These high-level critical thinking requirements are needed to address the current complexity of clients' evolving healthcare needs. CTS are essential in analyzing and implementing competent nursing actions for patients who necessitate complex care. To measure competency in nursing education, individual experts and groups created various instruments to measure pre-licensure nursing students' clinical competency before they graduate from nursing school. Two examination tools that measure competency are Health Education Systems Incorporated (HESI) and Assessment Technologies Institute (ATI). Two examination tools that

measure CTS are California Critical Thinking Skills Test (CCTST) and the Health Science Reasoning Test (HSRT). All four tools will be discussed in the next section.

Health Education Systems Incorporated

In efforts to better prepare pre-licensure nursing students to pass the NCLEX-RN, some nursing schools have mandated that students take a Health Education Systems Incorporated Exam (HESI) RN exit exam. The HESI-RN exit exam is marketed as an assessment tool used to determine the likelihood of pre-licensure nursing student graduates' success with passing the NCLEX-RN. The 150 multiple-choice and fill in the blank test items are used to evaluate pre-licensure nursing students' critical thinking level using the nursing process as they manage clients' healthcare needs in specialty areas such as community health, critical care, fundamentals, geriatrics, maternity, medical-surgical, pathophysiology, pediatrics, professional issues, and psychiatric/mental health (Elsevier, 2020). Students who score below 649 on the HESI are not expected to pass the NCLEX-RN exam, while students who score over 900 have a 96%-99% chance of passing the exam (Elsevier, 2020). The HESI results identify students' strengths and weaknesses so that students can remediate in core nursing content areas that were challenging before they take the NCLEX-RN exam.

Assessment Technologies Institute

The Assessment Technologies Institute (ATI) is marketed as a comprehensive predictor exam that assesses mastery of specific nursing content in all areas of nursing core classes (mentioned above) and is used to determine probability of passing the NCLEX-RN exam (ATI, 2013). Students can have up to 150 multiple-choice test items to measure critical thinking strengths and weaknesses. Students who receive a proficiency score of less than one are not likely to meet the minimum standards to pass the NCLEX-RN. In contrast, students who show a

proficiency level of two or three have a high propensity to exceed minimum standards of passing the NCLEX-RN (ATI, n.d). Pre-licensure nursing students who do not receive a proficiency level that is greater than one are recommended to remediate in core nursing content areas that were identified as challenging.

California Critical Thinking Skills Test

In contrast to the above tools that predict likely hood for passing the NCLEX-RN exam, since the early 1960s CTS tools such as the Watson-Glaser Critical Thinking Appraisal, Minnesota Test of Critical Thinking, Ennis-Weir Critical Thinking Essay Test, and the Cornell Critical Thinking Test, just to name a few, have been used to measure CTS in educational institutions (Staib, 2003).

The CCTST was developed in the 1990s to measure the discipline-neutral critical thinking skills of university students (Phillips, Chestnut, & Rospond, 2004; Zuriguel-Pérez et al., 2017) and the Health Sciences Reasoning Test (HSRT) was adopted from the CCST to measure CTS in healthcare professionals (Insight Assessment, 2019). Each tool will be discussed below.

The CCTST instrument was developed from a definition of critical thinking contributed to the Delphi report by the American Philosophical Association, which described critical thinking as “an intellectual process which, in a decided, deliberate, and self-regulated manner, seeks to arrive at a reasonable decision” (Zuriguel-Pérez et al., 2017, p. 257-258). Critical thinking skills are measured through multiple- choice questions, charts, graphs, and diagrams to problem-solve through everyday scenarios (Insight Assessment, 2019).

According to Insight Assessment (2019), the CCTST has 34 questions spread across five subscales: Analysis, Evaluation, Inference, Deductive Reasoning, and Inductive Reasoning. The Analysis subscale measures comprehension and includes categorizing and determining

significance of a scenario. The Evaluation subscale measures an individual's ability to assess relationships detected in scenarios and explain findings. The Inference subscale measures the ability to form conjectures and hypotheses from scenarios and draw conclusions. The Deductive Reasoning subscale measures one's ability to determine if findings are true based on a known, established, and validated premise, while the Inductive Reasoning subscale measures the ability to take evidence from observations and apply knowledge from experience and validated sources to reach a probable conclusion.

Even though the CCTST is a discipline-neutral instrument that is based on general knowledge, nursing programs have used the instrument to measure changes in CTS (Naber & Wyatt, 2014). Naber and Wyatt (2014) used the CCTST to measure the critical thinking outcomes of reflective writing assignments. The authors found no significant differences between the experimental group (reflective writing group) and controls for overall CCTST scores, but the writing group showed improvement in four subscales, which include induction, deduction, analysis, inference, and evaluation. Fero et al. (2010) compared the performance scores of videotaped vignettes and high-fidelity human simulation (HFHS) to outcomes of the CCTST to discover the critical thinking development of the simulation-based activities. Statistically significant relationships were found between problem recognition in the videotaped vignettes and overall performance in the HFHS and CCTST scores. For all participants, the CCTST scores ranged from 13 to 30, with the highest score for inductive reasoning and the lowest score for analysis.

Nursing programs that measure longitudinal CTS outcomes have also used the CCTST. To illustrate, Beckie, Lowery, and Barrett (2001) evaluated the CTS of three cohorts of pre-licensure BSN students at the start of their junior year, start of their senior year, and upon

program completion. The test results of two cohorts were compared with a cohort of students who completed the BSN program before a curriculum change to promote critical thinking. The cohorts were largely female (81.8%−89.1%) with average age ranges of 24.6 to 26.4. Most (77.8%−88.7%) had no prior experience with a critical thinking course. The cohort to experience the first year of the revised curriculum showed a statistically significant increase in overall CCTST scores from the pre-change cohort ($F = 18.58$, $p = .001$) and statistically significant increases for the subscales of evaluation, inference, deductive, and inductive reasoning (all $p = .001$). The second-year post-change cohort did not show a statistically significant increase in the overall CCTST scores or any subscale scores compared with the pre-change cohort. Beckie et al. reported that life circumstances unique to members of the second-year post-change cohort could account for the results of this group; also, several cohort members found the CCTST cognitively challenging, and some were not motivated to accurately complete the third round of testing.

As a general knowledge instrument, the CCTST has been used to evaluate critical thinking development outside the nursing field, for example, among pharmacy students (Phillips et al., 2004), business majors (Bycio & Allen, 2009), and non-science majors in a freshman biology class (Caruso, Israel, Rowland, Lovelace, & Saunders, 2016). The instrument helped program administrators determine if students met national benchmarks, fulfilled accreditation expectations, or benefited from an extracurricular research assignment. The CCTST does not specifically test healthcare professionals on how they would respond to evolving clinical events. As a result, the HSRT was adapted from the CCTST in efforts to better assess the CTS of healthcare professionals (Insight Assessment, 2019; Zuriguel-Pérez et al., 2017). The instrument includes the same subscales as the CCTST, but some researchers may wish to use the HSRT

because the item contents are presented in a context recognizable to healthcare professionals (Paans, Sermeus, Nieweg, Krijnen, & van der Schans, 2012).

Health Sciences Reasoning Test

The HSRT was specifically designed to measure an individual's ability to appropriately diagnose healthcare-related scenarios (Insight Assessment, 2019). These scenarios include, but are not limited to, diagnosing a client problem; analyzing emergent conditions; understanding treatment implications; interpreting, analyzing, and explaining health risks that can lead to disease processes; and anticipating treatment to related complications (Insight Assessment, 2019). The HSRT consists of 33 multiple-choice items that prompt individuals to "draw inferences, make interpretations, analyze information, identify claims and reasons, and evaluate the quality of arguments" (Forneris et al., 2015, p. 307). Paans et al. (2012) described examples of CTS relevant to healthcare delivery among the HSRT subscales that include the following (a) understanding the significance of situations and procedures (analysis), (b) formulating assumptions and hypotheses (inference), (c) reflecting on procedures and results (evaluation) (d) ability to apply a general rule to a number of observations (inductive reasoning), and (e) ability to verify the correct nursing diagnosis through reasoning. Reliability of the HSRT was established using the Kuder-Richardson-20 for scales with dichotomous choices; overall internal consistency ranged from .77 to .84 (Insight Assessment, 2019). The HSRT has been used to determine the influence on student nurses' critical thinking development from simulation activities (Forneris et al., 2015; Sullivan-Mann, Perron, & Fellner, 2009).

Sullivan-Mann et al. (2009) compared ADN students in a medical-surgical course who received two simulation scenarios (control group) with those who received five scenarios (experimental group). At posttest, participants from the experimental group correctly answered

significantly more questions about the simulation than they had at pretest ($F = 6.74$, $p < .05$), while the improvement of the controls did not reach significance ($p > .05$). After ANOVA series, both groups showed significant improvement at posttest for the subscales deductive reasoning and analysis ($F = 9.6$, $p = < .01$; $F = 9.86$, $p = .01$, respectively). Forneris et al. (2015) evaluated the effects of a structured debriefing in a two-group, pretest/posttest design. Participants were nursing students at private faith-based 4-year colleges. Students who received the structured debriefing (intervention group) scored significantly higher at posttest on the HSRT than at pretest ($p = .03$), while the control group did not score significantly better at posttest ($p = .44$). The intervention group had significantly better overall HSRT scores than the controls at posttest. However, after ANOVA to control for change over time, the intervention group did not score significantly better than the controls on the HSRT at posttest ($p = .23$).

The HSRT test typically takes 30-50 minutes to complete. Individuals receive an overall score and individual score on the core constructs of CTS mentioned above to determine if effective reasoning skills were used to make adequate decisions about a healthcare situation. HSRT scores of 26 or greater indicate that the individual has superior CTS, and a score of 14 or less indicates an individual has subpar CTS. Increased HSRT scores have shown a positive correlation for an individual to have success in passing professional licensure examinations and improving their clinical performance (Insight Assessment, 2019). The CCTST and the HSRT tools are used in educational research to measure the CTS of individuals through use of case studies, prior experience, and simulations, just to name a few. This researcher used the HSRT for this research study because this tool specifically examines the reasoning skills of individuals in healthcare related scenarios.

Active-Teaching Method Research Studies to Teach Critical Thinking

As stated throughout this dissertation, stakeholders are calling for nursing education reform. Thus, multiple educational research studies have been conducted to explore evidence-based active-teaching methods that effectively enhance CTS in students, which will be discussed below.

Concept Mapping and Case Studies

Orique and McCarthy (2015) conducted a 15-week, single-group, quasi-experimental study with a pretest/posttest design to examine the relationship between critical thinking and the use of concept mapping and case studies in a foundational nursing course. A convenience sample of first-semester pre-licensure BSN participants (N = 49) were taught the nursing process and nursing care plan development at different points during the semester. At Week 8, case studies were used to teach the above content. While there was no intervention at Week 9, concept mapping was used at Week 10, and at Week 11 concept mapping and case studies were used. Data results from the Holistic Critical Thinking Scoring Rubric indicated that CTS were significantly higher at Week 11 while implementing both concept mapping and case studies (M =3.714, SD = 0.456), when compared to concept mapping alone (M = 2.939, SD = 0.242) at Week 10 and case studies as the only instructional strategy (M = 2.306, SD = 0.466) at week 8.

Kaddoura et al. (2016) conducted a two-group experimental study with a pretest/posttest design in a pathophysiology and pharmacology course. They used a convenience sample of first-year pre-licensure BSN students to teach them how to connect pathophysiology concepts with appropriate pharmacological treatment. The intervention group (n = 41) received a brief case study about a patient diagnosed with diabetes and used concept mapping as the instructional strategy. The control group (n = 42) was taught diabetic content through traditional lecture. Data

results from the HESI exam showed that the intervention group had a significant increase in posttest scores (pretest: *M* = 795.9, *SD* = 43.18; posttest: *M* = 880.0, *SD* = 48.73) when compared to the control groups' posttest scores (pretest, *M* = 811.7, *SD* = 49.13; posttest, *M* = 836.9, *SD* = 54.97).

Case Study

Gholami et al. (2016) conducted a single group quasi-experimental research study to examine the relationship between critical thinking and the use of lecture and case studies. A pretest/posttest design with a convenience sample of third-year pre-licensure BSN (*N* = 40) students enrolled in a critical care course. Content such as myocardial infarction, respiratory failure, and cardiovascular accident were taught via lecture during the first week of the semester and the same group received the same case study scenarios, thus, the intervention and control group were compared against themselves. Two nursing faculty who each had 4 years of clinical experience were assigned to the group to help facilitate and trigger discussions about client scenarios. Data from the CCTST showed an increase in the intervention group's overall posttest scores (pretest: *M* = 9.72, *SD* = 2.44; posttest *M* = 10.75, *SD* = 2.41), when compared to the control group's overall posttest scores (pretest: *M* = 9.74, SD = 2.13; posttest: *M* = 9.72, SD = 2.44). Moreover, the intervention group's posttest scores significantly increased in the CT subscales of evaluation (pretest: *M* = 3.67, *SD* = 1.29; posttest, *M* = 4.32, *SD* = 1.52) and deduction (pretest: *M* = 4.67, *SD* = 1.70; posttest: *M* = 5.21, *SD* = 1.73); however, the control group had no significant increase in CT subscales.

Unfolding Case Study in the Traditional Classroom Setting

There is little empirical evidence in nursing education to quantitatively (using HSRT) and or qualitatively (focus groups) support the use of UCS in the TCS. In an effort to support the use

of UCS in a TCS, Carter & Welch (2016) conducted a two-group quasi-experimental research study pretest/posttest design to determine if CTS increased with use of UCS vs traditional lecture. A convenience sample of second-year pre-licensure ADN students received renal and musculoskeletal course content. The intervention group (n = 40) received the above course content using UCS, while the control group (n = 44) received the course content via lecture. Carter & Welch (2016) reported that both groups performed worse on the HSRT overall posttest; however, the control group scores (pretest: M = 21.34, SD = 3.61; posttest: M = 17.16, SD = 6.22) decreased more than the intervention group scores (pretest: M = 20.8, SD = 3.88; posttest: M = 20.32, SD = 3.97).

Focus of the Mixed-Methods Research Study

Nursing organizational stakeholders have strongly recommended that nursing faculty design research to examine the best active-teaching methods to better develop and enhance CTS in the TCS. The research must address the learning needs of today's generational mix of pre-licensure nursing students before they enter into practice (ACEN, 2020; CCNE, 2018; HLC, 2020; IOM, 2010; NCSBN, 2018). Accordingly, active-teaching methods must incorporate multimodal learning opportunities that engage pre-licensure nursing students so they can learn *how* to hypothetically make effective clinical judgements in the safety of a TCS (ACEN, 2020; NCSBN, 2018).

In the first two chapters of this document, the researcher has provided rationales for integrating multimodal learning opportunities throughout UCS in the TCS. Thus, the focus of this research study was to develop and enhance the CTS of BSN pre-licensure students with multimodal learning styles using VARK throughout UCS in the TCS. Hence, as mentioned in Chapter I, the first purpose of this research study was to incorporate the active-teaching method,

UCS (independent variable) in the TCS. A second purpose was to integrate multimodal learning opportunities utilizing VARK throughout UCS in a TCS. The goals of the research were threefold. The first goal was to measure whether or not the use of UCS in a TCS would enhance the CTS of BSN pre-licensure students with a validated tool; the second goal was to explore whether students who were exposed to UCS in the TCS demonstrated stronger academic performance in classroom course content examinations; and the third goal was to explore the perceptions of a subset of BSN pre-licensure students to determine if the use of multimodal learning opportunities utilizing VARK throughout UCS and improved CTS in the classroom setting, clinical setting, and preparing for course content exams and to explore if they perceived greater levels of engagement during the learning process.

Summary

Registered nurses are the largest group of practicing clinicians who provide client care in a variety of healthcare settings (NCSBN, 2018, 2019). Their forefront roles with caring for the complex healthcare needs of clients require them to have high-level CTS to effectively problem-solve through clinical situations (NASEM, 2016; NCSBN, 2018). Thus, stakeholders have strongly recommended that schools of nursing use active-teaching methods to teach pre-licensure nursing students *how* to use effective CTS, in the TCS, so they are able to problem-solve in a variety of healthcare settings (ACEN, 2020; CCNE, 2018; HLC, 2020; IOM, 2010; NCSBN, 2018).

Equally important, it is suggested that active-teaching methods are student centered so that pre-licensure nursing students who learn differently have opportunities to learn how to effectively respond to client situations upon passing the NCLEX-RN (Benner, 2015; IOM, 2010). Accordingly, nursing faculty are still researching ways to bridge the gap between what is

taught in nursing education and what is required of entry-level RNs in clinical practice (Cazzell & Anderson, 2016; Benner, 2015). This research study, supported by the above literature review, was designed to provide evidence on the value of using multimodal learning opportunities utilizing VARK throughout UCS to develop and enhance CTS for pre-licensure nursing students in the classroom setting, clinical setting, preparing for course content exams, and engagement during the learning process.

Chapter III: Methodology

Multimodal learning opportunities throughout UCS in the TCS has not been adequately investigated to provide nursing faculty with effective active-teaching methods that develop and enhance CTS for pre-licensure nursing students. Moreover, there have been no research studies exploring BSN pre-licensure nursing students' perceptions of multimodal learning opportunities throughout UCS and the improvement of CTS in the classroom setting, clinical setting, and preparing for course content exams. There have also been no research studies exploring if they perceived greater levels of engagement during the learning process. Thus, stakeholders are calling for nursing faculty to develop and/or modify current evidenced-based active-teaching methods in order to efficiently develop and enhance CTS for today's generational mix of BSN pre-licensure students who have multimodal learning styles. This change needs to be accomplished by using empirical research that is generalizable to comparative populations (NASEM, 2016; NCSBN, 2018; NLN, 2016b). In this chapter, the researcher will discuss the following (a) purposes and goals of the research study, (b) research methods, designs, and questions, (c) research hypotheses and assumption, (d) research setting and sample, (e) research instruments, (f) procedures, (g) institutional review board approval, and (h) research design limitations.

Purposes and Goals of the Research Study

As mentioned in Chapters I and II, the first purpose of this research study was to incorporate the active-teaching method, UCS (independent variable) in the TCS. A second purpose was to integrate multimodal learning opportunities utilizing VARK throughout UCS in a TCS. The goals of the research were threefold. The first goal was to measure whether or not the use of UCS in a TCS would enhance the CTS of BSN pre-licensure students with a validated

tool; the second goal was to explore whether students who were exposed to UCS in the TCS demonstrated stronger academic performance in classroom course content examinations; and the third goal was to explore the perceptions of a subset of BSN pre-licensure students to determine if the use of multimodal learning opportunities utilizing VARK throughout UCS and improved CTS in the classroom setting, clinical setting, and preparing for course content exams and to explore if they perceived greater levels of engagement during the learning process.

Research Methods, Designs, and Questions

The researcher selected a mixed-methods research approach to obtain quantitative and qualitative data results that could be generalizable to comparative populations. Mixed-methods research uses both quantitative and qualitative research in a single study, which provides a comprehensive understanding to a research problem as opposed to using either research method alone (Fraenkel et al., 2019). Quantitative and qualitative research methods are two ways of knowing and constructing meaning in the world by seeking out answers to questions (Creswell, 2014; Fraenkel et al., 2019). Both research methods also stimulate further inquiry on a given research topic (Creswell, 2014), as each design generates different types of data results (Fraenkel et al., 2019).

Quantitative Research

With quantitative research designs, researchers investigate a complex problem to support or refute the effect of relationships between the independent and dependent variable (Creswell, 2014). The most common benefit to using this design is related to generalizability to larger populations other than those participating in the study (Creswell, 2014; Fraenkel et al., 2019). Quantitative research utilizes precise methods of collecting data such as surveys, questionnaires,

and assessments that involve numerical measurements that then test hypotheses about the cause/ effect and correlations of relationships (Fraenkel et al., 2019).

Quantitative nonequivalent quasi-experimental research design. The nonequivalent quasi-experimental research design was chosen for the quantitative portion of this study because it is commonly used in education to examine the effect of an intervention on its selected population without random assignment (Creswell, 2014; Fraenkel et al., 2019). The nonequivalent group design involves a pretest and posttest to determine potential cause and effect of an independent variable (intervention) on the dependent variable (outcome) of existing groups (Creswell, 2014; Fraenkel et al., 2019). Feasibility is seen as a benefit, as the nonequivalent research design does not require extensive pre-screening (Fraenkel et al., 2019). Additionally, this research design does not have logistical constraints that are seen with use of true experimental designs (Fraenkel et al., 2019; LoBiondo-Wood & Haber, 2018). This design is also useful in obtaining robust data results from educational studies and has been used to bridge the gaps that exist between what students learn in the classroom and what occurs in clinical practice (Creswell, 2014; LoBiondo-Wood & Haber, 2018).

Quantitative Research Questions

1. Will the use of UCS (independent variable [IV]) in a TCS increase course content exam scores (dependent variable [DV]) for BSN pre-licensure students in the experimental group more than the equivalent exam scores for the control group?
2. Will the use of UCS (IV) in a TCS increase CTS as measured by HSRT pretest and posttest scores (DV) more in the experimental group than the control group?

Qualitative Research

Qualitative research is not deductive and has no rigid predetermined hypotheses, as assumptions are developed inductively as the study progresses; as a result, participant experiences are constructed to illuminate robust meanings (Creswell, 2014; Frankel et al., 2014; Green et al., 2015). Researchers capture participant perspectives and experiences through thick descriptions, which is seen as a benefit (Fraenkel et al., 2019). Thick descriptions describe the voices, emotions, actions, and contextual meanings of participants' verbal and non-verbal behaviors to offer a deeper understanding of their diverse individual perspectives Green et al., 2015). Analysis of gathered data adds depth and breadth to research topics and provides robust narratives that cannot be obtained through quantitative research methods (Creswell, 2014).

Qualitative focus group design. Focus group discussions can generate new thinking about a research topic by capturing participants' personal perceptions and experiences about an intervention. Equally important, qualitative research recognizes that each participant can view and interpret the same circumstances differently (Fraenkel et al., 2019). The details of the data are of the utmost importance because they magnify the voices of participants, so that the simplicities and complexities of their viewpoints are heard (LoBiondo-Wood & Haber, 2018). Design flexibility is seen as a benefit to using the qualitative research design because there are no rigid predetermined assumptions about hypotheses (Creswell, 2014; Fraenkel et al., 2019). With focus groups, participant experiences are constructed to illuminate robust meanings (Green et al., 2015).

For the qualitative portion of this research study, the researcher conducted a one-time 1-hour focus group session to answer the following question: *How do multimodal learning opportunities throughout UCS in the TCS effect BSN pre-licensure students' CTS in the*

classroom setting, clinical setting, preparing for content exams, and engagement during learning process? The researcher opted to conduct a qualitative focus group session because there were no research studies in nursing exploring BSN pre-licensure students' perceptions of multimodal learning opportunities throughout UCS and the improvement of CTS in the classroom setting, clinical setting, and preparing for course content exams; and exploring if they perceived greater levels of engagement during the learning process. The assumption for this portion of the study was that focus group participants from the experimental group would provide positive feedback on how the use of multimodal learning opportunities utilizing VARK throughout UCS improved their CTS in the classroom setting, clinical setting, and preparing for course content exams; and that they perceived greater levels of engagement during the learning process.

Qualitative Focus Group Semi-Structured Statements and Question

1. Tell me about how UCS in the TCS affected your thinking in the:
    a. classroom
    b. clinical setting
2. Tell me about how UCS in the TCS affected your thinking about:
    a. preparing for course content exams
3. Tell me about how UCS in the TCS affected:
    a. your engagement in class
4. Do you have any other comments about the use of UCS in the TCS?

Research Hypotheses and Assumption

There were two hypotheses for the quantitative portion of this study. First, the researcher hypothesized that the BSN pre-licensure students who participated (experimental group) in the

active-teaching method, UCS in the TCS, would have increased CTS as measured by the Health Science Reasoning Test (HSRT) posttest scores. The second hypothesis the BSN pre-licensure experimental group would have higher course content exam scores than the equivalent course content exam scores achieved by the control group.

Qualitative research utilizes assumptions rather than hypotheses. The assumption for this portion of the study was that focus group participants from the experimental group would provide positive feedback on how the use of multimodal learning opportunities utilizing VARK throughout UCS improved their CTS in the classroom setting, clinical setting, and preparing for course content exams; and that they perceived greater levels of engagement during the learning process.

Research Setting and Sample

This research study was conducted at a midsized public university in the Midwest. The university is fully accredited by the HLC and offers more than 200 undergraduate majors, minors, and certificates with more than 150 graduate programs for more than 21,100 students. The School of Nursing is fully accredited by the CCNE and offers three types of undergraduate programs that include RN-to-BSN, traditional, and accelerated second-degree track. Individuals who are already RNs can apply to the RN-to-BSN track, which offers online classes, and candidates can earn their degree between 12-24 months. With the traditional track, nursing students take classes on campus for 4 years to earn a BSN degree. Applicants who have a bachelor's degree in a non-nursing discipline (Bachelor of the Arts or Bachelor of Science) can, upon admission, take the accelerated second-degree track to earn their BSN in 20 months (5 semesters). The traditional and accelerated second-degree take some classes together as they did in this research study. In 2019, the School of Nursing had a first-time NCLEX-RN pass rate of

92.56 (personal communication from the director of the School of Nursing). The School of Nursing admits up to 80 traditional and 32 accelerated second-degree applicants every fall semester.

Sample of Participants: Quantitative

Prior to the Fall 2018 semester starting, and with institutional review board (IRB) approval for the study (see Appendix C), the director of the School of Nursing used the school's central records database to split students enrolled in an adult medical/surgical nursing course into two groups, therefore creating two sections of the course, thus requiring two instructors with or without this study. Criteria for the random split was by gender and program designation (traditional/accelerated second-degree) to ensure that there were comparable groups for each of the sections. The adult medical/surgical nursing course at this university focuses on nursing care of adults and families with chronic illnesses and populations vulnerable to chronic illnesses. With a focus on critical thinking, the course emphasizes the application of nursing knowledge through teaching/learning, interdisciplinary collaboration, patient advocacy, and the coordination of care. To be eligible for this study, participants had to be English speaking, BSN pre-licensure traditional or accelerated second-degree students, enrolled in the Fall 2018 adult medical/surgical nursing course.

The researcher taught one adult medical/surgical nursing course section and the lead instructor who previously designed the course, created the PowerPoint slides, syllabus, and course content examinations, taught the other course section. A convenience sample (N = 70) of BSN pre-licensure nursing students was drawn from these sections and were asked to participate in this research study. For compensation, the experimental and control groups received a total of two points for taking the pretest and posttest HSRT that was outlined in the syllabus by the lead

instructor. However, it is important to note that all participants had to have a passing grade in the class to be eligible for the points.

Sample of Participants: Qualitative

Traditional and accelerated second-degree BSN pre-licensure students from the experimental group were asked to volunteer for a 1-hour focus group session at the end of the 15-week semester (after their final exam). Eight students (four traditional and four accelerated second-degree students) agreed to participant in the one-time focus group session. It is important to note the researcher did not intentionally set out to have an equal number of traditional/accelerated second-degree students for the qualitative portion of this research study; however, it was beneficial to obtain verbatim from each of the different groups with different education levels. The focus group session was held in an empty room on campus. Focus group participants did not receive any compensation for their participation.

Research Instruments

Measuring Instrument Reliability and Validity

Reliability. Reliability means that a research tool consistently yields reliable data results. Determination of reliability is measured thorough internal consistency reliability, inter-rater reliability, and test-retest reliability (Schuringa, Spreen, & Bogaerts, 2014; Shirali, Shekari, & Angali, 2018). Internal consistency is measured when items on a research tool actually measure what it is meant to measure, inter-rater reliability is measured two or more individuals consistent with ratings on items of a research tool, and test-retest reliability is measured when items on a research tool are given to the same individual at different times to determine if scores remain consistent (Schuringa, et al., 2014).

Validity. The definition of validity as it pertains to "the extent to which a concept is accurately measured in a quantitative study" (Heale & Twycross, 2015, p. 66). Establishing validity helps to ensure that an instrument and its use are fair and unbiased (Buchanan & Finch, 2005). Validity is recognized as encompassing three types: *content validity*, *construct validity*, and *criterion validity*; the latter type includes the extent of *predictive validity* (Heale & Twycross, 2015). Below is a summarization of each type.

Content validity. An instrument that adequately covers all the content it should with respect to the variable being measured is determined to have content validity. Content validity plays a primary role in instrument development, and all aspects of the measure, including test items, stimuli, response formats, and scoring, should be subject to an analysis of content validity (Rusticus, 2014). Subject matter experts are helpful in determining content validity during the development and/or adaptation of an instrument.

Construct validity. An instrument that measures the targeted construct and does not measure an unintended construct is determined to have construct validity (Heale & Twycross, 2015). For example, an instrument intended to measure generalized anxiety that instead measures clinical depression has poor construct validity. It may be difficult to establish construct validity immediately; several studies and trials can yield a credible statistic (Glen, 2014).

Predictive validity. When an individual's or group's performance measurement outcome with a specific tool, can be used to predict the scores of future measurements of the variable, then the tool is determined to have predictive ability. Predictive validity is one of three approaches to criterion validity, which is the correlation of an instrument's measurement outcomes with those of other instruments measuring the same variable (Heale & Twycross, 2015). Predictive validity is similar to concurrent validity, except the former construct applies to

future measurements and the latter to concurrent measurements of the variable with different instruments (Boateng, Neilands, Frongillo, Melgar-Quinonez, & Young 2018).

Quantitative Instrument 1: Health Science Reasoning Test

As discussed in Chapters I and II, the HSRT is a critical assessment tool that is specific to health disciplines, and therefore the researcher selected this tool to measure participants' pretest and posttest overall CTS and subcategories of CTS, which include analysis, inference, evaluation, induction, deduction, and inductive reasoning. Thirty-three multiple-choice items were taken from the CCTST to create a healthcare-focused critical thinking exam (HSRT) that typically takes 30-50 minutes to complete. HSRT scores of 26 or greater indicate the test-taker has superior CTS and a score of 14 or less indicates the test-taker has subpar CTS. Increased HSRT scores have shown a positive correlation for test-takers to have success in passing professional licensure examinations and improving their clinical performance.

Reliability of the HSRT. As mentioned above, reliability of an instrument yields consistent results. Reliability of the HSRT was established using the Kuder-Richardson-20 for scales with dichotomous choices; overall internal consistency ranged from .77 to .84 (Insight Assessment, 2019).

Validity of the Health Science Reasoning Test. As mentioned above, 33 multiple-choice items were taken from the CCTST to create a healthcare-focused critical thinking exam (HSRT). With developing and validating scales, Boateng et al. (2018) encourage attention to validity during three phases of scale creation: item development, scale development, and scale evaluation. In 1986, Insight Assessment was established as the California Academic Press by Dr. Peter Facione (Insight Assessment, 2019). Facione's (1990) landmark Delphi Research Project

defined the core cognitive skills of critical thinking, thus creating and then publishing the CCTST. According to Facione (1990),

> The CCST was constructed using a bank of 200 previously piloted multiple-choice items. Thirty-five items were selected on the grounds of their apparent clarity, level of difficulty, and discrimination. On the CCTST items 1-5 target interpretation, 6-9 analysis, 10-13 evaluation, 14-24 inference, and 25-35 explanation. After examining the item analysis for the CCTST based on its first administration to 480 pretest subjects and the initial 465 posttest subjects, item 26 was dropped for lack of discrimination using the point biserial method. (p. 10)

Construct validity was established by running a series of experiments in which college students took the test before and after completing courses designed to promote CTS; the students who took the courses showed significant improvement on the CCSTS at the two posttests ($p < .0075$ and .000 on one-tailed t-test with p set at $< .05$), while the students who had not taken the critical thinking courses (control group) did not show significant improvement at the posttests, indicating their CTS where not at the level of the experimental group.

Insight Assessment (2016) reported the current validity properties of the CCTST. Content validity is established in several ways (a) the test measures the domain of critical thinking as defined by the Delphi group, including the recognized human reasoning processes of analysis, inference, and evaluation, (b) the test is utilized by those who need to test human reasoning and decision-making skills, for example, research investigators and human resource professionals, (c) different forms of the test are available to match the population's education level (K-12, undergraduate and graduate levels, (d) the test items are based on everyday tasks that necessitate critical thinking and not on any particular fields of knowledge. Construct validity is established

by the outcomes of studies that (a) correlated the CCTST scores with those of other tests of higher-order reasoning or (b) selected the CCTST to find evidence that a course, training program, learning treatment, etc. influenced the improvement of CTS (Insight Assessment, 2016). Lastly, Insight Assessment (2016) described the property of predictive validity by reporting that independent research from around the world found that individuals demonstrated a relationship between CCTST performance and later achievement, such as learning skills, professional licensure, or transition to employment.

Validity of Health Science Reasoning Test. The HRST tool has been used globally (US, Asia, Europe, and the Middle East) to gather comprehensive critical thinking assessments for accreditation, learning outcomes, quality improvement, program evaluations, and hiring staff. Additionally, the HSRT tool has also been used worldwide to measure CTS of dental, occupational health, physical therapy, and nursing undergraduate and graduate students (Insight Assessment, 2019). As a specialized healthcare instrument to measure critical thinking, the HSRT does not have a broad range of study findings from which to draw conclusions about its psychometric properties, as Insight Assessment (2016) did with the CCTST. However, 33 multiple-choice questions were taken from the HSRT and some studies from the past decade have indicated the HSRT's content, construct, and predictive validity. For example, content validity can be inferred by the report from Huhn, Black, Hensen, and Deutsch (2011) in that "the HSRT and its content validity were derived from the same Delphi study on critical thinking skills used to establish the CCTST" (p. 182). The instrument uses vignettes from the healthcare industry for the questions; however, no healthcare-specific knowledge is necessary to take the test, as only the domain of critical thinking is involved. Construct validity of the HSRT was established in the study by Huhn et al. (2011), which compared the test outcomes of first-year

physical therapy students (novices) with those of certified physical therapists working in practice areas (experts). The expert physical therapists were assumed to use reasoning skills in their clinical practice on a regular basis. The experts had significantly higher HSRT scores than the novices. The predictive validity of the instrument was weakly established in a study of Doctor of Pharmacy students (Cox & McLaughlin, 2014). The potential grades of program courses that relied on CTS were significantly correlated with HSRT scores. However, there were non-significant correlations between the students' performance on the HSRT collected at the beginning of the doctoral program and their academic performance in the courses. In 2016, Cone et al. noted that the HSRT was not highly predictive of future grades or academic performance, although the instrument was significantly correlated with courses that taught critical thinking.

Quantitative Instrument 2: Course Content Exams

Each of the three exams had a total of 50 multiple-choice questions. The experimental and control groups received the exact same course content exams from the same adult medical/surgical nursing course. The course content was presented to both groups during lecture using PowerPoint slides developed by the lead instructor. The course content included cardiovascular disorders and peripheral vascular disease (exam one), and pulmonary, musculoskeletal, and endocrine disorders (exam two). The final exam (exam three) was non-cumulative and covered gastrointestinal, neurological, and urinary/renal disorders along with cancer and palliative care.

Reliability. As mentioned above, reliability of an instrument yields consistent results. Reliability of the course content exams was not established as each exam was hand scored. Thus, reliability of exams could not be obtained.

Validity. The lead instructor developed all of course content exams, ensuring alignment of the exam questions with course content. The lead instructor reviews the course content exams each semester to evaluate exam questions for validity and questions are revised as needed. Per the lead instructor, the course content exams where the same in 2018 as the ones from 2017. Thus, validity of the course content exams was not obtained through construct, or predictive validity as described above. It is important to note that course content exams do not have reliability measures. However, validity was established through face validity, also known as content validity and refers to the notion that a test appears to measure what it purports to measure (Boateng, et al., 2018).

Qualitative Instrument: Focus Groups

The researcher was the tool for the qualitative portion of this research. As mentioned in Chapter I, the researcher's professional experience includes 10 years of theoretical and clinical teaching of pre-licensure nursing students and 22 years of experience as a staff nurse, preceptor, scrub nurse, and board-certified adult clinical nurse specialist in various areas of nursing. The researcher's complex clinical experiences necessitated the use of CTS to teach pre-licensure nursing students and RNs. Both of these groups required multimodal learning opportunities to learn how to critically think in fast-paced clinical healthcare settings. The professional roles mentioned above have shaped the researcher's beliefs on *how* pre-licensure nursing students with multimodal learning needs can begin to develop and enhance their CTS in a TCS.

It is important to appreciate the symbiotic learning relationship between a nursing student and the nursing faculty. When considering how BSN pre-licensure nursing student's best learn, it was essential for the researcher to recognize that pre-licensure nursing students' learning styles, learning experiences, and truths about how to learn how to critically think may be different from

the researcher and are different within and between students. Thus, the researcher had to be astutely cognizant of their own positionality. Moreover, human biases whether known or unknown exist, thus, it was critical for the researcher to be aware of own biases and verbalize potential biases, which was monitored with field notes. In an effort to adequately understand that knowledge is constructed at an individual level and exists in multiple forms, the researcher used an interpretive lens to understand the multiple and distinctive realities of BSN pre-licensure learners. Interpretivist assume there are numerous truths that exist, and each person has their own viewpoint (Krueger & Casey, 2015).

Qualitative validity. There are many viewpoints and terms that help to describe the validation of a study; Creswell and Poth (2018) recommend that validation strategies such as accuracy and trustworthiness be used to validate qualitative research studies. To obtain accuracy, Creswell and Poth (2018) stated that researchers must seek participants' input on the accuracy of the transcripts to determine if the researcher accurately captured their responses. Following the collection of the data, this researcher emailed descriptive codes and preliminary theme labels to the participants to ensure that their responses were accurately captured during the focus group session. Participants were given a week to provide feedback on themes, sub-themes, and order of importance; however, no one responded.

Procedures

Quantitative Consent

On the first day of the semester, an IRB approved typed recruitment script (see Appendix A) was given to all potential participants outlining the research purpose, description of procedures, potential risks/benefits, confidentiality, voluntary participation, and dissemination of findings. Potential participants had the opportunity to ask questions and contact the researcher

via email to opt out of the research study by September 10, 2018, with no negative effects on their course grade. The researcher used passive consent; thus, consent was inferred if students did not email the researcher to withdraw from the research study. Moreover, students who did not email the researcher to withdraw from the research study were informed they still had an opportunity to opt out of the research study at any time.

Qualitative Consent

On the first day of class, students from the experimental group were informed that the researcher would be asking for volunteers to participate in a 1-hour focus group session after they had completed their final exam (on the same day). It was explained that the focus group session would give them the opportunity to share their perceptions about the use of multimodal learning opportunities throughout UCS in the TCS. The researcher used active consent for all focus group participants. A week before the final exam, students who were interested in volunteering for the focus group session received typed copies of the focus group consent to review and ask the researcher questions before agreeing to sign the consent (see Appendix B). Participants were notified that they could refuse to participate at any time, even after signing the informed consent. Participants were also informed they would be audio recorded and assigned a pseudonym and to only use their pseudonym during the 1-hour focus group session to ensure confidentiality. To further ensure participant confidentiality, the focus group transcripts were stored on two password-protected computers, one in the researcher's home and one in the research chair's locked office on campus. Physical audio recordings were kept in a locked filing cabinet until they were destroyed. Furthermore, participants were also asked not to tell anyone outside of the group about anything that was discussed during the 1-hour focus group session.

Data Collection

Quantitative procedure. As mentioned previously in this chapter, the lead instructor developed core nursing materials (e.g., PowerPoint slides, syllabus, and course content exams) for all BSN pre-licensure students enrolled in the adult medical surgical nursing course. As mentioned above, the director of nursing divided students into two groups. The lead instructor taught one section (control group) of the adult medical/surgical nursing course and the researcher taught the other section (experimental group) as an adjunct instructor. Both the experimental and control groups received the same nursing course content materials mentioned above. However, active-teaching methods for the experimental group consisted of use of the integration of multimodal learning opportunities throughout UCS in a TCS, while the lead instructor used teaching strategies she has been accustomed to using in the adult medical/surgical nursing course. Both classes with met on the same day and times (Wednesday, 5:30 p.m.–7:10 p.m.), however each course section met in different classrooms.

Health Science Reasoning Test procedure (Pretest). The experimental and control groups completed the electronic version of the pre-HSRT at week 2 of the semester and a post-HSRT at week 14 to determine differences in CTS between the experimental and control groups. The Insight Assessment team generated a total of 84 usernames and passwords for the researcher to randomly administer to a sample size of 70 participants. The researcher cut the usernames and correlating passwords into strips and placed them into a plastic bag. At pretest, students randomly chose a strip out of the plastic bag to use for pretest and posttest. The participants were asked to keep the assigned usernames and passwords in a safe place and/or take a photo with their cellphone, so the same usernames and passwords could be used to link pretest and posttest results at the end of the semester. However, at the start of pretest, some assigned usernames and

passwords were not valid when some students tried to login to the HSRT testing system. The researcher was able to provide these students with alternate usernames and passwords because there were 14 usernames and passwords left from the initial pool. Additionally, the researcher created a customized profile question asking participants to designate if they were in the lead instructor's or researcher's class. At the end of the semester, because of technical difficulties with the HSRT website, data from the custom profile question was unable to be retrieved. However, the researcher added the custom profile question at posttest. Age, gender, ethnicity, and level of education were captured from the HSRT database.

Health Science Reasoning Test procedure (Posttest). There were also multiple challenges with using the electronic version of the HSRT at posttest. To illustrate, 68 participants completed the HSRT posttest, as one student from the experimental group withdrew from the medical surgical nursing course before the HSRT posttest was administered. However, some participants were not able to designate their class assignment due to the HSRT system not accepting their answer to the researcher's custom question about whether they were assigned to the lead instructor or researcher's class. After speaking with a representative from Insight Assessment, the above custom question was removed. There were also technical challenges with four participants being unable to get logged in with their same pretest usernames and passwords, which necessitated an Insight Assessment representative providing the researcher with additional randomly generated usernames and passwords. The researcher was able to match two of the four HSRT pretest-posttest scores from participants' demographics (age, gender, ethnicity, and level of education). However, the other two participants changed one or more above-named demographics, and as a result the researcher was not able to link their pretest-posttest scores. Additionally, eight participants who completed the pretest did not complete the posttest, thus the

researcher was unable to link a total of 10 posttest scores to pretest scores. Consequently, the final sample size for the HSRT pretest-posttest was $n = 59$.

Course content exams. As mentioned above, all course content exams were developed by the lead faculty. A total of three paper pencil exams were administered during the 15-week semester, at weeks four (exam one), eight (exam two), and at week 15 of the course (final exam). The experimental and control groups took the exact same exams and also had the same amount of time to complete each exam (75 minutes). The multiple-choice exams were independently hand checked by each instructor, and at the end of the 15-week semester, the lead instructor emailed the researcher the control group participants' course content exam scores to use for data analysis.

Qualitative Procedure

As mentioned above, on the first day of class, students from the experimental group were informed that the researcher would be asking for volunteers to participate in a 1-hour focus group session after they had completed their final exam (on the same day). A week before the final exam, students who were interested in volunteering for the focus group session received typed copies of the focus group consent to review and ask the researcher questions before agreeing to sign the consent. At week 15 (after the final), eight volunteers from the experimental group agreed to meet in an empty classroom on campus for the 1-hour focus group session. Before the start of the focus group session, the researcher reviewed the consent form with participants and allowed them the opportunity to ask questions and voice any concerns. Additionally, the participants were reminded that they could opt out of the focus session at any time without penalty. Participants were assigned a pseudonym and asked to only use their pseudonym during the discussion and not to share any of the discussed content with anyone

outside of the focus group session. Participants gave the researcher permission to take notes during the focus group session and the researcher made additional debriefing notes 4 hours after the session ended, which included tone of voice, gestures, and facial expressions.

The researcher used the above-mentioned three open-ended, semi-structured statements as a form of inquiry to get participants to reflect upon and discuss *how* the use of UCS in the TCS affected their thinking in the classroom/clinical setting, preparing for course content exams, and their level of engagement in the class. To obtain additional robust verbatim from the participants, the researcher asked them to share other comments about the use of UCS in the TCS.

Data Analysis Procedure

Course content exams. Version 23 of the Statistical Package for the Social Sciences (SPSS) software program was used to analyze data. Three exams, with 50 questions each, were administered during the 15-week semester. Independent samples t-tests were conducted to compare individual exam score means between the experimental and control groups, and overall exam score means between the experimental and control groups.

Health Science Reasoning Test. Version 23 of SPSS was also used to run statistics for the HSRT pretest (taken at week 2) and posttest scores (at week 14) to determine if CTS increased more in the experimental group than in the control group. An analysis of covariance (ANCOVA) was used to examine differences between the experimental and control group's overall CTS and subcategories (including induction, deduction, inference, analysis, and evaluation) of CTS.

Focus group. The researcher hired an independent contractor to transcribe the participants' verbatim statements from the 1-hour focus group audio recording. The researcher carefully read through the transcription and re-listened to the audio recordings to fill in any gaps

and/or change misinterpreted verbatim acquired from the audio recordings. The researcher then examined participants' verbatim responses using content analysis to identify frequency of like terms and phrases after listening and re-listening to recorded interviews and reading and re-reading the typed transcription line-by-line. The researcher also recruited two experienced Doctor of Philosophy (PhD) qualitative researchers to review the focus group transcript using content analysis. After all parties completed the initial review of the transcript, the researcher spoke to the qualitative PhD researchers to compare and agree on descriptive codes and themes.

Institutional Review Board Approval

Before the start of the research and before any quantitative or qualitative data were collected, this research study received IRB approval (see Appendix C). There was no anticipated ethical damage to participants and confidentiality was assured, which was explained in detail in the consent section of this chapter (see Appendix B).

Research Design Limitations

Quantitative Design

Non-randomization (nonequivalent groups) of participants is seen as a disadvantage in the quasi-experimental design because of possible threats to internal validity, which makes it critical for the researcher to identify and limit threats to strengthen causal assertions (Creswell, 2014). Threats to internal validity occur if one or more alternative hypotheses exist to explain outcomes. In contrast, internal validity is evident when the researcher observes unambiguous relationships between the dependent and independent variables. Additionally, randomization of the intervention and control groups allows the researcher to have more control of extraneous variables during the study, as it controls misleading interpretations of causality (Creswell, 2014). According to Creswell (2014), mortality and design contamination are the most common internal

threats to validity in the pretest-posttest quasi-experimental design. Thus, Skelly, Dettori, and Brodt (2012) suggested that researchers minimize and/or control potential confounding variables so that there are no alternative explanations of treatment effects. The ultimate goal of controlling confounding variables is to provide statistical data that proves that the effects on the dependent variable are due to the independent variable (Creswell, 2014).

Qualitative Design

Use of the qualitative research design does not allow generalization to larger populations and is seen as a limitation (Green et al., 2015). Additional limitations include a high level of researcher subjectivity, in that the researcher's emotions may interfere with conducting, collecting, and interpreting information gained from participants (Green et al., 2015). In some instances, limitations to the qualitative design are seen when the researcher is visible during observations and in-depth interviews (Denzin & Lincoln, 2011; Green et al., 2015). Non-verbal cues from the researcher could change the authenticity of responses and/or behavior of those participating in the study and could prevent participants from sharing actual feelings, which will make output biased (Fraenkel et al., 2019). Additionally, participants who dominate the discussion may influence others to agree with their perspective, possibly resulting in other participants' apprehension to be honest about a topic—which would also make output biased (Fraenkel et al., 2019; LoBiondo-Wood & Haber, 2018).

Summary

Many studies have examined nursing pedagogies that develop and enhance CTS for BSN pre-license students through active-teaching methods, such as the ones outlined in Chapter II. However, a growing body of literature calls for the transformation of nursing education (AACN, 2008; ACEN, 2020; CCNE, 2018; HLC, 2020). Thus, BSN faculty must be

able to develop and/or modify active-teaching methods using empirical research that will be applicable to the population of today's current nursing students and is generalizable to comparative populations. This inquiry is important because, currently, no empirical mixed-method research studies in nursing education integrate multimodal learning opportunities throughout UCS in TCS. Moreover, no qualitative data has been captured exploring the above-mentioned active-teaching method and its effect on BSN pre-licensure multimodal learners' CTS in the classroom setting, clinical setting, and preparing for course content exams; and level of engagement during the learning process.

Chapter IV: Results

This chapter provides quantitative and qualitative results and will be split into two sections. The first section will report the following (a) quantitative results, (b) research question for demographic characteristics and HSRT pretest and posttest scores. The second section of this chapter will report the following (a) qualitative results, (b) participants verbatim and non-verbal behaviors to each semi-structured statements and question.

Quantitative Results

As stated in Chapters I-III, the first purpose of this mixed-methods research study was to incorporate the active-teaching method, UCS (independent variable) in the TCS. A second purpose was to integrate multimodal learning opportunities utilizing VARK throughout UCS in a TCS. The quantitative goals of the research were twofold. The first goal was to measure whether or not the use of UCS in a TCS enhanced the CTS of BSN pre-licensure students with a validated tool; the second goal was to explore whether students exposed to UCS in the TCS demonstrated stronger academic performance in classroom course content examinations.

Data analyses

Data analyses were conducted using SPSS version 23 where descriptive, paired *t*-test and independent *t*-test analyses were used. Descriptive statistics were conducted to determine the distribution of the variables; a paired *t*-test was conducted to determine the significant difference between pretest and posttest among the control and experimental group. Independent *t*-test was conducted to determine the statistical difference between control and experimental group. Multi-way ANOVAs were conducted to examine overall scaled and percentile scores against participant demographics. An ANCOVA was conducted to compare HSRT overall pretest and posttest mean differences against participant demographics.

Demographic Results

Seventy BSN pre-licensure students participated in this research study. One participant from the experimental group took the HSRT pretest and the first two course content exams and withdrew from the class before taking the final exam and the HSRT posttest. Additionally, eight participants who completed the HSRT pretest did not complete the HSRT posttest. From the demographic analysis (see Table 1) female respondents were the majority in both the pretest (77.5%, *n* = 55) and posttest (82%, *n* = 50). White, Caucasian, and Anglo American were the majority in the study with 85% (*n* = 58 in pretest and *n* = 51 in posttest). More than half of the participants had a bachelor's degree in both pretest (55.1%, *n* = 38) and posttest (55.7%, *n* = 34). Participants in the control group were the majority in the pretest (50.7%, *n* = 36) as compared to posttest group (42.6%, *n* = 26). Ages of participants in years are shown in Table 2.

Table 1

Demographic Variables

Items		Pretest		Posttest	
		Frequency	Percent	Frequency	Percent
Sex	Female	55	77.5	50	82.0
	Male	14	19.7	11	18.0
Ethnicity	White, Caucasian, Anglo American	58	85.3	51	85.0
	Asian, Asian American, Pacific Islander	6	8.8	4	6.7
	Black, African American	3	4.4	3	5.0
	Other	1	1.5	2	3.3
Education	High School	29	42.0	24	39.3
	Associate's	1	1.4	2	3.3
	Bachelor's	38	55.1	34	55.7
	Master's	1	1.4	1	1.6
Group	Control	34	50.7	26	42.6
	Experimental	35	49.3	35	57.4
	Total	69	100.0	61	100.0

Table 2

Ages of Participants in Years

Age	F	%	Valid%	Cumulative%
19	2	2.8	2.9	2.9
20	14	19.7	20.3	23.2
21	22	31.0	31.9	55.1
22	1	1.4	1.4	56.5
23	3	4.2	4.3	60.9
24	2	2.8	2.9	63.8
25	4	5.6	5.8	69.6
26	4	5.6	5.8	75.4
27	3	4.2	4.3	79.7
28	3	4.2	4.3	84.1
29	1	1.4	1.4	85.5
30	1	1.4	1.4	87.0
31	3	4.2	4.3	91.3
32	3	4.2	4.3	95.7
37	1	1.4	1.4	97.1
40	1	1.4	1.4	98.6
42	1	1.4	1.4	100.0

Research Question for Health Science Reasoning Pretest and Posttest

Will the use of UCS (DV) in a TCS increase CTS as measured by HSRT pretest and posttest scores (IV) more in the experimental group than the control group?

Between groups Health Science Reasoning Test differences at pretest and posttest. As mentioned above, one student withdrew from the class before the HSRT posttest was given. Thus, the one student from the experimental group was not captured in the analysis displayed in Table 3. To ensure the control and experimental groups were equivalent separate independent *t*-tests were conducted to determine whether there was a statistically significant mean difference in scores between conditions at pretest and posttest on the HSRT. Table 3 shows that there is no statistical difference on pretest scores between participants in control and experimental group with $p > 05$.

Table 3

Independent t-Test for HSRT Pretest Scores

	Group	*N*	Mean	SD	Mean difference	*t*-test	*p*-value
OVERALL	Control	34	21.24	3.830	-.765	-.888	.377
	Experiment	35	22.00	3.308			
Percentile	Control	34	63.91	28.165	-5.888	-.919	.361
	Experiment	35	69.80	24.983			
Induction	Control	34	7.03	1.623	-.599	-1.702	.093
	Experiment	35	7.63	1.285			
Deduction	Control	34	6.71	1.915	-.466	-1.043	.301
	Experiment	35	7.17	1.790			
Analysis	Control	34	4.26	1.355	.036	.118	.907
	Experiment	35	4.23	1.190			
Inference	Control	34	4.26	1.355	.150	.533	.596
	Experiment	35	4.11	.963			
Evaluation	Control	34	4.59	1.282	-.355	-1.243	.218
	Experiment	35	4.94	1.083			

An independent *t*-test was also conducted to explore whether there was a significant difference in mean posttest scores between the conditions. From the analysis, Table 4 shows that there is no statistical difference between posttest scores among participants in control and experimental group with $p > 05$.

Table 4

Independent t-Test for HSRT Posttest Scores

	Groups	*N*	Mean	SD	Mean difference	*t*-test	*p*-value
OVERALL	Control	26	22.46	2.970	.290	.288	.775
	Experiment	35	22.17	4.456			
Percentile	Control	26	73.19	20.333	1.107	.177	.860
	Experiment	35	72.09	26.539			
Induction	Control	26	7.31	1.644	-.149	-.350	.727
	Experiment	35	7.46	1.651			
Deduction	Control	26	7.42	1.653	.280	.552	.583
	Experiment	35	7.14	2.158			
Analysis	Control	26	4.50	1.105	.014	.043	.966
	Experiment	35	4.49	1.380			
Inference	Control	26	4.42	1.065	.366	1.143	.258
	Experiment	35	4.06	1.349			
Evaluation	Control	26	4.54	1.392	-.262	-.792	.432
	Experiment	35	4.80	1.183			

Mean difference on the Health Science Reasoning Test from pretest to posttest by group. With no differences between conditions, the researcher moved onto paired *t*-tests to determine whether each condition significantly gained in CTS from pre to post test. As mentioned above, eight participants who completed the HSRT pretest did not complete the posttest. Additionally, four participants changed one or more of their demographics at posttest. After analyzing the demographics of the four participants, the researcher reviewed the demographics and was able to link HSRT pretest and posttest scores for two participants but was not about to match demographics to the other two participants. Thus, there was a total of 10 participants who were not captured in the HSRT pretest-posttest final analysis, resulting in a control group of $n = 24$. When comparing the control groups HSRT pretest mean scores between those with and without posttest scores ($n = 10$ vs $n = 24$), Table 5 shows that participants without posttest scores ($n = 10$) scored lower in overall, percentile, induction, deduction, and inference

when compared to the other groups (n = 24) overall, percentile, induction, deduction, and inference scores. Independent t-tests found the differences were not statistically significant. Without significant differences, it was determined that the smaller group was representative of the entire control group class and the researcher proceeded with subsequent analyses.

Table 5

Difference in HSRT Pretest Mean Scores

Pretest	*N*	Mean	SD	Std. Error Mean
OVERALL	10	20.60	4.575	1.447
	24	21.50	3.551	.725
Percentile	10	58.60	32.945	10.418
	24	66.13	26.384	5.386
Induction	10	6.20	1.555	.490
	24	7.38	1.285	.317
Deduction	10	6.60	2.271	.718
	24	6.75	1.800	.367
Analysis	10	4.70	1.160	.367
	24	4.08	1.412	.288
Inference	10	3.50	1.650	.522
	24	4.58	1.100	.225
Evaluation	10	4.20	1.135	.359
	24	4.75	1.327	.271

To answer the first research question about significant growth in CTS, a separate paired *t*-test was ran to compare pretest and posttest means for each condition. The control group showed a gain in overall percentile, deduction, and analysis from pretest to posttest scores. Table 6 shows that the only statistically significant gain was for the deduction subscale scores (mean difference = -0.625, t = -2.084, $p < 05$). There is no statistical mean difference between pretest and posttest scores in overall, percentile, induction, analysis, inference, and evaluation scores with $p > 05$.

Table 6

Mean Difference Between HSRT Pretest and Posttest Scores Among Control Group

		Mean	*N*	SD	Mean difference	*t*-test	*p*-value
Pair 1	OVERALL Pre	21.50	24	3.551	-.875	-1.772	.090
	OVERALL Post	22.38	24	2.901			
Pair 2	Percentile Pre	66.13	24	26.384	-6.750	-1.720	.099
	Percentile Post	72.88	24	20.328			
Pair 3	Induction Pre	7.38	24	1.555	.042	.146	.885
	Induction Post	7.33	24	1.685			
Pair 4	Deduction Pre	6.75	24	1.800	-.625	-2.084	.048
	Deduction Post	7.38	24	1.689			
Pair 5	Analysis Pre	4.08	24	1.412	-.375	-1.476	.153
	Analysis Post	4.46	24	1.103			
Pair 6	Inference Pre	4.58	24	1.100	.208	.794	.435
	Inference Post	4.38	24	1.056			
Pair 7	Evaluation Pre	4.75	24	1.327	.167	.558	.583
	Evaluation Post	4.58	24	1.412			

Table 7 shows that there was no statistically significant mean difference between pretest and post test scores for the experimental group in overall, percentile, induction, deduction, analysis, inference, and evaluation scores with ($p > 05$). However, the experimental group showed a gain in overall, percentile, and analysis from pretest to posttest scores.

Table 7

Mean Difference Between HSRT Pretest and Posttest Scores Among Experimental Group

		Mean	N	SD	Mean difference	t-test	p-value
Pair 1	OVERALL Pre	22.00	35	3.308	-.171	-.235	.816
	OVERALL Post	22.17	35	4.456			
Pair 2	Percentile Pre	69.80	35	24.983	-2.286	-.507	.616
	Percentile Post	72.09	35	26.539			
Pair 3	Induction Pre	7.63	35	1.285	.171	.529	.600
	Induction Post	7.46	35	1.651			
Pair 4	Deduction Pre	7.17	35	1.790	.029	.071	.944
	Deduction Post	7.14	35	2.158			
Pair 5	Analysis Pre	4.23	35	1.190	-.257	-1.040	.305
	Analysis Post	4.49	35	1.380			
Pair 6	Inference Pre	4.11	35	.963	.057	.213	.833
	Inference Post	4.06	35	1.349			
Pair 7	Evaluation Pre	4.94	35	1.083	.143	.669	.508
	Evaluation Post	4.80	35	1.183			

Research Question for Course Content Exams

Will the use of UCS (DV) in a TCS increase course content exam scores (IV) for BSN pre-licensure students in the experimental group more than the equivalent exam scores for the control group?

Mean difference on course content exams by group. Independent *t*-tests between groups with Exam I, Exam II, final exam, and average score were determined to see if there is significant difference between the mean scores. From the analysis, the experimental group had the highest mean (42.81) as compared to control group (41.00) in Exam I. The difference is significant with *t*-value = -2.169, $p < 05$. Therefore, we can conclude that the experimental group had the highest score in Exam I as compared to the control group. In addition, there were no statistical significant differences between control and experimental groups in Exam II, or the final exam and average scores as shown in Table 8.

Table 8

Independent t-Test Between Group and Course Content Exam Scores

	Groups	*N*	Mean	SD	Mean difference	*t*-value	*p*-value
Exam I	Control	33	41.00	4.085	-1.806	-2.169	.034
	Experiment	36	42.81	2.755			
Exam II	Control	33	39.09	3.376	1.202	1.500	.138
	Experiment	36	37.89	3.276			
Final exam	Control	33	39.24	2.739	-.952	-1.305	.196
	Experiment	36	40.19	3.267			
Average score	Control	33	39.7778	2.49397	-.51852	-.928	.357
	Experiment	36	40.2963	2.14369			

Research Questions for Demographic Characteristics and Health Science Reasoning Test Pretest and Posttest Scores

Will there be differences in the effects of UCS on CTS by demographic characteristics?

Health Science Reasoning Test Mean Differences by Demographic Characteristics

Multi-way ANOVAs and an ANCOVA were conducted to examine whether there were scaled or percentile score differences by age, sex, ethnicity, and condition effect at pretest, posttest and pretest-posttest change while controlling for pretest scores. The analyses found no significant difference in mean overall pretest score (see Table 9) or percentile score (see Table 10) between age, sex, and ethnicity with $p > 05$.

Table 9

Pretest with Multi-Way ANOVA-HSRT Overall Scaled Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	85.611[a]	8	10.701	.809	.597
Intercept	8913.608	1	8913.608	674.063	.000
Sex	47.163	1	47.163	3.567	.064
Ethnicity	4.487	2	2.244	.170	.844
Instructor	4.190	1	4.190	.317	.576
Sex Ethnicity	13.762	1	13.762	1.041	.312
Sex Instructor	2.889	1	2.889	.219	.642
Ethnicity Instructor	11.088	2	5.544	.419	.659
Sex Ethnicity Instructor	.000	0	-	-	-
Error	780.198	59	13.631		
Total	32687.000	68			
Corrected Total	865.809	67			

a. R Squared = .099 (Adjusted R Squared = -.023)

Table 10

Pretest with Multi-Way ANOVA-HSRT Percentile Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5018.059[a]	8	627.257	.861	.554
Intercept	84278.012	1	84278.012	115.700	.000
Sex	2858.710	1	2858.710	3.925	.052
Ethnicity	263.653	2	131.826	.181	.835
Instructor	301.268	1	301.268	.414	.523
Sex Ethnicity	864.646	1	864.646	1.187	.280
Sex Instructor	184.522	1	184.522	.253	.617
Ethnicity Instructor	741.421	2	370.710	.509	.604
Sex Ethnicity Instructor	.000	0	-	-	-
Error	42976.573	59	728.416		
Total	352577.000	68			
Corrected Total	47994.632	67			

a. R Squared = 105 (Adjusted R Squared = -.017)

The posttest multi-way ANOVA analyses found there was a significant difference in mean overall posttest score by ethnicity with F (1, 56) = 4.21, $p < 05$ (0.02), as shown by Table 11. Posttest Tukey HSD showed that Black and other students scored below their White and Asian classmates, but the differences were not significant (p = .09 and p =.16, respectively).

Table 11

Posttest with Multi-Way ANOVA-HSRT Scaled Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	147.427[a]	7	21.061	1.460	.203
Intercept	6898.823	1	6898.823	478.292	.000
Sex	2.938	1	2.938	.204	.654
Ethnicity	121.511	2	60.756	4.212	.020
Instructor	25.549	1	25.549	1.771	.189
Sex Ethnicity	.000	0	-	-	-
Sex Instructor	1.761	1	1.761	.122	.728
Ethnicity Instructor	68.445	2	34.222	2.373	.104
Sex Ethnicity Instructor	.000	0	-	-	-
Error	721.193	50	14.424		
Total	29560.000	58			
Corrected Total	868.621	57			

a. R Squared = .170 (Adjusted R Squared = -.053)

The posttest percentile score analysis also found significant differences by ethnicity (see Table 12) and post hoc results found Black students scoring below their White and Asian classmates, but the differences were not significant (p = .08 and p =.11, respectively).

Table 12

Posttest with Multi-Way ANOVA-HSRT Percentile Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6074.227[a]	7	867.747	1.589	.161
Intercept	68211.446	1	68211.446	121.218	.000
Sex	193.896	1	193.896	.355	.554
Ethnicity	4796.908	2	2398.54	4.391	.018
Instructor	1152.277	1	1152.277	2.110	.153
Sex Ethnicity	.000	0	-	-	-
Sex Instructor	332.606	1	332.606	.609	.439
Ethnicity Instructor	2587.639	2	1293.819	2.369	.104
Sex Ethnicity Instructor	.000	0	-	-	-
Error	27310.893	50	546.218		
Total	336221.000	58			
Corrected Total	33385.121	57			

a. R Squared = .182 (Adjusted R Squared = -.067)

To control for any pretest differences the researcher ran an ANCOVA to test for pretest to posttest growth in critical thinking across gender, ethnicity, and treatment group. The results found no differences by gender (p = .67), ethnicity (p = .62), or treatment group (p = .71) on the overall scaled score (see Table 13). There were similar results for each group on the percentile scores with no significant differences by gender (p = .57), ethnicity (p = .08), or treatment group (p = .76; see Table 14).

Table 13

ANCOVA with Scaled Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	13626.493	1	13626.493	677.231	.000
Sex	3.683	1	3.683	.183	.671
Ethnicity	118.147	2	59.074	2.936	.062
Instructor	2.808	1	2.808	.140	.710
Sex Ethnicity	.000	0	-	-	-
Sex Instructor	.150	1	.150	.007	.931
Ethnicity Instructor	55.175	2	27.587	1.371	.263
Sex Ethnicity Instructor	.000	0	-	-	-
Error	1006.045	50	20.121		

Table 14

ANCOVA with Percentiles

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	122639.627	1	122639.627	127.830	.000
Sex	316.819	1	316.819	.330	.568
Ethnicity	5046.508	2	2523.254	2.630	.082
Instructor	88.877	1	88.877	.093	.762
Sex Ethnicity	.000	0	-	-	-
Sex Instructor	33.900	1	33.900	.035	.852
Ethnicity Instructor	2386.629	2	1193.314	1.244	.297
Sex Ethnicity Instructor	.000	0	-	-	-
Error	47969.938	50	959.399		

In conclusion, it was established that the use of UCS in a TCS did not increase course content exam scores or CTS as measured on the HSRT from pretest to posttest.

Qualitative Results

To reiterate from Chapters I-III, the assumption for this portion of the study was that focus group participants from the experimental group would provide positive feedback on how the use of multimodal learning opportunities utilizing VARK throughout UCS improved their CTS in the classroom setting, clinical setting, and preparing for course content exams; and that they perceived greater levels of engagement during the learning process. The goal was to explore the perceptions of a subset of BSN pre-licensure students to determine if the use of multimodal learning opportunities utilizing VARK throughout UCS and improved CTS in the classroom setting, clinical setting, and preparing for course content exams and to explore if they perceived greater levels of engagement during the learning process.

Data Analyses

As described in Chapter III, at the beginning of the semester, students in the experimental group were asked if they would be willing to participate in a one-time 1-hour focus group session at the end of the 15-week term and after the final exam. The focus group participants included four students from the traditional program and four from the second-degree accelerated program for an *n* of 8. There were six females and two males. Seven participants identified as White, Caucasian, and one participant identified as Asian. With level of education, one participant held a Master's degree, three held a Bachelor's degree and the other four students held a high school diploma (see Table 15). Ages of participants in years are shown in Table 16.

Table 15

Demographic Variables

		Frequency	Percent
Sex	Female	6	75.0
	Male	2	25.0
Ethnicity	White, Caucasian, Anglo American	7	87.5
	Asian, Asian American, Pacific Islander	1	12.5
	Black, African American	0	0
	Other	0	0
Education	High School	4	50.0
	Associate's	0	0
	Bachelor's	3	37.5
	Master's	1	12.5
Focus Group Total		8	100

Table 16

Ages of Participants in Years

Age	*F*	%	Valid%	Cumulative%
20	2	25.0	25.0	25.0
21	1	12.5	12.5	37.5
23	1	12.5	12.5	55.0
25	1	12.5	12.5	62.5
28	1	12.5	12.5	75.0
32	1	12.5	12.5	87.5
40	1	12.2	12.5	100

Prior to beginning the focus group session, participants signed a written consent form which gave the researcher permission to both audiotape and take notes during the 1-hour focus group session which was held in a room on campus. The researcher made additional debriefing notes 4-hours after the session ended. These additional notes included tone of voice, gestures, and facial expressions. Using a continual iterative process of reviewing the notes, the transcripts, and the feedback from external reviewers, the preliminary thematic analysis was derived.

The researcher's thematic analysis of the focus group includes each of the semi-structured statement and question (discussed in Chapters II and III) followed by:

1. Participants' verbatim and non-verbal behaviors to each semi-structured question
    a. Number of participants supporting or not supporting each semi-structured open-ended statement/question
2. Preliminary theme labels and corresponding descriptive codes (participants verbal comments that support preliminary themes)
3. Analysis of preliminary theme labels that lead to the predominant theme
    a. Rational for ranking preliminary theme labels
4. Predominate theme with supporting samples of verbatim and non-verbal behaviors
5. Brief discussion of students' relevant verbatim not included in predominate theme

Krueger and Casey (2015) recommended key themes be ranked based on participants' intensity about a concept (how much passion or force was behind the comments), order of importance about a concept, how many participants mentioned the same concept (internal consistency), how consistent participants were about a concept (extensiveness), how frequent a concept was mentioned, and how specific participants were about a concept. This researcher used all of the above recommendations to prioritize and rank preliminary theme labels.

Using Krueger and Casey's (2015) recommendations, a systematic examination of keywords and phrases lead to preliminary theme labels. The researcher's analysis of preliminary theme labels revealed one predominate theme, which is "Positive impact of UCS and multimodal learning opportunities on student engagement and thinking." How this predominate theme was

derived from the focus group session is described below starting with each semi-structured question and supporting verbatim.

Participants' Verbatim and Non-Verbal Behaviors to Each Semi-Structured Open-Ended Statement and Question

First Semi-Structured Open-Ended Statement (Part A)

"Tell me about how UCS in the TCS affected your thinking in classroom."

Josie responded by saying, *"I thought it was helpful for like part of it, cause it doesn't cover everything usually it [UCS] was targeted toward what you would like emphasize during class."* Several participants commented on how UCS allowed them to apply what they learned in the TCS setting. For example, Zion stated,

> *Oh, oh, yes, I think that that [UCS] helped a lot. That works for my thinking style…when it's just slides you know, um, I'm left to kind of pick up the pieces and read through it myself but having like a situation where I can in real-time connect to specific things, I think that helps a lot, for sure.*

Anna replied by stating,

> *I think it* [UCS] *helped a lot, because it actually took everything that was on the slides and put it to real-life thinking, and made it actually like I was seeing and actually having to think through it like a nurse, not just words on a slide, they [PPT slides] are hard to follow.*

Mark echoed Anna and explained, *"I thought it was a great way to learn…it got people involved."* Sharon's explanation was more explicit; she stated,

> *It helped me because it's not just, you know a boring lecturing. You give us some example. It's kind of like a case study, so it help us have some critical thinking, kind of like a live case instead of just, you know plain lecturing.*

Mark chimed and stated *"And it allows you to directly apply the information."* Alexa stated,

> *They [UCS] made me apply the stuff that we JUST learned immediately!* Harley explained more by stating, "*You could visualize it, you could see it, you could hear it, understand it, see like use of all your senses so it became more concrete.*

Sarah agreed by stating, *"I think that that [UCS] helped a lot is because it's kind of like the critical thinking where we could apply stuff that we just learned to a situation."* Sarah went on to say, *"So it was like putting it into perspective rather than just like, what it is and what it looks like… like we can put it to a patient and like, kind of like a real-life application."*

Semi-Structured Open-Ended Statement (Part B)

"Tell me about how UCS in the TCS affected your thinking in the clinical setting."

Sarah and Alexa stated that UCS helped them in the clinical setting. For example, Sarah stated,

> *I think it helped just cause, like in the classroom you could see it, and if we saw it in clinical it was like ok, I've seen this, and then like how did we unfold it in class? UCS in the clinical setting? [participant thinking]. Um, like putting pieces together.*

Alexa agreed with Sarah and stated,

> *Oh yeah for sure. I loved that. That's like the best part of clinical. I will get one thing about it, I'll be like so I understand this because I learned it in class the other day and I will ask a question with the other people and they [peers] are like OH YEAH we learned that too! and then I remember cause they [peers] said something.*

Four participants agreed that they did not use any of the UCS in the clinical setting; however, they stated the UCS helped them to learn how to critically think, and in the future, they could possibly use what they remembered from the classroom UCS in the clinical setting. To illustrate, Josie stated,

> *I don't know. I didn't particularly follow them [UCS] outside of class, but they were good like just for in class, like to apply the knowledge to what we learned that day. I don't know if I remember them like the next day. If you ask me what it was, I don't know if I'd remember [laughter].*

Mark, echoed a similar response:

> *So, I didn't come across any, anything that we covered explicitly, but it definitely helped to think critically. I think that any time that you are doing something other than just memorizing, it just helps you to think outside the box.*

Anna stated, *"Um, I don't know so much currently this time around, but I can see how it would help in the future for sure…but I don't remember using any of it this semester."*

Zion agreed with Anna and stated, *"I don't know if in the clinical setting, that I thought back to the case studies in particular, but maybe the knowledge that I've gained from them I was able to connect to lecture."*

Two participants talked about how some of the UCS could help them if they came across a patient exhibiting certain signs and symptoms. To illustrate, Sharon stated: "*Like one of the cases said that patient had rigid abdomen. I didn't see that in the clinical, but in the future especially like working med surg…yeah it will help."* Harley went on to say,

> *If I had a patient with like UC [ulcerative colitis]…I would be able to see the symptoms happening and that would trigger my brain to see that and to use it [UC visual aids used throughout UCS in the TCS].*

Second Semi-Structured Open-Ended Statement

"Tell me about how UCS in the TCS affected your thinking about preparing for content exams."

The researcher believes that the participants had mixed feelings when the above statement was posed, to illustrate, Zion stated that the UCS helped him with content that was discussed in class when he was reviewing the PowerPoint slides. Moreover, he stated, *"UCS helped me to connect to what we had discussed."* Sarah agreed and explained,

> *I think it [UCS] prepared us a lot for the exam because rather than just like straight forward: What is the patho? Or what is the medication on the exam? It was like, OK, how about a 31-year-old patient, with this…what would you do? And that's kind of like how we went over in class. It was like, OK, this person in that situation, and what would you do?*

Anna stated, *"It [UCS] helps just kind of make more sense of what the whole disease process was…but rather than just like memorizing from a slide, it [UCS] made me actually understand how it worked."* Sharon explained that UCS mimicked questions on the content exam. She explained, *"You know analyze the case and have some critical thinking, yes it helps."*

Three participants did not think that UCS in the TCS helped them prepare for the exam. To illustrate, Mark stated

> *So it just helps to look at the big picture…just helps your critical thinking… as far as studying, I don't know that it helped as much with actually taking the exams. I think it*

helps because you are able to… think more creatively and you're just looking at the body more realistically, you know?

Josie agreed with Mark and specified, *"I didn't like think about that [UCS] much after class… It [UCS] helps me to understand what I understand."* Harley stated, "*They [UCS] made me critically think more… also to see like what areas I am weak in."* Alexa echoed the other students' sentiments and stated, *"I don't think that I really did anything with that [using UCS to prepare for content exams]."* She went on to say, *"I'm more of like a writer and then a reader."*

Third Semi-Structured Open-Ended Statement

"Tell me about how UCS in the TCS affected your engagement in classroom."

The above open-ended statement elicited an array of responses, Sarah was the first one to speak, and stated

I think it [UCS] kept us engaged more because it was more interesting … it was like you have a situation and you need to apply what you JUST learned to it. So, it's like you HAVE to be [engaged] for it.

Alexa chimed in, saying, *"Oh! It made me pay attention. You were ALWAYS gonna ask questions. I loved it!* [Laughter from the group]." Anna shared her feelings and specified, *"Studies [UCS] that we were actually like answering back to, it was good. It was great engagement."* Two other participants gave examples on why classroom engagement was important. Mark believed that UCS in the TCS stimulated his engagement; more specifically, he stated, UCS allowed him to *"not just to take in what you are telling us but to actually think about it actively and apply it."* He also mentioned that some people who were taking the class were already tired because the class convened in the evening (5:30 pm -7:30 pm). Sharon responded by saying *"I get up at 5 o'clock in the morning [on the day of lecture], but so far, I had not had*

any sleeping, like yawning, not at all [in class]…yeah, cause live cases." Anna spoke about time constraints with using UCS in the TCS and stated, *"I think some of them [UCS] were rushed through though… but as long as we actually had time to answer…it helped more."* On the other hand, Josie did not agree with the other participants; she stated,

> *I don't think it [classroom engagement with UCS] did for me. I'm more of a listener. I like to hear what other people say. I mean, I might answer inside my head, but I don't, I don't know why I just don't say it out loud.*

During the focus group discussion, Alexa was the first participant who brought up the researcher's methods of teaching by stating, *"You brought in props…that was helpful and made me remember…just you know like another visual aid…and you know your mic drop?* [The researcher used a teaching technique called "drop the mic" as a gesture that signifies achievement when students caught on to a nursing concept (s) in less than 5 minutes.] *"We looked forward to it… it's like little things that you do personally as a teacher… Even if we don't like the topic, it was hard… but it was just an enjoyable experience regardless of the hard content."* Alexa was then asked to provide feedback on specific teaching methods she would suggest adding or removing if she was to attend subsequent lectures taught by the researcher. Alexa responded by stating that she would like to have more "repetition"; she went on to say,

> *You did it [repetition] most of the time. I've noticed that it's not even necessarily things that we are going to be tested on, but it's what is important to nursing…because repetition is how I learned… I'm a slow learner and I need the repetition.*

Participants were asked if they had any other comments about UCS, pictures, and YouTube videos that were used to present complex nursing content in the TCS. Mark stated,

> *The YouTube videos were good, AH! And the pictures! [Stated with excitement] I think anytime you use visual it's helpful… you know we are just learning so much and… If you can't picture it in your mind, if you haven't seen it before … you miss a lot of the pieces….*

Sharon added to the discussion by stating,

> *I liked the pictures you chose and help us remember the signs and symptoms," and went on to say, "I really like the idea of the unfolding case study in the classroom… and will be a good method of teaching for future instructors.*

Sarah detailed, *"I think like the pictures we had were nice cause it like brought a visual and overall your energy in class was really nice [Laughter]. It helped us engage too, because it is important!"* **She also mentioned the length of the PowerPoint slides:** *"I don't know if there's a way if you would like condensing it [PowerPoint slides]… these diseases have… similarities…so it's not like 130 slides!* Zion stated, *"UCS helped more than maybe looking at more like a YouTube video; it works for my thinking style…." Josie explained, "It [UCS] keeps the class a little more interesting too… it's not just words and boring! [Laughter from whole group]."* Josie also suggested that UCS be used for other assignments, while Alexa pointed out how she and her classmates would collaborate during the UCS. More specifically, Alexa stated, *"But you know I remember part of it [patient scenario] and the person sitting next to me remembers part of it, and we put it together."*

Semi-Structured Open-Ended Question

> "Do you have any other comments about the use of UCS in the TCS?"
>
> Anna jumped in and stated,

> *I thought they [UCS] were great…I would like more of them honestly… that's how I learned… I learned by seeing how it works in real-life…I don't learn by slides. So, some of it was more based off of interactive case studies or um, like, just real-life. What am I going to see? like in real-life…I would like more of them [UCS] honestly… I learned by seeing how it works in real-life. I don't learn by slides... just reading from slides just doesn't do anything for me.*

Zion announced in a firm voice,

> *I'll say this, I've had a lot of professors throughout nursing school and I would say the majority of these professors present the class as like a slide show and you sit there, and they lecture to you, but they aren't necessarily engaging you… I think that the case studies were a great way to connect the material to like actual application.*

Josie shared,

> *Well I would personally like it if you were making the tests [laughter]"* and then went on to say *"I think the pictures are helpful. The videos are helpful too, I think… the videos and pictures would probably be more helpful if we had them on our slides to take home, like so we could go back to them.*

The researcher explained that the PowerPoints with the UCS were not give to the experimental group because the researcher did not want to take a chance of the material being shared with the control group. Harley sated, *"Well, I think the YouTube videos really helped like… because you could like put an example to it… and pictures too, like, just help you get the general, like using visualizing rather than just hearing it."*

Number of participants supporting or not supporting each semi-structured open-ended statement/question. Some participants' verbatim supported (n = 7) and a participant

verbatim didn't support (*n* = 1) the use of UCS in the TCS and its effect on their thinking in the *classroom* setting.

Some participants' verbatim supported (*n* = 4) and some participants' verbatim didn't support (*n* = 4) the use of UCS in the TCS and its effect on their thinking in the *clinical* setting. Some participants' verbatim supported (*n* = 4), and some participants verbatim didn't support (*n* = 2) and some participants did not have verbal input (*n* = 2) the use of UCS in the TCS and its effect on their thinking with *preparing for course content exams.*

Some participants' verbatim supported (*n* = 6), a participant did not have input (*n* = 1) one participant's verbatim did not support (*n* = 1) the use of UCS in the TCS and its effect on their *engagement in class.*

Preliminary Theme Labels and Corresponding Descriptive Codes

The researcher ranked preliminary themes in order of significance based on participants' intensity, participant perception of importance, internal consistency, extensiveness, frequency, and specificity of responses, as recommended by Krueger and Casey (2015). Preliminary theme labels are ranked in order of significance with supporting examples of participant' verbatim. Table 17 shows student cognitive competence ranking as number one, Table 18 shows student engagement ranking as number two, Table 19 shows student-centered teaching ranking as number three, and Table 20 shows reality-teaching ranking as number four.

Table 17

Student Cognitive Competence

Preliminary Theme Label 1	Descriptive Codes
Student Cognitive Competence in the Traditional Classroom Setting	• Helped me to connect to what we had discussed • I think it prepared us a lot for the exam because rather than just like straight forward, what is the patho, or what is the medication on the exam, it was like…how about a 31 year-old patient, with this…what would you do?…the person is in this situation what would you do? • It helps just kind of make more sense of what the whole disease process was…but rather that just like memorizing form a slide, it [UCS] made me actually understand how it worked • So it [UCS] just helps you look at the big picture…just helps your critical thinking • Think more creatively and you're just looking at the body more realistically • Made me critically think more…also to see like what areas I am weak in

Table 18

Student Engagement

Preliminary Theme Label 2	Descriptive Codes
Student Engagement in the Traditional Classroom Setting	• I think it kept us engaged more because it was more interesting • Oh, it made me pay attention • It was great engagement • It helped tremendously, • Like you were very good at keeping us engaged • I thought it was very effective during the class time we are all very engaged as far as I can see • Unfolding case studies were always helpful, I loved it • I get up at 5 o'clock in the morning [on the day of lecture], but so far, I had not had any sleeping, like yawning, not at all [in class]…yeah, cause live cases. • I think that the case studies were a great way to connect the material to like actual application.

Table 19

Student-Centered Teaching

Preliminary Theme Label 3	Descriptive Codes
Student-Centered Teaching in the Traditional Classroom Setting	• You brought in props…that was helpful and made me remember…just like you know another visual aid • Repetition…I've noticed that it's not even necessarily things that we are going to be tested on, but it was important to nursing…because repetition is how I learned…I'm a slow learner and I need the repetition • The YouTube videos were good, AH! And the pictures! I think that anytime that you use a visual its helpful • I like the pictures you chose and help us remember the signs and symptoms • I think the pictures we had were nice cause it like brought visual • I would like more of them [UCS] honestly…I learned by seeing how it works in real-life. I don't learn by slides…just reading from slides doesn't do anything for me • It [UCS] works for my thinking style • It [pictures and videos]…keeps the class a little more interesting too...it's not just words and boring!

Table 20

Reality-Teaching

Preliminary Theme Label 4	Descriptive Codes
Reality-Teaching in the Traditional Classroom Setting	• That [UCS] works for my thinking style, I can in real-time connect to specific things It [UCS] actually took everything that was on the slides and put it to real-life thinking, and made it actually like I was seeing and actually having to think through it like a nurse • They made me apply the stuff that we JUST learned immediately It allows us to directly apply the information, you could visualize it, you could see it. You could hear it, understand it, see like use all of your senses so it became more concrete • It's kind of like the critical thinking where we could apply stuff that we just learned to a situation, we can put it to a patient and like, kind of like a real-life application

Analysis of Preliminary Theme Labels That Lead to the Predominant Theme

Rationale for ranking preliminary theme labels. As stated above, Krueger and Casey (2015) recommended that key themes be ranked based on participants' intensity about a concept (how much passion or force was behind the comments), order of importance about a concept, how many participants mentioned the same concept (internal consistency), how consistent participants were about a concept (extensiveness), how frequent a concept was mentioned, and how specific participants were about a concept. Thus, as mentioned earlier, the researcher ranked preliminary themes in order of significance based on participants' intensity, participant perception of importance, internal consistency, extensiveness, frequency, and specificity of

responses. Each of the four preliminary themes with supporting verbal and non-verbal behaviors will be discussed in the next section.

Preliminary theme: Student cognitive competence in the traditional classroom setting. This preliminary theme was ranked as number one, based on intensity, internal consistency, extensiveness, frequency, and specificity of responses.

- *"Not just to take in what you are telling us but to actually think about it actively and apply it."*
- *"I'll say this, I've had a lot of professors throughout nursing school and I would say the majority of these professors present the class as like a slide show and you sit there, and they lecture to you, but they aren't necessarily engaging you… I think that the case studies were a great way to connect the material to like actual application."*
- *"It [UCS] helps just kind of make more sense of what the whole disease process was…but rather than just like memorizing from a slide, it [UCS] made me actually understand how it worked."*
- *"You know analyze the case and have some critical thinking, yes it helps."*
- "*They [UCS] made me critically think more… also to see like what areas I am weak in."*
- *"I think it* [UCS] *helped a lot, because it actually took everything that was on the slides and put it to real-life thinking, and made it actually like I was seeing and actually having to think through it like a nurse, not just words on a slide, they [PPT slides] are hard to follow."*
- *They [UCS] made me apply the stuff that we JUST learned immediately!"*

- *"I think that that [UCS] helped a lot is because it's kind of like the critical thinking where we could apply stuff that we just learned to a situation."*
- *"If I had a patient with like UC [ulcerative colitis]…I would be able to see the symptoms happening and that would trigger my brain to see that and to use it [UC visual aids used throughout UCS in the TCS]."*

Preliminary theme: Student engagement in the classroom setting. This preliminary theme was ranked as number two, based on intensity, perception of importance, internal consistency, extensiveness, frequency, and specificity.

- "*I think it [UCS] kept us engaged more because it was more interesting … it was like you have a situation and you need to apply what you JUST learned to it. So, it's like you HAVE to be [engaged] for it."*
- *"Oh! It made me pay attention. You were ALWAYS gonna ask questions. I loved it!* [Laughter from the group]." *"…studies [UCS] that we were actually like answering back to, it was good. It was great engagement."*
- *"I get up at 5 o'clock in the morning [on the day of lecture], but so far, I had not had any sleeping, like yawning, not at all [in class]…yeah, cause live cases*
- *"I'll say this, I've had a lot of professors throughout nursing school and I would say the majority of these professors present the class as like a slide show and you sit there, and they lecture to you, but they aren't necessarily engaging you… I think that the case studies were a great way to connect the material to like actual application."*

- *"I think like the pictures we had were nice cause it like brought a visual and overall your energy in class was really nice [Laughter]. It helped us engage too, because it is important!"*

Preliminary theme: Student-centered teaching in the traditional classroom setting. This preliminary theme was ranked as number three, based on intensity, internal consistency, extensiveness, frequency, and specificity of responses.

- *"You brought in props…that was helpful and made me remember…just you know like another visual aid.*"
- *"You did it [repetition] most of the time. I've noticed that it's not even necessarily things that we are going to be tested on, but it's what is important to nursing…because repetition is how I learned… I'm a slow learner and I need the repetition."*
- *"The YouTube videos were good, AH! And the pictures! [Stated with excitement] I think anytime you use visual it's helpful… you know we are just learning so much and… If you can't picture it in your mind, if you haven't seen it before… you miss a lot of the pieces."*
- *"I liked the pictures you chose and help us remember the signs and symptoms," and went on to say, "I really like the idea of the unfolding case study in the classroom … and will be a good method of teaching for future instructors."*

Preliminary theme: Reality teaching in the traditional classroom setting. This preliminary theme was ranked as number four, based on internal consistency.

- *"I learned by seeing how it works in real-life. I don't learn by slides... just reading from slides just doesn't do anything for me."*

- *"When its just slides you know, um, I'm left to kind of pick up the pieces and read through it myself but having like a situation where I can in real-time connect to specific things, I think that helps a lot, for sure."*
- *"Like we could put it to a patient and like, kind of like a real-life application."*

Predominant Theme with Supporting Samples of Verbatim and Non-Verbal Behaviors

"Positive impact of UCS and multimodal learning opportunities on student engagement and thinking."

- "*I think it [UCS] kept us engaged more because it was more interesting … it was like you have a situation and you need to apply what you JUST learned to it. So, it's like you HAVE to be [engaged] for it."*
- *"Oh! It made me pay attention. You were ALWAYS gonna ask questions. I loved it!* [Laughter from the group]."
- *"Studies [UCS] that we were actually like answering back to, it was good. It was great engagement."*
- *"Not just to take in what you are telling us but to actually think about it actively and apply it."*
- *"I'll say this, I've had a lot of professors throughout nursing school and I would say the majority of these professors present the class as like a slide show and you sit there, and they lecture to you, but they aren't necessarily engaging you… I think that the case studies were a great way to connect the material to like actual application."*
- *"You brought in props…that was helpful and made me remember…just you know like another visual aid…and you know your mic drop? We looked forward to it… it's like*

little things that you do personally as a teacher… Even if we don't like the topic, it was hard… but it was just an enjoyable experience regardless of the hard content."

- *"The YouTube videos were good, AH! And the pictures! [Stated with excitement] I think anytime you use visual it's helpful… you know we are just learning so much and… If you can't picture it in your mind, if you haven't seen it before… you miss a lot of the pieces.."*
- *"I really like the idea of the unfolding case study in the classroom … and will be a good method of teaching for future instructors."*
- *"UCS helped more than maybe looking at more like a YouTube video; it works for my thinking style…."*
- *"It [UCS] keeps the class a little more interesting too… it's not just words and boring! [Laughter from whole group]."*
- *"I think it* [UCS] *helped a lot, because it actually took everything that was on the slides and put it to real-life thinking, and made it actually like I was seeing and actually having to think through it like a nurse, not just words on a slide, they [PPT slides] are hard to follow."*
- *"When it's just slides you know, um, I'm left to kind of pick up the pieces and read through it myself but having like a situation where I can in real-time connect to specific things, I think that helps a lot, for sure."*
- *"It helped me because it's not just, you know a boring lecturing. You give us some example. It's kind of like a case study, so it help us have some critical thinking, kind of like a live case instead of just, you know plain lecturing."*
- *"I think that that [UCS] helped a lot is because it's kind of like the critical thinking where we could apply stuff that we just learned to a situation."*

- "*One of the cases said that patient had rigid abdomen. I didn't see that in the clinical, but in the future especially like working med surg…yeah it will help."*
- *"If I had a patient with like UC [ulcerative colitis]…I would be able to see the symptoms happening and that would trigger my brain to see that and to use it [UC visual aids used throughout UCS in the TCS]."*
- *"I think it [UCS] prepared us a lot for the exam because rather than just like straight forward: What is the patho? Or what is the medication on the exam? It was like, OK, how about a 31-year-old patient, with this…what would you do? And that's kind of like how we went over in class. It was like, OK, this person in that situation, and what would you do?"*
- *"It [UCS] helps just kind of make more sense of what the whole disease process was…but rather than just like memorizing from a slide, it [UCS] made me actually understand how it worked."*
- *"I don't know if there's a way if you would like condensing it [PowerPoint slides] … these diseases have… similarities…so it's not like 130 slides!"*

Brief Discussion of Relevant Student Verbatim not Included in Predominate Theme

The researcher did not want to lose some of the important concepts that were not included in the predominate theme, which include the following participants' verbatim:

- *"I don't think it [classroom engagement with UCS] did for me. I'm more of a listener. I like to hear what other people say. I mean, I might answer inside my head, but I don't, I don't know why I just don't say it out loud."*
- *"I don't think that I really did anything with that [using UCS to prepare for content exams]… "I'm more of like a writer and then a reader."*

- *"I think some of them [UCS] were rushed through though… but as long as we actually had time to answer…it helped more."*
- *"But you know I remember part of it [patient scenario] and the person sitting next to me remembers part of it, and we put it together."*
- *"And you know your mic drop? We looked forward to it… it's like little things that you do personally as a teacher… Even if we don't like the topic, it was hard… but it was just an enjoyable experience regardless of the hard content."*

Collaboration among peers. It is important to note that some of the participants' verbatim were not included in the preliminary themes or the predominate theme; the researcher still considered their comments significant as their input highlighted how UCS evoked peer-to-peer collaboration. To illustrate, one participant highlighted how UCS in the TCS allowed her to collaborate with her peers by stating*, "But you know I remember part of it [patient scenario] and the person sitting next to me remembers part of it, and we put it together."* Students need to learn in the classroom to identify and collaboratively solve problems; this experience will delineate what is expected of them when they begin to practice as entry-level RNs. Collaboration will enhance communication techniques that nursing students can expound upon when they start their careers as licensed healthcare providers**.**

Literature support of preliminary theme labels. As mentioned in this chapter, participant verbatim led to four preliminary theme labels. Below, the researcher will briefly provide literature that supports the chosen preliminary theme labels.

Student cognitive competence in the traditional classroom setting. Evolving client healthcare needs in dynamic healthcare settings require pre-licensure students to develop CTS in TCS before entering into practice (Kaylor & Strickland, 2015; NCSBN, 2018). Thus, nursing

faculty must use active-teaching methods that engage today's pre-licensure nursing students enough to develop and enhance CTS to prepare them for their roles as entry-level RNs; this must take place in the TCS where students receive foundational nursing knowledge (Bryant, 2016; Kaylor & Strickland, 2015). Unfolding case studies, can be used to engage most nursing students during the learning process and allows nursing faulty to formatively evaluate pre-licensure nursing students level of competence, and hypothetical clinical decision-making capabilities (Bryant, 2016; Kaylor & Strickland, 2015).

Student engagement in the traditional classroom setting. The traditional classroom setting is progressively evolving with new ways of teaching today's population of pre-licensure nursing students (CCNE, 2018; HLC, 2020; NCSBN, 2018). As discussed in Chapter II, student engagement is imperative for the development and enhancement of CTS during the learning process, especially in the TCS (Freire, 1993; Wagner, 2014). Student engagement can be stimulated through reciprocal dialogue between pre-licensure nursing students and nursing faulty. Reciprocal dialogue between nursing student and nursing faculty create learning environments where pre-licensure nursing students are able to gather and discuss necessary facts with nursing faculty before making any hypothetical clinical judgments or critical decisions about a client's clinical case (Freire, 1993; Wagner, 2014). With the reciprocal dialogue process, nursing students are able to self-reflect to identify possible weaknesses or strengths with clinical decision-making skills.

***Student-centered learning in the traditional classroom setting*.** In order to enhance the quality of the learning process in TCS, pre-licensure nursing students who can comfortably relate to their preferred learning style has the propensity to better understand difficult medical/surgical nursing content that is disseminated during a class session. From an active-learning point of

view, student-centered teaching engages students during the learning process which helps with the development and enhancement CTS (Wagner, 2014). Moreover, providing pre-licensure nursing students with practical learning opportunities coupled with UCS further helps students connect theoretical information to clinical practice, which is the aim of nursing education (Bryant, 2016; Kaylor & Strickland, 2015; NCSBN, 2018).

Reality teaching in the traditional classroom setting. Incorporating active-teaching methods that are relevant to the evolving healthcare needs of clients, in TCS, have the propensity to help students develop CTS that are needed for their upcoming roles in rapidly changing healthcare settings (Rankin & Brown, 2016). Thus, exposure to real-life client scenario, in the TCSs can give nursing faculty opportunities to unfold real-life clinical challenges for a healthcare population with evolving healthcare needs. One of the pertinent characteristics associated with UCS is that realistic client scenarios give pre-licensure nursing students opportunities to analyze cases similar to scenarios that can be expected or anticipated in actual clinical practice (Bryant, 2016; Kaylor & Strickland, 2015). Moreover, use of UCS in the TCS provide pre-licensure students with opportunities to apply theoretical knowledge to dynamic clinical situations that are similar to actual nursing practices.

As stated earlier in this chapter, the researcher merged all of the above preliminary theme labels into the predominate theme: “Positive impact of UCS and multimodal learning opportunities on student engagement and thinking.” This predominate theme captured the essence of how students value the use of multimodal learning opportunities throughout UCS and in the TCS; literature to support this predominate theme will be discussed below.

Literature Support for Predominant Theme

Throughout this dissertation, the researcher has provided an in-depth and robust literature review on reasons why multimodal learning opportunities throughout UCS in the TCS should be used in nursing education. Below, the researcher will provide an additional brief description to support the predominate theme.

Use of multimodal learning opportunities throughout UCS in TCS gives nursing faulty opportunities to present a clinical situation that evolves in an unpredictable manner, similar to what pre-licensure nursing students will experience in an actual healthcare setting (Bryant, 2016;Wagner, 2014; Kaylor & Strickland, 2015; Kopka, Aschenbrenner, & Reynolds, 2016). Thus, using UCS in the TCS allows nursing faculty to unfold client clinical cases in a sequential manner as they introduce complex clinical situations that require pre-licensure nursing students to synthesize information and use CTS to make appropriate hypothetical clinical decisions about a client's case (Bryant, 2016; Kaylor & Strickland, 2015; Kopka et al, 2016). Simply put, UCS provide opportunities for nursing faculty and pre-licensure nursing students to come together in reciprocal dialogue to analyze client's evolving healthcare needs, using subjective and objective data to anticipate, plan, and hypothetically implement nursing interventions, in the safety of a TCS (Bryant, 2016; Carter & Welch, 2016; Kaylor & Strickland, 2015).

Quantitative and Qualitative Summary

Quantitative

From the quantitative analysis, HSRT pretest-posttest scores from the experimental and control group had no significant difference in CTS. In addition, this study found that the use of UCS in a TCS increased course content exam scores of the first exam. Despite the significant difference of the course content exams scores on the first exam among the experimental group,

the study did not report significant results for exams two and the final exam among the control and the experimental group. Although the quantitative results showed no significant differences in HSRT pretest/posttest scores between the experimental and control groups and the last two course content exams, participants from the focus group session shared their positive perspectives on the use of multimodal learning opportunities throughout UCS in the TCS, which will be discussed below.

Qualitative

Throughout this dissertation, the researcher provided in-depth evidence that shows how the evolving healthcare needs of clients drive change in how pre-licensure students are taught while attending nursing school. Accordingly, stakeholders have challenged nursing faculty to modify and/or create an active-teaching method that can develop and enhance the CTS of a pre-licensure nursing population who have multiple ways in which they learn. Thus, the researcher conducted a one-time, 1-hour focus group session to glean verbatim from participants to determine if the use of multimodal learning opportunities throughout UCS in the TCS had a positive impact on BSN pre-licensure nursing students. Participants' robust verbatim showed that the above-named active teaching method was instrumental in their ability to critically think and engage in the learning process as the multimodal learning activities appealed to their learning styles. In the next chapter, the researcher will discuss implications and recommendations for future nursing educational research studies.

Chapter V: Discussion and Recommendations

The evolving healthcare needs of clients in today's healthcare settings have caused professional organizations, such as ACEN (2019), CCNE (2018), HLC (2020), NCSBN (2019), and NSEM (2016), to call for nursing education reform. As a result, active-teaching methods are needed to sustain the rigor of clients evolving/real-world clinical scenarios in the TCS, so that pre-licensure nursing graduates can not only pass the NCLEX-RN—but also be prepared to practice in their future roles as effective critical thinkers in different healthcare settings (ACEN, 2019; IOM, 2010; NCSBN, 2016, 2019; NLN, 2012).

Equally important, today's population of pre-licensure nursing students learn in many ways (Chicca & Shellenbarger, 2018; Eckleberry-Hunt & Tucciarone, 2011; Seemiller & Grace, 2017; Shatto & Erwin, 2016). Thus, nursing faculty are called to consider the multimodal learning needs of pre-licensure nursing students as they research active-teaching methods that engage them in the learning process so that the development and enhancement of CTS in the TCS can take place (CCNE, 2018; D' Souza et al., 2014; Freire, 1993; HLC, 2020; NCSBN, 2019; Wagner, 2014).

The first purpose of this mixed-methods research study was to incorporate the active-teaching method, UCS (independent variable), in the TCS. A second purpose was to integrate multimodal learning opportunities utilizing VARK throughout UCS in a TCS. The goals of the research were threefold. The first goal was to measure whether or not the use of UCS in a TCS would enhance the CTS of BSN pre-licensure students with a Validated tool; the second goal was to explore whether students who were exposed to UCS in the TCS demonstrated stronger academic performance in classroom course content examinations; and the third goal was to explore the perceptions of a subset of BSN pre-licensure students to determine if the use of

multimodal learning opportunities utilizing VARK throughout UCS and improved CTS in the classroom setting, clinical setting, and preparing for course content exams; and explore if they perceived greater levels of engagement during the learning process. Chapter V is organized as follows (a) research questions with discussions, (b) research study implications, (c) research study strengths and limitations, (d) recommendations for nursing education, and (e) recommendations for future research.

Research Questions with Discussions

1. *Will the use of UCS (DV) in a TCS increase CTS as measured by HSRT pretest and posttest scores (IV) more in the experimental group than the control group?*

As explained in Chapter IV, the statistical analyses showed that there were no significant differences between the experimental and control groups' HSRT overall scores ($p > 05$) and all of the HSRT subscales (percentile, induction, analysis, inference, and evaluation scores; ($p > 05$).

As mentioned throughout this dissertation, the HSRT in association with UCS in the TCS has not been thoroughly studied in nursing education. However, there was one research study by Carter and Welch (2016) who used UCS in the TCS with ADN students. Thus, Carter and Welch's (2016) quantitative data results were compared with this researcher's quantitative data results (HSRT/course content exam scores). To illustrate, Carter and Welch (2016) investigated the use of UCS in the TCS with ADN pre-licensure nursing students and used HSRT pretest/posttest to measure changes in participants CTS. Data results showed a decrease in HSRT overall and in the subscale posttest scores. Similar to this researcher's study, there were no statistical significance in HSRT overall and subscale posttest scores (all $p > 05$) for the experimental and control group.

For the Carter and Welch (2016) study, the decrease in the HSRT scores could be connected to exam fatigue, as ADN participants took the HSRT exam twice (pretest/posttest), took the renal exam twice (pretest/posttest), and took the musculoskeletal exam twice (pretest/posttest), which resulted in participants taking a total of six exams over the course of the semester. Although the researchers did not indicate the number of weeks in one semester, from this researcher's experience, ADN programs usually have 7- to 7.5-week semesters, which is why ADN pre-licensure nursing students can graduate from an ADN program in 2 years (as highlighted in Chapter II).

From this researcher's study, BSN participants took the HSRT exam twice (pretest/posttest) and took three course content exams that included cardiovascular disorders and peripheral vascular disease (Exam I) and pulmonary, musculoskeletal, and endocrine disorders (Exam II). The final exam (Exam III) was non-cumulative and covered gastrointestinal, neurological, and urinary/renal disorders along with cancer and palliative care. Thus, exam fatigue could be the reason for this researcher's non-statistical data results for the HSRT overall and subscales posttest scores.

However, it is also very important to mention that data results from the HSRT tool did not correlate with verbatim transcripts from focus group participants regarding the use of UCS in the TCS to develop and enhance of CTS, when this researcher asked students: "Tell me about how UCS in the TCS affected your thinking in classroom." As explained in Chapter IV, several participants indicated that use of UCS in the TCS allowed them to apply nursing course content that they had just learned to a client's unfolding case. Equally important, most of the participants stated the UCS in the TCS helped them to "critically think" about client's clinical cases, and that UCS in the TCS worked better for their thinking style instead of just having words on a

PowerPoint slide. This researcher believes that the focus group participants' verbatim showed merit with using UCS in the TCS, in that the active-teaching method indeed develops and enhances CTS in the TCS.

Other research studies (mentioned in Chapters II and III) had mixed results with using the HSRT with to measure CTS in pre-licensure nursing students (Brune, 2014; Forneris et al., 2015; Sullivan-Mann et al., 2009; Upshaw, 2016). To demonstrate, Upshaw (2016) conducted a quasi-experimental research study with participants from a BSN program. Upshaw's aim was to determine if LFS UCS improved CTS, knowledge acquisition, and hand off communication more in the experimental group than in the control group. The experimental group received pre-simulation clinical activities and a PowerPoint on chronic obstructive pulmonary diseases and pneumonia before their 3-hour UCS. In contrast, the control group participated in 1-hour lectures. Each group took the HSRT pretest and posttest, data results showed no statistical significance ($p > 05$) between groups. In a similar study, and as described in Chapter II, Forneris et al. (2015), conducted a research study with BSN students from four different Schools of Nursing. The goal was to determine if HFS UCS increased CTS in pre-licensure nursing students. The experimental group completed prep materials/activities (creating medication cards, reviewing diagnosis, describing pathophysiology, completing readings and anticipating potential complications) before the start of an additional three simulations (with UCS). Each simulated UCS lasted 20 minutes with 40 minutes of debriefing. Each group took the HSRT pretest and posttest, data results showed that there was statistical significance between groups ($p < 0.05$).

With both above-described research studies, students were able to *prepare* for the simulated scenario which is seen as a benefit during nursing school; however in clinical practice, often-times RNs do not have the time to *prepare* for a client's acute clinical event. In this

researcher's study, the use of UCS were structured to mimic evolving clinical scenarios that depict situations where participants did not have time to review pertinent subjective and objective data before the UCS, which could have influenced the non-statistical significance on the HSRT the posttest scores. This researcher believes that UCS must include acute client scenarios if the goal is to prepare pre-licensure nursing students for their roles as entry-level RNs in today's healthcare settings.

Two other research studies found that the HSRT pretest/posttest had no statistical significance in the CTS of nursing students (Brune, 2014; Sullivan-Mann et al., 2009). For example, Brune (2014) conducted a research study with first semester BSN pre-licensure students to determine if concept mapping would increase CTS in the experimental group more than in the control group (lecture was the mode of instruction). The experimental group had the opportunity to review examples of concept maps but did not receive specific prep materials (subjective/objective data) before the intervention began. In the Sullivan-Mann et al. (2009) study, ADN participants were exposed to HFS to determine if CTS increased more in the experimental group (exposed to five HFS) than in the control group (exposed to two HFS). Neither the experimental group nor control group received prep materials (subjective/objective data) before the intervention began. Thus, the question is: Does the HSRT effectively measure CTS in nursing students? The HSRT tool is healthcare specific; however, CTS are broadly measured in dental, occupational health, physical therapy student, and nursing students (Insight Assessment, 2019). As described in Chapter II, RNs are on the frontlines of healthcare, which has been seen with the COVID-19 pandemic; thus, a discipline-specific critical thinking tool is needed to accurately measure CTS that relate to the evolving healthcare needs of clients. Carter and Welch (2016) surmised, "The HSRT is not a consistent tool across various nursing student

populations to evaluate nursing students' critical thinking" (p. 145). This researcher agrees with Carter and Welch's (2016) suggestion, which is, there needs to be a reliable and valid discipline-specific tool that measures changes in nursing students CTS as it relates to their future roles to effectively care for real-world client evolving healthcare needs (acute and chronic).

2. *Will the use of UCS (dependent variable [DV]) in a TCS increase course content exam scores (independent variable [IV]) for BSN pre-licensure students in the experimental group more than the equivalent exam scores for the control group?*

Independent *t*-tests were conducted to compare the mean scores between the experimental group and the control group for course Exams I, II, and the final exam (50 questions for each exam). For Exam I, the experimental group had a mean score of 42.81, while the control group's mean score was 41.00; this difference was significant with *t*-value = −2.169, $p < .05$. There were no statistically significant differences between the experimental and control groups' Exam II or final exam scores. In the Carter and Welch (2016) study, the experimental and control groups showed an increase in pretest/posttest scores, however there were no statistical differences in course content scores between the experimental and control groups. With this researcher's study and with the Carter and Welch (2016) study, the course content exams were created by one of the instructors. For both research studies, the validity of the course content exams was not obtained through construct or predictive validity. However, validity was established through face validity, also known as content validity, which refers to the notion that a test appears to measure what it purports to measure (Boateng et al., 2018).

Carter and Welch (2016) conducted an item analysis to determine if the renal and musculoskeletal course content exam questions were reliable. Both exams "achieved a point-biserial index of .20 or greater on a range of - 1.00 to 1.00" (p. 144). According to McGahee and

Ball (2009), point-biserial index is a form of item analysis that determines if a specific test question should be rewritten. Test items with a point-biserial index of < 0.20 should be revised and a point-biserial index of > 0.70 is considered a reliable test question. For this researcher's study, no point-biserial index was used to determine reliability of each test question, as each exam was graded by hand, thus, no item analysis was run. Although face validity was established with both studies, it is possible that the course content exam questions only measured lower-level thinking (memorization/comprehension) instead of measuring higher-levels of critical thinking (application, analysis, synthesis, and evaluation). Establishment of reliability and validity is essential for course content exams if the goal of summative evaluation is to measure CTS in nursing students over the course of a semester. It is important to mention, again, that the course content exams were created by the lead instructor, and this researcher was unaware that the exams were being hand graded until after the research study had begun.

The amount of new course content for each lecture in association with each exam could explain differences in exam scores with this researcher's study. The experimental and control groups took three instructor-created course content exams. The course content included two disease processes for Exam I, three disease processes for Exam II and the final exam included five disease processes totaling 10 covered disease processes in a 15-week session. Yet participants from the experimental and control group had the same amount of course content exam questions (50). Thus, the non-statistical significance for this researcher's study could be due to the amount of new and complex nursing content that the participants had to learn on Exams II and III.

Based on this researcher's experiential knowledge as a nursing professor, she believes that nursing faculty should consider the ratio of new nursing content that is being taught for each

class session to the number of course content exam questions that students are being tested on. Moreover, this researcher believes that participants were tasked with having to determine what was *important* to learn for each exam, which could also have influenced their test scores. West (2018) stated that "teaching to the test" (i.e., spending most of class time on practices to answer test items correctly) has been criticized, especially at the primary and secondary level. Thus, a few of the ways to remedy the above-challenge is to cut down on *nice-to-know* information and include more *need-to-know* information during lecture, increase the number of exam questions as the amount of new nursing material is being increased, and most importantly, allow for more active-learning opportunities so that students can be engaged while learning large amounts of complex nursing material during a class session.

Although there were no significant differences on Exams II and II between the two groups, the researcher gleaned positive verbatim comment from some focus group participants when the following question was posed: "Tell me about how UCS in the TCS affected your thinking about preparing for content exams." For example, most of the participants stated that the use of UCS in the TCS helped them see the big picture instead of just memorizing from a slide. Thus, it is possible that students in the experimental group would have performed worse on the second and final course exams if they had not engaged in CTS development during the use of UCS.

Psychological factors associated with academic achievement is an additional explanation for the variances in the course exam outcomes, which could be related to psychosocial variables that have been investigated in prior literature. Glasgow et al. (2019) noted that many areas of nursing require a high level of technical skills and didactic knowledge that must be assessed. Qualitative research has uncovered themes related to test performance, including nursing

students' feelings of being overwhelmed and stressed about the demands of their program, fears of being stigmatized by test results, and an increase in requests for testing accommodations, such as an alternate physical location (frequently as the solitary room occupant) and increased time or blocks of time for taking the test (Liu & Xu, 2017). It is important to note, that in this study, no testing accommodations from the experimental and control groups were made known to the researcher or the lead instructor. A comprehensive literature review on high stakes testing in nursing education uncovered similar themes of students' test anxiety, fear of stigmatization due to poor test scores, and skepticism regarding the relationship between test content and prior learning activities (Hunsicker & Chitwood, 2018). Any of these themes or a combination of themes could have been an underlying factor in the test performance of the present study.

3. *How do multimodal learning opportunities throughout UCS in the TCS affect BSN pre-licensure students' thinking in the classroom setting/clinical setting, preparing for content exams, and engagement in class?*

The researcher's question links to other recent research studies. To illustrate, Wagner (2014) conducted a qualitative research study with junior-level BSN pre-licensure nursing students to explore their perceptions of using multimodal learning opportunities with learning cardiac function/disorders in a TCS. Classroom observations revealed that "class discussion was deeper and student engagement was higher" (Wagner, 2014, p. 350). This researcher had similar findings in that when UCS were presented to the class, through observation, students were excited about answering questions, and they were more engaged than when the researcher lectured from the PowerPoint slides. Moreover, *all* focus group participants shared that UCS in the TCS engaged them in the learning process, which helped them apply CTS to a client's case. Furthermore, focus group participants stated that the use of multimodal learning opportunities

(YouTube videos, pictures, and medical related props) helped them visualize client signs and symptoms and made the class more exciting instead of sitting through a “boring lecture.” Thus, this researcher can conclude that the use of multimodal learning opportunities throughout UCS in the TCS increased classroom engagement, which allowed for critical thinking opportunities.

It is worth noting one of the nursing student participants in Wagner’s (2014) study was able to relate important pathophysiology concepts learned about cardiac function/disorder to an actual client’s case in the clinical setting. More specifically, the client had a diagnosis of hypertension and atrial fibrillation and was scheduled for a dose of metoprolol (a blood pressure medication). Upon taking the client’s vital signs, that nursing student participant noted that the client was hypotensive and related the objective assessment finding to what was learned during the multimodal learning opportunity in the TCS. The nursing student participant noted that holding the medication would be an appropriate nursing intervention. Her assessment findings and decision to hold the medication was supported by the attending physician.

In this researcher’s study, focus group participants stated that they did not care for any clients in the clinical setting who exhibited signs and symptoms of any of the UCS that were covered in class. However, two participants talked about how some of the UCS could help them if they came across a patient exhibiting certain signs and symptoms in the clinical setting. More specifically, the participants stated that the pictures of a rigid abdomen (with appendicitis) and ulcerative colitis shown during class clearly depicted signs and symptoms that a client would experience in a healthcare setting. As a result, they felt as if they would be able to identify and help treat a client with appendicitis and ulcerative colitis in nursing practice as an entry-level RN.

Simpson and Richards (2015) used student suggestions from students' end-of-semester course evaluations to revise the nursing curriculum. Some of the students' verbatim that were highlighted in the article that lead to the curriculum changes are as follows: *"I have trouble seeing the big picture and how this fits into the nursing curriculum"* and *"Involve the students to make the class more interesting"* (Simpson & Richards, 2015, p. 163). Junior-level BSN pre-licensure students (N = 64) who enrolled in a public health science course participated in the research study. In previous years, the public health science course was set up for traditional lecture and student learning was evaluated through course exams and one written essay. With the revised curriculum, lecture was moved to an online format and the classroom was used for active learning activities, which included case studies.

Through in-class surveys distributed at the end of the semester, participants shared positive comments regarding the new course design (Simpson & Richards, 2015). Some of the comments that were highlighted in the study and that are similar to comments obtained from the focus group of this research study are as follows: *"I enjoy the case studies and working together. The case studies that we have had this semester have allowed critical thinking and kept me engaged throughout the entire two-hour class period"* and *"I liked having different activities and not the 'same old lecture' course"* (Simpson & Richards, 2015, p. 165). Focus group participants from this research study had similar comments, which were explained in detail in Chapter IV. Other qualitative research studies support the use of active-learning opportunities during class time to engage students during the learning process (Adkins, 2018; Hong & Yu, 2017; Kaylor & Strickland, 2015). Thus, this researcher can conclude that active learning opportunities, such as UCS, are satisfying to students because they enjoy the activity and feel a sense of mastery over the information taught.

Research Study Implications

The quantitative results of this study did not find differences in CTS as measured by the HSRT between the experimental and control groups. Additionally, the use of UCS in a TCS did not show a difference in academic performance on course content exam scores between the experimental and control groups. Possible reasons for the non-statistical significance in pretest/posttest for HSRT and course content exams were discussed in detail above. However, qualitative results from participants' verbatim comments revealed that the use of multimodal learning opportunities throughout UCS in the TCS had a positive effect on their classroom engagement and CTS in the classroom.

The use of multimodal learning strategies throughout UCS in the TCS was supported in this study by the participants' verbatim from the focus group session. Unfolding case studies provided BSN pre-licensure nursing students with opportunities to critically think through real-life clinical situations in the safety of a TCS. In order for effective learning to take place, it is imperative for pre-licensure nursing students to have active involvement in the learning process (Freire, 1993; Wagner, 2014). Unfolding case studies allow students to understand nursing concepts and articulate them back to her or his peers and nursing faculty in a way which promotes increased understanding of complex nursing concepts (Day, 2011, Carter & Welch, 2016). The above teaching method also gives students opportunities to collaborate to find logical solutions to patients' clinical situations (Lauver et al., 2009; Yuan et al., 2010). Thus, the findings of this study have the potential to promote changes on how pre-licensure nursing students (with multimodal learning styles) are taught in the TCS resulting in changes in nursing school curriculums.

Research Study Strengths and Limitations

As stated in Chapter III, a strength of the nonequivalent quasi-experimental research design is that it is commonly used in education to examine the effect of an intervention on its selected population without random assignment (Creswell, 2014; Fraenkel et al., 2019). This design is also useful in obtaining robust data results from educational studies and has been used to bridge the gaps that exist between what students learn in the classroom and what occurs in clinical practice (Creswell, 2014; LoBiondo-Wood & Haber, 2018).

This researcher's data results did not show statistical significance with pretest and posttest HSRT scores and only had a statistical significance with the first course content exam. The researcher's understanding of the named reasons for the non-statistical significance can still be used in subsequent research by those wishing to replicate this study, as it is a strength that other researchers can learn from this researcher's mistakes. Moreover, feasibility was a strength to this research design as there were no logistical constraints, which are seen with true experimental designs (Fraenkel et al., 2019; LoBiondo-Wood & Haber, 2018).

Rogers and Révész (2019) highlighted an example of a research study consistent with the pretest-posttest design, in which the number of participants in the control group were $n = 27$ and the number of participants in the experimental group were $n = 36$. This aligns with the researcher's control group size of $n = 33$ and experimental group size of $n = 36$. Additionally, there are PBL research studies that have varying convenience sample sizes (using the pretest-posttest design) to determine if active-teaching methods, such as UCS and case studies, increased CTS in nursing students in the TCS. To illustrate, Carter and Welch (2016) had a sample of $N = 84$ and Bryant (2016) had a sample size of $N = 85$ to determine if UCS increased CTS in nursing students. Brune (2014) had a sample size of $N = 22$ and Gholami et al. (2016) had sample size of

N = 40 to determine if case studies increased CTS in nursing. This researcher's final sample size was *N* = 59, which falls in between the sample sizes of the above-named studies. However, the researcher completed a post-hoc power analysis, which indicated that a sample size of 65 each for both the experimental group and the control group would be more adequate to obtain significant differences in the pretest-posttest design and was seen as a limitation.

The experimental and control groups completed the electronic version of the pre-HSRT at Week 2 of the semester and a post-HSRT at Week 14 to determine differences in CTS between the two groups. Taking the HSRT pretest/posttest exams within a short period of time could have had an impact on non-significant test scores, which is seen as a limitation. In the similar study by Carter and Welch (2016), participants also took two HSRT pretest/posttest exams within a semester. As stated above, the researchers did not indicate the number of weeks for one semester; however, in the researcher's experience, ADN programs usually have 7- to 7.5-week semesters.

As discussed in detail in Chapter IV, there were several technical/connectivity challenges with using the electronic version of the HSRT, which was seen as a limitation. Moreover, as explained previously, it is questionable if the HSRT effectively measures the CTS of pre-licensure nursing students, which is also seen as a limitation.

Another limitation of this study is that course content exams were created by the lead instructor and were hand graded not allowing the opportunity to calculate reliability measures. Moreover, validity of the course content exams was not obtained through construct or predictive validity and is considered another limitation.

As discussed in Chapter III, qualitative research is not deductive and has no rigid predetermined hypotheses. Preliminary themes are developed inductively as the study

progresses; as a result, participant experiences are constructed to illuminate robust meanings (Creswell, 2014; Fraenkel et al., 2019). Researchers capture participant perspectives and experiences through thick descriptions, which is seen as a benefit (Fraenkel et al., 2019). Thick descriptions describe the voices, emotions, actions, and contextual meanings of participants' verbal and non-verbal behaviors to offer a deeper understanding of their diverse individual perspectives (Krueger & Casey, 2015). Analysis of gathered data adds depth and breadth to research topics and provides robust narratives that cannot be obtained through quantitative research methods (Creswell, 2014). The above-named benefits of a qualitative research study was seen as a strength for this research study.

This researcher was able to obtain robust verbatim from the one-time, 1-hour focus session, which was a strength of this mixed-methods research study. However, only conducting one focus group session to obtain verbatim on the perceptions of the use of multimodal learning opportunities throughout UCS in the TCS is also seen as a limitation. Several authors suggested that four to six focus groups be used to generate enough data that will lead to a saturation of verbatim (Guest, Namey, & McKenna, 2017; Hennink, Kaiser, & Weber, 2019; Krueger & Casey, 2015). For this researcher's study, it would have not been feasible to conduct four to six focus group sessions as participants were already inundated with attending clinical during the morning and lecture during the evening. Additionally, conducting four to six 1-hour focus group sessions would have required participants to stay on campus until after 8 p.m., as class was from 5:30 p.m.-7:10 p.m. Conducting the focus group session late in the evening could have led to participants not being engaged enough to provide the researcher with robust verbatim. Moreover, time of day for the focus group session was also seen as a limitation. The focus group session was conducted at the end of the 15-week semester and after the final exam. Although the

researcher obtained robust verbatim from the focus group participants, the day and time chosen to conduct the research could have stunted the amount of verbatim that was obtained.

The researcher did not conduct a focus group session with the control group. Conducting focus group sessions with both groups in the evening and after lecture would not have been feasible (reasons discussed above). However, a strength to conducting a focus group session with a subset of participants from the control could have illuminated additional information that could be used to explore components of lead instructor's active-teaching methods that facilitated or did not facilitate classroom engagement during the learning process and which active-teaching methods developed and or enhanced CTS in the TCS.

Both the experimental and control groups received the same nursing course content materials. It is important to note that the lead instructor prepared an average of 79 PowerPoint slides for each class lecture, which was 1 hour and 40 minutes in length. Thus, a limitation was the number of PowerPoint slides and the researcher's limited time to use UCS in the TCS. The researcher added 8-10 slides on UCS and usually only had 10-15 minutes of class time left to unfold the case study to evaluate students' understanding of disease processes. Thus, planning to have more time for UCS in the TCS could have had positively influenced the quantitative statistical results.

Recommendations for Nursing Education

Based on the findings of this mixed-methods research study, there are several recommendations for nursing education. Primarily and most importantly, the researcher recommends that nursing faculty create a pedagogical space for the use of multimodal learning opportunities throughout UCS in the TCS. More specifically, the overarching consensus from the focus group participants was for nursing faculty to use multimodal learning opportunities

throughout UCS in the TCS because this pedagogy fostered classroom engagement, development and enhancement of CTS through evolving client scenarios, and collaboration among peers.

Additionally, the facets of the above active-teaching methods were beneficial as the researcher had opportunities to assess participants learning through reciprocal dialogue. Reciprocal dialogue allowed both students and the researcher to identify appropriate or inappropriate thought processes about a client's clinical case. Moreover, the researcher was able to offer timely feedback to participants. More specifically, as BSN pre-licensure participants worked through UCS that were presented by the researcher, she was able to provide participants with immediate feedback on understood/misunderstood nursing concepts and clarify misconceptions in real-time.

Furthermore, reciprocal dialogue allowed the researcher to immediately respond and correct participants' hypothetical nursing intervention if their decision would have led to a negative healthcare outcome. The same was true if a correct decision was made that hypothetically caused a client's condition to improve. Reciprocal dialogue allowed participants to see the healthcare outcomes based on their hypothetical nursing interventions in the safety of a TCS. This allowed for a clearer understanding of complex nursing material during the learning process, rather than waiting for examination results (summative evaluation). The researcher recommends that reciprocal dialogue be used more frequently before summative exams are administered as nursing faculty will be able to use student responses as a guide to plan or design instruction according to the needs of the students.

One major recommendation is for nursing faculty to cut down on the amount of PowerPoint slides used to disseminate complex nursing materials so that there is more class time to use UCS. More time to use UCS in the TCS will allow nursing faculty to create more involved

client cases, which will allow for more active-learning opportunities that can deepen understanding and expound upon students' understanding/misunderstanding of specific nursing concepts by using reciprocal dialogue and formative assessments.

Moreover, from this researcher's findings, there are some alternative active-teaching methods that could be used in the TCS that would allow for more time to unfold client clinical scenarios. For example, nursing faculty can assign chosen disease processes for pre-licensure nursing students to review before attending lecture. The review of disease processes should minimally include the following (a) pathophysiology, (b) clinical manifestations (subjective and objective), (c) medical management (including procedures), (d) medications for treatment, (e) nursing management, (f) risk factors, and (g) client education. Once lecture begins, nursing faculty can use the first 30 minutes of class time to answer questions that students may have regarding the reviewed nursing materials, which will then give nursing faculty more time to use their chosen evidenced-based active-teaching method with each lecture. For this researcher's preference, use of multimodal learning opportunities utilizing VARK throughout UCS in the TCS will allow nursing students to analyze and synthesize clinical manifestations, and use inference to hypothetically determine the most effective treatments that can lead to positive healthcare outcomes. This researcher believes that the above active-teaching method would create an efficient learning environment that encompasses the recommendations from Freire (1993), Facione, (1990), and Scheffer and Rubenfield (2000). Accordingly, it would be forward thinking for nursing faculty to use this researcher's quantitative and qualitative data results, along with the proposed teaching classroom environment as a guide to further modify/develop/redesign the nursing courses to engage pre-licensure nursing students in learning

processes, so that they can begin developing and enhancing CTS in the safety of a classroom setting.

Recommendations for Future Research

Using multimodal learning opportunities throughout UCS in the TCS could be one of the many keys to answer the call for new active teaching methods that develop and enhance CTS for pre-licensure nursing students. However, this researcher recommends a few modifications for future research if and when this study is to be replicated. As mentioned in this dissertation, the lead instructor developed core nursing materials for the semester (e.g., PowerPoint slides, syllabus, and course content exams). This was done to keep the semester materials consistent between the experimental and control groups. However, the researcher's recommendation is for future researchers to develop pedagogical materials that will create a space for more active-learning opportunities when presenting the content.

As explained in detail above, this researcher would recommend that future researchers use both a discipline-specific, as well as valid and reliable critical thinking tool to measure the CTS of pre-licensure nursing students. Moreover, if a researcher chooses to use course content exams to measure CTS in pre-licensure nursing students, he or she must ensure that each exam is reliable/valid and actually measures higher-level critical thinking as it relates to the evolving healthcare needs of clients.

At the end of the school semester, the School of Nursing provided students with an opportunity to anonymously complete an instructor and course evaluation form (instructor not present when students completed the evaluation) using a 5-point Likert scale. The evaluation form also had a section for students to add additional comments regarding likes/dislikes about the instructor/course and provide constructive suggestions. After the researcher reviewed her

end-of-semester evaluation results, it was determined that future researchers should obtain IRB approval to use end-of-semester evaluations (from the experimental and control groups) to gain more quantitative (5-point Likert scale) and qualitative information (participant narratives) on whether classroom engagement was stimulated/not stimulated during the learning process, likes/dislikes about the classes, and additional constructive suggestions for classes. This researcher believes that data results within the end-of-semester evaluations (from the experimental and control group) could provide more quantitative and qualitative data that could be used to further guide nursing curriculum changes.

This researcher recommends that multiple focus group sessions be conducted (with the experimental and control groups) with a sample size of 8-10 participants for each of the focus group sessions. This is important because the researchers will have an extensive number of verbatim transcripts to illuminate pedagogical methods that support or dispute active-teaching methods that develop and/or enhance CTS in the TCS, and which active-teaching methods appealed or did not appeal to participants' learning style.

A longitudinal mixed-methods study should be conducted on the use of multimodal learning opportunities throughout UCS in the TCS. The longitudinal mixed-method study could be set up in three parts. First, researchers could follow a cohort of pre-licensure students from entry into the nursing program through graduation to measure CTS and explore perceptions on the use of the above mentioned active-teaching method (at the end of each semester) with a validated critical thinking tool before taking the NCLEX-RN. Next, after the same group of participants have taken the NCLEX-RN, the researchers could compare first-time NCLEX-RN pass rates against end of graduation CTS scores, and explore participants' perceptions of whether the use of multimodal learning opportunities throughout UCS in the TCS positively helped them

with taking the NCLEX-RN. Lastly, with the same cohort of participants, the researchers could conduct a qualitative study at 12 months of entry-level practice to explore the perceptions of how, or if, the above teaching method assisted participants with CTS when caring for clients in the clinical setting. Although this would be a monumental study, this researcher believes that data results would provide the field of nursing education and nursing faculty with vast information on *how* the use of multimodal learning opportunities throughout UCS in TCS does or does not do the following (a) increases CTS throughout nursing school, (b) increases first-time pass rates on the NCLEX-RN, and (c) prepares pre-licensure nursing students for their roles as entry-level RNs.

Summary

Reforming nursing education is necessary for patients needing complex care in unpredictable and rapidly changing healthcare settings. In some cases, nursing education focuses on *what* to teach, without considering *how* to best teach pre-licensure multimodal learners. Therefore, stakeholders have called on nursing faculty to constantly explore or modify active-teaching methods that prepare current and future pre-licensure nursing students to effectively care for today's clients who have ever-evolving healthcare needs.

Equally important, nursing faculty are called on to consider the multimodal learning needs of pre-licensure nursing students as they research active-teaching methods that engage students in the learning process so that the development and enhancement of CTS can take place in the TCS (CCNE, 2018; D' Souza et al., 2014; Freire, 1993; HLC, 2020; NCSBN, 2019; Wagner, 2014). Although there was no statistical significance in the HSRT pretest/posttest scores or on course content Exams I and II between the experimental and control groups, qualitative data revealed significant and robust verbatim supporting the use of multimodal learning

opportunities throughout UCS in the TCS. The evidence from participants' verbatim comments showed that use of multimodal learning opportunities throughout UCS accommodated the various learning styles of students. Moreover, UCS were seen as a benefit to focus group participants in multiple ways. For instance, UCS fostered an active-learning environment that empowered BSN pre-licensure nursing students to become active learners and use CTS to manage acute and chronic evolving clinical problems in the safety of the classroom setting.

Use of multimodal learning opportunities throughout UCS in the TCS can be created to mimic the rigor of clients' acute and chronic evolving clinical cases. Moreover, as illuminated from focus group participants' verbatim, the above teaching method engaged them in the learning process, met most of their learning styles, stimulated critical thinking, and recommended that other nursing faculty use multimodal learning opportunities throughout UCS in the TCS. Although this researcher used multimodal learning opportunities throughout UCS in the TCS in an adult medical/surgical course, the active-teaching method could also be used across the nursing curriculum. Use of the named active-teaching method could be the ultimate key to answer the call for development and enhancement of CTS for BSN pre-licensure nursing students. However, more quasi-experimental and/or longitudinal research studies (outlined above) are needed to determine long-term effects on the use of multimodal learning opportunities throughout UCS in the TCS.

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APPENDICES

Appendix A: Recruitment Letter

Recruitment Script

Project Title: Comparing Teaching Pedagogies in a Traditional Didactic Classroom Setting

Purpose: The purpose of this research study is to explore differences in student achievement between two different instructional methods.

Invitation to Participate: You are invited to participate in a research study. In order to participate, you must identify as an entry-level BSN student who is enrolled in NURS 330 in the fall of 2018. Please ask any questions you have about participation in this study.

Study Procedures: I would like to use your content exam scores and pre/post Health Science Reasoning Test (HSRT) scores as research data. Your content exams and pre/post HSRT are a part of the class curriculum whether or not you decide to participate in this research study. Data will not be collected until final grades are posted.

During the semester both NURS 330 instructors will use teaching strategies that they are accustomed to using to teach the content outlined in the syllabus.

Confidentiality and Risks: The primary risk of participating in this study is a potential loss of confidentiality. I will remove your name and any other identifying information before analysis content exam and pre/post HSRT scores and code it numerically. All research data will be stored in locked cabinets or in an electronically password-protected computer files.

Benefits: Participation in this research will not affect your grade in this class and you will not directly benefit from participating in this research. However, this study has the potential to benefit nursing faculty with nursing education pedagogies that develop and enhance critical thinking skills in future diverse entry-level nursing students.

Dissemination: Aggregate findings from this research project will be shared with my committee at Eastern Michigan University (EMU), as part of the requirements of my doctoral program. The findings may be written up for presentation at the graduate research fair at EMU or used in later professional presentations or conferences or submitted for publication. Any dissemination of findings will be anonymous and done in aggregate.

Please keep this form in your records. Please contact Elaine. M. Lloyd (elloyd2@emich.edu) by September 10th if you wish to opt out.

Appendix B: Focus Group Consent

Informed Consent Form

The person in charge of this study and the principle investigator is Elaine M. Lloyd. Mrs. Lloyd is a student at Eastern Michigan University (EMU). Her faculty adviser is Dr. Laurie Blondy. Throughout this form Elaine M. Lloyd will be referred to as the "investigator."

Project Title: Using Unfolding Case Studies in a Traditional Didactic Classroom Setting to Develop and Enhance Critical Thinking Skills for Diverse Entry-Level Bachelor of Science in Nursing Students
Principal Investigator: Elaine M. Lloyd, Graduate Student
Faculty Advisor: Laurie Blondy, Ph.D., Associate Professor of Nursing

Invitation to participate in research

You are invited to participate in a research study. In order to participate, you must identify as an entry-level BSN student who has completed NURS 330 in the fall of 2018 Elaine M. Lloyds section. Participation in this research study is voluntary. Please ask any questions you have about participation in this study

Important information about this study

- The purpose of the study is to explore diverse entry-level Bachelor of Science in Nursing (BSNs') perceptions about the use unfolding case studies (UCS) in the traditional classroom setting (TCS).
- Participation in this study involves a one-hour focus group session in an assigned classroom on EMUs main campus. The focus group session will be scheduled after the final exam has been taken.
- The one-hour focus group session will be audio-taped
- Risks of this study include a potential loss of confidentiality.
- I will code all of their personal identification information collected to protect their identity and also offer the use of a pseudo-name within the group for further protection of identity.
- Participation in this research is voluntary. You do not have to participate, and if you decide to participate, you can stop at any time.
- I will be collecting demographic data such as age and gender

What is this study about?

The purpose of the study is to explore diverse entry-level Bachelor of Science in Nursing (BSNs') perceptions of how/if UCS in the TCS, help developed and/or enhanced their critical thinking skills (CTS).

What will happen if I participate in this study?

Participation in this study involves

- Completing a one-hour focus group session. The session will allow you to provide the investigator with feedback regarding helpful or non-helpful nursing pedagogies that developed and enhanced CTS in the traditional classroom setting.
- Attending a focus group lasting approximately one-hour. The focus group will involve up to ten research participants and the investigator. You will be asked to create a pseudo-name and only use your pseudo-name in the focus group.

The investigator would like to audio record you for this study. If you are audio recorded, it will be possible to identify you through your voice. If you do not want to be audio recorded, you cannot participate in the one-hour focus group session.

What are the expected risks for participation?

The primary risk of participation in this study is a potential loss of confidentiality.

Some of the survey and focus group questions are personal in nature and may make you feel uncomfortable. You do not have to answer any questions that make you uncomfortable or that you do not want to answer. If you are upset, please inform the investigator immediately.

Are there any benefits to participating?

You will not directly benefit from participating in this research. However, the feedback that you provide the investigator can be used to modify nursing pedagogies beyond EMU as a result of dissemination of the study results in a professional journal.

How will my information be kept confidential?

The investigator plans to publish and or present the results of this study. The investigator will not publish any information that can identify you.

The investigator will keep your information confidential by only using your pseudo-name during the one-hour focus group session. The audio recordings will be transcribed within two-weeks of the focus group session. In addition, all participants in the focus group will agree to maintain confidentiality of all focus group discussions. The investigator will also assign a numerical code to each participants' audio recorded responses to ensure confidentiality. Audio taped transcriptions will use only the assigned numerical code (without pseudo-name).

The focus group transcripts will be stored in password-protected computer file, at the investigators home, and audio recordings will be kept in a locked filing cabinet until they are destroyed.
The investigator will make every effort to keep your information confidential, however, we cannot guarantee confidentiality. Other groups may have access to your research information for quality control or safety purposes. These groups include the University Human Subjects Review Committee, the Office of Research Development, the sponsor of the research, or federal and state agencies that oversee the review of research, including the Office for Human Research

Protections. The University Human Subjects Review Committee reviews research for the safety and protection of people who participate in research studies

The investigator will ask you and the other people in the group to use only pseudo names during the focus group session. The investigator will also ask you not to tell anyone outside of the group about anything that was said during the focus group session. However, we cannot guarantee that everyone will keep the discussions private.

Storing study information for future use

Data will be stored, at a minimum, 3 years post study closure or final publication, whichever is later. All coded and identifiable information will be stored on an EMU password protected computer/secure server in a password-protected file.

The investigator may share your information with other researchers without asking for your permission, but the shared information will never contain information that could identify you.

Will I be paid for participation?

Participants will not be compensated

Study contact information

If you have any questions about the research, you can contact the Principal Investigator, Elaine M. Lloyd, at elloyd2@emich.edu or by phone at 734-487-2310. You can also contact Mrs. Lloyd's adviser, Dr. Laurie Blondy, at lblondy@emich.edu or by phone at 734-487-2310.

For questions about your rights as a research subject, contact the Eastern Michigan University Human Subjects Review Committee at human.subjects@emich.edu or by phone at 734-487-3090.

Voluntary participation

Participation in this research study is your choice. You may refuse to participate at any time, even after signing this form, with no penalty or loss of benefits to which you are otherwise entitled. You may choose to leave the study at any time with no loss of benefits to which you are otherwise entitled. If you leave the study, the information you provided will be kept confidential. You may request, in writing, that your identifiable information be destroyed. However, we cannot destroy any information that has already been published.

Statement of Consent

I have read the information in this consent form including risks and possible benefits. I have been given the chance to ask questions. My questions have been answered to my satisfaction, and I agree for my audio- tape to be used as indicated above.

Signatures

_____
Name of Subject

_____ _____
Signature of Subject Date

I have explained the research to the subject and answered all his/her questions. I will give a copy of the signed consent form to the subject.

_____
Name of Person Obtaining Consent

_____ _____
Signature of Person Obtaining Consent Date

Appendix C: Institutional Review Board Approval Letter

Elaine Lloyd
Eastern Michigan University, School of Nursing

Re: Exempt - Initial - UHSRC-FY17-18-409 Using Unfolding Case Studies in a Traditional Didactic Classroom Setting to Develop and Enhance Critical Thinking Skills in Diverse Entry-level Bachelor of Science Nursing Students

Dear Elaine Lloyd:

The Eastern Michigan University Human Subjects Review Committee has rendered the decision below for Using Unfolding Case Studies in a Traditional Didactic Classroom Setting to Develop and Enhance Critical Thinking Skills in Diverse Entry-level Bachelor of Science Nursing Students. You may begin your research.

Decision: Exempt

Appendix D: Unfolding Case Study Example

The researcher used multimodal learning strategies throughout UCS in the TCS for all of the nursing content. To illustrate, the researcher embedded two pictures of make-believe clients (Pete and Pat) at the beginning of the PowerPoint to show different body types of individuals diagnosed with diabetes. Pete was slim in stature (type 1 diabetic) and Pat (type 2 diabetic) was overweight. The researcher also showed a 2 min, 11 s YouTube video to show the differences between type 1 and type 2 diabetes instead of only lecturing about differences. Medical-related props were used as an additional learning modality. For example, the researcher used two red top blood tubes to mimic the perfusion of blood in diabetic clients, one was mixed with red dye and honey and the other was mixed with red dye and water, to compare and contrast how slow (red colored honey) or fast (red colored water) a patient's blood would circulate throughout the body. The researcher used this method to give students a visual of how clients with elevated blood sugars (red colored honey in blood tube) can cause microvascular (eye, kidney, and neuropathy) and macrovascular (brain, heart, and peripheral vascular) complications.

After lecturing on metabolic syndrome, the researcher showed pictures of Pete and Pat and asked the class the following questions (a) who was more at risk for being diagnosed with the metabolic syndrome and why, (b) signs and symptoms of metabolic syndrome, and (c) how metabolic syndrome is treated. It is important to note that the lead instructor prepared 100 PowerPoint slides for the diabetic class session and 80-100 PowerPoint slides for subsequent class sessions. The researcher added 8-10 slides to unfold case studies and usually had 10-15 minutes of class time left to unfold a case study to evaluate students' understanding of disease processes.