Bridging the Theory to Practice Gap: Improving Critical Thinking Skills in BScN Nursing Students

Thesis submitted in accordance with the requirements of the University of Liverpool for the degree of Doctor of Education

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CRITICAL THINKING IN STUDENT NURSES

Declaration

I declare that the work presented in this thesis is my work and has not been used in any form at the University of Liverpool or any other university, except for the production of this thesis.

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Acknowledgements

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Abstract

The purpose of this study was to examine the level of critical thinking skills of student nurses enrolled in a bachelor of nursing program at a University in Trinidad. It also aimed to identify the factors that promote and hinder critical thinking development and tested two strategies to ascertain their impact on student's critical thinking development.

The study adopted a quasi-experimental, mixed-method approach. For the quantitative phase, students were asked to complete the California Critical Thinking Skills Test questionnaire twice to determine their level of critical thinking. The questionnaires were completed both before and after two interventions, concept mapping and clinical cases. Pre and post-test were also utilized during this phase.

For the qualitative phases, information was sought from both the student nurses and their clinical instructors to unearth answers about the factors that promote and hinder critical thinking development of student nurses and to determine the student nurse's perceptions of critical thinking strategies tested in this study. Two rounds of focus groups were held with the students, first with both the experimental group and a control group, before the interventions were tested and then another focus group was held with the experimental group after the interventions were implemented. Individual questions were emailed to the clinical instructors to ascertain their responses about critical thinking of student nurses.

The study results demonstrated that the level of critical thinking of the student nurses was low to moderate, and the tested strategies had no significant impact on the student's critical thinking development with such a short intervention. The students identified a few factors that

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promoted their critical thinking development, such as variety in the use of student-centered teaching methodologies and clinical assistance from competent staff nurses. The study also revealed that issues such as limited supervised clinical exposure, program and course structure issues, and lack of frequent, timely feedback contributed to the difficulty of student nurses developing critical thinking skills.

This study has implications for both nursing education and healthcare organizations. The findings can be utilized to guide the curriculum's restructuring to align the content and practice objectives better, and the reorganization of classroom strategies and the teaching methodologies implemented. Orientation programs can be developed to assist new student nurses and graduated nurses in their transition to the use of critical thinking. The clinical instructors' and the healthcare preceptors' roles can also be redefined based on the information gathered in this study.

Recommendations for further research in areas such as implementing the test strategies for an extended period and across various year groups were also articulated in the study.

Keywords: critical thinking, nursing education, student nurses, healthcare, nursing

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Definitions

BScN Nursing student – a student enrolled in a four-year nursing degree program at a higher level academic institution.

Clinical case – a clinical scenario given to groups of students for them to deliberate, discuss and solve questions through the process of critical thinking

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Abbreviations

CCTDI   California Critical Thinking Disposition Inventory

CCTST   California Critical Thinking Skills Test

CXC   Caribbean Examination Council

PBL   Problem-based learning

WGCT   Watson–Glaser-Critical Thinking

Bridging the Theory to Practice Gap: Improving Critical Thinking Skills in BScN Nursing Students

Introduction

The modern healthcare environment is very dynamic and calls for healthcare professionals who can use the knowledge and tools they have in an analytical manner to make split-second decisions that can impact the lives of many. For registered nurses to be able to execute this task competently, they must acquire, improve and master the implementation of critical thinking skills. In their training, however, it has been noted that student nurses have difficulties in the acquisition of critical thinking skills (Hasanpour, Bagheri & Heidari, 2018).

Critical thinking is a cognitive activity, different from other methods of thinking, in that it is purposeful, goal-oriented, and evaluative in nature (Abraham, 2014; Daly, 1998), that allows for reasoning and problem solving (Adam & Juergensen, 2019). It is solution oriented, and involves the use of multiple dimensions of cognition in the analysis of, in this case, clinical issues (Kaddoura, Van-Dyke & Yang, 2016).

The researcher has been a registered nurse for 16 years and worked in the staff development unit of one of the general hospitals in Trinidad & Tobago for four years before beginning tenure as a nursing instructor, for an additional seven years at the University in Trinidad. As a clinical instructor, the researcher assessed registered nurses' skills in the clinical setting and implemented remedial interventions when competencies were inadequate. At the University the researcher's responsibilities include teaching foundation courses which are prerequisite to courses later in the program. The University is built on the motto taking students beyond excellence. Its focus is to develop the holistic student by ensuring each program builds

the students in facets other than academia, such as spirituality and socially. It is a very diverse institution with students from across the Caribbean region and internationally. The University cohorts have been increasing annually from 25 students when the program was started in 2007, to 125 in the 2016 intake. This increase has resulted in a larger student-educator ratio, requiring the development of new strategies for teaching and monitoring critical thinking development in student nurses.

The researcher's observation and involvement show that both student nurses and registered nurses, particularly the newly graduated nurses, experience difficulty developing and implementing critical thinking skills. Pitt et al. (2015) noted a similar finding and reported that registered nurses, particularly those employed for less than one year, were "consistently unable" to utilize critical thinking skills (p. 125). The outcome of this lack of competence has affected the nurse's ability to make critical, life-saving decisions that affected the care they implemented and patient outcomes (Fesler-Birch, 2005).

As an educator and a nurse, it is evident that critical thinking is a fundamental principle of nursing upon which decision-making is underpinned, and its development can be challenging (Shoulders, Follett & Eason, 2014). Therefore, for nursing students to mature as proficient independent practitioners, that as a skill, critical thinking and its implementation utilising multiple approaches to meet the student's needs must be given priority. The reasons student nurses at the university and locally in Trinidad and Tobago have such difficulty developing and implementing this crucial skill, is an area which remains unexplored. As a result, educators and administrators alike lack valuable evidence as to how to improve the student nurses' ability to engage in critical thinking and implement this in everyday patient-care activities. This research

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aims to add to the literature the reason student nurses have difficulty mastering this skill, by examining what is the level of critical thinking skill of BScN students at the University, and what strategies educators can implement to improve student nurse's ability to think critically.

Thesis Structure

This research paper contains six chapters aimed at examining and improving critical thinking in BScN students.

Chapter 1 **is** the Introduction, which outlines the changing healthcare environment and highlights the need for student nurses and registered nurses to possess critical thinking skills

Chapter 2 **is** Literature Review, which examines critical thinking from various perspectives. It introduces the various definitions of critical thinking, including those that underpin this research such as the definition presented by the Delphi Project. Literature on critical thinking in nursing, nursing students and nursing education is also presented to demonstrate its impact on patient care and clinical competence, identify the difficulties experienced by nursing students and the requirements and changes in nursing education. The two theoretical perspectives, Ausubel and Elder Theory of Meaningful Learning and Paul 's Stage Theory of Critical Thinking will also be reviewed. Finally, concept mapping and clinical cases, two techniques to improve critical thinking will be presented followed by assessment tools to measure critical thinking.

In Chapter 3, the Methodology presents the research questions and sub-questions of this thesis. Justification of the mixed-method study design is given. It then outlines the method and procedure for implementation of the research, across various data collection stages.

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Chapter 4 is the presentation of the analysis and findings of the research. It includes the results of the mixed methods outlined in Chapter 3.

Chapter 5 is the Discussion where detail considerations of primary and sub-questions are done utilizing the results and findings, as well as theoretical frameworks.

In Chapter 6 the Conclusion, recommendations, study limitations, areas for further study, access issues, ethical consideration and concluding thoughts, presented.

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Literature Review

The healthcare environment has transitioned through many changes in the recent past, and as a result, the clinical environment is one where registered nurses' roles are expanding, giving them much more accountability and autonomy (Carter, Creedy & Sidebotham, 2016). This expanded role requires registered nurses to have a sound multifaceted knowledge background and be able to apply that knowledge safely and effectively when implementing care (Birks, Ralph, Cant, Chun Tiec & Hillmanc, 2017). There is now growth in the technology utilized in the delivery of health care, an aging population, an increase in the complexity of patients with comorbidities and complex care issues (Safford, 2015), and patients who are demanding better quality care (Simpson & Courtney, 2002). It is expected that the advancements in the delivery of healthcare will continue to revise the role of the nurse. As advances in healthcare technology increase in the future, the scope of practice of registered nurses will continue to be redefined (Feringa, De Swardlt & Havenga, 2018). The aforementioned factors combined with the need to contain cost and reduce the time patients spend in hospital (Simpson & Courtney, 2002), require registered nurses to have the ability to think critically in order to be able to effectively function as part of a complex multi-disciplinary team.

In this continually evolving healthcare environment, Papathanasiou, Kleisiaris, Fradelos, Kakou, and Kourkouta (2014) noted that student nurses have difficulty making decisions and if this difficulty is not addressed and emphasis is not placed on helping student nurses develop critical thinking skills, it can affect the safety and competence of care administered to clients. The literature suggests therefore, that critical thinking is a skill that nurses must implement in their execution of patient care to be able to assess and interpret the needs of their patients and

decide on the best course of action. Without it, nurses will be ill-equipped (Simpson & Courtney, 2002; Pitt et al., 2015).

This literature review adopted a traditional or narrative approach, where its aim was to examine comprehensively the body of knowledge available on the topic critical thinking. Its intent was also to identify gaps in the literature to demonstrate where this thesis adds to the body of knowledge. The topic of critical thinking is very broad and therefore, the scope of the literature review had to be defined or narrow for the context of this thesis. Therefore, sources were selected that included areas such as critical thinking development in students overall, nursing students and registered nurses. The literature review was also focused on theories that aid in critical thinking development and strategies that can be used to improve this. As a result of the word limits of this thesis, all information found could not be utilized. For example, the literature revealed various definitions of critical thinking that evolved over time, however, for this research even though some were mentioned, focus was given to the definition advocated by the Delphi project, used as the definition underpinning the discussion.

Another example where all reviewed information was not included was the theoretical perspective. Various theories were examined such as The Theory of Critical Thinking of Nursing, Garrison's Theory of Critical Thinking and Dialogue Theory for Critical Thinking. However, David Ausubel Theory of Meaningful Learning and Elder and Paul's Stage Theory of Critical Thinking were utilized because they complemented both nursing overall and the ethos of the department and university as described below. In the coming literature review, information is also presented on teaching strategies that promote critical thinking and tools used to assess

critical thinking, these too contain variations some of which were excluded and are discussed below.

Understanding Critical Thinking

The need for critical thinking development not only in nursing students but across all academic and professional disciplines is essential (Puig, Blanco-Anaya, Bargiela & Crujeiras-Pérez, 2019). Defining critical thinking prior to 1990 proved difficult because various experts and professions had differing definitions, a lack of consensus that led to some degree of confusion. From a review of the literature, critical thinking definitions were focused on the utilization of cognitive processes, being open to various outcomes, or having a high degree of skepticism. From the literature, as well, it was also postulated that the affective domain also impacted critical thinking.

Facione (1990) defined critical thinking as a higher-order skill, requiring an individual to engage in a multifaceted cognitive process. In this process a given situation is assessed, information is collected from various sources such as direct observation, reflecting on one's past experiences, communicating with others about the issue (Smith & Szymanski, 2013), analyzed, and a conclusion arrived at upon which action is based (Pitt, et al., 2015). In 2001, Ignatavicius identified six essential cognitive skills, namely analysis, interpretation, evaluation, inference, explanation, and reflection, required for successful implementation of critical thinking (Ignatavicius, 2001; Lin, Han, Pan & Chen, 2015; Carter, Creedy & Sidebotham, 2016). These cognitive skills complement Facione's cognitive process well, where, given a situation, the critical thinker is expected, after assessing the situation, to utilize the skills of interpretation,

evaluation, inference, explanation, and reflection in the gathering and processing of relevant information, and after engaging in analysis, decisions are made and action taken.

John Dewey (1916) and Kurfiss (1988) took a philosophical standpoint on critical thinking and its implementation. These authors proposed that one who is a critical thinker postpones making conclusions and views a situation as having multiple possible outcomes, having the ability to argue or discuss issues from multiple perspectives with reasons for and against each, which they suggested is parallel to what occurs in critical thinking (Simpson & Courtney, 2002). Thus, being a skeptic and not accepting a single truth was deemed as central to becoming a critical thinker (Dewey, 1997; Simpson & Courtney, 2002). Therefore, based on what was put forward by Simpson and Courtney (2002), this researcher concludes that it is important in the development of critical thinking, that students are engaged in activities such as debates and group discussions which allow them to scrutinize a given issue, examine the literature and other forms of evidence to find support and opposition to various points of view, process the information and organize their position for decision making. By engaging in these activities students are allowed to engage in the critical thinking process and are better positioned to develop the skill.

Critical thinking is multidimensional, that is, it involves the cognitive, affective, and psychomotor domains, as proposed by Watson and Glaser (Zulmaulida, Wahyudin, & Dahlan, 2018). Kiltz (2009); Simpson & Courtney (2002); Zulmaulida, et al. (2018) identified that various theorist such as Watson and Glaser (1980), Brookfield (2017) and Mc Peck (1981) all proposed that knowledge and skill are essential to critical thinking, but one's attitude, worldview and emotion must also be considered, as these are significant factors in one's ability to think

critically. Therefore, critical thinking development requires students to not only be taught the knowledge and skill such as Ignatavicius's six essential cognitive skills, but also to understand the need to become reflexive practitioners, with the drive for life-long learning, and always to be open to multiple perspectives. A reflexive practitioner is one who examines and understands the "impact of their assumptions, values, actions on others and what is being said and not said" on critical thinking (Cunliffe, 2016, p. 741). It therefore involves going beyond the issue itself to understanding how your personal worldview may impact on your ability to critically think and make decisions.

Wilgis and McConnell (2008) described critical thinking as a specific skill required by nurses to facilitate the effective implementation of their expansive role as a member of the health care team. The authors claimed that critical thinking is a process whereby nurses utilize the steps of the nursing process; assessment, diagnosis, planning, implementation, and evaluation, to analyze patient care issues and arrive at a priority list of interventions to solve clinical dilemmas (Lin et al., 2015). This inclusion of the nursing process is very applicable and concurs with the definitions above whereby nurses as critical thinkers require multifaceted information and complex mental processing, as very often there is not one solution to a clinical issue, but multiple interventions that are required to be applied in a prioritized and sometimes simultaneous manner.

As a result of the variation in definitions there was a lack of consensus on a definition to describe what critical thinking was prior to 1987. It was in 1987 that the American Philosophical Association appointed Facione to establish the Delphi Project. The Delphi Project was a convening of experts from various disciplines such as nursing, education, and research (Shoulders, Follett & Eason, 2014) from across the USA and Canada, to systematically examine

how to define critical thinking and how it was to be assessed. The outcome of this expert panel was the development of a consensus definition of critical thinking to assist in curriculum development, its implementation, and how critical thinking is assessed. This project concluded with the production of the Delphi Report, which was adopted by the American Philosophical Association in 1990 (Facione, 1990). The proposed definition published in the report read:

"We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference as well as explanation of the evidential conceptual, methodological, criteriological or contextual considerations upon which that judgement was based. Critical thinking is essential as a tool of inquiry. Critical thinking is a pervasive and self-rectifying human phenomenon. The ideal critical thinker is habitually inquisitive, well-informed, honest in facing personal biases, prudent in making judgments, willing to consider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit." (Facione, 1990, pg. 3).

This definition encompasses many facets of critical thinking and as a result not only allows for unification in the defining of critical thinking across disciplines but also identifies area of focus for critical thinking development, as well as, sets parameters to use in its assessment.

Further, Shoulders et al., (2014) reviewed the Delphi Report and noted that the expert panel also examined what is critical thinking in nursing and put forward the following definition:

"Critical thinking in nursing is an essential component of professional accountability and quality nursing care. Critical thinkers in nursing exhibit these habits of the mind: confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance, and reflection. Critical thinkers in nursing practice the cognitive skills of analyzing, applying standards, discriminating, information seeking, logical reasoning, predicting, and transforming knowledge." (Ibid, pg. 208).

The above definitions identified the skills required for student nurses to be deemed critical thinkers. However, even though student nurses and graduating nurses may possess a high degree of theoretical knowledge, they may lack the ability to apply this knowledge and solve problems in the clinical setting, resulting in poor or unsafe care administered to patients (Wahl & Thompson, 2013; Kermansaravi, Navidian & Yaghoubinia, 2019). This evidence highlights the urgent need to identify where the gaps are in students acquiring this skill and identify strategies to improve its development, both of which this study aims to do. The above definitions from the Delphi report were used to guide the examination of critical thinking and the tools used to assess same for this research.

Critical Thinking in Nursing

In the fast-paced health care environment and the expanding role of the nurse, critical thinking is vital in the delivery of patient care to guide clinical decision making, as poor judgment or decisions can have detrimental effects on patients. Fowler wrote about the increasing demands placed on registered nurses from this modernized health care system, and

thus, the agreement by educators and practicing nurses alike, of the need to put critical thinking

development as a fundamental requirement for nurses (Fowler, 1998). Nurses are usually the

health care personnel monitoring at the patient bedside, and failure to utilize critical thinking in

the provision of patient care can result in "inequitable, poor quality or even dangerous nursing

care" (Lee, Abdullah, Subramanian, Bachmann & Ong, 2017; Bodin, 2012; Simpson &

Courtney, 2002, p. 90). The aforementioned, once more, highlights how essential critical

thinking is to nursing practice and how it underpins all activities.

As critical thinkers, registered nurses should be able to assess even small changes in a

patient's condition, interpret what these changes mean in the context of all the information that

they have gathered and implement a plan of care that can prevent a patient from decompensating

and even death. From the definitions above, it is clear that to be a critical thinker registered

nurses must possess specific characteristics and must be able to utilize the skill promptly in the

delivery of care.

Forneris (2012) and Chang, Chang, Kuo, Yang and Chou (2011), conducted cross-sectional

studies, examining the relationship between critical thinking and nurses' clinical competence and

in both studies noted that there was a link between both variables (r = 0.32, p < 0.001), which

demonstrated that a positive correlation existed between critical thinking and the competence

level of nurses. The authors in both studies used the Watson-Glaser Critical Thinking Appraisal

and the Nursing Competence Scale in their examination of clinical nurses and found that the

nurses' critical thinking and nursing competence were at the middle level. Further, as critical

thinking scores increased, so did nurses' competence level (Forneris 2012; Changet al., 2011).

Overall, the authors suggested that the higher the ability of a registered nurse to think critically

and justify decisions, the more competent the registered nurse will be (Forneris 2012; Chang et al., 2011). These results demonstrate the need to increase the critical thinking skills of registered nurses and student nurses alike, as it showed that when critical thinking skills increased, so did nurses' competence.

Since clinical decisions frequently identify multiple options, all of which may have value, a competent registered nurse must have the skill of choosing and justifying the best option for the present situation, which will vary from patient to patient, setting to setting, and impacted by other factors (Jacob, Duffield & Jacob, 2018; Kaya, Şenyuva & Bodur, 2018; Polat, Erkan, Kutlu, Ay & Purİsa, 2018; Ulsenheimer, Bailey, McCullough, Thornton & Warden, 1997). The results of the studies by Forneris (2012) and Chang et al. (2011) above emphasize the need to improve critical thinking to improve clinical competence, and equip nurses with the skills to choose the best decision options for the patient.

In a longitudinal study conducted by Pitt et al. (2015), it was demonstrated that critical thinking scores could be used to predict student's outcome at the end of the nursing program, that is, who completes successfully and who does not. Their results showed that students' analysis on a critical thinking scale was a strong predictor of the student not only completing the program but doing so in the three years allocated to the program.

The health care system is inundated with problems, ranging from high cost of healthcare, inequity regarding availability and accessibility of care, and overall quality of care issues, and nurses practicing without critical thinking can be seen as part of the problem (Nilsen, Seing, Ericsson, Birken & Schildmeijer, 2020; Azizi-Fini, Hajibagheri & Adib-Hajbaghery, 2015; Gilbert & Nordyke, 1993).

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Laschinger, Hall, Pedersen, and Almost (2005) conducted a research in 14 hospitals in Ontario, Canada, to ascertain patient satisfaction. The research revealed that the hospital's overall satisfaction and the quality of care delivered was directly pinned on the level of nursing care administered (Laschinger et al.,2005). Thus, from these findings, leaders, and managers of hospitals and medical institutes can deduce the importance of improving registered nurses' critical thinking skills not only to improve patient outcomes as demonstrated above but also to improve institutional ratings.

Therefore, reflecting on the literature identified above and that by Papathanasiou, Kleisiaris, Fradelos, Kakou and Kourkouta (2014), it is suggested that if nurses' interventions are not pinned on the implementation of critical thinking, the outcome will be ineffective, unsafe, and haphazard in relation to nursing care. Thus, it is evident that further discovery is required to unearth the reasons why students transit from the nursing institutions without the mastery of this skill and, as a result, become nurses that implement care with deficits in their ability to manage patients with this higher level skill.

Critical Thinking in Nursing Students

Tanner in 2006 coined the term "thinking like a Nurse" (Tanner, 2006; Kabeel, & Eisa, 2016, p. 91), which highlights the fact that student nurses are not only trained in the art and science of nursing but also to develop higher-level thinking skills, which requires the implementation of critical thinking. Thus, if student nurses are to progress to registered nurses that are competent practitioners, critical thinking development must commence early in training

and be practiced frequently, or students may be unable to implement critical thinking consistently in their delivery of care (Kabeel & Eisa, 2016; Pitt et al., 2015).

Critical thinking development is fostered in academic environments by promoting discussion and engagement of the concepts at the student level (Belluigi & Cundill, 2017; Goldberg &Ingram, 2011). Research has also suggested, however, that other factors such as the student 's age, their level of clinical exposure and experience, as well as their educational level are all factors that can impact their ability to develop and master the skill of critical thinking (Azizi-Fini et al., 2015). Research conducted on undergraduate freshmen and senior nursing students noted an overall poor level of critical thinking of student nurses across the various levels (freshman versus senior) (Azizi-Fini, et al., 2015; Eslami & Maarefi, 2010). This is important to note for educators, as it highlights the possibility that students can transition through nursing programs, where multiple approaches would have been implemented, without their critical thinking skill advancing to a competent level. Therefore, educators must be mindful that critical thinking development, being a complex task, requires a multidimensional approach targeting students at various levels of the nursing program and not taking for granted that its improvement is not linear with students' years of study.

Conversely, a different picture was shown from a study by Khalili, Baba Mohammadi, Hadji Aghadjani and Qods (2003) on 17 first-year, 3rd-semester students using the California Critical Thinking Skills Test (CCTST Form B) to evaluate the outcome of two strategies used in teaching a class. The first half of the class was taught using the classic method (multimedia-aided lectures ending with questions and answers), and the second half used critical thinking methods (group discussions, student lectures, and writing assignments) to improve in-depth learning and

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critical thinking in student nurses. The results of the CCTST showed a significant improvement in the students overall learning in both groups. However, the mean scores of the exam results showed a greater improvement in the student grades when the critical thinking strategies were implemented, demonstrating that critical thinking could be taught if the correct teaching strategies are utilized.

Another study that supports that critical thinking is a skill that can be improved through curriculum adjustment and adopting student-centered teaching approaches, was conducted by Thompson and Rebeschi (1999). It assessed the critical thinking skills of 38 Baccalaureate nursing students at an urban university, upon entry to the program until two weeks before the students graduated (1995 – 1997). This nursing program shifted from its traditional process of implementation, that is, through the use of more teacher-centered approaches, to utilization of the APA Delphi report definition of critical thinking to guide its program in the development of its outcomes, to direct how processes like the nursing process will be utilized within the curriculum to aid in students' development of critical thinking, and identifying what teaching strategies would be used to build inductive and deductive reasoning for the cohort. This study used the California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Disposition Inventory (CCTDI) as its instruments and found an overall significant increase in the students' level of critical thinking, with means scores across all subscales increasing (Thompson & Rebeschi, 1999).

To examine further how critical thinking can be taught, Huang, Lindell, Jaffe and Sullivan (2016) interviewed both medical and nursing faculty to ascertain the approaches faculty utilized to teach critical thinking. The faculty identified strategies such as problem-based learning (PBL)

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and clinical cases to facilitate students working through scenarios to aid in critical thinking development. On the other hand, Alosaimi (2013) suggested a close examination of the curriculum, where educators/administrators ensure that the curriculum is one that is based on models of critical thinking and implements activities, assignments, and assessments that foster critical thinking development. Solihati and Hikmat (2018) took yet another approach and suggested examining the textbooks used in educational programs, as they found when examining Indonesian language textbooks, the books did not contain many critical thinking activities, and the few it did were centered on the same type of activity. Thus, nursing faculty must examine if the textbooks that are being used foster critical thinking through the use of varied critical thinking exercises. Additionally, Boso, van der Merwe and Gross (2019) highlighted that there are various frameworks and models that aim at assisting student nurses in critical thinking development. However, they demonstrate varying degrees of success. For example, Romiszowski's (1981) framework for knowledge and skills and Marzano's (2001) taxonomy both uses the foundation of blooms taxonomy to improve students' abilities to make link, develop thinking processes and improve on the use of metacognition, which are important in critical thinking development. However, deficits were highlighted in these frameworks, as they inadequately focus on the application of cognitive and higher-order process of thinking (Dwyer, Hogan and Stewart, 2014). Therefore, they may have identified the skills required but not the process to apply these skills in decision making processes. Other frameworks such as the Critical Thinking Framework for Any Discipline by Duron, Limbach and Waugh (2006), which identified practical classroom activities that can be implemented to aid students' in critical thinking development. These activities included "determine learning objectives, teach through

questioning, practice before assessing, review, refine and improve and provide feedback and assessment of learning" (Boso, van der Merwe and Gross 2019, p. 582). However, even though research demonstrated that the classroom environment in crucial in the development of critical thinking skills, the activities identified in this framework, has not received adequate examination or observation in nursing research (Boso, van der Merwe and Gross, 2019). As a result, none of these authors offer a holistic solution to the problem of critical thinking development of student nurses, and so, it is hoped that results gained from this research can add to this body of knowledge and aid in finding that solution.

It is also essential to examine what can hamper the development of critical thinking skills in nursing. Boso and Gross (2016) highlighted eight factors that can negatively affect the development of critical thinking namely, "course structure and materials; lack of institutional framework/support; students' characteristics; large class sizes, time limitation; faculty limitation; seeing faculty as authority that should not be challenged; encouraging inappropriate learning styles and finally, the desire for good grades" being the primary motivation for learning (p. 10-11). All of these factors identified by Boso and Gross (2016) are possible factors that can hinder the development of critical thinking in students at the researcher's institution and thus evaluation for same is necessary to institute measures to alleviate these potential problems.

From the above results, and from the pronouncements of Follman (2003), it seems that the literature on critical thinking in nursing students, its ability to be developed and what factors affect its development negatively and positively, are having inconsistent "change in professional nursing students and thus concluded the results are mixed and conflicting" (p. 255), as some authors found that critical thinking was poor across all the levels of nursing students, even when

they became clinical nurses, while others noted that critical thinking could improve and thus, requires increased engagement by academic institutions and a realignment of the curriculum. More recently in 2020 Gonzalez, Hsiao, Dees, Noviello and Gerber advocated for the need for more research to be done in nursing to examine critical thinking and how the habit of critical thinking can be developed in nursing students. This area, therefore, requires greater exploration to identify the various issues hampering student nurses' critical thinking development and identify solutions to same. It is noted overall that student-centered learning and student engagement facilitate learning, however, because different interventions were used in the above studies, such as utilizing various teaching methodologies to assess its impact on critical thinking, as well as different assessment tools (CCTST, CCTDI, etc.), there is a possibility that these differences could have impacted on the results. There is therefore, a call for a greater exploration of the methods used to prepare students to utilize the skill of critical thinking, as well as understanding the student factors that can promote and hinder critical thinking development, which was explored in this study.

Critical Thinking in Nursing Education

One of the key goals of nursing education is the development of student nurses who can think critically (Kaddoura et al., 2016; Azizi-Finiet al., 2015). Kaddoura et al. (2016) also noted that international bodies such as the Institute of Medicine America (independent, non-profit organization that provide advice to the public, policy, and decision-makers), and the American Association of Colleges of Nursing, mandate that nursing institutes recognize the role of critical thinking in providing registered nurses with the ability to effectively attend to issues in the

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clinical setting, considering their expanding role and dynamic work environment. Further, the National League for Nursing in the United States places critical thinking development and assessment as key criteria for nursing curriculum and, therefore, has placed it as one of the areas assessed for accreditation purposes (Facione & Facione, 1994).

Hackworth and Case-Smith (2012) proposed that after analyzing responses from 317 radiologic science program directors, that a factor that hinders students' development of critical thinking was the teaching strategies utilized in the program. Therefore, the curriculum should be carefully assessed to ascertain if the strategies utilized are aligned to critical thinking development or not. When the nursing curriculum emphases acquisition of content instead of mastery of critical thinking in the transfer of knowledge from the theory to practice, newly graduated nurses lack the ability to think critically (Pitt et al.,2015; Daly, 1998) and are less likely to function safely and effectively in the clinical area. With this in mind, there is now a need to call for nursing curricula to be evaluated to ensure that they foster critical thinking mastery and strategies that promote same, as opposed to content delivery by educators.

The Institute of Medicine America committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing produced a report on the future of nursing, which stressed the importance of nursing institutions and nursing residency programs implementing more hands-on pedagogical strategies to aid students in the development of critical thinking skills and to revolutionize the learning environment from the promotion of traditions and practices of the past (Shoulders et al.,2014). It was a call to transition to evidence-based practice and promoting bridging the gap between theory and practice through the use of critical thinking. With this recommendation in mind, this current research aims to assess if the two strategies discussed

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below can be used to facilitate students' improvement in critical thinking development and, therefore, aiding to move away from the traditional teacher-centered style of teaching, such as lectures.

In the Caribbean region and locally in Trinidad and Tobago, nursing education has also moved in the direction of the assessment of critical thinking skills in our nursing students. This is demonstrated in the change from the Nursing Council of Trinidad and Tobago to the Caribbean Examination Council (CXC), the organization responsible for administering the final regional examination to qualify student nurses and a clear shift towards examining student's ability to use critical thinking skills (Government of the Republic of Trinidad and Tobago, 2013).

Paul and Heaslip (1995) posited that nursing curricula should be geared to teach students to utilize critical thinking reflectively, using various clinical scenarios, for them to become skilled practitioners with expert knowledge. Therefore, the focus of nursing curriculum must be two-fold, firstly, to develop the nurse that can implement care safely in the dynamic healthcare environment and secondly to focus on nursing content and the mastery of critical thinking skills (Lin et al.,2015).

However, researchers such as Raymond, Profetto-McGrath, Myrick and Strean (2018) argue that the curriculum and other issues mentioned above may not be all the factors to examine when exploring the issue of critical thinking in nursing education. They noted that the issue might be the critical thinking ability of the nurse educator, who is challenged in their use of critical thinking and hence have difficulty in aiding the students in the development of this skill (Raymond, Profetto-McGrath, Myrick and Strean, 2018; Zygmont and Schaefer, 2006; Mangena

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and Chabeli, 2005). Therefore, it is imperative when examining critical thinking in nursing, for the focus not only to be on the student factors, curriculum, textbooks, and strategies of class implementation, but also on the competencies of the nursing educator, which can be a factor that hinders critical thinking development. For example, research by Boso and Gross (2015) found that 95.3% of the 106 nursing educators' participants could not define critical thinking completely, thus the need for further examination of nursing educators' competencies and roles. During this research, focus groups will be held with both students and clinical instructors to ascertain what factors, educators' competence possibly being one, hampers critical thinking development in the student nurse. Raymond, Profetto-McGrath, Myrick and Strean, (2018) identified a gap in the literature regarding this factor and suggested that it requires further exploration.

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Theoretical Perspectives on Critical Thinking Development

During the literature review various theories relating to critical thinking were explored such as the Garrison's Theory of Critical Thinking and others identified above. The theories were also examined based on broad categories such as behaviorist, constructivist, and other learning theories as described shortly. However, for this inquiry the theories utilized should not only be applied to improve critical thinking of the BScN nursing student, but also complement the curriculum, the uniqueness of the University's nursing program, and the faith-based ethos of the institution. Thus, the literature review was guided by these factors to identify the best theoretical perspectives for this research. Across the years, various theories emerged to examine how learners learn, including the way in which adults learn. For example, behaviorist theorists such as Pavlov, Watson, Thorndike, and Skinner, focused on the apparent behaviors of the learners, as opposed to the cognitive processes that take place. The theorists that subscribe to cognitivism such as Piaget, Vygotsky and Ausubel, shift the focus of examining behaviors to that of cognitive processes (Valente, Costa, Lynch & Barros, 2018). There are also the oriented theorists such as Dewey, Bruner and Elder and Paul, who propose that learners should be actively engaged to be able to construct knowledge. Therefore, in order for students to make sense of information they must engage in internal processing of the information with their preexisting information and experiences, and constructing new meaning (Valente et al., 2018).

In examination of critical thinking above, it was highlighted that the critical thinker must possess the ability to utilize past knowledge and experience when analyzing care issues to determine the best decision. Thus, elements such as this guided the research in the choice of the theoretical framework for this study. For this research, two theories help frame various elements,

the theory of Meaningful Learning by David Ausubel, and Elder and Paul 's Stage Theory of Critical Thinking. The theory of Meaningful Learning by David Ausubel was utilized as the theoretical framework, guiding the choice of teaching strategies tested, the analysis process and discussion. Research suggested that the Ausubel Meaningful Learning Theory used concept learning and concept mapping to promote the development of critical thinking (Bousquet, & Ohio State Univ., 1982). This cognitivist theory posits that in order for students to acquire new knowledge one must build or interact with previous knowledge, which is then redefined, modified or changed based on the interaction with the new information (Agra et al., 2019). Ausubel 's and other cognitive theories, postulate that the main elements that influence the learning process is what was previously known by the student and that the information must be made meaningful to them (Agra et al.,2019). This theory was chosen because it encapsulates well how the curriculum guides the learning process, where many of the University courses are built on concepts taught in previous courses, or one course is a prerequisite for another to build on. Therefore, the learning process is seen as a step by step process that builds one concept on another. Also, ensuring that the student is incorporated in the learning process is another essential element of the University program and this theory, where information delivery and activities implemented are done to allow for student assimilation of knowledge.

Finally, Ausubel's Theory identifies the importance of making learning meaningful to the students and to encourage active engagement, this also is fundamental to the program whereby through the use of journals and portfolios, students can examine the information in a manner that is meaningful to them. However, even though the University program and curriculum are designed to actively engage the students and make learning meaningful, it is not always easily

and consistently implemented, and its implementation is not standardized so that it can be done haphazardly. Thus, this research aims to use this theory to guide the recommendations made to improve the learning process for students. Research has demonstrated that the use of this theory in nursing results in improved knowledge acquisition or learning and better application of knowledge (Agra et al.,2019).

The theory of Meaningful Learning by Ausubel is a five-step process which when implemented, increases the learning of the students and the ability of the student to actively engage or critically think and assimilate new information (Meydan, 2018). The five steps of this theory are:

Step 1: Reviewing preliminary information. Here the student focuses on the information he or she has on the newly learned subject, that is, their prior knowledge on the subject.

Step 2: Analyzing the newly learned subject. At this step, the student actively engages in examining the newly learned materials, its concepts, its parts, and what it may mean.

Step 3: Comparing preliminary and newly learned knowledge. The students at this stage will compare the information they have with the new information presented to them, examining similarities and differences between the two.

Step 4: Cognitive Self Reflection. This stage sees the students actively engaging in a cognitive process whereby the students modify the old information from exposure to the new.

Step 5: Transferring. At this stage, the student now uses or applies the new knowledge to solve problems (Meydan, 2018).

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Figure 1

Theoretical Structure of David Ausubel Meaningful Learning Theory Source: (Meydan, 2018)
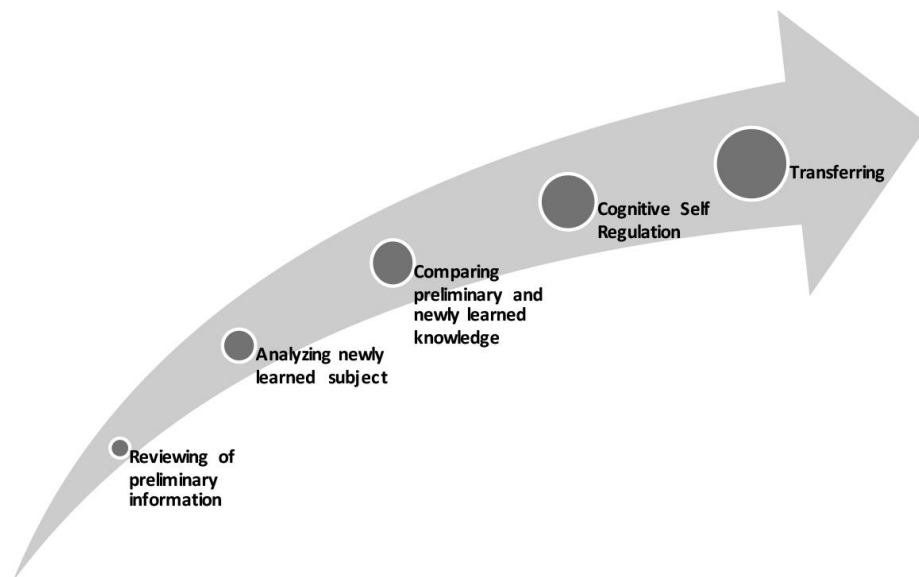
From the above description of the theory, it can be noted that the process of learning and critical thinking development requires students to challenge themselves by engaging in reflection, analysis, and recreating new schemas, then transferring this new knowledge to the decision-making process and solving presenting problems. For nursing, this is what our students should be able to implement. Also, these steps can be utilized when choosing teaching strategies that best facilitate critical thinking development and active engagement of the student. For this study, this theory of Meaningful Learning has guided the choice of utilizing concept mapping and clinical case as the test strategies to ascertain their impact on students learning and critical thinking development. This is because the Meaningful Learning Theory is underpinned by the concept of a step by step process to learning, starting from where the learner is and building on their knowledge. It also advocates for learner's engagement in the learning process, and thus,

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guided the choice of the are two student-centered teaching strategies tested in this study, concept

mapping and clinical cases, that embrace these principles.

The second theory that grounds this research is the Elder and Paul's Stage Theory of

Critical Thinking. Elder and Paul (1996) described the critical thinker as a thinker that is

challenged and proposed that students must be actively involved in the learning process to be

able to think critically and use the skill of critical thinking to solve problems (Riggs & Hellyer-

Riggs, 2014). This theory examines six stages that an individual must progress through on their

journey to mastering the skill of critical thinking. The six stages are: unreflective, challenged,

beginning, practicing, advanced, and master thinkers (Elder & Paul, 1996). The assumptions that

underpin this theory aligned well with this research, and thus, aided as a guide in the planning

and implementation of this research. The first assumption was that all individuals that developed

critical thinking skills pass through the predetermined stages (Paul & Elder, 1997). This relates

well with nursing and nursing education, as we are guided by models such as the Benner's

Novice to Expert Model, which describes how nurses go through stages of skill acquisition

(novice, advanced beginner, competent-level, proficient and expert) in skill development as they

transit through their development as nurses (Thomas & Kellgren, 2017; Murray, Sundin & Cope,

2019).

Additionally, using this theory assisted in the choice of the tool utilized in the assessment

of the students critical thinking skill the CCTST, which allowed for the classification of students

at various levels of critical thinking, from superior to poor level, supporting the premise that

development of critical thinking is a process beginning with poor or unreflective and advancing

to superior or a master critical thinker. Thus, the results for the CCTST were examined within

the context of this theory to aid in understanding which stages the CUC students were at, and thereafter, developing recommendations to get students to the mastery level of critical thinking.

The second assumption of the Stage Theory of Critical Thinking is that to progress from one stage to the next requires active involvement from the student, (Paul & Elder, 1997), a concept held by Ausubel's theory above. This theoretical assumption also fits well for this research as the research is implemented at an institution where student's active involvement is paramount in their learning process. Active involvement of students is mentioned in five out of the 12 of the nursing department objectives. Some objectives are to challenge students in the integration of principles and professional ethics, using strategies that develop analytical and critical thinking in students and to utilize that skill in the evaluation of practice, and ensuring that the students not only acquire knowledge but can demonstrate same and develop into self-motivated lifelong learners (USC, 2017). However, the implementation of these objectives is sometimes challenging; for example, what are the most appropriate teaching strategies to actively engage our students? Thus, this theory was utilized to guide the design and analysis of this research required to fill these gaps within the department.

The third assumption of this theory is that for students to develop the mastery of critical thinking or progress through the journey, the strategies used in assisting students in developing same must be at a level that is understood by the students (Paul & Elder, 1997). This research tested two strategies, clinical case, and concept mapping, in keeping with this assumption that as educators, it is important to seek to discover and implement strategies that foster student involvement in their development of critical thinking.

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Therefore, for this study, the Meaningful Learning Theory by Ausubel and the Stage Theory of Critical Thinking by Elder and Paul framed how the study would be implemented, that is a phased or step by step methods and using an inclusion criteria of students with a foundation in critical thinking concepts so that the concepts can be improved. These theories also assisted in the choice of tools utilized, as for this study, the CCTST was used to ascertain information about the student nurses' critical thinking skills and placed them into categories as demonstrated by Elder and Paul's theory. Concept mapping and clinical cases were chosen as the student-centered test strategies, as they had the elements of active engagement and content set at student understanding level, which were identified by these theories as elements needed to assist in the critical thinking development of students. Lastly, these theories were used as guides in formulating the recommendations, as they offered models on which the recommendations could be built.

Techniques to Improve Critical Thinking

McMullen and McMullen (2009) attempted to explain how critical thinking should be taught to students. They noted because it is a skill for implementation, competence in critical thinking must be gained through practice (McMullen & McMullen, 2009). From the literature, it can be deduced that the development of critical thinking is an individualized journey that develops based on the student's engagement, support, and exposure to situations and environments that fosters critical thinking.

Nurses with more years of service and clinical experience possess a greater ability to think critically compared to newly graduated nurses; however, even though they have had more time to practice, the skill was still underdeveloped (Shoulders, et al.,2014). As such, to increase the

mastery of critical thinking skills, more student-centered teaching strategies such as concept mapping, group activities, clinical cases, journaling, simulations and problem-based learning (Shoulderset al, 2014; Simpson & Courtney, 2002) must be implemented in schools and continuing education programs.

Hacisalihoglu, Stephens, Johnson and Edington (2018) conducted research on students at Florida A&M University and conclusively found through the use of an experiment and control group of students, that students who were taught using strategies that fostered student engagement and critical thinking such as one-minute paper, think-pair-share, group activities and the utilization of clickers, increased students learning, that is, exam scores and homework assignments, up to 16% more than the control group.

Azizi-Fini et al., (2015) and Simpson and Courtney (2002), postulated that the use of traditional teacher-centered methods impedes critical thinking development. From a review of available research, Carter, Creedy and Sidebotham (2016) recommended that information was deficient regarding what areas are lacking in critical thinking of student nurses and which strategies when implemented best assist in its development, both to which this research is aimed at contributing.

Research was conducted on three Baccalaureate nursing programs in Beirut, Lebanon, to ascertain whether they utilized teacher or student-based strategies for learning and assessment. The findings revealed that there was a scarcity in the use of student-centered approaches and that the educators placed emphasis on covering volumes of content and examined for retention of that content (Kantar, 2014). This finding mirrors what occurs currently in the department at the University, where content delivery is still the emphasis of classroom activities. The results from

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Kantar's study highlighted the urgent need for upgrading of educator's competence in the implementation of student-centered strategies. Rosciano (2015) suggested student-centered strategies can be challenging for educators but must be done, as it is through the implementation of the student-centered approaches that educators can facilitate knowledge transfer and development of critical thinking skills (Kantar, 2014).

The researcher reviewed various student-centered strategies highlighted in the literature when selecting the strategies to be tested in this research. Exploration of the literature revealed many of the student-centered strategies had conflicting outcomes from their implementation. For example, Son (2020) and Akalin and Sahin (2020) demonstrated the use of simulation resulted in improvement in students' critical thinking scores and, thus, had a positive impact on nursing students' critical thinking development. However, when Kelleci, Yilmaz and Aldemir (2018), conducted a similar experimental study on nursing students, simulation did not improve students' ability to think critically and, thus, was not recommended as a student-centered approach for nursing students. Similarly, the implementation of games such as puzzles was found to be helpful in critical thinking development by Garwood (2020) and Garrison, Colin, Lemberger and Lugod (2021). However, Lewis and Parkyn (2020) reminded readers of the various disadvantages of gaming. These conflicting reports occurred in other strategies as well, and at the University, teacher-centered approaches are still heavily relied on, and therefore, to narrow confusion and to identify appropriate strategies to implement, concept mapping and clinical case were tested to ascertain their impact on critical thinking development and will be discussed further below.

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Concept Mapping

Concept mapping was developed by Novak in 1972, grounded on the principles of Ausubel's theory of learning (Kaddoura et al., 2016; Novak & Canas, 2007). As noted above, Ausubel's theory of learning suggests that learning takes place by the interaction of new knowledge with old, where the learner starts with what he/she knows and integrates the new knowledge to refine and expand on what was previously known (Agra, Formiga, Simplício de Oliveira, Lopes Costa, Graças, Fernandes & Nóbrega. 2019). Concept mapping is a teaching strategy that utilizes a schematic representation of the material being taught, whereby students are assisted in making connections between the new and their existing knowledge and aids in the understanding of difficult concepts (Lin, Han, Pan & Chen, 2015). Thus, concept maps can help transit students through active engagement from rote memorizers to higher-order metacognitive individuals who can competently analyze a situation and think critically (Garwood, Ahmed & McComb, 2018). It requires the students to be actively engaged in the process and is effective when it starts with what is known by the students, builds on same, and makes connections between new and previous knowledge.

Chengyuan, Wheijen, and Shihyin (2019) offered that concept maps are very diverse tools, that can integrate both formulas and written text, and utilize visual and verbal modes in its delivery, to assimilate new knowledge with what is known by the student, resulting in improved problem solving and critical thinking. Concept mapping was found to be an effective teaching strategy that decreases the cognitive load and student anxiety while increasing students' motivation to learn and overall performance (Sun & Lee, 2016). Studies demonstrated that concept maps could increase student memory and understanding of the interconnectedness or

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relationship between concepts, improve recall of information, and the ability to coherently express the information in the future (Lee, Chen, Wang & Chung, 2018). The use of concept maps on cognitive skills of healthcare professionals was examined, and it was found to improve critical thinking skills and decision making within the clinical environment (Aliyari, Pishgooie, Abdi, Mazhari & Nazari, 2019). Further, it has been shown to improve the transference of theory to practice, thus decreasing the theory to practice gap, and having positive effects on nursing students' academic outcomes and critical thinking skills development (Dorttepe & Arikan, 2019). Kinchin described how concept maps could be used to promote higher-order thinking and can also be used as an evaluation tool to identify students' thought processing and their points of knowledge deficit (Kinchin, Möllits & Reiska, 2019).

A two-group concept map and clinical case research was conducted on 83 freshman nursing students in an American university, to elicit if the use of concept mapping during lectures throughout a semester will improve critical thinking development in the students. The students were assessed using the Health Education Systems, Incorporated critical thinking test, at the beginning and end of the course. The results showed that the critical thinking scores were significantly higher 84.15 points in the group taught using concept mapping, as compared to 25.24 points in the control group taught using lecturing only (Kaddoura et al., 2016). When implemented in BSN nursing students ', concept mapping was shown to improve students' overall critical thinking score (Carter, Creedy & Sidebotham, 2016) in all the critical thinking areas except analysis and deductive reasoning (Kaddoura et al., 2016). Concept mapping is seen as a method that actively engages students and allows for connections and relationships to be made in the concepts that may have been missed if traditional methods were used.

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Overall, concept mapping has been promoted to improve critical thinking development in student nurses and other populations. Seventy nursing students enrolled in the Tehran Nursing and Midwifery school were participants in a study to demonstrate which is better, concept mapping or traditional strategies at developing students' critical thinking ability. The students were divided into two groups, where one was taught using concept mapping, whereas the other group using traditional strategies such as lecture, demonstration, and practical exercises. Pre- and post-intervention scores of 9.71±2.66 vs. 15.20±2.71 in the concept mapping group, and 9.64 ± 2.14 vs. 10.25±2.06 in the control group, confirmed that it is a tool that should be used in nursing education to improve critical thinking.

Another study conducted on newly graduated nurses tested the implementation of concept mapping to ascertain if the novice nurse's critical thinking will improve. Results from the study using the Concept Map Care Plan Evaluation Tool, showed the paired t-test of student's post-test scores was (t = -2.797; df = 13; p = .008) (Wilgis & McConnell, 2008). This result demonstrated that use of concept maps as a teaching strategy does significantly improve critical thinking development.

However, some authors such as Wickramasinghe, Widanapathirana, Kuruppu, Liyanage, & Karunathilake (2007) and Nirmala and Shakuntala (2011) argue that concept mapping is not a tool that can be used in short-term learning because it is a method that must first be learned by students before its implementation and therefore, cannot be used in such circumstances (Lin et al., 2015). This research, concept mapping was used in one session to ascertain its impact and the results noted below. There was a degree of confidence in choosing and using this method as it was noted previously that the inclusion criteria for students is that they would have taken a

course which include critical thinking methodologies. Therefore, students had some background into concept mapping, and its implementation. One of the tools used in student year-one classes, though haphazardly, was concept mapping, so, the issues argued by the above authors were negated.

Also, research conducted by Wheeler and Collins (2003) found that when critical thinking was explored in BSN students with the use of concept maps no significant findings were observed between the concept map group and the control group, leading to the proposal that other active learning teaching strategies such as clinical cases be implemented in assisting students in the development of critical thinking (Lin et al., 2015). The studies above presented conflicting results, as some demonstrated the value of using concept maps, whereas others, such as Wickramasinghe, et.al, (2007) and Nirmala and Shakuntala (2011) showed that it is inappropriate in some instances and others, Wheeler and Collins (2003), noting no impact on improving critical thinking skills. The application or implementation of clinical cases have not been studied locally and thus, it is the aim of this research that the implementation of this study in the chosen population will add to the discussion if concept mapping can improve critical thinking, particularly in nursing students, where the skill of critical thinking is vital in the implementation of their duties.

Clinical Cases

A clinical case is a strategy whereby students are given real or hypothetical scenarios that they must deliberate on to come up with the best solution to a problem, clinical, or otherwise, in a safe environment. It allows students to consider multiple options for situations, but more so, explore the process to coming up with the potential options, creating that ability to deeply engage

issues, analyze, and evaluate them, which contributes to their critical thinking development (Shoulders et al., 2014). From the critical thinking definitions above, it was noted that a critical thinker must be able to be skeptical, always engaging multiple options in the quest to identify the best solution to the current issue. The use of clinical cases facilitates critical thinking development by this process by allowing the students to engage a clinical issue, identify the multiple causes, diagnoses, and solutions and come up with the best treatment plan for that patient.

Clinical cases are very dynamic, they can be used to engage students at all levels of the nursing education and beyond, as they allow for the scenarios to range from simple to complex, and wide to specific. A well-designed clinical case must include certain components. Shoulders, et al., (2014) identified a clinical case must include learning outcomes, not to confine the students' explorations or encouraging students to focus on getting the correct answer but as a guide to ensure the topic is widely explored, and to demonstrate and develop an awareness in students of the process it takes to arrive at an outcome and that during the exploration, many options are possible, an essential skill required by registered nurses (Shoulders et al., 2014).

There are some disadvantages to the use of clinical cases as identified in the research of Popil (2011), who noted that with clinical cases there is a potential bias of the author of the case, who can phrase the case in a manner that leads the students to a predetermined response and not allow full exploration. Further, Popil (2011) posited, where the learning intent is concrete information, a clinical case is not a good teaching methodology, as it requires good questioning skills on the part of the facilitator, is time-consuming, and may frustrate ill-prepared students.

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Cotugno (2018) also examined the effect of using the clinical case to improve the critical thinking skills of criminal justice students and found that there was no significant difference between the pre- and post-test of students, which the author posited could suggest there is no impact of clinical case on critical thinking development.

Conversely, a clinical case was found to reduce the theory-to-practice gap, and facilitate the analysis of a problem, from multiple viewpoints and examination of the variety of outcomes (Lee, 2007; Lin et al., 2015). Lee studied the use of clinical cases in 83 undergraduate students in an effective learning course and utilized Knoop's (1984) analytical steps (**See Appendix 5**) for the implementation of clinical cases to engage the students in a discussion to ascertain its impact on their critical thinking skills (2007). The finding demonstrated a significant increase in critical thinking in both the control and concept map group. It was found that the mean in the pre- and post-test of the clinical case group was 2.78 and 3.31, whereas the control group was 2.64 and 3.21 both at $p < .05$, showing the significant increase in the student critical thinking, with higher scores in the clinical case group (Lee, 2007). The Knoop's (1984) analytical steps were used to guide the students while engaging in discussion during the clinical case, and will be recommended as a standardized method of clinical case implementation for the University department if proven effective in this study.

Research was conducted in a hospital in Hualien, Taiwan, on 392 nurses using the California Critical Thinking Skill Test (CCTST), Form A, and pre/post-test assessment. Results demonstrated that the use of clinical case in the delivery of clinical content to registered nurses showed a significant improvement between pretest 10.88 ± 3.49 in the concept map and clinical case group and 10.98 ± 4.72 in the control group and post-test scores 12.43 ± 2.58 and $9.42 \pm$

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3.74 in the concept map and clinical case and control groups respectively, thus demonstrating a greater understanding of the concepts delivered and aided in their critical thinking development (Huang, Chen, Yeh & Chung, 2012).

These demonstrated differences across the aforementioned studies highlight again the need for this study in this area to ascertain if the implementation of clinical cases can improve critical thinking skills.

Assessment of critical thinking development

A review of the literature has demonstrated that there are various tools available to measure critical thinking skills across disciplines and employment settings. However, even though not specific to nursing, Pitt et al. (2015) noted that the California Critical Thinking Skills Test is a tool that is frequently utilized when assessing the critical thinking skills in the nursing profession. The California Critical Thinking Skills Test assesses critical thinking by examining the areas of analysis, inference, evaluation, deductive reasoning, and inductive reasoning (Pitt et al.., 2015)

The Watson–Glaser-Critical Thinking (WGCT) tool is another widely utilized tool to assess critical thinking level and development. However, it was deemed insufficient in its ability to assess the complex multidimensional issues and content areas in nursing (Yildirim, & Ozkahraman, 2011; Brunt, 2005). Brunt examined the California Critical Thinking Skills Test and found that even though it was not a test specific to nursing, it was more appropriate in assessing critical thinking in nurses (2005), as it was more adaptable to nursing compared to other tools such as the WGCT (Yildirim & Ozkahraman, 2011).

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The choice of California Critical Thinking Skills Test questionnaire was multifaceted. First, the tool has already been tested and has been found to be reliable and valid (Afshar, Rahimi, & Rahimi, 2014). Its reliability was determined with internal consistency and use of KR-20 and construct validity determined with factor analysis and internal consistency and group difference, resulting in a test coefficient for reliability of 0.62 (Khallli & Hosseln Zadeh, 2003). Gholami et al., (2016) in their study conducted test/retest validity on the CCTST Form B questionnaire used in this study, and found a correlation coefficient of 0.9 and using Cronbach 's alpha reported the internal consistency coefficient was calculated as 0.7 to 0.77 for the sub-scales and as 0.79 for the total scale, also demonstrating the validity of the questionnaire.

Additionally, the CCTST was developed in alignment with the definition of critical thinking outlined by the Delphi study, used in this research (Hunter et al., 2014; Insight Assessment, 2019). The CCTST assess critical thinking across domains identified above, three of which evaluation, inference, and analysis were part of the Delphi report definition on critical thinking, and logical reasoning used in the Delphi report definition of critical thinking in nursing (McMullen & McMullen, 2009). Hence, the CCTST tool was chosen as the tool used in the research, as it was based on the guiding definitions of critical thinking that informed the research.

From the above, it can be noted that students across all the years of nursing school and registered nurses have difficulty in the development of critical thinking skills, and even though it is established that student-centered approaches are superior in critical thinking development compared to teacher-centered approaches, which student-centered strategies are best remains unknown.

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Also, as noted earlier, there is a void of research in the area of critical thinking of BScN nurses in the Caribbean, which is required to aid our administrators both within educational and medical institutions in the development of critical thinking skills in both student nurses and registered nurses alike. This is to ensure the care administered to the clients do no harm but improve client outcomes. Therefore, this research aims to add to the body of knowledge in understanding this phenomenon and assist in improving the critical thinking development in student nurses.

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Methodology

This research aims to answer the following research questions and thus add to the improvement of critical thinking skills of student nurses and by extension registered nurses.

Research Question

1. How can critical thinking of BScN nursing students be improved?

Sub Questions

1. What is the current critical thinking skills level of BScN nursing students at the University?

2. What factors impede the development of critical thinking skills of BScN nursing students?

3. What factors contribute to the development of critical thinking skills of BScN nursing students?

4. What strategies can nurse educators implement to improve critical thinking skills of student nurses?

This chapter discusses the rationale for the research methodology and methods chosen. It elaborates on the chosen study design and describes the various data collection tools used in this study, which were the California Critical Thinking Skills Test questionnaire (CCTST), local pre and post exams, and focus groups. There were two interventions also implemented in this study to ascertain their effects on the student's development of critical thinking, namely concept mapping and clinical case. This chapter also outlines how the research was implemented using a five-stage process.

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Research Paradigm

A research paradigm is the belief system of a community that incorporates their philosophical assumptions or the lens through which they see the world and understand knowledge (Walsh & Kaushik, 2019; Duenas & Brown, 2019). This worldview or paradigm choice required detailed consideration by the researcher to ensure that it matched well with the researcher's worldview and the area under exploration. The research paradigm directs the researcher not only in their role in the research, but also in how the topic would be examined; that is, the questions asked, the methods chosen, tools and strategies used and how the findings are interpreted (Mackenzie & Knipe, 2006).

A pragmatist paradigm underpins this research as it focuses on finding practical solutions that work for a particular context (Tompson, 2017; Frey, 2018; Maarouf, 2019). The relationship between knowledge and action can be explored from three pragmatism perspectives: functional, referential, and methodological. From a functional pragmatism perspective, knowledge is required for action to occur; that is, knowledge can be utilized to enhance or direct action and aid in developing practice (Goldkuhl, 2011; Maarouf, 2019). The referential pragmatism perspective examines the "knowledge about action"; that is why an individual or group takes a particular action. The methodological pragmatism perspective explores "knowledge through action" where knowledge is ascertained through involvement in action; therefore, the knowledge that one acquires is created based on the activities they engage in (Goldkuhl, 2011; Maarouf, 2019, p. 5).

These perspectives offered great insights to the researcher and focused on the different standpoints the research can adopt to unearth the information on the explored phenomena. Thus,

the adoption of a pragmatic paradigm for this research was a good choice, as the research seeks to ascertain practical solutions that are relevant (Kelly & Cordeiro, 2020; Tompson, 2017) and will work to improve the critical thinking development of BScN nursing students. Kelly and Cordeiro (2020) suggest that the pragmatic paradigm aims at gaining a deeper understanding of complex issues through the use various techniques or methods to unearth the knowledge being sort. For this reason, the pragmatic paradigm is a good 'fit' with this research and the research questions, as it allows for a diversity of questions to be asked and a flexibility in methodologic choice to answer the questions. Additionally, using a pragmatic methodological worldview that knowledge is created from action, various facets of this thesis were shaped. For example, the theories used were based on principles of active engagement of students, and the teaching strategies adopted were also based on this paradigm. Pragmatists believe that even though two individuals cannot experience a situation exactly the same, they can have common or similar experiences and thus have a similar belief system (Walsh & Kaushik, 2019).

The pragmatist paradigm was chosen for this research as opposed to a positivist paradigm because from the positivist view there is one single truth, that is, the hypothesis is either proven or discredited (Mack, 2010). The positivist uses scientific methods and answers are best found through the use of quantitative methods with a focus on reliability and validity of the tools to measure the phenomena being examined (Patel, 2015). For this study of a complex phenomenon, only using positivist measures is not enough and to achieve depth of study, thus, constructivist elements are also appropriate. However, the constructivist/interpretivist paradigm by itself would have also been insufficient as a research paradigm for this study. Even though there is a belief that multiple truths exist, which is valued for an issue such as critical thinking, this paradigm

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epistemological focus is one of interpretation to unearth the meaning of an issue through qualitative means (Patel, 2015). Both positivist and constructivist paradigms on their own will be unable to derive the holistic understanding required for this topic because apart from the need to embrace the possibility that multiple realities exist, there was also a need to examine the issue from multiple methodological approaches in the form of mixed methods research to be able to triangulate the data.

This researcher's choice of the pragmatic paradigm is supported by authors such as Vaushik and Walsh (2019), who in their examination of the three paradigms discussed above, proposed if they were placed on a paradigm continuum, the positivist paradigm will be on one end and researchers who prescribe to the constructive or interpretivist paradigm on the other. This is so because the positivist paradigm requires logic, generalization, objectivity, deductive reasoning, and a standard process when implementing research. In contrast, the constructivist paradigm focuses on qualitative means of discovery using inductive reasoning and may appear more informal and subjective. However, the pragmatic paradigm can be seen as a middle ground, merging what is positive about both the positivist and constructivist approaches and adopting a flexible position to choose the best method to answer the research questions asked (Vaushik and Walsh, 2019). Therefore, abductive reasoning is used in the pragmatic paradigm and allows for moving between the positivist and constructivist paradigms while discovering the phenomena (Vaushik and Walsh, 2019). Hence the research can maintain the scientific underpinning while allowing for multiple outcomes. This was a fundamental need in this research and thus a reason for the choice of this paradigm.

However, shortcomings of the pragmatic paradigm have been highlighted, such as the need to place more focus on the assignment of a methodology, as this "connects abstract philosophical issues to actual mechanical methods" (Kaushik and Walsh, p. 255). In this way it is proposed that the researcher focus on the impact of the methodology chosen on the research. The researcher agrees with authors such as Goles and Hirschheim (2000) in addressing this concern, as they articulate that knowledge acquisition can be a complex activity and thus may require acquiring knowledge from multiple methods, subjectively and objectively. For this research, as the topic was explored from various perspectives, thus flexibility was required as oppose to the mutually exclusive methods as in the other paradigms discuss above. Another, difficulty some researchers have with the pragmatic approach is the possible of the introduction of bias, as the researcher and his or her worldview may influence the outcome of the research by the way the methods are conducted (Kaushik and Walsh, 2019). However, Morgan (2007) noted that in all research it is the author that ultimately makes decisions as to what questions would be asked and how it will be explored. As a result, all research is influenced by the researcher's worldview. However, the pragmatic paradigm as used in this thesis, tries to mitigate the introduction of bias, through the implementation of the use of opposing methodologies, whereby adhering to the strict process nature of the positivist and the deep exploration of the constructivist.

The epistemological stance of pragmatism is that there is no universal truth, but there can be multiple views gathered in seeking knowledge to guide actions based on the individual and shared experiences (Maarouf, 2019; Walsh & Kaushik, 2019). Gorard (2017) proposed that there are multiple realities which can be examined from multiple perspectives and therefore, through the utilization of a mixed method research grounded in pragmatism researchers can unearth

solutions to the research questions or issues under investigation. This is true for the researcher's phenomena being explored, as education is complex and there are many factors that promote and hamper CT development and there are various solutions that can be implemented to improve it. Therefore, with this pragmatist worldview, the researcher aimed to uncover the answers to the primary research question and the sub-questions and add to the body of knowledge regarding improving critical thinking of nursing students.

Shaw, Connelly and Zecevic (2010) addressed the benefits of integrating quantitative and qualitative modes of inquiry, as it allows for the amalgamation of multiple perspectives. They propose this results in more practical outcomes and the development of expertise in practice (Shaw, Connelly and Zecevic 2010), which is imperative in nursing. Since the pragmatic paradigm promotes flexibility in knowledge generation, it embraces mixing methods to discover the truth and improve practice.

The researcher was guided in choosing the paradigm and methodology by authors such as Parvaiz, Mufti & Wahab (2016), who demonstrated the complementarity of the pragmatic paradigm and use of mixed method research in knowledge inquiry. The authors highlighted that pragmatists aim to discover the best solution to a problem and shift the focus from strict adherence to ontology and epistemology. The pragmatist adopts the position of inter-subjectivity, where low value is placed on laws and strict adherence to theory and methodological choices while also rejecting the stance of complete subjective reliance for knowledge generation (Parvaiz, Mufti & Wahab, 2016). For the pragmatic researcher, the focus is on duality and "what works" best (p. 68), and therefore, the two extremes in qualitative and quantitative approaches are embraced. Thus, pragmatism is viewed as a framework that guides the use of mixed-method

research, allowing for the integration of data from two methods, resulting in greater strength and confidence in the results (Blank, 2013).

Choice of Mixed Methods Methodology

For this study, a concurrent triangulation quasi-experimental mixed-method research design was employed, as it has the potential of bringing together the strengths of the quantitative and qualitative research methods. Ercikan and Roth (2006) argued that it is the questions that the researcher seeks to answer that determine the mode of inquiry used in the research. Thus, a mixed method research methodology was chosen as the outcome of using both methods together aids in obtaining holistic results, with a deeper understanding of the area under investigation, advancing scholarly discussion, and increasing validity, which could be reduced with any single method (Zohrabi, 2013; Lopez-Fernandez & Molina-Azorin, 2014; Ponce & Pagán-Maldonado, 2015; Porche, & Spencer, 2017; Schoonenboom, & Johnson, 2017). From the research questions asked, it can be noted that the researcher not only requires information about the level of critical thinking of BScN nursing students but also from the student's and clinical instructor's perspectives, their views about what factors negatively and positively influence critical thinking development in this institution. These questions require both objective and subjective data to answer in their entirety (Ercikan & Roth, 2006; Berman, 2017). Therefore, a quantitative approach was used to answer the more objective sub-questions 1 and 4, through the use of the California Critical Thinking Skills Test (CCTST) and Pre/Post-intervention assessment. A qualitative approach was used for the subjective standpoint; answering all four sub-questions using focus groups with both BScN nursing students and their clinical instructors. Thus, the use of both methods would aid in receiving a more holistic view of the issues surrounding critical

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thinking of BScN nursing students compared to any individual method being utilized (Leppink, 2016).

Therefore, based on the areas outlined above, the mixed method choice for this research was a concurrent triangulation method, which allows for concurrent collection of the quantitative and qualitative data, and thereafter, comparison and combination of the data (Creswell, 2006; Creswell, 2009; Santos et al., 2017).

Even though mixed-method research affords various benefits as described above, regarding its richness of data, and ability to examine complex issues, while ascertaining the participant's (students and clinical instructors) perspectives (Regnault, Willgoss, Barbic, & International Society for Quality of Life Research Mixed Methods Special Interest Group, 2018; Gilbert, Cattell, Edwards & Bowen, 2017), it also brings with it some challenges. Halcomb (2018) identified some of the challenges of mixed method research which were experienced during this research, such as the need for additional skill and experience, and time. The implementation of a mixed-method research is complex (Salehi and Golafshani, 2010). As a result, it requires astute planning at various stages of the process, for example, the researcher must consider if the implementation of the research will be done in phases and what sequencing will be used, that is, one method after the next or simultaneously as done in this research. Also, what the sample sizes are for both arms of the research, and what time will be allotted to each part of the research (Wisdom and Creswell, 2013) are all issues for concern. How the data will be integrated (Lieber, 2009) also poses challenges in the implementation of mixed-method research. The deliberation regarding the integration of the data includes when the data will be analyzed and integrated, that is, will the analysis be separate then integrated, or one approach implemented and then the other

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built on it, or a third possibility where the entire process has the methods embedded in one another (Halcomb, 2018). All the possible combinations and thus different outcomes create a great challenge for implementing mixed-method research and must be considered before choosing such as methodology.

Another challenge is the need for an increased level of resources. The implementation of mixed-method research results in collecting two sources of data, which can be voluminous and requires often a well-trained team of researchers with various skill sets to complement the data collected and requirements for analyses and interpretation (Halcomb, 2018). As a result, even in small-scale mixed-method research such as this, the need for resources, human and otherwise, can pose challenges to the use of mixed-method research.

Having all the resources will not ensure that the study is conducted and information analyzed and presented appropriately, if the researchers are not competent or possess the requisite expertise (Kroll and Morris, 2009). Engaging in mixed-method research requires that the researchers be competent in both qualitative and quantitative methods. Therefore, as a researcher, it was necessary to gain knowledge in both approaches to be able to overcome the challenges of using a mixed-method approach. This was overcome by the researcher enrolling in additional classes to gain proficiency in both methods and the process of implementation and integration of mixed methods.

To utilized mixed-method research, the element of time is another factor that the researcher must consider, as this too can influence greatly if this methodology is the right choice (Tariq and Woodman, 2013). Time and other factors such as sequencing of the research must align well for

the research to be planned well (Halcomb, 2018). Therefore, in instances such as in this research where time was a limiting factor, the adoption of concurrent mixed-method research was a preferred choice, as the collection of both sources of data concurrently aided in the reduction of time during the data collection phase, as well as having all the information available for analysis.

Tariq and Woodman (2013) presented a final issue that can complicate the choice of mixed-method research, the presentation of the research findings. As a result of the volume of data and the varying perspectives, the researcher must decide if the findings will be presented separately or in combination, both of which carry advantages and disadvantages. Therefore, the choice of implementing mixed-method research can pose difficulty to a researcher, and various issues must be deliberated on and planned well before choosing to use this methodology. However, even though these challenges exist, the outcome gained from this method outweighs the challenges. In the end, these two methods were used to gain information from both perspectives, but more so, the researcher aimed to ensure validity and replicability of the results (Wheeler, 2012).

Santos et al. (2017) identified four areas that must be considered when planning to implement a mixed-method research, and same were used to guide the researcher's choice of a concurrent triangulated mixed-method research. These four areas were the time factor, the weight of the methodologies, combination of the data, and the use of a theoretical framework (Santos et al., 2017). The time factor was a significant consideration, as the students who fit the inclusion criteria were available for only six weeks in classroom before they went into the clinical area for an additional six weeks and were inaccessible for gaining consent, implementing the strategies and conducting the focus groups at that time. Additionally, since the focus group

questions were prepared during the process of gaining ethical approval, it facilitated the data being collected concurrently, as opposed to sequentially as initially planned.

The choice of equal weighting given to both the quantitative and qualitative approaches was based on the research questions asked. As the researcher, to the aim was to fully understand the phenomena being examined and be able to answer all the research questions posed, this therefore required data from both approaches equally. From the research questions under investigation, it can be noted that gaining information on the student's levels of critical thinking and the areas in their critical thinking that are strongest and weakest can be provided from a tool such as the CCTST scale. The CCTST tool as described below, allows for the examination of the level of critical thinking of persons and through the use of seven areas of critical thinking some of which are analysis, interpretation, inference, it scores the critical thinking of the participants to allow for the answering of the identified research questions. Further, to be able to answer research Question 4, the researcher had to quantify if an improvement was gained by students after using the tested strategies (concept mapping and clinical case). The tool used in this study quantified the impact of the tested strategies was the pre/post-assessment test.

On the converse, answers to the research questions that focused on students and clinical instructors' views on deficits and successes in aiding our students in the mastery of critical thinking, were ascertained through methods such as focus groups, as they are useful when all the participants are exposed to the same thing, such as classes that exposed them to critical thinking strategies, and thus, had similar experiences (Borglin & Fagerstrom, 2012). Leung and Savithiri (2009) proposed that focus groups allow for going beyond numbers and finding meaning, as well as evaluation purposes. Therefore, focus groups were held with both the students and the clinical

educators separately, to ascertain details about critical thinking and its development in our student population. Consequently, as the researcher, to explore and answer the research questions in their entirety, mixed-methods were used, and the results thereafter were triangulated.

Finally, this research was framed using the David Ausubel Meaningful Learning Theory and A Stage Theory of Critical Thinking developed by Linda Elder and Richard Paul, which promotes student engagement and strategies that facilitate same, as discussed in the literature review.

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Research Design

Method and Procedure: Study site, instruments utilized and study participants

Study site

This study was conducted at a University in Trinidad, which was founded 1927, and is a tertiary educational institution in the Southern Caribbean (USC, 2017). It is a private university and caters to students from over 40 countries, which results in a diverse student body. It is a Seventh-day Adventists University that aims to develop holistic students, that is, student's spiritual, physical, mental and social development which is well beyond academics. The study was conducted in the nursing department, of which this researcher is a faculty member. Ethical approval was received from the institution prior to the commencement of the study, and all relevant persons were informed of the study topic, aims, commencement, participants, etc. At the study site, rooms were made available to ensure the anonymity of the participants during the focus groups, and assurances kept as to no disruption in the student's schedules.

The nursing program offered at the university runs for four years, concluding with a practical and regional written pre-registration exam. As aforementioned, the final written exam has now been changed to assess critical thinking to a higher degree, which has proven difficult not only for our local students but regionally as well (Government of the Republic of Trinidad and Tobago, 2013).

Study Instruments

For this mixed-method study, various instruments were used at different stages of the implementation of the research. The quantitative instruments were the California Critical

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Thinking Skills Test (CCTST) questionnaire and two pre- and post-assessment exams. The qualitative arm of the research used focus groups, implemented with students and clinical instructors. These instruments are discussed in the following section- data collection stages, which examines how the data collection was implemented and which tool was used at each stage.

Data Collection Stages

The data were collected between the period September 2018 and July 2019. It commenced with the initial distribution of the questionnaire, the California Critical Thinking Skill Test (CCTST). This was followed by a pre-intervention focus group. Two interventions were then tested, that is, concept mapping and clinical case. There were also two rounds of pre- and post-assessment implemented before and after the execution of the tested strategies in the concept map and clinical case, clinical case only, and the control groups. Thereafter, a post-intervention focus group was implemented and a final distribution of the CCTST.

For this research, the participants included both students enrolled in the generic BScN nursing program at the University, as well as clinical instructors who oversee the student nurses within the clinical area as they seek to obtain and improve their skills in various areas. The inclusion criteria used for the students allowed to participate in the study was the nursing students must be enrolled at the University, and this nursing degree must be their first undergraduate degree, to ensure that all students were at the same level regarding critical thinking exposure. Also, the students included must have completed at least one course which utilized a critical thinking methodology during this undergraduate program, such as problem-based learning, journaling, clinical case or concept mapping, to facilitate discussion of their

experience with the concepts during the focus groups and assess their ability to think critically using the quantitative questionnaire.

A total of 85 students did the first round of pre and post-assessment quiz, 49 in the control group, and 36 in the concept map and clinical case group, out of a class of approximately 90 students, representing a 94% response rate. The original students of the cohort taking the CCTST questionnaires above, numbered 50 and the additional 40 students were those not in the cohort or year group, but were in the class session because they did not take the class with their year group. Reasons for this may include, the student failed the course when they did it originally with their cohort and is repeating the course, or the student did not acquire all the prerequisites to gain entry to the course with their cohort, illness, or pregnancy issues. Also, a consequence of the number of students in the class being significantly more than the present cohort, resulting in inadequate classroom space, the class had to be split into groups of 50 and 40 to fit available classrooms.

The students who met the inclusion criteria were recruited by a buffer at the end of a class session to ensure no disruption to their schedule. Two buffers or representatives were assigned to enroll students in the study. One buffer was assigned for the students in the experimental group and the other for the control group students. The buffers were tasked to give the students a description of the study and its purpose, the requirement for entry, the information about consent and confidentiality, and to assure students that grades cannot be affected. After the buffers discussed the above and answered any questions the participant information sheets for students were given out, and the students were then allowed to accept or reject entry into the study.

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Figure 2

Stages of Data Collection

Data Collection stages

Stage 1
- Distribution of the California Critical Thinking Skills Test (CCTST) questionnaire.

Stage 2
- Pre-intervention focus groups ➡ Experimental and Control groups

Stage 3
- Implementation of interventions ➡ Concept mapping and Clinical cases.
- Pre & Post-test testing

Stage 4
- Reissuing of the California Critical Thinking Skills Test questionnaire

Stage 5
- Post-intervention student focus group (experimental group)
- Clinical instructors focus group

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The sequence of data collection was as follows:

Stage 1.

The first stage of data collection was the distribution of the California Critical Thinking Skills Test (CCTST) questionnaire. This questionnaire contains thirty-four multiple-choice questions to assess the development of critical thinking in post-secondary students. It examines general issues and took the students an average of 45 minutes to complete, 45-50 minutes being the upper limits recommended for completion of the questionnaire (Insight Assessment, 2019).

The CCTST questionnaire examines seven areas of critical thinking, namely analysis, interpretation, inference, evaluation, explanation, induction, and deduction, and scores each area out of 100 points. The result of the scores are placed in categories to indicate the student's overall ability to think critically and the individual score for each category to allow for exploration as to which category contributes the greatest challenge to student's critical thinking development (Raymond, Profetto-McGrath, Myrick & Strean, 2018). The table below represents the overall assessment scores and the critical thinking categories that were used in the analysis of the student's level of critical thinking in this study.

Table 1

Critical (CT) Thinking categories and assessment scores

CT Categories	Superior Level	Strong Level	Moderate Level	Weak Level	Poor or Not Manifested
Assessment Score	Greater than 85	79-85	70-78	63-69	Less than 63

Source: (Insight Assessment, 2017)

The choice of this questionnaire was guided by Elder and Paul's Staged Theory of Critical Thinking. Noted in the theoretical perspective, this theory suggests that a person's level of critical thinking can be placed on a spectrum from superior to poor, which gives the ability for accurate identification of an individual's critical thinking skill, so that appropriate interventions can be made. This research set out to explore that level of critical thinking in the students, in order to identify their level of critical thinking and based on the results establish recommendations to take them to the next level. With this classification criterion outlined in the Elder and Paul's theory, after examination of various tools, the CCTST best facilitated the evaluation of student nurses and classification of their critical thinking skills and hence, was chosen as the critical thinking assessment tool for this study.

The questionnaires were administered to the participants online, and the students were informed by the buffer and the participant information sheet that the questionnaires were to be completed at their convenience within one week of receiving the questionnaire. The students,

upon signing the consent forms, gave their email addresses to the buffer, who then passed it on to the researcher for distribution of the questionnaires. Using an online medium for distributing the questionnaires worked well as students went out in the clinical setting, and thus, completing same did not interfere with their class time or time on campus. However, the timeliness in which the questionnaires were done was a major disadvantage, as most students did not complete the questionnaires in the stipulated period, some a month later. Nevertheless, all the pre-intervention questionnaires were done before the interventions, even though they were done after the requested one-week timeframe, and thus, did not affect the analysis of the questionnaires. Another major challenge was with the distribution of the questionnaires, where some email addresses were illegible and returned to the sender (the researcher). This was rectified by the few participants resubmitting their emails. All the questionnaires were distributed within two-weeks. The students later had to complete the questionnaire a second time, as identified below in stage 4.

Stage 2.

Stage 2 of the research utilized focus groups. Based on the inclusion criteria, all the students must have had previous encounters with critical thinking methodologies used as teaching strategies in former classes and, as such, will be able to contribute to the discussion on critical thinking activities. The researcher conducted all focus groups, and consent forms were signed before the commencement of the focus groups. The focus groups were recorded digitally using take recorder, which the students had prior notification of, as it was documented in the PIS form. The focus groups totalled four in number. The first two focus groups were held one with the control group and the other with the concept map and clinical case group prior to the

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implementation of the strategies being tested. Students were asked by the buffer to volunteer to participate in the focus group, of which twelve students volunteered, six from the concept map and clinical case group, and six from the control group.

Both theories underpinning this research documented the importance of active student engagement in the process of critical thinking development. Base of the same it was important for the researcher to conduct these focus groups as they allowed the student's perspective on critical thinking to be ventilated, aided in the answering of research Questions 2, 3 and 4, and the development of the recommendations presented. The focus group lasted 56 minutes in the control group and 45 minutes in the concept map and clinical case group. Both groups were asked the same questions. The questions discussed are listed below.

Pre-intervention focus group questions for students

1. What do you understand by the term critical thinking?

2. Do you think critical thinking is important in nursing? Why?

3. What are the qualities or characteristics of a good critical thinker?

4. What are some of the difficulties you experience in developing critical thinking?

The focus groups were held on the university compound but not in the vicinity of the student's classroom. For the focus group, a convenience sample was used. Although convenience sampling has limitations such as selection bias, it was hoped that because all the students were exposed to the same previous critical thinking strategies as part of the nursing program, and course teaching methods, they were suitable to give information that represents the population. The other focus groups, namely, the post-intervention focus group and the focus group with the clinical instructors, are discussed in stage five below.

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Stage 3.

This stage involved the implementation of interventions, the use of concept mapping and clinical cases. Safdar, Hussain, Shah and Rifat (2012) conducted research built on the concepts of Ausubel's theory on the use of concept mapping in the development of students' critical thinking and found it was successful as it encourages active engagement of students in the learning process, improving retrieving and transference of knowledge. The theories of Meaningful learning by David Ausubel and Elder and Paul's Stage theory of Critical Thinking described above, both suggested that critical thinking is developed through student engagement. Based on this proposal the researcher chose these two interventions as they both had the ability to actively engage students, and also because they are already used in the department but the impact and the best method for their implementation was unknown.

Ausubel and Elder and Paul's theories both highlighted the need for active engagement of students in the learning process for improved learning and critical thinking development. This guided the choice of both concept mapping and clinical cases as the teaching strategies tested in this study, as they facilitated students being allowed to take a leading role in the discovery of the information and as a result will be more engaged in the learning process.

Additionally, in the third assumption of Elder and Paul's theory, they describe the need not only to involve students actively in the acquisition of information, but that the content must also be at an understandable level and relevant to the students. The cases that were used in this research were designed based on these principles. The clinical cases were done on patients that the students would interface with on the wards, to aid in reflection of what they may have seen, as well as transference as suggested by Ausubel when they go back into the clinical area.

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Therefore, utilizing principles identified by both Ausubel and Elder and Paul's theories regarding the need to start with information at the student's level and then build from that point, the cases developed were relevant to the student's stage of the program (year 2) and based on common diseases they encounter in the clinical area. Also, the clinical cases were also done at a beginning level, where the diagnosis of the patients was given, as the students were now being introduced to pathophysiology and thus, ensuring that the clinical cases were understandable or within the scope of the students.

Additionally, the clinical cases were chosen as the courses to implement the strategies and the timeline available best aligns with strategy, as the time the students were available was short (6 weeks) and putting students in groups for deliberation on topics allowed for more practice in working out patient issues. The course used in the research also had many linked concepts that students tend to miss, and concept maps are great for displaying multiple linked concepts. For these strategies, when used in the department, students are allowed to deliberate together in groups to work through difficult concepts that arise, but the impact on critical thinking development has not been assessed, necessitating this study.

The interventions were done using one cohort of students split into two groups - the control group (no intervention) and the concept map and clinical case group where the interventions were implemented. A group of students from the concept map and clinical case group were used to test another clinical case and this was called the clinical case only group. This clinical case group was used for two reasons. Firstly, the rest of the students went out on their clinical rotation and were unavailable, and secondly, because it was important to ascertain if there was any difference between the use of the interventions together and clinical case on its own.

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The same teacher taught the classes. These sessions were done as a whole class discussion on the topic carded for that date and time on the student's course roster. This was to ensure that the student's schedules were not disrupted, and the course was completed in the prescribed timeframe. The topic completed was immunity in the concept map and clinical case group and von Willebrand disease in the clinical case only group.

The first session was done with the entire concept map and clinical case group. The concept map was used to discuss active immunity (**Appendix 1**) and how various types of vaccines fit in the process. It was used as a teaching tool, where different concepts of the topic were added the map displayed during the class discussion, to improve the student's ability to make connections and enhance their critical thinking skill development. The facilitator, in this case the researcher, engaged the students on the topic which commenced with a general discussion on microorganisms and the role of immunization in maintaining wellness and protecting against illness. The topic then expanded into the types of immunity, with a focus on active immunity. The group was asked to reflect on their community health clinical experience, where they learnt about various vaccine and observed vaccines being administered. This knowledge was used to identify various types of vaccines and to place the named vaccines into different categories. While the discussion was ongoing the concept map was expanded. During this session, clinical cases were also given on the topic immunity, where the students worked in groups to answer the questions, and then a whole class discussion was held to fill the gaps.

The second session was implemented with the clinical case only group, a subset of the concept map and clinical case group, as not all the students from the concept map and clinical case group were available for the second case. This group was given a clinical case only during

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this session. The clinical case used was on the topic von Willebrand disease which is shown in **Appendix 2**. This case encouraged nursing students to engage in an in-depth exploration of the topic being discussed in the case, to link their pre-existing knowledge to new knowledge, and allow the application of multiple possible options as solutions for discussion, thus, aiming to develop the skill of critical thinking in nursing students. Since the second group was a subset of the first intervention group, the scores of the pre- and post-test done in both sessions were used to ascertain if there were any significant differences between the pre- and post-test scores of each session, and also to determine if the difference was more in the session where both strategies were used or the clinical case alone.

The students in the intervention groups were allowed to work in groups to explore the topics and achieve the session objectives. Because the students were now entering year two and did not complete pathophysiology, the course where they engage in the study of diseases and changes that occur in the body as a result of the disease, the clinical case revealed the patient's disease and then they were allowed to explore the topic.

The control group had no intervention used, and the course was delivered using its traditional methodology, via PowerPoint, during a lecture, where the teacher delivered the content, and students were allowed to ask questions at various points, and the teacher also asked the class questions.

As a result of the time constraints for the completion of this research, that is, availability of the students and the EdD timeframe for the thesis, only one group was investigated in the test and control groups, as opposed to repeating same with multiple groups and comparing the data.

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During the teaching sessions, both when the interventions were implemented and with the control group, another data collection instrument was employed. A pre/post-test was given to both the concept map and clinical case group as well as to the control group on the topic immunity (Appendix C). Another pre/post-test was done with the clinical case only group on von Willebrand disease (Appendix D). The pre/post-tests were done to assess the student's understanding of the content delivered by the different strategies and allow for comparisons between the groups. These results are discussed below in the Results chapter.

The pre/post-test contained the same questions for the given session. The pre-test was distributed and completed by the students at the start of the session before the topics were delivered, and the post-test completed at the end of the session. The timing given for the pre/post-test for both sessions was the same (20 minutes). The students had prior notification of this session via the PIS form and verbally by the buffer. At the start of the class, the students in the intervention group were again notified, and the students were allowed to continue in the experimental group or join the control group where the usual teaching methodology was implemented. No student chose to leave the class where the teaching strategies were being implemented (the experimental group) and attend the class using the traditional teaching method (the control group). The control group class was held after the experimental group as this was to facilitate any student not wanting to participate in the interventions or if a student did participate and still wanted exposure to the topic via the usual delivery method. No student did both the intervention and the traditional class. The classes were held at different times but during the same week. Each session took approximately 2 to 21/2 hours.

Stage 4.

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Reissuing of the California Critical Thinking Skills Test questionnaire was done at this stage, via online delivery, where all participating students had to repeat the questionnaire, and the scores from both questionnaires were compared. For some students, the period between the two questionnaires was less, as they did not complete the first questionnaire within one week. However, all of the questionnaires from the first round were completed before the interventions were implemented.

Stage 5.

This stage concluded the data collection phase, where the second round of focus groups was held with the concept map and clinical case group participants from the initial focus group to ascertain their views on the interventions used (concept mapping and clinical case) and how they compared to the traditional strategy of lecture style. This post-intervention focus group was significantly shorter than the pre-intervention focus groups, lasting 13:54 minutes, as the students had similar views on their feelings about the session, as discussed in the Results chapter. The questions discussed are listed below.

Intervention focus group questions for students

1. Did the interventions (Clinical case and concept mapping) impact on your critical thinking development? How?

2. Which of the two interventions had the greater impact, and why?

3. Compared to the usual didactic teaching, which style do you think better assist in your critical thinking development?

4. What could be done to improve critical thinking development further?

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A separate focus group was to be conducted with clinical instructors to ascertain their views on critical thinking development in our student body. The clinical instructors are staff of the university in the nursing department and are deployed to the various healthcare institutions to assist the university's students in acquiring proficiencies in the various skills.

The clinical instructors at the time the data collection for the study were seven in number and assigned across the four general hospitals in Trinidad. The inclusion criteria for the clinical instructors were that they had worked with the institution for a minimum of one year. The instructors were invited via email to volunteer to participate in the study. For this research, four clinical instructors were used, one clinical instructor from each of the four general hospitals, to ascertain if there were variations in teaching students within the clinical setting across hospitals and if it was a factor that affected critical thinking. They were emailed the participant information sheet and the consent form.

Due to the preparation of students for examination, it was challenging to meet with the clinical instructors. Thus, their views were ascertained via an online medium where the focus group questions were sent via email, and instructors replied individually via written discussions. Further, clarification and details were requested and supplied from the clinical instructors via email. The clinical instructor's questions are listed below.

Clinical instructor's focus group questions

1. On a scale of 1 to 5, how will you rate our student's ability to think critically?
2. Why do you give this ranking?

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3. Do you see a lack of critical thinking development hampering nursing care administered by our students? Why?

4. Does our educational environment foster critical thinking development?

5. What do you think are some of the obstacles to our students developing critical thinking skills?

6. What can be done to improve student's critical thinking development?

Ethical Considerations

Access Issues

Ethical approval was acquired from both the University of Liverpool and the University (**Appendix 6 & 7**) prior to the commencement of the research. There were a few challenges accessing the students and clinical instructors, even though this researcher is faculty at the University within the nursing department, and the findings of this research will be used to improve the student's development of critical thinking and the overall student outcomes. It is also expected that an improvement in critical thinking skills will lead to an improvement in student's final exam results, which will give the department and university a competitive edge. However, as it was a short semester and the students were only in the classroom for six weeks before they went into the clinical area for a further six weeks, their time was limited, and so was the ability to meet with them. The fourth-year students were also being prepared for their final practical exam by the clinical instructors, which also made it very difficult for meeting. Because of the time constraints of this thesis and the inability to use students in the researcher's class that

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fit the study entry criteria a requirement for ethic approval, these students in this semester were the best choice.

Other Ethical Considerations

For this research, the two main ethical issues that may present are Dual-role conflict and issues arising from researching in the researcher's institution and department "Dual-role conflict" (Floyd, 1997, p. 247), is where there may be pressure on the researcher's students to participate in the study because the researcher is their teacher and the perceived threat of not participating or withdrawing affecting their marks. The second issue arises from researching in the institution and department where the researcher work and how the results, if negative, will reflect on same.

To mitigate these issues, Floyd (1997) advised adhering to the rules of research, such as codes for ethical practice in research some of which are voluntariness and informed consent (Cohen, Manion & Morrison, 2011c). Information on consent, voluntarism confidentiality, anonymity and withdrawal from the study were given by the buffers in the recruitment phase and was discussed Methods.

Data Storage and Retention

The data collected in this research were stored in two ways. Firstly, the audio tapes were transferred to a computer owned by the researcher, who has sole access to the computer. The computer is password protected, and the password is known only by the researcher. The data from the online questionnaires were also stored on the password, protected computer. Data such

as the pre and post paper-based test administered to students, the researcher's notes and the audio tapes from the focus groups were stored in a locked cabinet, in a locked office at the researcher's home office, for which the researcher only has the keys. The data collected will be retained for a period of five years, thereafter, it will be either deleted or shredded.

Power Relations

Power as described by Ladkin (2017) is the ability to change the views, ideals or conduct of someone by another of greater dominance. The researcher-participant relationship is one where the researcher respects the confidentiality and rights of the participants and ensures that the research causes no harm to the participants while the researcher attempts to gather data to shed light on the phenomena being explored (Mitchell, 2010). However, Karnieli-Miller, Strier and Pessach (2009) noted this relationship has been governed by many traditions and paradigms and thus creates a challenge to find a balance between friendship, professionalism and prevent coercion or dominance, thus, resulting in a complicated relationship (Isaac, 2020).

Further, this relationship becomes more complicated when there is a mixing or dual role of researcher and participants, as in student and teacher (Karnieli-Miller, Strier and Pessach, 2009). This challenge of what can be described as an unequal relationship, has resulted in the need for implementation of ethical structures in research to protect the participants. As a consequence, researchers must ensure and present transparently the procedures employed in their research, such as the recruitment process, assurance of participants' confidentiality and anonymity and the process of interaction between researcher and participants, as when carrying out interviews (Das, 2010).

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Therefore, the researcher, also being faculty in the department where the research was conducted, had to attend to power relations to ensure students were not coerced but enrolled in the research voluntarily. One of the ways this challenge was managed was by adopting a pragmatic paradigm, where the researcher adhered to some of the constructivists' values and the positivist values. From the constructivist perspective, a high level of reflexivity was necessary to make sure that the researcher understood that all persons come with a value system and beliefs that propel them in a particular direction, and therefore as a researcher, the environment where the research, particularly where the interviews were conducted, must be one where the participants feel safe and open to express themselves honestly (Adom, Yeboah and Ankrah, 2016). However, the positivist values suggested that the researcher ensure that the research was conducted with a high degree of objectivity to allow for the results' trustworthiness, especially as an insider researcher. Therefore, strict adherence to ethical and research principles was done to prevent the negative consequences of unequal power relations (Park, Konge and Artino, 2020) (appendix H and G research ethics certificate).

Morgan (2007) discussed the term inter-subjectivity used in pragmatic research, which allows the researcher to go beyond the objective/subjective dichotomy and adopt a position within the research that meaningfully utilizes the benefits of both the qualitative and quantitative approaches. This was demonstrated in this research. The researcher was able to unearth valuable information on the student nurses' critical thinking level from the quantitative research via the use of the questionnaires and qualitatively through the use of the focus groups with the students and clinical instructors. Thus, as suggested by Morgan (2007), the pragmatic paradigm, as used

in this research, allows for greater discovery through the use of various methods in one research to avoid ethical pitfalls related to the power relation of the researcher versus the participants.

Further, Raheim, Magnussen, Sekse, Lunde, Jacobsen and Blystad (2016) identified the dual role conflict that can occur when a researcher is both an insider (belonging to the participants group) and an outsider (the independent researcher). The authors suggested, "continuous reflexive awareness" on the part of the researcher to be aware of their impact on the research and the participants, discussed later in this chapter, and having an individual or group to supervise the researcher/researched relationship (Raheim, Magnussen, Sekse, Lunde, Jacobsen and Blystad, 2016, p. 10). For this research these individuals were the researcher's primary and secondary supervisors and the University of Liverpool's ethics committee.

With the above background and the fact that the participants are students within the researcher's university and department, the researcher placed focus on ensuring that her position, particularly in the recruitment phase, would not coerce students to enroll in the study but adhere to the principle of voluntarism. Therefore, for the study, the researcher chose a cohort that was not assigned to her that semester so that the students would not feel they have to enroll in the study to protect their grades. Also, before the interviews, which were conducted by the researcher, the researcher made clear to the students that at that time, the researcher was in the role of a researcher and not that of a nursing instructor. During this time, the researcher again reminded the participants they can withdraw at any time, and all the information gathered will be confidential. Additionally, during the recruitment phase, two buffers were used to enroll participants in the study to mitigate the pressure on students to enroll. The process of recruitment is discussed below.

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Recruitment of Participants by the buffers.

Prior to participant recruitment

Two buffers were chosen to assist with the recruitment of students as participants for this study. Before the students were asked to enroll in the study, the researcher oriented the buffers to the study and their roles. The study aims and benefits to all stakeholders, including the students, were identified, and various forms such as the consent and PIS forms were explained. However, most of this session focused on the importance of voluntarism and ensuring that the students understood that enrollment was not compulsory or would have any negative or positive effect on their status as a student.

The buffers chosen were also educators within the department who were able to develop a rapport with the students in an environment where they were free to ask questions and voice their concerns. The buffers were responsible for providing the students with information about the research, ensuring that the forms were signed, but more so, ensuring that the students understood that enrollment was truly optional.

During the recruitment phase

During this phase, the buffers, one for the control group and one for the experimental group, held discussions with the students in the researcher's absence. The research details were discussed, questions answered, enrollment, withdrawal, and refusal discussed, and then students were allowed to enroll in the study of free will by signing the forms and submitting an email address for the questionnaires to be sent.

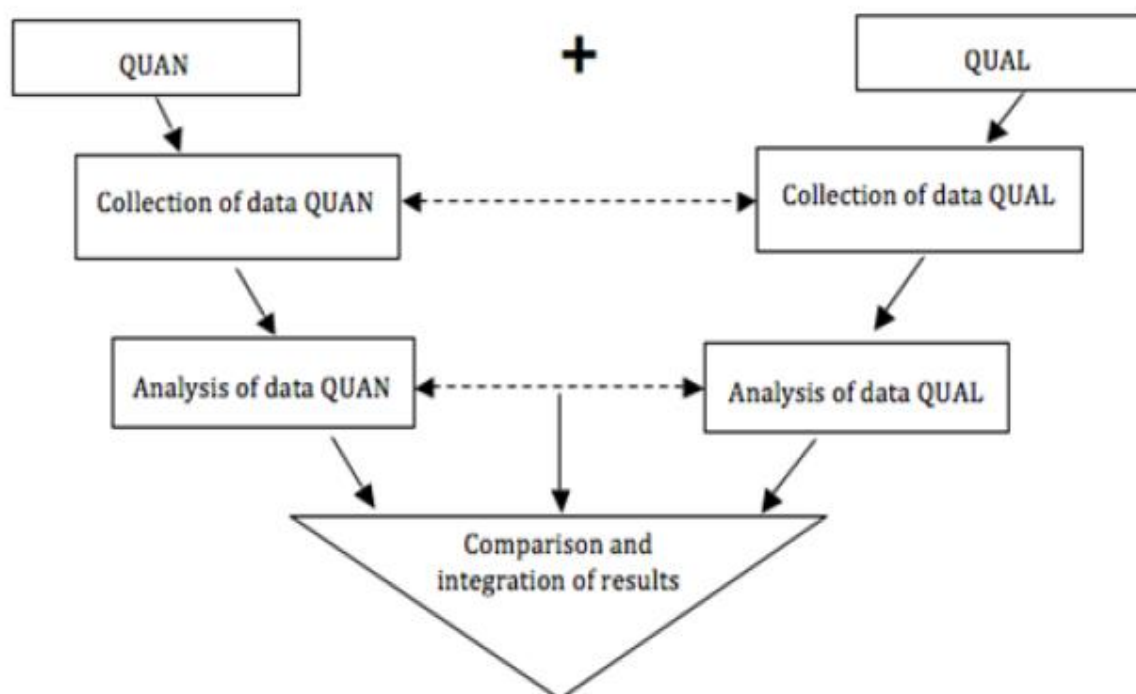CRITICAL THINKING IN STUDENT NURSES

After the recruitment

The buffers and the researcher met again and discussed how the recruitment process was implemented. The forms and emails were collected, and data collection commenced.

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Data Analysis Methods

Being a concurrent mixed-method research, both qualitative and quantitative data were available for analysis at the same time. However, the analysis of the quantitative data was done first and followed by the qualitative data, and then the two triangulated. Ilic (2019) posited that through the implementation of triangulation of a mixed-method research the strength of the findings is increased. Triangulation can be used to describe the relationship between the findings of the qualitative and qualitative research, and acts to give a better understanding of the issues being examined (Ulrika et al., 2011). For this research, a concurrent strategy of triangulation was utilized as identified in research by Bentahar and Cameron (2015) and displayed in Figure 3 below. The researcher, after collecting and analyzing both the qualitative and quantitative data combined the results to answer the research questions asked and discussed the outcome of the combination in the discussion section of the thesis.

Figure 3

Concurrent Strategy of Triangulation

Quantitative data analysis.

The quantitative data from this research, namely the CCTST questionnaires and the pre and post-test scores, were analyzed to ascertain the students' level of critical thinking and the outcome of the test strategies, using the SPSS computer program software and displayed graphically and numerically. Trochim (2006a) informs us that descriptive statistics are useful in condensing large amounts of data into a manner that is sensible and easily understood by the target audience. From the literature, various statistical techniques can be used to analyze data,

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descriptive statistics, such as mean, median, mode, percentages, standard deviation, and skewness (Jansen and Warren, 2020; Bhatia, 2018; Li, 2013) being one option. The mean or the average was used extensively in this research to identify averages that could be compared across the data, as discussed below. However, the other techniques such as the median or the middle value, standard deviations how the range is dispersed, and the symmetry level of the range or the skewness were not used as they did not add to answering the research questions asked (Jansen and Warren, 2020). For example, knowing the median of the test scores did not help identify the students' level of critical thinking or aid in identifying which category (poor to superior) they would fall, thus, not adding to the research analysis.

The CCTST questionnaires were analyzed using descriptive statistics measure of central tendency, where the mean of the overall score of the questionnaire, as well as the means of the seven critical thinking areas, were calculated and compared. Means between both groups – the control group and concept mapping and clinical case groups were also complete to identify changes in the scores from the first to the second administration of the questionnaires and between the two groups. Following the Elder and Paul's (1996) theory regarding the classification of student's level of critical thinking, the results from the questionnaire's overall means of both groups were then applied to the CCTST categories, poor to superior to ascertain the critical thinking level of our BScN nursing students.

Inferential statistics were also used in the data analysis phase of the research, and similarly to the descriptive statistics there were many options from which to choose, such as T-Test, Anovas, correlation and regression (Jansen and Warren, 2020; Bhatia, 2018; Li, 2013). The first

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three techniques identified were used in this study to compare responses and unearth answers to the research questions as described below. However, regression analysis was not done as its aim is to identify cause and effect between variables, which was not within the scope of this study (Jansen and Warren, 2020). Therefore, the t-test was used, as it was promoted to assess the statistical difference between means of two groups (Trochim, 2006b). This can help compare the scores across students of the two groups in their responses to the California critical thinking test and in the post-intervention class assessment discussed later. The first and second administration of the questionnaires, in both groups, were analyzed using the t-test to ascertain if there was a significant difference. A paired t-test was conducted, followed by one-way ANOVA, which was calculated across the overall mean scores of the questionnaires and compared with different variables such as age and gender, to determine if statistical differences exist. The analysis of the CCTST questionnaires ended with a correlation analysis of the seven critical thinking areas and then against age group.

The pre and post-test scores were also analyzed using SPSS statistical software, as well as descriptive statistics and inferential statistics conducted. The descriptive statistics conducted were the mean score of the control group, concept map, and clinical case group, and the clinical case only group, which were compared. Modes were also calculated across the three groups pre- and post-test scores to compare their performance.

Paired t-test and one-way ANOVA inferential statistics were conducted as was done the CCSTS.

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Qualitative data analysis.

For this research content analysis was used to analyse the qualitative data gained from the various focus groups. An advantage of using content analysis as suggested by Bengtsson (2016) is that it can be used in the analysis of all types of data expressed in text, that is, from open-ended and single answer questions, focus groups and interviews, observations and pictures. This study utilized both focus groups with the students and open- and close-ended questions with the clinical instructors and thus, this method of analysis gave the flexibility in analyzing the data from the different collection methods. Another reason for the choice of content analysis is it is a very economical method of data analysis as no software had to be purchased, which worked well for the researcher. However, there were two disadvantages of content analysis that had to be considered and mitigated prior to its use in this study. Firstly, content analysis is a time consuming process (Huma & Nayeem, 2017), and thus additional time was assigned to the process when the time plan for the research was developed. Another concern of content analysis was the possibility of researcher bias and validity problems (Huma & Nayeem, 2017). Therefore, to minimize these issues a checklist for the implementation of content analysis described below was utilized in improve the trustworthiness of the results.

Two documents guided how content analysis was implemented in this thesis. Firstly, a checklist put forward by Elo, Kaariainen, Polkki, Utriainen, and Kyngas (2014) (See **Appendix C**) that researchers utilize to ensure and increase the trustworthiness of their findings when using content analysis. This was used to guide the process, from data collection to the reporting of the findings. For example, in the preparation phase, the checklist of questions on the best method to answer research questions, self-awareness, and informants to aid in the choice of focus groups as

the data collection method. The organization phase, along with the second document, guided the number of concepts and the categorising of themes. Lastly, the results were reported systematically, answering the various research questions with direct quotations used, again guided by the checklist.

The second document used in the analysis of the data from the focus groups was the University of Leicester outline for implementing content analysis (University of Leicester, n.d.) (**Appendix D**). Content analysis is frequently used in nursing research (Elo & Kynga, 2008), and thus will be "fit for the audience" (Cohen, Manion & Morrison, 2011a, p. 642). Through the use of content analysis, deductions were made from the data collected in an organised and objective manner (Bengtsson & Malmo University, 2016). In keeping with trying to make the research scientifically sound, one of the elements of "good" research as described by Yates (2004, p. 22), the content analysis process began with transcribing the audio tapes verbatim, to minimize researcher bias and promote more confidence in the results. Then as directed by the University of Leicester outline, each focus group transcript was deliberated on, making notes on important information, then forming major and minor categories and major and minor themes. Inductive coding was implemented in a very systematic order, where firstly codes were identified during the review and reexamination of each focus group data (Medelyan, 2020). Saldana (2008) describes a code as a word or short phrase that is used often or captures a striking point made by participants. Therefore, the researcher examined the transcripts and in a side panel identified all the codes that seem to summarize the essence of what the participant attempted to articulate. This coding was then completed across all the other focus group transcripts as well. The next step employed by the researcher was to examine all the identified codes and to group or organize

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liked codes into categories. Categorizing was described by Saldana (2008) as putting codes into "families" (p. 8). Therefore, all the codes were extracted and similar codes were grouped into larger categories that consolidated the thoughts expressed in the codes. This process needed refining at times as some of the categories had to be reclassified as the process continued. The next step was the formation of themes, or overarching statements to describe the categories under that umbrella theme (Vaismoradi and Snelgrove, 2019). Various themes were developed from the categories obtained and these were used in the answering of the research questions and presented in the following chapter.

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Results and Findings

This chapter will present the results and findings of the data collected at the various stages of the data collection process identified in the previous chapter. It will include analysis of the two rounds of the California Critical Thinking Skills Test CCTST questionnaires, the focus group discussions, and the results of two rounds of pre and post-assessment scores of the concept map and Clinical Case, Clinical Case only, and the control groups. It will be presented in sections, where Section 1: is the results of the CCTST, Section 2: pre/post-test results, and Section 3: the findings of the focus groups.

Section 1: California Critical Thinking Skills Test (CCTST) Questionnaire

The CCTST questionnaire, as described above, is one which is discipline-neutral test used to ascertain the level of critical thinking in various populations, including student nurses. The CCTST allows test takers to demonstrate their ability to think critically and also can be used to predict the ability of individuals to think critically when placed in real-life situations. This test was designed to measure reasoning skills through the use of everyday scenarios and ranges in its difficulty (Knox, 2013).

The test was implemented to the same groups of students twice, once before instruction, and once after instruction, to determine if the students' level of critical thinking increased after instruction. A total of 50 students consented to participate in this part of the research, with a total of 42 completing both questionnaires. The students were selected using convenience sampling and of the 42 students completing both questionnaires 39 were females and 4 were males. Their ages ranged between 17 to 45 years, which mirrors the age range for entry into the program. The largest group of students fell in the 17-20 age group and represented 42% of the participants.

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27% came from the 21-25 age group, 20% from the 26-30 age group, 5% from the 31-35, 2% from the 36-40 age group and 5% in the age range above 40 years old. The participants were all students of the University and enrolled in the course Growth and Development, a year two nursing course. The participants represented a diverse group, as the student body included local, regional and international students.

Even though 42 participants may appear to be a small sample size for quantitative research, when combined with the findings from the qualitative research sets, and the literature review, a holistic view of the topic is established and it is from this stance and the thick descriptions of contextual information provided that generalisations can be made. During the data collection phase, follow-up emails were sent and calls made to all non-responders to maximise the response rate.

Cronbach's alpha was calculated for the questionnaire to determine its internal consistency or the reliability of the questionnaire, and it was found to be 0.85. Table 2 shows the means scores across the seven areas of critical thinking assessed by the CCTST questionnaire. The mean overall score for the questionnaires was 66 for both the first and second administration of the questionnaire. Therefore, there was no significant change in the student's average score from the first to the second administration of the questionnaire. From table 2 it can also be seen that interpretation (75 to 73), and deduction (68 to 67) also had a small decrease in the mean scores from the first administration to the second administration of the questionnaires. On the other hand, evaluation (65 to 66), induction (70 to 71) and explanation (66 to 67) had a small upward shift in their mean scores from the first administration to the second administration of the questionnaires. Both analysis and inference had no change. Of note, the critical thinking area

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with the highest mean was interpretation in both the first and second administrations of the questionnaire.

To investigate if there was a significant difference between the first and second CCTST scores of the groups an independent t-test was conducted on the scores of the first and second administration of the questionnaires in the control group and the concept map and Clinical Case group. These results are also displayed in Table 2 along with the mean scores. The results indicate that the mean questionnaire scores in both the control and concept map and Clinical Case group were not statistically significant at the $\rho < 0.05$, thus, accepting the null hypothesis that means scores between the first and second administrations of the questionnaires were the same. Therefore, we can conclude that changes seen above were not significantly different in the means across the first and second administration of the questionnaires. This finding was supported by the 95% confidence intervals of both groups -4.821 / 1.016 and -1.200 / 4.793 lower and upper limits in the control group and concept mapping and Clinical Case group, respectively.

Table 2

Mean scores of CCTST questionnaires and Paired t-Test across the control group and the Concept map and Clinical Case Group

Assignment Description		Overall Score	Interpretation	Analysis	Evaluation	Inference	Induction	Explanation	Deduction
First Administration of questionnaire	Mean	66	75	68	65	68	70	66	68
	N	42	42	42	42	42	42	42	42
Second Administration of questionnaire	Mean	66	73	68	66	68	71	67	67
	N	42	42	42	42	42	42	42	42

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Further analysis of the means was conducted to compare the two groups responding to the questionnaires, the control group and concept mapping and Clinical Case groups in Table 3. From Table 3, it can be noted that the overall mean in the control group increased slightly (67 to 69) from the first administration to the second administration of the questionnaires. However, from the t-test results it can be noted that this and all other changes described between the means of the two groups were not statistically significant. For example, for the concept mapping and Clinical Case group there was a small decrease from (66 to 64) in the first administration to the second administration of the questionnaires. It can also be noted that the critical thinking area with the highest mean was interpretation in both groups with students scoring 76 and 75 in the control group first and second administration of questionnaires, and 74 and 71 in the concept mapping map and Clinical Case group first and second administration of questionnaires. The critical thinking area where students had the most difficulty was evaluation in both groups, in the first administration of the questionnaire 67 and 63 and deduction and explanation 68 and 63 in the control and concept mapping and Clinical Case group respectively.

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Table 3

Mean scores and test results of CCTST areas between the control and concept mapping and Clinical Case groups.

Assignment Description	First administration of Questionnaire Mean		Second administration of Questionnaire Mean	
Group	Control Group	Concept mapping and Clinical Case Group	Control Group	Concept mapping and Clinical Case Group
Overall Score	67	66	69	64
Interpretation	76	74	75	71
Analysis	68	68	70	66
Evaluation	67	63	70	63
Inference	68.00	68	70	66
Induction	71	69	74	68
Explanation	68.00	64	71	63
Deduction	68	67	68	65

Table 4 displays the five critical thinking levels a student can be categorized based on their assessment scores. Using the mean scores of the groups ascertained in Table 3 to determine the student's critical thinking level, it can be deduced that in the control group's first administration of the questionnaire, all categories were at the weak level, except interpretation and induction, which were at the moderate level. The control group's second administration of the questionnaire all the areas other than deduction were at the moderate level, thus, demonstrating an improvement in the analysis, evaluation, inference and explanation category. Deduction

remained at the weak level. For the concept mapping and Clinical Case group, in both questionnaires, all areas were weak except interpretation, which was moderate and explanation which was poor. Also of interest was that there was a small but not significant downward trend in the scores on the CCTST in all the areas in the concept mapping and Clinical Case group, except evaluation which remained unchanged, whereas, only interpretation and deduction showed this small negative decline in the control group. However, even though there was a small reduction in the overall score and categories in the concept map and Clinical Case group, and increases in the overall score of the control group and other categories, no mean score fell within the strong or superior levels. Further, exploration of the means of the individual student scores in both groups were implemented which also revealed that no student fell within the strong or superior levels.

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Table 4

Critical (CT) Thinking categories and assessment scores

CT Categories	Superior Level	Strong Level	Moderate Level	Weak Level	Poor or Not Manifested
Score	Greater than 85	79-85	70-78	63-69	Less than 63
Assignment Description	First administration of Questionnaire Mean			Second administration of Questionnaire Mean	
Group	Control Group	Concept mapping and Clinical Case Group		Control Group	Concept mapping and Clinical Case Group
Overall Score	67	66		69	64
Interpretation	76	74		75	71
Analysis	68	68		70	66
Evaluation	67	63		70	63
Inference	68.00	68		70	66
Induction	71	69		74	68
Explanation	68.00	64		71	63
Deduction	68	67		68	65

Pre- and Post-Assessment Scores Analysis

Two interventions were tested during this study (Clinical Case and concept mapping) to ascertain their impact, if any, on the learning of students and their development of critical

thinking skills. The cohort, as described in the previous chapter, was divided into two groups. In one group where the interventions were tested during two teaching sessions (concept map and Clinical Case group and Clinical Case only group (a subset of the concept map and Clinical Case group)). The other group (control group) was the students who were taught using the traditional method of teaching (lecture with PowerPoint and classroom discussion). For this study, the group titled concept map and Clinical Case group was taught using both concept mapping and Clinical Case together during a single class session. The group title Clinical Case only group was a group of the students from the concept map and Clinical Case group who were enrolled in another class, where the Clinical Case intervention alone was used. This subset of students was used because the initial class concluded, and the remaining students were in clinical practice. The three groups were given the pre-test on the class topic of that session (immunity or von Williebrand Factor) before the commencement of the class and the post-test towards the end of the class. Therefore, there were two different pre/post-test based on the class session being conducted. The results were analyzed using SPSS statistical software version 23 and descriptive statistics, independent sample T-test, and one-way ANOVA were used to answer the relevant research questions.

As described above, a total of 85 students did the first round of pre- and post-assessment quiz, 49 in the control group, and 36 in the concept map and Clinical Case group, out of a class of approximately 90 students. The second round of the assessment was conducted on a smaller class of 14 students, a subset of the concept map and Clinical Case group discussed earlier, called the Clinical Case only group, where the different topic (von Williebrand Factor) was done, and all agreed to participate.

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Table 5 represent descriptive statistics of the pre- and post-test scores for the control group, concept map and Clinical Case group, and the Clinical Case only group. The mean performance of the control and concept map and Clinical Case groups were calculated and compared. The mean of the control group in the pre-test was 4 compared to 5 in the post-test. Similarly, the mean of the concept map and Clinical Case group in the pre-test was 4 and 7 in the post-test, both showing an increase in student performance. Although the performance in both groups increased after teaching, the improvement was greater in the concept map and Clinical Case group (3) compared to (1) in the control group (see figure 5 below).

Table 5

Assessment score of control group, concept map and Clinical Case group and Clinical

Case only group

Group		Number	Mean	Std. dev	Mode	95% CI	
						Upper	Lower
Control	Pre-Test	49	4	1.514	3	3.71	4.58
	Post-Test	49	5	1.692	5	4.88	5.85
Concept map and Clinical Case	Pre-Test	36	4	1.404	3	3.50	4.45
	Post-Test	36	7	1.222	7	6.23	7.05
Clinical Case	Pre-Test	14	5	1.910	3	3.47	5.67
	Post-Test	14	7	1.875	7	6.06	8.23

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Descriptive statistics were also conducted on the pre and post-test scores of the students who had the Clinical Case intervention alone conducted. The results are also represented in Table 5. Analysis of the scores before and after the second Clinical Case was implemented on its own, resulted in a mean of 5 and 7 in the pre- and post-test, respectively. Of note, the Clinical Case intervention alone, increased students' performance by (2), compared to the improvement with the concept map and Clinical Case Group (3) when both interventions were implemented during the same sessions. Figure 4 below displays the means of the pre/post-test scores of the three categories and the improvement of the scores between the pre/post-test scores. From this figure it can be noted that the greatest increase from pre- to post-test scores was in the concept map and Clinical Case Group.

The confidence intervals were calculated at 95%, and the data showed that in all the categories, the performance increase from the pre- to post-test scores was statistically significant, as the null hypothesis of 0 indicating means are equal for pre- and post-test was refuted.

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Figure 4

Difference between the pre and post-test means of the three categories
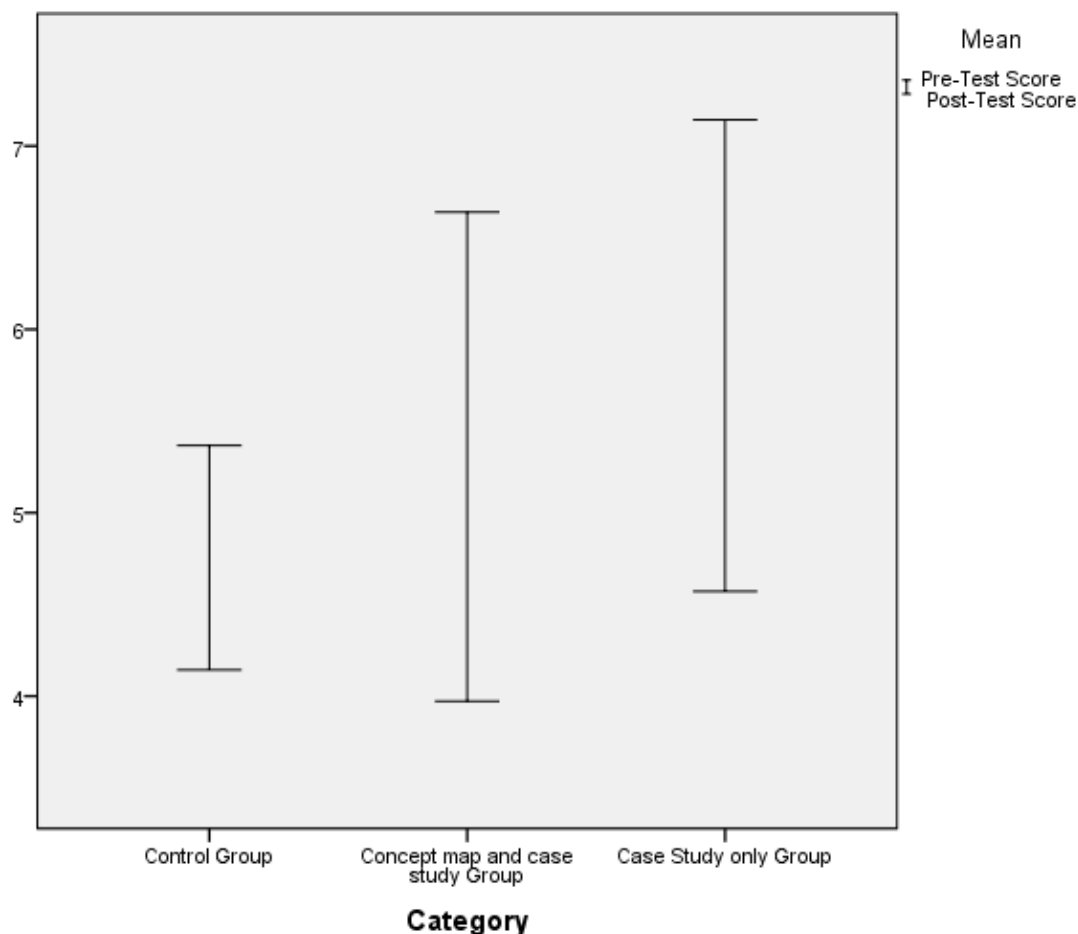
The modal scores suggested that the students in the groups that had interventions conducted (concept map and Clinical Case; and Clinical Case only) performed better on the post-test, as their modal scores were often higher than in the pre-test. Further, between the two intervention groups, there was a greater improvement in the concept map and Clinical Case group where both interventions were implemented as compared to the second session, where Clinical Case only was used in the delivery of the class. This result may suggest that using both strategies together might yield better results and will be investigated further below.

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The mean difference between the three categories was control group 1, concept map and Clinical Case group 3 and Clinical Case only group 2.

A paired t-test was conducted within the three groups, control group, concept map and Clinical Case group and Clinical Case only group, to determine if the increase observed in the mean post-test scores of the students were statistically significant. These results are displayed in table 6. The results indicate that the increase in the means post-test scores were statistically significant for the control group, concept map and Clinical Case groups and the Clinical Case group, as all the p values were less than 0.05, thus, indicating that means between the pre- and the post-test scores were not the same. Further, from examination of the confidence intervals, the results from the p values are supported, as the means from the three groups fall between their 95% confidence intervals. Therefore, we can conclude that there is a significant difference in the means across the pre- and post-test scores in all categories, with concurrence between the confidence intervals and the p values showing students' scores were significantly different in the pre- and post-test assessments across the three groups.

Table 6

Post-Test Score - Pre-Test Score	Paired Differences				95% Confidence Interval of the Difference	
	Mean	t	df	Sig. (2-tailed)	Lower	Upper
Control Group	1.	5.455	48	.000	.773	1.676
Concept map and	3	9.282	35	.000	2.083	3.250

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Clinical Case Group						
Clinical Case Only Group	2	3.174	13	.007	.821	4.321

Paired t-Test across the three categories

Finally, the post-test score data were also analyzed using one-way ANOVA to compare the means of the three groups simultaneously, and a P-value of p= 0.000 was found. This value is less than 0.05, which suggests that there are significant differences between the post-test scores between the three groups (F (2,96) = 10.592, p = 0.000). (See Table 7)

Table 7

ANOVA					
Post-Test Score					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	52	2	26	11	.000
Within Groups	235	96	2		
Total	287	98			

Significant differences between the post-test scores between the three groups

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ANOVA results across the three categories.

However, this information though similar to the results above, do not indicate where the

differences were significant. To determine where the significant difference/s is/are a Tukey post

hoc test was conducted, as shown in Table 8.

Table 8

Tukey post hoc test comparing post-test scores between the three categories

Multiple Comparisons						
Dependent Variable: Post-Test Score						
Tukey HSD						
(I) Category	(J) Category	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control Group	Concept map and Clinical Case Group	-1*	.344	.001	-2.09	-.45
	Clinical Case Only Group	-2*	.475	.001	-2.91	-.65
Concept map and Clinical Case Group	Control Group	1*	.344	.001	.45	2.09
	Clinical Case Only Group	-1	.493	.565	-1.68	.67
Clinical Case Only Group	Control Group	2*	.475	.001	.65	2.91
	Concept map and Clinical Case Group	1	.493	.565	-.67	1.68

From Table 8 we can see that there was a statistically significant difference in all of the

post-test scores of comparisons except between concept map and Clinical Case group (6.639 ±

0.224 score, p = 0.565) and Clinical Case only group of (7.143 ± 0.419 score, p = 0.565).

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Focus Group Findings

The following is the finding of the focus group discussion held with the students and the responses from the clinical instructors from the University. It is divided into two sections. Part 1 includes the finding of the pre- and post-focus group, where students were asked questions to answer the four research sub-questions. The findings from the clinical instructor's responses are also included in this section. In part 1, the findings are presented with the use of concept maps to give an overview of the areas highlighted by the participants and to identify the connection between the themes, categories, and codes from the analysis of the discussions. The concept map starts out with the theme being discuss to the center. It is then expanded to include the categories or groups of similar information. Lastly, a further level of expansion occurs to include the specific areas discussed by participants. Part 2, also with the aid of a concept map, reports the findings of the student's responses on their views on the two strategies tested (concept mapping and Clinical Case) during the research. To maintain anonymity of the participant participants are represented by (S) for students and (CI) for clinical instructor, followed by a number. For example, S1, S2 or CI1, CI2

<u>Part 1</u>

Figure 5 below, is a diagram of all the themes acquired from the analysis of the pre and post intervention focus groups conducted with the students. Each theme will thereafter be taken individually and discussed with samples of the students' comments supporting the themes established.

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Figure 5

Diagram showing themes from the pre and post focus groups
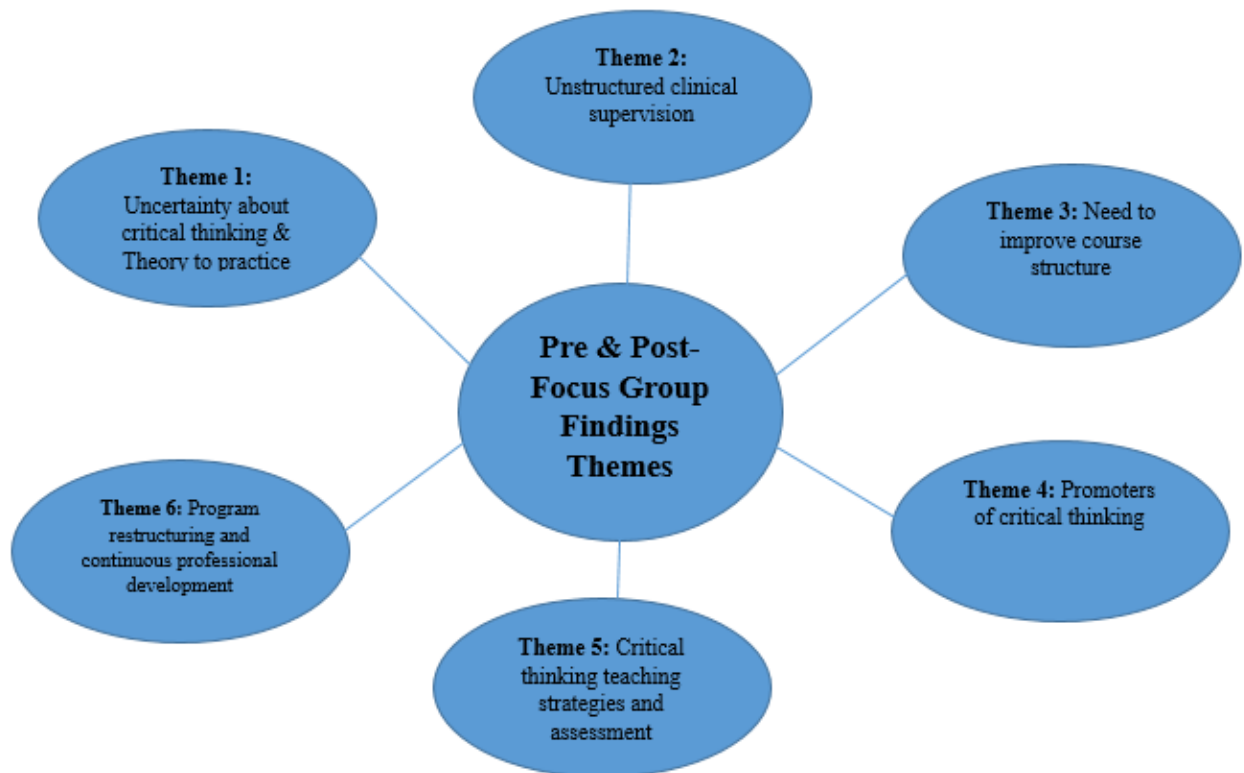
Theme 1: Uncertainty about what is critical thinking and a theory to practice gap negatively impact student's critical thinking level.

Figure 6

BScN Students Perception of CT
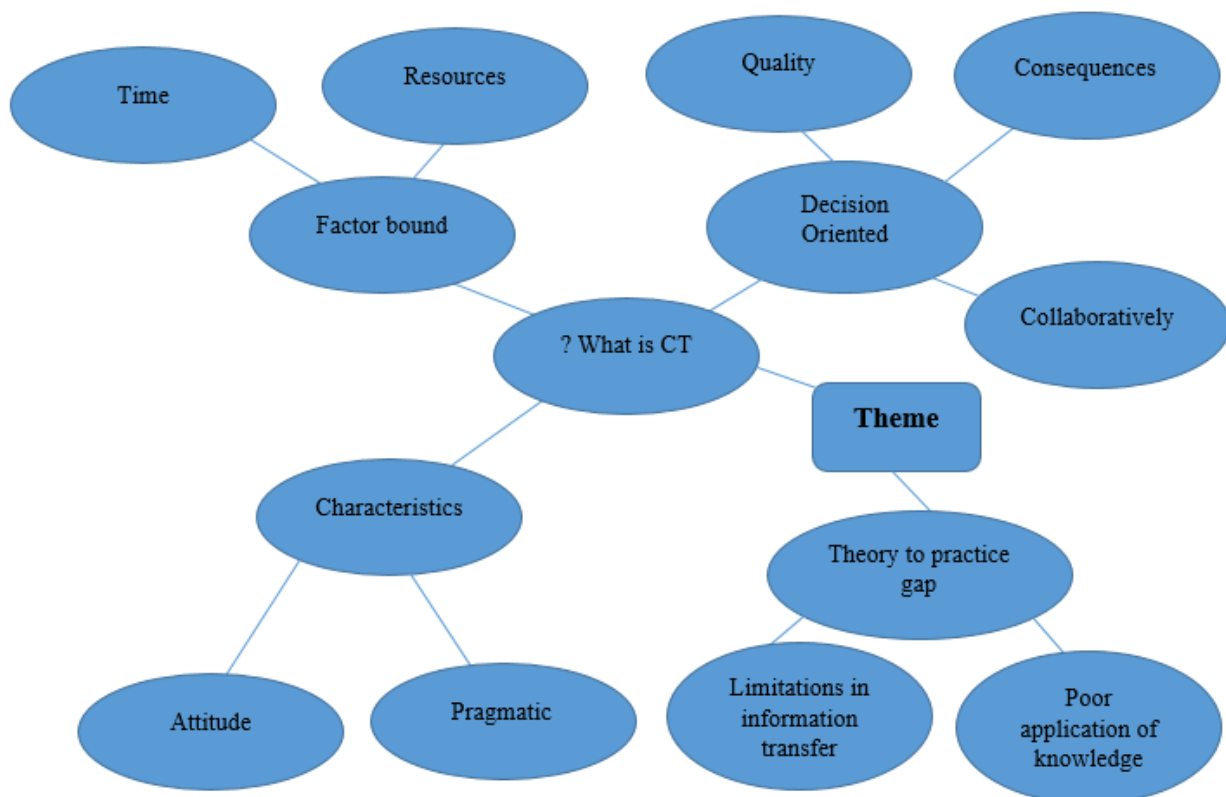
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Responses from the focus group discussions with both the student nurses and clinical instructors about what is the student nurse's level of critical thinking unearthed that student nurses have difficulty advancing their critical thinking skills because of two main obstacles. Firstly, they are unclear about what critical thinking is and the elements that are necessary for an individual to engage in the process of critical thinking, and secondly, there is a disconnect between what occurs in the classroom and how it is implemented in the clinical areas (see Figure 6). Exploration of the responses of the participants as to what are students' misconceptions regarding what critical thinking is, revealed that students perceive that critical thinking is based on issues such as factors bound (time and resources), decision making/outcomes of decisions, and characteristics of the individual engaging in the critical thinking process, as opposed to analysis, deductive and inductive reasoning and the other critical thinking areas discussed earlier in this research. They also postulated that knowledge to practice gap exists, where they have difficulty transferring the knowledge gained in the classroom to the clinical environment and being able to apply same when making clinical decisions. These two obstacles and their subareas will be discussed next.

Students Misunderstanding of what is Critical Thinking

Factor Bound

The students saw time and resources as integral facets of critical thinking. They proposed that critical thinking is about solving problems and must be done quickly or instantaneously. Critical thinking was described as *"the quickest solution to the problem (S1)"* or *"making wise decisions in a very short space of time frame (S2)."* Additionally, it was said that critical thinking is *"the quickest thinking, because the patient may need it immediately, that is thinking on the*

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spot (S1)." Therefore, critical thinking is viewed as *"on-the-spot quick thinking (S1)"* to solve an issue at hand.

The participating students also saw resources such as medical supplies and equipment used in the clinical areas as a critical thinking factor that is required for critical thinking to occur. Thus, the respondents articulate that any limitation in resources can limit an individual's ability to think critically. In essence, it was put forward that the ability to think critically is dependent on the resources available; it is the ability to make decisions that are *"accurate as possible with the resources that you have (S3)."* Therefore, similar to the student's misconception about critical thinking being time-dependent, they also postulated that without resources, critical thinking would also be challenging.

<u>Decision-oriented</u>

The student's uncertainty about critical thinking was also demonstrated when they attempted to articulate the purpose of critical thinking. It was noted that critical thinking was for decision making, and thus, if not done well, results in negative consequences to the patient and staff. Critical thinking is *"assessing problems and then thinking it through to see how you could solve the problem. It is being able to use ideas or thoughts that are outside the setting, to solve a problem (S7)"* that is, engaging in a decision-making process. Therefore, for them, critical thinking is a process used to solve problems; however, the process or the steps whereby they can use critical thinking for example, to gather multiple sources of data, analyze and interpret it and use it to come up with multiple options and choice the best for the particular issue, could not be articulated by the students.

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Beyond critical thinking being a decision making process, students also focus on the quality of the decision or its outcome. They noted that critical thinking resulted in *"an effective judgment (S5),"* where as a *"nurse you need to be able to make wise decisions (S2)"* that *"can benefit you [the nurse] and them [the patient] (S6)."* Thus, *"poor outcomes (S6)"* will occur if critical thinking is not used in the clinical setting.

Additionally, participants postulated when making decisions involving critical thinking it must be done collaboratively. *"You always have colleagues that you can consult with to hear their ideas (S3)"* when engaging in critical thinking. Critical thinking is *"seeking answers from like-minded person*s (S3)" or *"finding staff members whom you can consult to ensure this is the accurate decision (S1)."* Working collaboratively as a team was also highlighted as an essential factor in being able to think critically. Thus, *"being able to cooperate with others [is important] because critical thinking does not involve working alone, but working with others as well (S4)."* Therefore, critical thinking is not seen as an individual task, but one done in consultation with others.

Critical thinker characteristics

An individual's personal characteristic and their attitude also allowed for critical thinking to occur or not. It was suggested that an individual who is confident, pragmatic or self-aware, can work in teams and improvise, as well as take risks, is more likely to be able to think critically. Therefore, for someone to be good at critical thinking, they should *"be open-minded and having a positive attitude to accept thoughts and ideas from others (S3)."* They continued that one must be honest with oneself about what they know and accept their limitations. Participants also noted that critical thinking is also about *"taking the risk because you could put*

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the patient or the affected person in a more serious state (S8)," and thus, you *"have to be confident and not underestimate yourself (S7)."*

<u>Theory to practice gap</u>

Lastly, when asked to rate students on a scale of 1-5, one being little to no critical thinking ability and five being mastery of critical thinking, three out of the four clinical instructors placed students at having a level of critical thinking at two. It was proposed that students have difficulty or low levels of critical thinking because of their inability to transfer the information learned in the classroom and clinical lab to the clinical area and incorporate same in the critical thinking process. *"Students are unable to link theory with practice and are able to recall facts but unable to apply knowledge at the bedside (CI1)."* It was taught that *"because students are unable to use the knowledge they have gathered to solve patient issues or care for patient's needs based on the assessments obtained (CI2),"* they cannot think critically.

Theme 2: Clinical supervision is not structured to facilitate adequate practical experience or the critical feedback required for students to develop critical thinking.

Figure 7

Factors that Impede CT Development in BScN Students
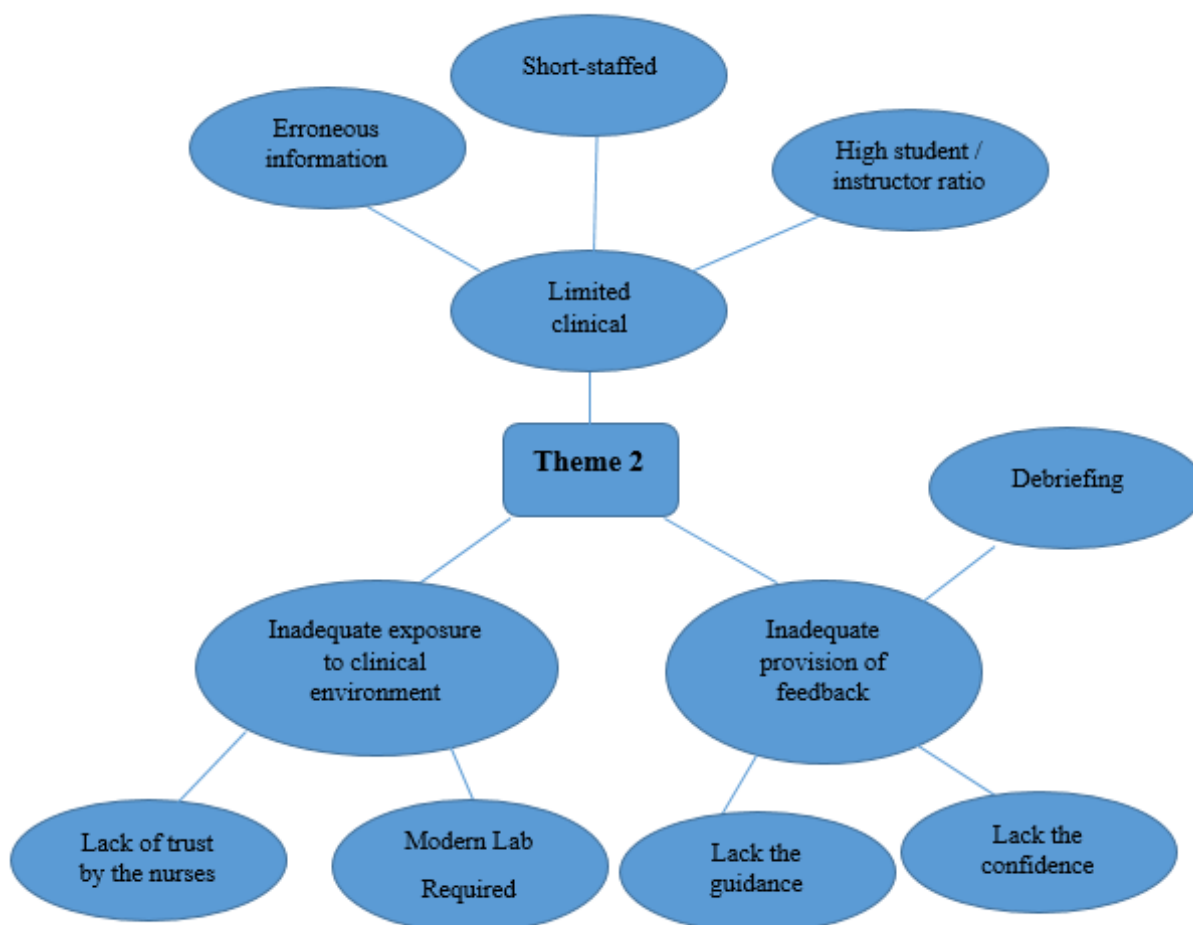
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The students and clinical instructors were asked to discuss their views on what factors hinder student nurse's critical thinking development. Three areas were articulated across the groups under the above theme, which included challenges with limited clinical supervision, inadequate exposure to clinical environments, and inadequate provision of feedback (see Figure 7).

Clinical supervision

Clinical supervision was seen as having a competent person to oversee the students while in the clinical setting, to guide them as they perform various activities in the clinical areas and develop their critical thinking. This function can be performed by either a nursing instructor assigned by the the University or a registered nurse within the clinical area. Students stressed that their need was for a competent person, as many times they were given erroneous information and taught skills incorrectly. Respondents noted, *"We would learn from seeing the mistakes out there because when we [are] out there, we do not have anybody to say this is the wrong thing, and this is what we d*o (S3)." They continued that *"what we are being taught in a class is different from what goes on in the clinic sometime*s (S9)" and *"[There was] an instance where we went out on clinical rotation before and we learn the wrong thing from nurses (S1)."* One of the reasons highlighted for the limited supervision by the registered nurses on wards was that many times the wards are short-staffed, and as a result, the availability of competent staff and the time to supervise the students during the various activities were limited. This was expressed when it was stated:

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> *This is how they accustom doing it, so they (registered nurses) will say well okay,*
>
> *this is how we do it, but that is not the way to do it [we] go the long way, like that*
>
> *but so how are we supposed to know what to say accurately, if we see it this way*
>
> *(S3).*

Therefore, as a result of this limited clinical supervision and guidance, students are given misinformation and not afforded the time and expertise required to guide them through the process of critical thinking development.

A high student to clinical teacher ratio was also suggested as a factor contributing to the limited support or supervision of the students. Respondents articulated, *"we do not have that [supervision], is only how much clinical instructors we have that can divide themselves into different health centers or hospitals, and some of the nurses do not even do the proper procedure (S4)." "Clinical instructor staff is inadequate, affecting the individual student teaching that is often required when helping students to develop their critical thinking skills (CI3)."* Therefore, due to the high student enrollment and large numbers of students assigned to the clinical areas at any point in time, the frequency with which clinical instructors rotate to the various areas is low. Additionally, when they do go to the various areas, they are unable to stay for an extended period and give students the individual attention they need to address their unique critical thinking insufficiencies.

Inadequate exposure to clinical environments

The second area highlight by students in the theme above was that inadequate exposure to the clinical environment is a factor that contributes to deficiencies in student's critical thinking development. Nursing students of the University are assigned to various clinical areas ranging

from health centers, medical and surgical wards, accident and emergency departments, operating theatre, and other specialized areas, to reinforce what they learn in the classroom and give students the ability to practice skills and develop their critical thinking. Within these various clinical settings, it is expected that students will engage with patients with various disorders and apply the skill of critical thinking to determine what are the best care solutions for the patient. However, during the focus group, various challenges regarding the ability to gain clinical experience and foster growth in student's critical thinking were identified. For example, it was expressed that while in the clinical area, students were not allowed to actively participate in patient care, as demonstrated by the comment, *"we do not get to implement or practice what we are taught (S3)."* One of the reasons put forward for students not being allowed to practice their skills was a lack of trust by the nurses on the wards. *"They believe to themselves that we are probably lacking that knowledge and that experience (S4)"* and *"They feel we cannot handle being on a ward and just shut you off and I feel like best is just I do not because they do not believe in me(S4)"* was the sentiments noted by the participants.

A deficit was also noted in the clinical classes which prepare the students for the clinical environment. These classes aim to mimic the activities and experience students ought to have on the wards and, thus, start students on their journey to the mastery of critical thinking. However, it was voiced that *"you need to get more hands-on practice for the clinical class (S9),"* that is *"before we go to the hospital and health center we should be able to get the practical aspect, as in go the lab and do some hands-on and get like scenario (S2)."* With this exposure, students will gain the confidence to go into the clinical areas boldly, with an increasing level of

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competence and possibly engendering more confidence by staff nurses to allow students to perform more complex tasks.

It was suggested that the lack of a *"proper"* clinical lab where the students will have a safe environment that fosters critical thinking development is also a primary source of the problem. Clinical instructors advised that there is a need for a:

> *Modern Lab because the actual ward or clinical setting is fast-paced; the time*
>
> *students   need to maneuver through clinical issues can be impractical. A*
>
> *modern lab with simulation patients will make a major difference in developing*
>
> *the ability to think critically without the real-life and death pressure that exists in*
>
> *the practice area (CI3).*

Inadequate provision of feedback

The third factor that hinders students' critical thinking development emphasized by the participants was an inadequate provision of feedback. Participants noted that the lack of critical critique and feedback from clinical instructors and nurses contribute to student nurse's limited critical thinking ability because the students are not guided as to the areas where errors were made, and points to improve. They suggested that students needed *to "get scenario /situations where you have to think critically and where we went wrong, the lecturers could correct us, so we get experience before we go to the real world (S2)."* Additionally, it was reported that the lack of feedback also caused student nurses to lack the confidence they require to go out in the clinical area and apply the knowledge they have to engage the patients and staff and improve their critical thinking. *"I underestimate myself in the clinical areas and when implementing skills*

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(S7)" because of lack of feedback by instructors required to boost students' confidence and competence in the implementation of skills.

The use of debriefing was a feedback strategy put forward that nursing educators can utilize to facilitate growth in the student nurse's level of critical thinking. For the participants, a debriefing was seen as a method where educators and students can come together after an activity where critical thinking was utilized and discuss the activity to improve critical thinking implementation by the students. It was expressed as an activity where *"they [students] remain back in the class, and you [educators] guide them, where they went wrong (S1)."* Through this method, students can gain confidence if what they are implementing is correct, as well as gain immediate feedback as to how they can improve next time. Overall, this process aids with critical thinking development.

Theme 3: Courses have to be structured to include modern teaching strategies and growth in student involvement in the learning process.

Figure 8

Factors that Impede CT Development in BScN Students
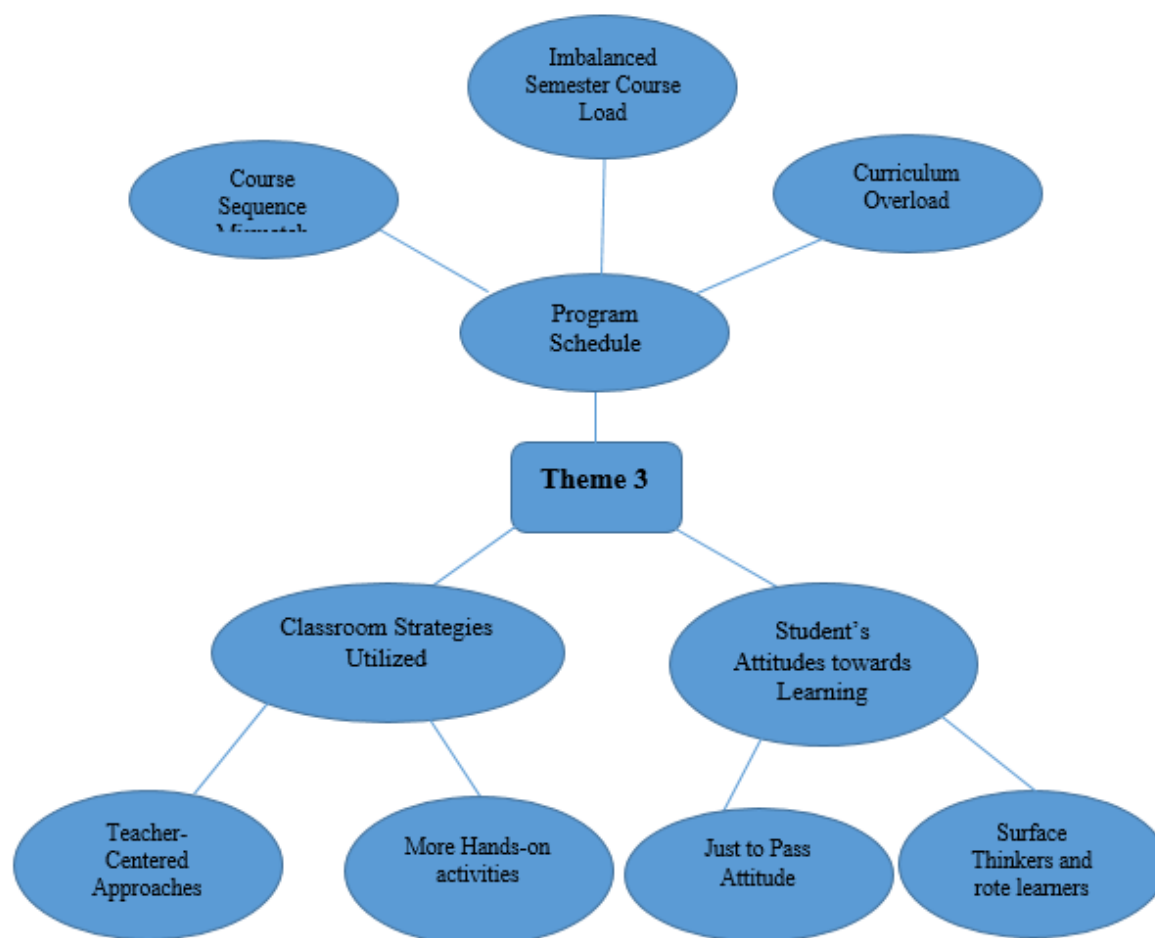
During discussions in the focus group, participants highlighted how the courses were structured and scheduled also impacted negatively on their ability to improve their critical thinking. They noted under the above theme that the program schedule, classroom strategies utilized, and the student's attitudes towards learning all hindered their critical thinking development (see Figure 8).

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Program schedule

The nursing program at the University is a sequenced one, meaning that the courses are fixed at a particular time in the program and cannot be done outside of the scheduled period. The participants complained that the program sequence was not balanced, as some semesters were overloaded, and others course time was under-utilized. One such comment was: -

> *I think if they going to that six weeks in class and six weeks training that they should probably lessen down the courses or put more core courses before we go out on the ward for example if we put like pathophysiology or some other core course that will benefit us for when we go out on the wards so we can apply it to what we learn (S1).*

Others highlighted the mismatch that sometimes exists between what is taught in the classroom and when the students are allowed to reinforce the skills/information in the clinical setting. Evidence of this mismatch was explained when a participant described that *"In some areas, the curriculum is not synced with clinical experiences, e.g., pharmacology (CI1)."* This meant when pharmacology was done in the classroom, and students did not go into the clinical area at that time and, as a result, was unable to immediately transfer the knowledge to the clinical setting when engaging in critical thinking. Additionally, when they do get to engage patients' pharmacological drugs as part of the patient care, application was difficult, as it was difficult to recall the information. This, the participants voiced, may hamper the student's ability to utilize critical thinking involving pharmacological issues and their overall critical thinking ability.

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It was also noted that the overloading of the curriculum because of the program schedule did not allow time for students to develop critical thinking. A clinical instructor expressed that:

It takes time to develop the ability to think critically. There must be extensive reading and discussions about various viewpoints surrounding the situation or subject if students are to understand the decisions made entirely. Rotation time in the clinical setting results in students being told what to do instead of thinking through what should be done (CI3).

Classroom strategies utilized

From the theme above, classroom strategies utilized were also identified as a factor that hinders the student's critical thinking development. Lack of engagement with the students prevented them from actively thinking through procedures that are required in critical thinking development. It was expressed that, *"Do not just teach us the basic stuff. Let us have an example so we could be able to start to train our minds to think critically (S1)."* Students believed that the lecturing or teacher-centered approaches used were insufficient in critical thinking development. One such student stated they (lecturers) *"are just presenting it, so it is not really how the lecturer did not bring it. We know it, but do we execute what is taught (S4)."* Lecturing, according to the students, does not facilitate their critical thinking development; they needed more hands-on. A participant suggested, *"hands-on like if they carry us to like a hospital setting and something comes up, and they say you use critical thinking to solve this problem and see what you will do (S7)"* approaches like this they thought will facilitate critical thinking development.

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Participants identified that few classes used varying teaching methodologies that allow students to engage with the content being delivered in different ways. The students identified one session where there was engagement, and they noted it helped in their understanding of the material, as well as the application of the material when attempting to use critical thinking. During a particular class session,

> *We were taught, and after we would practice hands-on, we learn from audio, and after we were tested to see what we know, we were placed in a scenario would think critically and in the situation, there were even changes in the patient condition (S1).*

They also applauded the teaching in the classroom, as it was detailed and allowed for a vast amount of information to be passed on to the students. This is what they noted was needed across all classes, as this was done during this one class.

Student's attitudes towards learning

The third category that was highlighted under this theme was the student's attitude toward learning. Critical thinking requires active involvement on the part of the students if it is to be developed and mastered. However, the clinical instructors noted that the student's attitude was one where knowledge acquisition and skills development was not the primary goal, but to do the minimum and pass the course.

> *Their attitude toward learning hinders critical thinking development. Most students seem to want to "pass" the course with a lack of alertness to opportunities to use critical thinking. They lack of inquiry, the need to remain*

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> *well-informed and the understanding that every course/subject area of study is a*
>
> *part of the whole (CI4).*

Surface thinkers and rote learners were some other descriptions given by clinical instructors as to why it is difficult for student nurses to develop the skill of critical thinking. Surface thinkers refer to the inability of the students to adapt to clinical situations and through analysis and other critical thinking elements and derive at multiple solutions from which to choose. It was noted that *"They [students] are surface thinkers and lack the ability to be flexible and consider alternative and opinions of others (CI4)."* Also, students had the skill of recall, but the ability to think independently and apply the information and knowledge they have to various situations is difficult. This is the context where the students were described as rote learners. It was articulated that *"They often seem to follow what they are told or shown without understanding the thinking, logic, and science involved (CI3),"* and *"when administering care if the situation or equipment is not ideal as listed in the book, they claim they cannot perform the skill or care for patients (CI2)."* Therefore, the students, at times, can be seen as idealistic and not adaptable.

Theme 4: Nursing supervision and skill acquisition aid students in critical thinking development

Figure 9

Factors that Contribute to CT Development of BScN Students
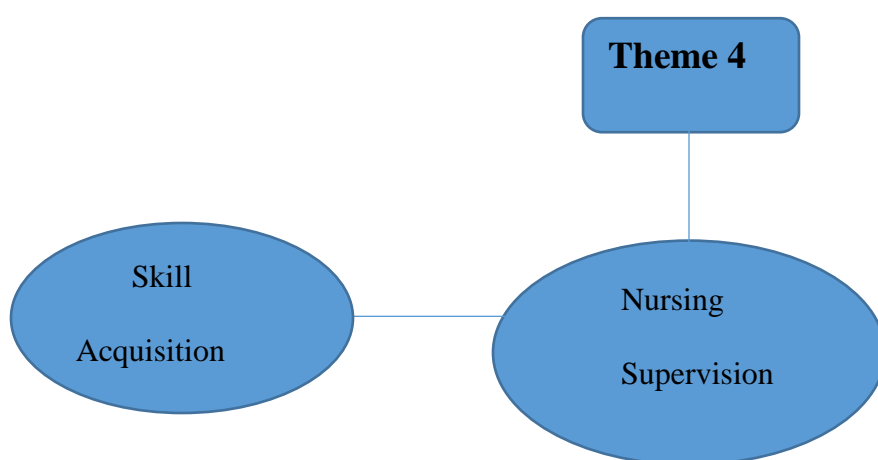
Very little was said by the participants regarding present factors that contribute to student nurse's critical thinking development. They articulated that their critical thinking development is stunted because of the factors identified above and not much is done to motivate them and facilitate their critical thinking development. Therefore, only one area was noted to have a positive impact on the student's development of critical thinking (see Figure 9).

The students expressed that when in the clinical areas, there are a few registered nurses that will assist in their skill acquisition and critical thinking development by allowing them to manage patient care issues and come up with a plan of care decisions using critical thinking. Some nurses *"have the information and show how they practice it (S6)."*

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However, even though this area was articulated as being valuable in assisting in the critical thinking development of the participants, they noted that this area was underdeveloped, since it was done only by a few nurses and not a structured, scheduled activity, and therefore, seen as inadequate to meet the needs of the student body if mastery of critical thinking is the goal.

Theme 5: Implementation of varying teaching methodologies, andragogy and the need for alternative forms of assessment are required to facilitate advancement in student's critical thinking.

Figure 4

Strategies to Improve CT Development of BScN Students
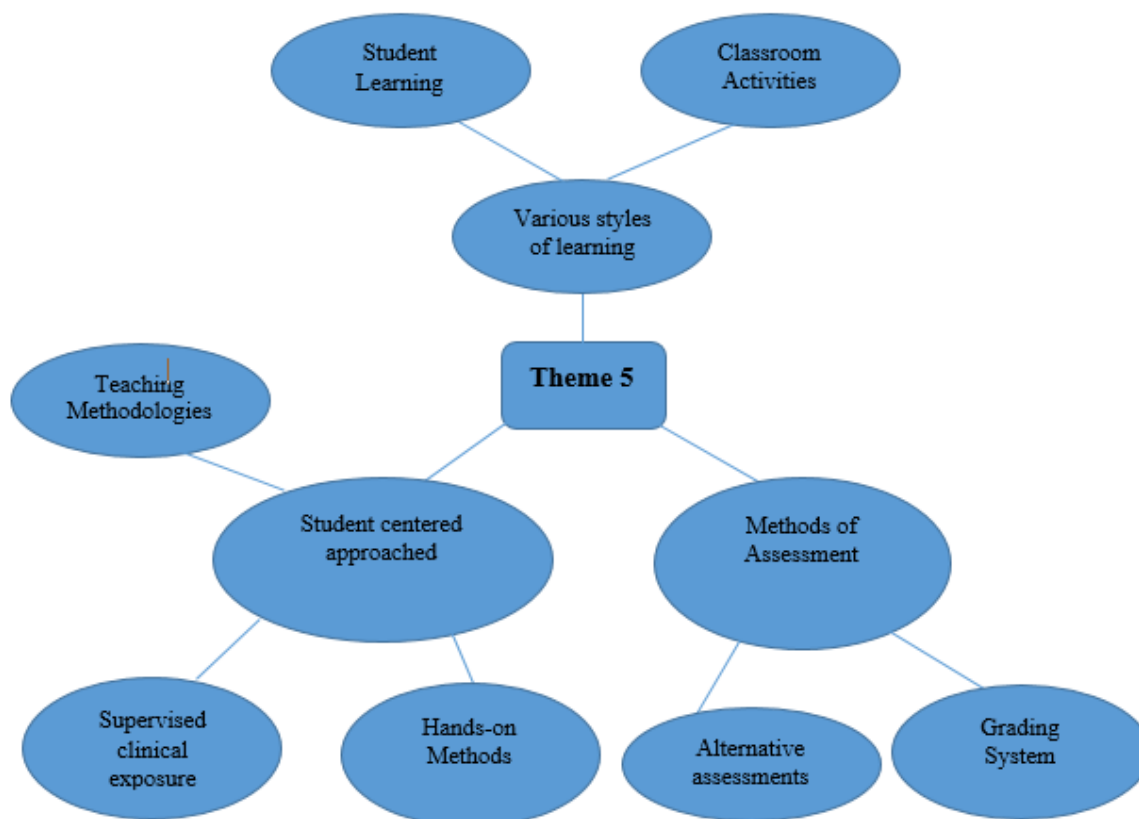
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The participants were also asked to discuss their views on what they thought nursing educators could implement to aid in improving student nurse's level of critical thinking to a mastery level. From the theme above, participants noted the learning styles of students, the methodology in which students were taught, and how they were assessed, were three areas that educators can implement changes to foster growth in student's critical thinking (see Figure 10).

Learning styles of students

Various respondents noted that the student body is very diverse, and as a result, how the students learn and express themselves in an academic environment differs. *"You have to take into consideration that people learn differently, so some people are visual learners and some people audio, and some people hands-on (S2)"* was how it was expressed during the discussion. Participants suggested that for students to be able to come to a deeper understanding of course materials and utilize the skill of critical thinking, differences in students learning styles were not only to be considered but underpin the planning of all classroom activities. Therefore, when educators are preparing their course materials and how they are to be implemented, they should ensure to *"teach the information in those different methods so they could account for everybody so that everyone could understand and grasp (S3)."* A student frustrated by the lack of consideration for their style of learning articulated, *"I get 'fed up' of words, so I prefer to see a diagram with just a flow chart, and that is it, you know. While somebody else might love the Marieb [text book] and its bulk of words (S7)."* Therefore, if nursing educators aim to assist students in the mastery of the skill of critical thinking, then it is crucial that the variations in the way students learn, be a fundamental consideration by educators.

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<u>Teaching methodologies</u>

A shift from teacher-centered to student-centered pedagogy was another area under the above theme, highlighted by participants that can be explored by nursing educators to aid students in critical thinking development. It was expressed that didactic modes of information delivery were the primary method of teaching used in the nursing department, and this method does not facilitate student nurse's ability to think critically as it does not require them to participate in classroom activities actively and practice the skill of critical thinking. Thus, there is a need for a shift from the teacher giving information to *"more hands-on practice. Have us interact with our colleagues as patients or as co-workers or our superiors (S5)"* to allow the student to work through the process using critical thinking in their decision making. It was suggested the need for more student engagement *"where they [educators] carry us to a hospital setting, and something comes up, and they say like use critical thinking to solve this problem and see what you will do (S9)."*

The majority of respondents expressed concern about the teaching strategies used by educators and suggested that strategies that allowed the students to actively participate in the learning process and allow their views and thought process be considered, have a greater likelihood of helping students understand how to use critical thinking and how to improve it.

> *If the teacher in the class has a discussion, you find we respond more than if it is we get it in a question format. When you have to explain yourself or relate to a real-life situation, we tend to speak out more (S8).*

Therefore, a variety of strategies were suggested that nursing educators can implement in both classroom and clinical environments to improve student nurse's levels of critical thinking.

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These suggestions were in keeping with the strategies tested during the implementation of the research and were found to be helpful to students. *"I think including more scenario type questions and simulations should be done during clinical teaching sessions. Inclusion of PBL and Clinical Case discussions (CI2)"* to aid students in using critical thinking, was how it was expressed by students. It was also articulated that *"they [educators] should give us more scenarios and similar strategies where we could use critical thinking and workout more activities (S7)."* Therefore, educators must be cognizant of the teaching methodologies they are implementing during their classroom and clinical sessions and ensure that active student participation is encouraged to foster growth in student's use of critical thinking.

Additionally, it was noted that while the shift to student-centered approaches is required, there is also a need for more supervised clinical exposure of students. It was not only essential to allow students the ability to engage the material actively and determine the best way forward using critical thinking, but also for educators to be there to assist with the process when difficulties arise. For example, to improve critical thinking a respondent suggested that they go to the clinical areas, be allowed to use the skill of critical thinking to administer care and work out clinical issues and with the assistance of an educator *"be able to correct yourself or know well next time is not like that (S3)."* This, the student suggested, fosters critical thinking development.

Assessment strategies

Under this theme, the participants also noted that the methods of assessment could also be used to support student's growth in critical thinking. They noted that there is a need for alternative forms of assessment, the use of debriefing, and a change in the grading system used if nursing educators want to improve the critical thinking of student nurses.

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Currently, the majority of assessments as articulated by the participants are done by a question and answer testing, which is multiple-choice, true and false, short answers and essays, under strict examination conditions, that promotes anxiety more than critical thinking. The form of testing produces *"anxiety and your minds go blank, and when you come out of the exam room, everything else does come back in your brain (S1)."* Therefore, there was a strong recommendation that alternative forms of assessment be utilized that will not only test content but allow for skill development and variation in how students are allowed to deliver the information acquired. *"Methods of evaluation need to move away from knowledge base only but should cause students to think and apply knowledge to nursing situations (CI3)"* was a suggestion. It was also articulated that:

> *Clinical assignments and assessments can also provide opportunities for students to develop critical thinking skills. Assignments on brief Clinical Cases and more dialogue on complex problems. Besides, questions that involve reasoning skills and the ability to organize and articulate knowledge can be used as a strategy to encourage the critical thinking process (CI4).*

Thus, there is the need for nursing educators to move away from knowledge and content testing and utilize assignment and assessment methods that allow students to use the skills to critical thinking in its completion and thus can take varying formats.

How grades are assigned to the various assessment areas was also noted by respondents as a factor that nursing educators must consider in helping student nursing develop their critical thinking skills. They noted that if the emphasis was to be placed on critical thinking development than recall of information, it was suggested that the grading be less focused on written tests that
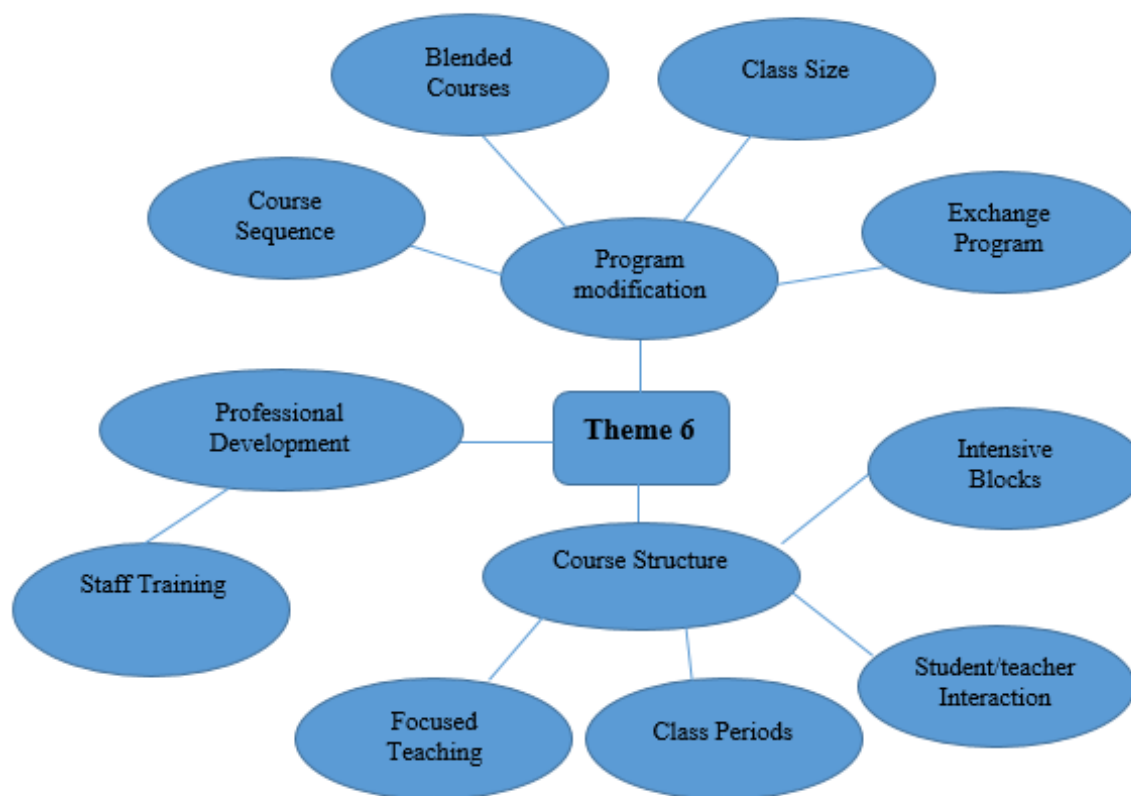
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require students to regurgitate information transferred from educators and more on assessing the

implementation of critical thinking. The students understood the need to demonstrate acquisition

of knowledge and the importance of assessing student's level of critical thinking. As a result, the

student notes that the grades should be split *"half demonstrating understanding of content and*

half-written implementation of critical thinking (S8)."

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Theme 6: Program restructuring and continuous professional development of staff is essential to increasing student critical thinking skills.

Figure 5

Strategies to Improve CT Development in BScN Students

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The participants commented on strategies nursing educators can implement to improve the critical thinking development of the BScN students, and a second theme also emerged. The participants suggested that changes be made both to the overall program structure and scheduling system, as well as the structure of the courses and how students and teachers interact. Continuous professional development of faculty was also noted as a key factor that will aid in the faculty members in being equipped to assist students with their critical thinking development (see Figure 11).

<u>Program modification</u>

As mentioned above, the nursing program at the University is a sequenced one, and thus, can only be enrolled at the scheduled time. It was communicated that the courses must be balanced, *"this semester, we have one core course, and next semester is core courses in pathophysiology, conceptual, microbiology (S5)."* Therefore, to assist with such an imbalance *"year one the courses like psychology and God and human life and could go probably to year four (S5)."* Thus, there is a need for administration and faculty to examine the entire program and how the courses are placed to ensure the maximum value to students. Another suggestion put forward regarding program modification was to make some of the courses blended, which is part face-to-face and part online. The participants noted that to assist with the schedule overload, *"make the course part in class and part online (S1)."* Additionally, placing more resources and support for students on an online platform for students to access at their convenience will also significantly assist students with access to information and tools that can aid in their critical thinking development. Thus, *"we do all the work in class but online we have all access to*

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resources, so you can post videos where we have other teaching (S1)" tools to reinforce and practice the use of critical thinking.

The size of the cohort was also proposed as an area that should be under program review, as the participants thought that the large class sizes did not foster critical thinking development. One comment said:

> *I understand that for some courses, labs are important, but the number of students is too much It is just restricting us from getting that hands-on. They [administration] could lessen down to the size of the class where we can get hands-on material (S2).*

This they thought will allow for more student engagement and increase the ability of students to use and improve their critical thinking. Finally, it was expressed that when reviewing the program that the introduction of an exchange program will be another strategy that can see a student's critical thinking improving. The introduction of *an "international student exchange program (CI1)"* is an excellent way to expose students to various environments that can aid them in improving their use of critical thinking.

Course structure review

Apart from reviewing the program, an examination of the course structure was another suggestion by participants to support students in growth in critical thinking. Some of the courses are taught by non-nursing faculty, as well as some courses students have to enroll in are non-nursing courses, such as academic writing and chemistry, in these two situations sometimes the information and the assignments given are not specific to nursing and thus lose the potential to fully benefit students.

It does not make sense we giving an assignment and is not related to nursing. Even if it is English make be something to do with nursing. So the assignment should be more focused, so when you do it, it is linked to the context of our profession (S3).

With more focus on instruction and assignments, students will be able to apply the information encountered during the process of critical thinking and thus improve the skill. Additionally, there is a need for greater interaction between students and faculty, so that issues surrounding use and mastery of critical thinking can be discussed and plans for improvement developed and monitored.

After class, if a lecturer says come and see me if you do not understand everything still you are not getting time to reach the lecturer because everybody is rushing the same time to see the lecturer so still you are at a disadvantage with it even after class if you have not learned it during class (S1).

Thus, greater emphasis must be placed on faculty office hours, where students have time allotted to see faculty to assist them with issues such as difficulty in the implementation of critical thinking.

Another issue that participants thought required attention was the fact that classes were back to back with little to no breaks in-between classes.

After class, you have another class and five minutes after you have a next class. Back-to-back 9:00 am to 7:00 pm, and you cannot do any assignments or apply the skills of critical thinking in assignments as there is no time (S1).

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Therefore, there is a need to examine how and when the courses are structured to allow the students time to process the information and apply it when using critical thinking. One suggestion made was to use an intensive block system, where week sessions are conducted, particularly linking the classroom to the clinical content to aid students in the use of critical thinking. One participant noted that:

> *Seeing that everything was rushed down so and we know these students are going*
>
> *out into the medical field a week before have like a core session with them, go*
>
> *through specific vital points to help them apply for the work (S2).*

Staff training was another proposal made by participants. It was noted that if the staff is continuously updated in methodologies to assist students in the development of critical thinking, student mastery of the skill will improve. Therefore, participants noted if critical thinking of students was to be improved, it was necessary to *"train faculty (CI1)"* so that they will have the tools to assist students in refining the use of critical thinking.

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Part 2.

A post-intervention focus group was conducted with the students involved in the classroom session, where the two test strategies were implemented. The following are the findings of that discussion.

Theme 1: Concept mapping and Clinical Case facilitates critical thinking development, but didactic methodology preferred by student nurses.

Figure 12

Students Comparison between Tested Strategies and Traditional Teaching Methodologies
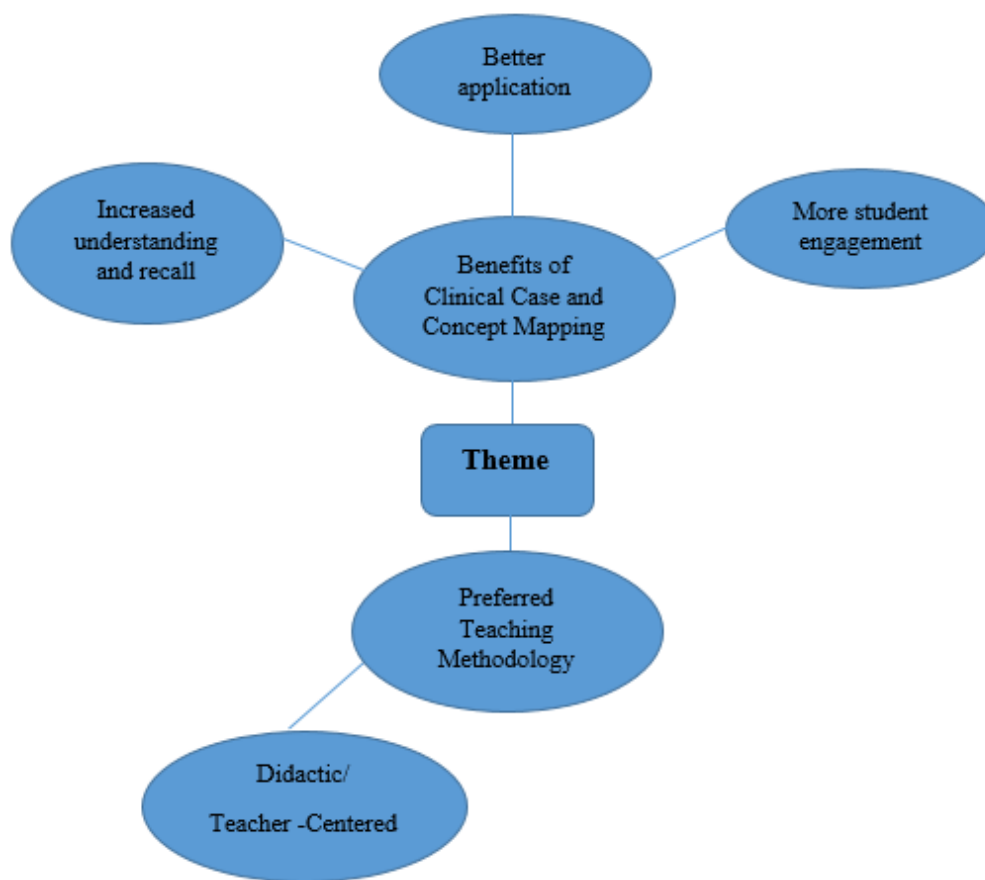
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During the post-intervention focus group with students, they were asked about their experience when the concept map and Clinical Cases were implemented, and to compare the outcome and impact of using these two methodologies with that of the traditional didactic method of teaching such as PowerPoint (see Figure 12). The students articulated that the implementation of both strategies was very beneficial, and *"putting the Clinical Cases made it easier to understand (S7)"* the content. The use of the concept map and the links that it made, made it easier to recall the information and connect the concepts, for example, *"the first time we did the test, we made out through guessing but then after the intervention, when you did it the certain terms and how you connected it(S10)"* made it more comprehensive and was able to use the information to answer the questions more accurately.

For some students, the use of the Clinical Cases also significantly improved their application of theoretical work to the clinical environment. It was articulated that:

> *The scenarios helped me more because we would be going into clinical and we would have to know specific skills and by implementing little scenarios know we get a better idea, so if we in the clinical settings and a problem may arise you can remember the scenarios and apply it and know exactly what to do (S8).*

Therefore, it *"makes application into the clinical environment easier (S10)"* for the students. The students also found that they were actively engaged in the learning process, which *"made them open their minds (S7)"* and allowed them to *"think for themselves (S7)"* which enhanced their application of the content and use of critical thinking.

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However, even though the students articulated that the tested strategies concept mapping and Clinical Cases *"worked a lot (S9)"* and *"increase their mind's (11)"* ability to utilize critical thinking, they preferred teacher-centered didactic teaching methods such as PowerPoint compared to the test strategies. They found that with the used of PowerPoint, they can focus on the content and not the teacher. *"When I see a PowerPoint, I write down everything I do not pay attention to what the lecturer saying (S7),"* was a response. With strategies such as PowerPoint, *"you [the student] do not have to go in the textbook sometimes because the teacher summarizes it for you already and try to make you understand better (S7)."* Thus, with strategies like PowerPoint, the effort is on the faculty and, to a less extent, on the students. Another student elaborated on their preference of the information being *"summarized by the teacher, instead of going into the book itself to read, which contains plenty of words and make their mind shut off (S10)."*

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Discussion

Critical thinking is a challenging skill for students to develop and master (Chiu & Cowan, 2012), and the nursing fraternity must address these challenges head-on, as a deficit in critical thinking poses threats to patients, their significant others, the institution, and the profession (Facione & Facione, 2008). Therefore, it is imperative that as nurses and faculty, we examine this phenomenon of critical thinking in our students and identify solutions to the problems. This chapter aims to utilize the results and findings and the two theories presented above, to answer the thesis research question and sub-questions geared at understanding BScN nursing student's critical thinking levels and the issues that can both hamper and promote critical thinking development of BScN students. It will include two section.

Discussion of Research Results and Finding

This section is geared at answering the research questions identified in this thesis. It will commence with a discussion of how the study results answers each of the research sub-questions and conclude with the use of results to answer the primary research question.

Discussion of Research Sub-Question 1

This section addresses the first sub-question, "What is the current critical thinking skill level of BScN nursing students at the University?" Analysis of the CCTST questionnaires overall scores and individual group scores (control group and concept mapping and Clinical Case group) showed no significant difference between the mean scores between the first to the second administration of the questionnaires as demonstrated by the results of the independent t-test and the 95% confidence intervals. Therefore, it can be deduced that overall exposure to the questionnaires during the first attempt of the questionnaire, and the interventions done during the

classroom sessions, had no considerable impact on the student's ability to think critically. These findings were similar to Kelleci, Yilmaz and Aldemir (2018), after a testing strategy of high fidelity stimulation was used in a group of students, and Janiszewski Goodin (2005), who tested the use deliberate discussion in nursing students.

On the other hand, this result conflicts with Gholami et al., (2016), findings of a significant improvement in the students critical thinking scores after the implementation of student-centered teaching strategies. Of note, the implementation of the teaching strategies tested was done over eight weeks, as opposed to two sessions of this research, suggesting the need for an extended period of strategy implementation to ascertain its effect on student's critical thinking development. The structure of our nursing program is that some semesters such as the one used to test the strategies, the students are in classroom for only a few weeks, on average six weeks and the researcher wanted to ascertain if small doses of these strategies will have an impact on these students critical thinking development and thus, can be used when the number of sessions with the students are limited.

Base on Ausubel and Elder and Paul's theories discussed earlier, by engaging students in student-centered strategies, allowing for exploration of the topic and assimilation of old with new information afford students environment where critical thinking can be developed. However, based on the findings of this research, where no significant impact occurred after small doses of these strategies, compared to those of Toulabi and Pour (2016), it may highlight that a vital element of the number of sessions or exposure is missing.

Therefore, the need for repetition or the dose-effect (more sessions) in the teaching of both classroom and more so in clinical skills for student nurse's aids students in achieving proficiency

level (Archer, 2010; Takashima & Verhoeven, 2019), recall of foundational knowledge and psychomotor skills required in nursing (Mahlan, 2018), with longer retention (Winston, 2015; Stegers-Jager & Cohen-Schotanus Themmen, 2013; Pell, Fuller, Homer, & Roberts, 2012; Muraskin, 1997). Thus, even though ensuring active student engagement is essential, as is allowing students to transit through Ausubel's five-step process, two sessions for the implementation of the strategies may be inadequate, making the number of sessions an area in need of further exploration.

The study results also demonstrate that there may be a need for a robust remedial program, where students with difficulty in grasping and implementing the skill of critical thinking progress through a series of self-directed and faculty-assisted activities in a safe environment, to engender change and improvement in their critical thinking skills (Winston, 2015).

Further, exploration of the critical thinking areas measured by the CCTST showed that the students were best at interpretation, as this was the critical thinking area that showed the greatest means in both the first to the second administration of the questionnaire. On the converse, evaluation was the critical thinking area with the most difficulty, as it has the lowest means overall in both questionnaires. This was different to what was found by Gholami et al., (2016) who nursing students in a similar experimental study comparing the use of teacher vs student-centered approaches (Lecture vs PBL) noted that deduction and analysis were the students highest and lowest area of critical thinking. Additionally, evaluation and inference were the next two lowest scores for those students, suggesting the need for further inquiry. For Shirazi and Heidari (2019) evaluation and analysis were the highest and the lowest subscale areas. Janiszewski Goodin (2005) showed inductive reasoning as the highest subscale in the

experimental and control groups and evaluation and analysis as the lowest subscales in the groups respectively. From these studies, even though to think critically students must be able to engage in all seven critical thinking areas, it can be noted that evaluation and analysis are two areas where nursing students frequently have difficulty, even though one study proved different. Also, various factors such as the strategy implemented, the timeframe the intervention was implemented, the year of the students in the nursing programs, the grade point averages of the students in the study and may other factors may influence which subscales the students improve in and which ones require greater attention. Therefore, this is an area that requires further examination, as it was not addressed within the scope of this study.

Further, the means from the questionnaires can be integrated into the assessment categories of the CCTST, to ascertain the students' critical thinking scores from weak to superior level. It can be noted that the overall performance of the students within both groups (control and concept mapping and Clinical Case) was within the weak to moderate category, with students in the concept mapping and clinical case group possessing slightly weaker but not significantly different scores. Azizi-Fini, and Adib-Hajbaghery (2015) findings were similar in that both freshman and senior nursing students had low levels of critical thinking using the CCTST questionnaire. Similarly, and Heidari (2019) noted that nursing students continued to have low CCTST scores as they transited through their nursing programs.

The overall scores of the CCTST can assist stakeholders to assess students' abilities to think critically and make decisions based on the use of critical thinking. Since critical thinking allows for the transference of knowledge from one context or situation to another, scores from the CCTSC can be used by faculty to determine which students will be able to function better in

the classroom and clinical areas and help identify who are the students in need of help and what are their deficiencies (Insight Assessment, 2016).

Examination of the meaning of the CCTST scores revealed that a student in the weak category will have predictive difficulties with reflective problem solving and reflective decision making, and those within the moderate category have the potential for same (Insight Assessment, 2016). Elder & Paul (1996) described the six stages an individual transit through during their critical thinking development. From the review of the literature, there were no studies that examined the critical thinking scores of individuals at the six stages, which may prove helpful to allow for a more accurate assessment of our students and make recommendation more specific to the needs at each stage. However, with review of the stages, the suggestion is that our students at the weak level may be placed in Elder and Paul's challenged or beginning stages as at these stages the person is aware of the importance of critical thinking and initiate steps to begin its development (Foundation for Critical Thinking, 2019). From discussions in the focus groups the students articulated that they understood the importance and need for critical thinking and thus required to develop same to function at an optimal level as nurses. For those students at the moderate level, it is suggested they be placed in the practicing thinker level, as at this level student's would have started to approach critical thinking in a more systematic way, they still have difficulty utilizing same in the decision-making and problem-solving processes (Foundation for Critical Thinking, 2019). The students did call for activities that engage them and allow for them to think and work through issues both in the classroom and clinical areas, but in the end still preferred the teacher-centered approaches. Thus from this one can conclude that they are

attempting to improve their critical thinking but because of the effort required revert to previous method of thinking.

Overall, these results indicate that the critical thinking level of our students is inadequate and insufficient to progress to safe and competent nursing staff if not improved. Therefore, based on the results of this study and other research presented, it should be seen as a matter of urgency addressing this phenomenon in our nursing students, as it has been identified earlier that poor critical thinking leads to poor patient outcomes.

ANOVA testing and Correlation analysis showed that age was the only personal factor that showed a statistically significant and positive relationship to the subscales. Increasing age was found to be a factor associated with increasing critical thinking when examined by Futami, Noguchi-Watanabe, Mikoshiba, and Yamamoto-Mitani (2019); Emir, (2009). This has implications for our enrolment, and therefore having a closer look at how age impacts our student's critical thinking development is warranted. Presently students enroll in our nursing program from age 18 to 45, and currently, the administration is discussing to increase or remove the upper age limit, thus, allowing for a greater diversity with regards to age within our student body. Ausubel theory requires an individual to link prior knowledge with new knowledge to develop new knowledge, therefore, is it that the older students have more life and other experiences and thus can better assimilate this information when engaging in critical thinking? Or is it that the older student is more committed to the learning process? A key element suggested by both theories used in this thesis and thus, is more likely to actively engage in the critical thinking. Hence, from the results, we see that the age of a student can impact their ability to think critically, but what is the cause of this? Thus, we need to explore this area further to

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ascertain what age groups have better critical thinking abilities, and how do we help students

outside of that age group master the skill.

Discussion of Research Sub-Question 2

Student nurses have difficulty in critical thinking development (Abdullah, Alzaidiyeen, & Yee, 2010; Arli, Bakan, Ozturk, Erisik, & Yildirim, 2017). Therefore, if faculty and clinical educators are to improve this deficit in student nurses, we must first understand what are the reasons for the difficulties experienced by student nurses in the development of their critical thinking skills, and thus make recommendations and plans for its improvement.

From review of the CCTST questionnaires, we noted that students experienced difficulty across all seven of the critical thinking categories, with overall scores of weak to moderate. Examination of the focus group findings showed that various issues contributed to students' inability to reach competency level in their critical thinking development. The lack of exposure to the clinical area with competent supervision and being availed immediate feedback were some of the issues raised. Proficiency in critical thinking is acquired through activities that include "social processing and role modeling," which occurs in the clinical setting (Twibell, Ryan & Hermiz, 2005, p. 72), and the greater the clinical exposure, feedback and work experience, the more consistent the use of critical thinking (Ludin, 2018; Wane & Lotz, 2013; Yang, 2012; Maskey, 2008). Within the context of Ausubel theory outlined above, for critical thinking development to occur through an assimilation process and meaningful learning, student will require clinical instructors to act as role models for nursing students to experience how the theoretical information learned in the classroom can be applied to the clinical environment (Sousa, Formiga, Oliveira, Costa, & Soares, 2015). It is through this engagement or experience the information then becomes personal and thus, allowed to be integrated with their previous knowledge, so that its application or transference as described by Ausubel is improved.

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Therefore, application of Ausuble theory of meaningful learning in nursing education, will encourage exposure of nursing students to the clinical environment and increase instructor feedback so that student nurses will gain the opportunity to be integrated into the care of patients, assimilate old and new knowledge and as a result, improve their critical thinking skills, becoming experts in utilizing the critical thinking process.

Consequently, if the clinical time is insufficient, or it is not utilized appropriately, that is, students not being able to engage patients with higher acuity levels and make decisions regarding their treatment plan from the use of critical thinking, or instructor feedback insufficient, students critical thinking development will be stunted (Gunay & Kılınç, 2018; Zamanzadeh, Jasemi, Valizadeh, Keogh & Taleghani, 2015; Sharif & Masoumi, 2005; Lofmark & Wikblad, 2001). Thus, the time spent in the clinical areas by students, as well as the objectives given, activities allowed and feedback administered, must be examined and modified to be meaningful to students and allow students maximum time and engagement to facilitate critical thinking development.

Students in this research complained about a high student-clinical instructor ratio (1 instructor: 20[+] students), and, as a result, were unable to have adequate clinical contact with their clinical instructors. Research advocate for one clinical instructor to 8-10 nursing students, however, it notes that the clinical groups are getting larger and as a result, students are not assisted in developing their critical thinking and decision making (Luhanga, 2018; Salifu, 2017; Ironside & McNelis, 2010).

As a result of this low student-clinical instructor interaction, students articulated, that their ability to utilize the critical thinking process was hampered, and there is sometimes acquisition

of erroneous information when knowledge is sought. Research describes the importance of clinical faculty guiding developing practitioners such as nursing students (student/faculty interaction), to improve the skill development and ensuring positive patient outcomes (Carter and Rukholm, 2008; Glynn, McVey, Wendt, & Russell, 2017; Roman, 2018). Further, Small, Pretorius, Jooste, and van Dyk (2008) demonstrated from the results of their study that even though clinical instructors were aware of their roles assisting students in critical thinking development, they do not pay attention to its development, and thus, student nurses are not assisted in improving their critical thinking (Abdullah, Alzaidiyeen & Yee, 2010).

Therefore, there is congruence between the literature, Ausubel's theory and the findings of this research, that the need for competent clinical staff engaging and guiding nursing students in their development of critical thinking is essential. Without this, critical thinking mastery will be difficult as confirmed by the CCTST rating. Additionally, it is also necessary to examine our clinical instructors and note their views on what they think their roles are in critical thinking development of student nurses and how they aid students in its advancement. Glynn et al., (2017) proposed that the role of clinical instructors is crucial in assisting student nurses bridge the theory to practice gap and develop higher order skills necessary in critical thinking. However, in research by Sadeghi, Oshvandi and Moradi.(2019), who examined the role of clinical nurses in student nurses' development, found that clinical instructors may be unfamiliar with their roles, "lack clinical competence, have low commitment to teaching" and as a result, may inhibit student nurses development (p. 1667). Information is on the role and impact of clinical instructors is absent in the researcher's local context and thus, findings from this research will have severe implications for nursing intuitions and healthcare organizations as the need for

clinical instructors or preceptors is evident in the development of critical thinking and positive patient outcomes.

The program and the course structure were also highlighted as impeding factors. The ability to link theory to practice depends on taking the information gained in the classroom environment and implementing same in various activities in the clinical environment to gain the desired outcomes. From the discussion, it was noted that student's rotations in the clinical areas are not always aligned to when the skills are taught in the classroom. This means that the theoretical components are taught at different times, even different semesters to when the students are expected to practice the skill in the clinical area. As a result of these gaps between classroom encounters and clinical encounters, the transfer of knowledge by the students is more difficult or widens the theory-to-practice gap (Scully, 2011). Therefore, the matching of classroom and clinical information and experiences are strongly advised to allow students the ability to implement seamlessly what they have learned.

In their research Flood and Robinia (2014) highlighted the challenge in nurse education in the integration of classroom and clinical practice, leaving students feeling disconnected and classroom-practice dissonance occurring. If our goal is to get students to the master thinkers levels, where they are able implementation the process of critical thinking within all aspects of their lives and are constantly and consciously examining methods to improve their thinking (Foundation for Critical Thinking, 2019), then minimizing classroom-practice dissonance is an essential method of assisting with same. Therefore, if classroom and clinical placements, where students implement the information learned in the classroom in the clinical environment, can be

brought closer together, this can contribute to students having less difficulty applying the information learned during their care and critical thinking activities.

Thus, it is imperative based on the findings of this research and the information presented in scholarly literature, that the program sequence is examined by administration and faculty, to align the classroom and clinical experiences to reduce the gap between knowledge acquisition and implementation in practice. For example, the students suggested when pharmacology is taught they should be allowed to go into the clinical area and practice the application of medication administration at that time, instead of being sent to unrelated areas to complete other skills.

Discussions with the clinical instructors identified student's poor attitude towards learning and critical thinking development as a key reason why students find it challenging to master this skill. Students wanting to know just the minimum to pass a course and not wanting to think for themselves were seen as some of the problems. This attitude towards their work, limit their level of involvement in activities and their commitment to improving their critical thinking. The instructor's views about student's attitude determining their level of critical thinking mirrors well with other research findings suggesting that students attitudes determine their critical thinking development, that is, students with positive attitudes towards critical thinking and its development, were more likely to incorporate these attitudes in seeing themselves as critical thinkers and more likely to develop the skill (Wangensteen, Johansson, Bjorkstrom & Nordstrom, 2010; Celuch, Black & Warthan 2009; Profetto-McGrath, 2003; Redding, 2001).

The second issue noted from the focus groups on what hinders student nurses critical thinking development was that students had problems transferring the knowledge gained in the

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classroom to the clinical area, described as the theory to practice gap, and thus are unable to utilize that knowledge in the critical thinking process. This inability or gap resulted in most of the clinical instructors in this study, scoring student's ability to think critically at twoon a scale of 1-5, which supports the results of the CCTST that students are at a weak to moderate level of critical thinking. The transference of knowledge to the practical environment is crucial if students are to develop their critical thinking (Wilkin, 2017; Profetto-McGrath, 2005; Sedlak, Doheny, Panthofer & Anaya, 2003). However, this is a common problem experienced by student nurses (Palmer & Ham, 2017; Corlett, 2000; Wong, 1978), as well as, entry-level nursing staff (Yang, Chao, Lai, Chen, Shih & Chiu, 2013; Nematollahi & Isaac, 2012). Therefore, if the students themselves articulate problems in employing the skill of knowledge transfer, it is imperative that as faculty, we implement strategies to decrease the gaps between the classroom and how it is applied in the clinical area.

Hence, from these results, it can be noted that the critical thinking level of the nursing students at our institution requires immediate attention, as results from both the CCTST and focus groups demonstrated that student's critical thinking level is low/moderate and requires improvement.

Critical thinking development is dependent on the teaching strategies that are utilized both in the classroom and clinical environments. Moreover, it is through the utilization of student-centered teaching methodologies that students are allowed to work through problems and utilize the elements of critical thinking to solve clinical issues and evolve to mastery in their critical thinking (Heiney Polyakova-Norwood &Degregory, 2019; Dehghanzadeh & Jafaraghaee, 2018; Chan, 2013).). The students had conflicting views on the use of student-centered teaching

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methodologies, on one hand, they advocated for its use to facilitate critical thinking development and to allow for maximizing student outcomes. They noted that strategies such as simulation, PBL, clinical cases, and others afforded them the time to think through issues and practice skills such as analysis, reasoning, evaluation, and interpretation, all of which are required for critical thinking development. However, when discussions were held about the tested strategies (concept mapping and Clinical Cases) and their comparison to teacher-centered approaches such as lectures using tools such as PowerPoint, their responses contradicted their prior call for strategies that require their active engagement. In the discussion about the tested strategies, the students articulated that they understand the importance and the possible benefits of using student-centered strategies, but they preferred the teaching methodology of lectures. The students articulated that the workload is too much, and they want the teaching to be focused and limited to only what they need to know. They preferred lectures using PowerPoint as the work would be presented to them, and they would not have to engage the literature and find the information themselves. Ward, Knowlton and Laney (2018); Sand-Jecklin (2007); and Devi and Deedi (2015) found similar results when they examined the two approaches in nursing and medical students respectively and the students had preference for teacher-centered approaches.

These statements by the students support the clinical instructor's views that the students are surface learners, idealistic or unable to be flexible in their thinking as the situation changes, and not wanting to think for themselves. It supported the clinical instructor's view that the student's attitude towards learning is superficial and teacher dependent. It also supports that the students are likely at the challenged or beginning stages of the Elder and Paul's Stage Critical Thinking Theory, with their understanding that student-centered strategies benefited in student

engagement, learning and critical thinking development, but preferred teacher-centered methods. It is evident from the student's discourse and their preference in teacher-centered approaches that critical thinking development will be difficult and, at times, even frustrating as it requires active work on the student's part, as well as a level of self-directedness which is not a goal of the students. The Ausubel Meaningful Learning Theory put forward that for students to engage in meaningful learning and build their capacity to critically think, they must have a commitment and a willingness to learn (Sousa et al., 2015). With this in mind and the views of students communicated above, preferring lectures with PowerPoint as the information is already analyzed and presented; it is evident why our students have difficulty developing critical thinking skills.

On the converse, Papanna et al., (2013) after implementing a comparative experimental study, found that the majority of 286 students, 71.4%, preferred student-centered approaches. Similarly, Vaezi, Azizian and Kopayehzadeh (2015); Montenery etal.,(2013); and Jeffries, Rew and Cramer (2002) noted that nursing students knowledge and critical thinking not only improved with student-centered teaching methodologies, but they also preferred these methodologies compared to teacher-centered teaching methodologies.

These findings suggest there is a need for examination of the orientation program for new students and how they are socialized to think about learning and critical thinking early in the program. Additionally, as seen above, the types of strategies utilized, at what stage in the program and its frequency are also areas of interest if we are to develop students with the attitude for critical thinking development, as opposed to students who rely on the teacher to think for them. It therefore must be ascertained how the students are taken through steps in critical thinking as described in Ausubel's theory and note if it is a systematic process or an

unmonitored, haphazard process. Also, it highlights the need for further research to ascertain if our students become more dependent on teacher-centered teaching methodologies as they progress through the program or simply need more exposure to the student-centered approaches to gain confidence in their use.

Discussion of Sub-group Question 3

Participants were asked to discuss, "What factors contribute to the development of critical thinking skills of BScN nursing students?" From the discourse, only two areas were highlighted and, the students articulated that even though positive, they were grossly inadequate. They reported that the implementation of one course that utilized various teaching methodology that made the information meaningful to them and also allowed for the application of the knowledge gained at the end when a scenario had to be completed. They noted that this classroom format and activities increased their ability to utilize critical thinking. This finding supports that of others (Ozkan, 2010; Griggs, Barney, Brown-Sederberg, Collins, Keith & Iannacci, 2009; Hannon, McBride & Burns, 2004; Grice, 1987), who noted that the use of diverse teaching strategies, particularly student-centered strategies resulted in greater improvement in student's learning and critical thinking development.

Assistance by a few competent nurses within the clinical areas in fulfilling their clinical objectives, application of classroom knowledge to the clinical environment, and advancement in their critical thinking skills was another contributing factor identified by the student nurses, especially with the deficit in clinical instructor-student's interaction time. It was the assistance of these few registered nurses on the wards that facilitated the student's proper assessment of patients and the implementation of treatment plans utilizing critical thinking. Registered nurses

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need to adopt this preceptor role as the outcome is better patient care and better-prepared future registered nurses. D'Souza, Venkatesaperumal, Radhakrishnan, and Balachandran (2013) highlighted how vital the clinical environment and clinical experience are to succeed as a nursing student, as it allows of all the domains of learning, cognitive, psychomotor and affective skills, to be utilized in the patient care process. Research has demonstrated that when students are guided in the clinical area, by a clinical instructor, preceptor or even by registered nurses, there are improvements in their skill performance, clinical competence, decision making, and a reduction in the theory to practice gap (Luhanga, 2018; Diane, Altmiller, Dorr a& Wolf, 2007).

Therefore, there is a need to incorporate the nursing staff in the teaching-learning process of student nurses to improve the overall care delivered to our patients. This request is not out of the registered nurse's scope as one of the core responsibilities of a registered nurse job description is to supervise and teach nursing students (Government of the Republic of Trinidad and Tobago, Ministry of Health, n.d.).

With only these two areas being highlighted and noting that they are not across all classes or wards, but in the minority, it is evident that a close examination of the nursing program and its curriculum is required, such as shifting for content delivery based curriculums to "teaching of thinking" curricula which integrate objectives of factual content delivery with objectives of cognitive and higher order thinking (Tahirsylaj & Wahlstrom, 2019; Marzano, 1988, p. 5). Also, guidelines of policies and models such as Model of Domain Learning and Remap STAD (Reading-Concept Mapping-Student Teams Achievement Division) learning model (Zubaidah, Mahanal, Ramadhan, Tendrita & Ismirawati, 2018; Fountain, 2011), pertaining to students' acquisition of critical thinking must also be implemented, monitored and evaluated. Additionally,

our systems for collaborating with staff within the clinical areas to fulfil their roles in the development of student nurse's critical thinking advancement must also be examined.

Discussion of Sub-group Question 4

This research was implemented to assist with finding solutions to aid our students in improving their critical thinking skills. Therefore, it was necessary to ascertain from the participants, "What strategies can nurse educators implement to improve critical thinking skills of student nurses?" research question four. Two themes emerged, with the first focusing on classroom strategies. The participants noted the need for various methods of teaching to be utilize to engage students, and called for transition from teacher-centered teaching methods and assessment to student-centered ones. This called for the shift in the teaching strategies were similar to that found by Meguid and Collins, 2017; Mainali and Heck, 2017; Latif, 2014; and Judd, Heath, and Fenster, 2011, where students noted the benefits of student-centered approaches and preferred same compared to other methods. Recommendations into possible frameworks and steps for critical thinking development to assist with this transition from teacher to student-centered methods follow in the concluding chapter.

As mentioned above, this finding was interesting in the student population, who, when student-centered approaches concept mapping and clinical case were implemented to test their impact on the students' critical thinking, the students articulated they found it enlightening, engaging, and stimulated their critical thinking. However, they preferred lecture using PowerPoint, a teacher-centered approach. Therefore, it is unknown if, for these students, their choice of teaching methodology is situational or if they truly understand the benefits and shortcomings of the various methods. Further exploration of this area is required.

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Program and course restructuring and continued staff development was a second theme that emerged from discussions on this topic. Overall the students found that various issues such as the mismatching of theory and clinical rotation, overbooked classrooms, and overscheduled class rosters needed to be urgently addressed if their critical thinking levels are to improve. They noted that because of the overbooking of the daily rosters, instructor engagement was low as well was transfer of knowledge. Similar findings were noted when researchers examined the impact of teacher-student interaction and deduced that such interactions could have a significant impact on bridging the theory to practice gap and aiding in the transference of knowledge (Ali, 2012; Louis & Smith, 1992)

The students also highlighted the skill of the instructor aiding in their critical thinking development can also be a source of the problem and suggested that close attention be paid to their continued skill advancement overall but particularly to their skills in assisting students in thinking critically. The call for nursing educators to undergo professional development training was noted in existing research as nursing educators are challenged in teaching student nurses to think critically (Schulz & Garrison, 2017).

Primary Research Question

This research embarked to ascertain how critical thinking of BScN nursing students can be improved. Through examination of the sub-questions, it was established the students overall critical thinking levels were low/moderate and thus, there is an urgent need to implement strategies to improve same. It was demonstrated that a shift from teacher-centered to student-centered teaching strategies was a fundamental mean of improving critical thinking of BScN nursing students.

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The students' comment during the focus groups concurred with the theory of Meaningful Learning by David Ausubel, when they articulated that there was a need for more focused teaching and the delivery of course content that was relevant to them and the profession of nursing. The findings showed that the student-centered strategies yielded better results from students, again demonstrating Ausubel's and Elder and Paul's Theories of Critical Thinking, which postulated that starting with student's knowledge on the subject matter and integrating them in the learning process is key to their learning and critical thinking development. Therefore, the integration of Ausubel theory of Meaningful Learning and Elder and Paul's Stage Theory of Critical Thinking in the revision of nursing curriculum can prove to be beneficial in improving critical thinking development of student nurses.

Therefore, to actualize the information above, student nurses' critical thinking requires improvement and a shift in teaching methodology. This means that an integration and application of theories into teaching practice and curricula is required. This can be realized through the review and restructuring of the curriculum to align it with objectives for critical thinking development as opposed to content delivery and regurgitation. This realignment should not only refocus the objectives of the overall program but filter down to the objectives of each course and the methods used for delivery and evaluation.

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A Reflexive approach

Reflexivity is a process whereby a researcher explores their beliefs and assumptions and its impact on their research (Rees, Sutcliffe, Dickson & Thomas, 2017). Reflexivity can have a bi-directional relationship, prospective and retrospective (Attia & Edge, 2017). Prospective is the researcher's impact on the research, and retrospective, the research's impact on the researcher (Attia & Edge, 2017).

There are various ways a researcher can engage in reflexivity, such as through the use of diaries or journaling, discussions with supervisors or colleagues, or by the researcher reflecting on the research process (Attia & Edge, 2017). For this research, discussions were held frequently between the researcher and the researcher's primary supervisor. These discussions included the researcher's progress and the researcher-researched relationship, particularly during the ethics approval stage, which meant that the researcher had to focus on the research, but also on the influence on the researcher's own role as researcher and educator. The researcher also engaged in reflexivity through the use of journaling. Traditionally, journaling was used by reflexive researchers in qualitative research. However, authors such as Walker, Read, and Priest (2013) found that it was also effective in quantitative research as it allowed for growth in skills and confidence of beginner researchers and permitted vital review of the research and its process.

For this research, journaling was used both in the qualitative and quantitative stages, where the researcher kept a journal on the research process from the commencement of the thesis and the researcher's reflections on data collection, analysis and the writing of it. The use of a journal was very helpful as it allowed a record on the various stages of the thesis to be kept so

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the researcher can access it and reflect on it, reviewing the researcher's impact on the research, and also on the research effect on the researcher. Therefore, through these journal entries, there was a continual examination of the researcher's stance and the research's development. This was also evident in the data collection stage of this concurrent mixed-method research, where the quantitative and qualitative data collection was being done simultaneously. The journal entries helped keep track of the researcher's thought process and allowed for future examination and reflection. Additionally, during the qualitative data analysis, the journal entries played a crucial role in highlighting the researcher's thoughts and assumptions on the focus groups' questions asked and the influence it may have on the analysis of the data.

The researcher was cognizant of her background as a clinical and nursing instructor and the difficulties noted in both registered nurses and student nurses in critical thinking implementation. Thus, with this in mind, the researcher focused on principles, such as the principles of qualitative inquiry, to minimize the impact of the researcher's worldview on the research and its analysis. These principles include "ensuring methodological cohesion, working inductively, being a responsive investigator, and attending to relational ethics" (Palaganas, ESanchez, Molintas & Caricativo, 2017, p. 427).

From a retrospective perspective, this research has significantly impacted the researcher as an educator and researcher. As an educator, it has deepened the researcher's understanding of critical thinking and its many dimensions. It has highlighted some of the issues that plague both students and staff and identified some of the systemic issues within the curriculum and the researcher's own practice that must be addressed. As a result, it has exposed the researcher to challenges students' and colleagues' experience and has already changed how the researcher's

courses are implemented. The researcher's skill set also improved tremendously, that is in the evaluation of research articles, the analysis of both quantitative and qualitative data, and the manner in which data is presented, but the greatest impact was the researcher's ability to engage in reflective practice.

Originality of Thesis

Critical thinking is an area that has been researched for some time because of its importance, particularly to professions such as nursing and education. Nursing, because it can be the determinant if the patient will have a negative or positive outcome and education, because it provides the future workforce that can either improve or hinder societal outcomes. Therefore, there is a need to understand why students have difficulty mastering this vital skill.

This research provides original knowledge on critical thinking of BScN nursing students, as Trinidad and Tobago and the Caribbean region is void of information. There is data scarcity on students' level of critical thinking, why they have difficulty in critical thinking mastery, what promotes its development, and the outcome of implementing student-centered strategies as a response to assist students in mastering critical thinking. Locally, the nursing student body comes from diverse populations with unique cultural norms, and therefore, this topic must be researched within the local context. This will provide stakeholders, directors (educational and institutional), educators, registered nurses, and students with valuable information upon which decisions can be made.

The multiplicity of data collected and triangulated was also original in this thesis. This research gathered information from a mixed-method perspective. It collected the student's and

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the clinical instructors' views on various facets of the topic. It tested teaching strategies, all of which answered different pieces of the phenomena and presenting the topic from a new viewpoint.

From the implementation of this research, information was added to the existing body of knowledge in areas such as, which teaching strategies aid in the improvement of critical thinking, but more so, the timeframe required for their implementation. From the current research, authors such as Aliyari, Pishgooie, Abdi, Mazhari and Nazari (2019) and Huang, Chen, Yeh and Chung (2012) argued that student-centered teaching approaches such as those tested in this research are effective in improving critical thinking. In contrast, researchers such as Singh (2011) found that even though there are benefits to student-centered teaching strategies, there are pitfalls that can be "dangerous" (p, 277) and can alienate students that are not inclined to this pedagogical approach. Additionally, Zarifsanaiey, Amini and Saadat (2016) conducted experiments using student-entered methods such as simulation and noted that even though the students' performance level may have improved their ability to think critically did not.

This research extended this debate by demonstrating that there is a need to shift the focus from examining only the impact of the strategies to that of the timeframes of the strategies that are implemented, as this can have serious implications on the outcome of the tested strategies. This needs to focus on if the timeframe fits well with the ideas of authors such as Archer (2010); Takashima and Verhoeven (2019) who prescribe to the concept of the dose-effect, or the need to increase repetition of concepts in the learning process.

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Additionally, examined research such as identified various models that can be implemented to improve the curriculum and help develop critical thinking. This research extended this approach by demonstrating how an existing model by Elder and Paul (2001) can be implemented to amend the curriculum to redefine the course objectives, thereby ensuring critical thinking elements are embedded in each course and promote critical thinking of the students. It also demonstrated how changes in student's' intellectual traits could be made by refocusing the curriculum on including implementation of intellectual standards, which can improve some of the critical thinking development deficits identified in this research.

Importance of the study

This study has implications for both nursing education and healthcare organizations, locally in Trinidad and Tobago, the Caribbean region and Internationally. The findings can be utilized to guide the University curriculum's restructuring to align the content and practice objectives better, and the reorganization of classroom strategies and teaching methodologies implemented. In the regional and international context, the theoretical framework and models suggested, can be used to guide curriculum review and ensure that the focus is shifted from context coverage to critical thinking building. Implementation of orientation programs was another proposed strategy that can be utilized locally and beyond to assist new student nurses in their transition to the use of critical thinking and the newly graduated nurse in the healthcare environment in the mastery of this skill. The clinical instructors' and the healthcare preceptors' roles across all nursing institutions can also be redefined based on the information gathered in this study.

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Conclusion

This chapter has been divided into three sections. Section 1 is the recommendations that can be implemented within both the classroom and clinical setting and will be presented to add to the body of knowledge currently available internationally and the void locally. Section 2 will highlight the limitations of this study and the areas for further research. Finally, Section 3 will conclude the thesis.

Section 1: Recommendation

The findings from this research unearthed various areas that require attention from several stakeholders to facilitate improvement in student nurse's critical thinking to a mastery level. Focus must be placed on the structure of the program, the staffing required to assist students with critical thinking development, the supporting policies to ensure the implementation of strategies identified, and fundamental changes to the curriculum to foster growth in student nurse's critical thinking.

Program reorientation.

The structure of the nursing program can be a hindrance to students developing and mastery of critical thinking. Therefore, it is imperative that the administrators, faculty, and student representatives come together and restructure the nursing program from its current form to realign the classroom and clinical experiences. This realignment must be in a manner that the classroom engagement is closely followed by the clinical experience to reinforce what was learned and allow for easier transfer and application of information, thereby narrowing the theory to practice gap. It was shown above, that mismatch or long periods between classroom and associated clinical rotations, classroom-practice gap, can lead to classroom-practice dissonance,

increasing the difficulty to transfer and apply classroom knowledge in the clinical area, which is required for critical thinking. In Ausubel theory above, the final step in critical thinking is transference of the new assimilated information. If students were allowed to wait long periods for this transference to occur in the clinical areas the information as seen in many instances may be forgotten, and that transference difficult, thus hampering critical thinking.

To reduce this mismatch and the occurrence of classroom-practice dissonance, Ajani and Moez (2011) articulated the need to move away from apprenticeship model and the use of nursing students as service providers, which was articulated by the students during the focus groups when they described themselves as being a pair of hands. There must be an area of realignment of the curriculum to mirror the operating procedures in the workplace. That is to have a curriculum that amalgamate theory and practice in nursing education and bring the two areas closer together to decrease the theory to practice gap. With this amalgamation of theory with practice requires the objectives of the program and those the students entering to the clinical areas will have to change from the apprenticeship objectives of skills acquisition to higher level thinking skills and application such as critical thinking. In discussing the classroom-practice dissonance Flood and Robinia (2014) noted that a process approach must be used, where students are taught in the classroom, then in a safe environment such as a simulation lab and then the application done in the clinical setting. This safe environment gives students more confidence in knowing that multiple options are available for a current situation, which is an essential element in critical thinking, and it facilitates them to use critical thinking in the application of their knowledge within these settings. Ausubel and Elder and Paul's theory states that critical thinking development and overall learning is a step by step process, where students are allowed

the opportunity to discover knowledge and make learning their own. Therefore, for us to allow our students these experiences a shift in the curriculum is warranted.

Implementation of early intervention for student at risk of failing (Winston, Vleuten & Scherpbier, 2014; Zhang, Fei, Quddus & Davis, 2014; Bloomfield, Diment & O'Meara, 2014). and a robust remedial program (Custer, 2018; Mee & Schreiner, 2016), are other areas strongly recommended to improve student performance as from the findings above, some students require more assistance than others with both knowledge acquisition and critical thinking development. Therefore, early intervention through the use of a remedial program can facilitate assisting students remaining on course during the program.

Staffing and Policy Development.

It was evident from the participant's discourse that the number of clinical instructors and the clinical time spent with instructors in the clinical areas were insufficient. Therefore, it is recommended that an adequate staff/student ratio that is, one clinical instructor to 6 to 8 (maximum of 10) nursing students (Texas Board of Nursing, 2019; Luhanga, 2018), be met to facilitate more time spent with students and their clinical instructors in the clinical environment, where greater application of information can be utilized when engaging in the critical thinking process. Our student-clinical instructor ratio as identified above is approximately one instructor to 20^+ students, thus, adhering to this recommendation of a maximum of 10 students to an instructor will pose various challenges such as space to house these new staff members in our small department, and recruitment of individuals that subscribe to the philosophies of a faith base organizations. However, the greatest challenge will be that of finances, as more salaries will have

to be paid. As a private, government-funded organization with economic challenges, finances may make it difficult to implement this recommendation.

The identification of clear objectives which students must achieve within the clinical environment, must also be established to ensure the proper acquisition of skills by the students within a particular time frame.

Policy development is also required to ensure improvement in student nurse's critical thinking skills. Policies with a theoretical underpinning such as Ausubel Meaningful learning will direct that faculty or staff nurses to create an engaging environment for students, that will afford them the time and support required to engage clinical issues, draw on their knowledge, link it with literature and experience from their clinical instructor or staff nurse and then facilitate the application of new knowledge to similar clinical situations. Policies regarding the role of the staff nurse in student nurse's critical thinking development must be clearly outlined and articulated to all stakeholders, so that students can receive that needed support, especially in the absence of their clinical instructors. Research revealed that when registered nurses were used as preceptors during student's clinical experience the students learning and clinical experience was greatly improved as students were afforded supervision, more hands-on time, support, feedback and integration into the care of the patients (Kolawole, Andrew & Evelyn Olorunda, 2019; Koontz, Mallory, Burns & Chapman, 2010), therefore, policies in this regard is warranted.

Curriculum Upgrade.

Nursing institution's curricula must be updated to match the needs of students, accreditation requirements, and allow for the active engagement of students in the learning

process to facilitate critical thinking development. Therefore, the shift from teacher-centered to student-centered methods of teaching must be made evident in the curriculum, and means for its monitoring and evaluation after implementation must also be a clear strategic direction of the curriculum. The Paul and Elder critical thinking model can be used as a framework upon which curriculum restructuring can be built, as its aim is enhancing logical thought and critical thinking development (Welch, Hieb & Graham, 2015). There are many frameworks available such as Facione and Facione Model, or Toulnin, and Brookfield Five Phase Model, however, the Paul and Elder critical thinking model used language that was more understandable and have various high-quality resources (Singleton & Rudy, 2019), making it a good choice. The Paul and Elder framework is composed of three parts. The "Elements of Reasoning" (also known as "Elements of Thought"), "intellectual standards and intellectual traits" (Mutakinati, Anwari and Yoshisuke, 2018, p. 55). The element of reasoning facilitates the deconstructing of issues so that the students are allowed to have a clearer understanding of what is occurring. This element allows the student to engage in questioning, identifying the assumptions and come up with their point of view on the issue, they are allowed to make inferences and predict the implications of implemented plans of actions (Thompson, Ralston & Hieb, 2012). This allows for active engagement of the student which is required in critical thinking development.

The intellectual standards will allow students to assess the quality of their reasoning, and allow for its continued development, until it becomes part of their reasoning or thinking process (Elmansy, 2017). Therefore, a curriculum with this element embedded, continuously calls on students to evaluate their thinking, that is if it is accurate, logical, fair, well researched, etc. Therefore, courses will be required to as part of their objectives to have students evaluate their

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method of thinking, their solutions to issues and the outcomes, to ascertain if it was the best solution for the issue, what were other solutions and their possible outcomes and how their thought process could have been different. This process while covering the course objectives and thus the curriculum will facilitate the student critical thinking capacity. When a curriculum continuously encourages students to apply the intellectual standards to the elements of reasoning the outcome is the development of intellectual traits in the students, such as courage, fair-mindedness, autonomy, humility, etc, (Elmansy, 2017). Traits such as these will be beneficial to our students, as during the focus groups they articulated lacking confidence. Also, the clinical instructors noted their poor attitude as a factor that hampered their critical thinking development; therefore, a curriculum underpinned by a framework such as this may create an attitude change in our students that facilitate critical thinking development.

Figure 13

Paul and Elder Critical Thinking Model
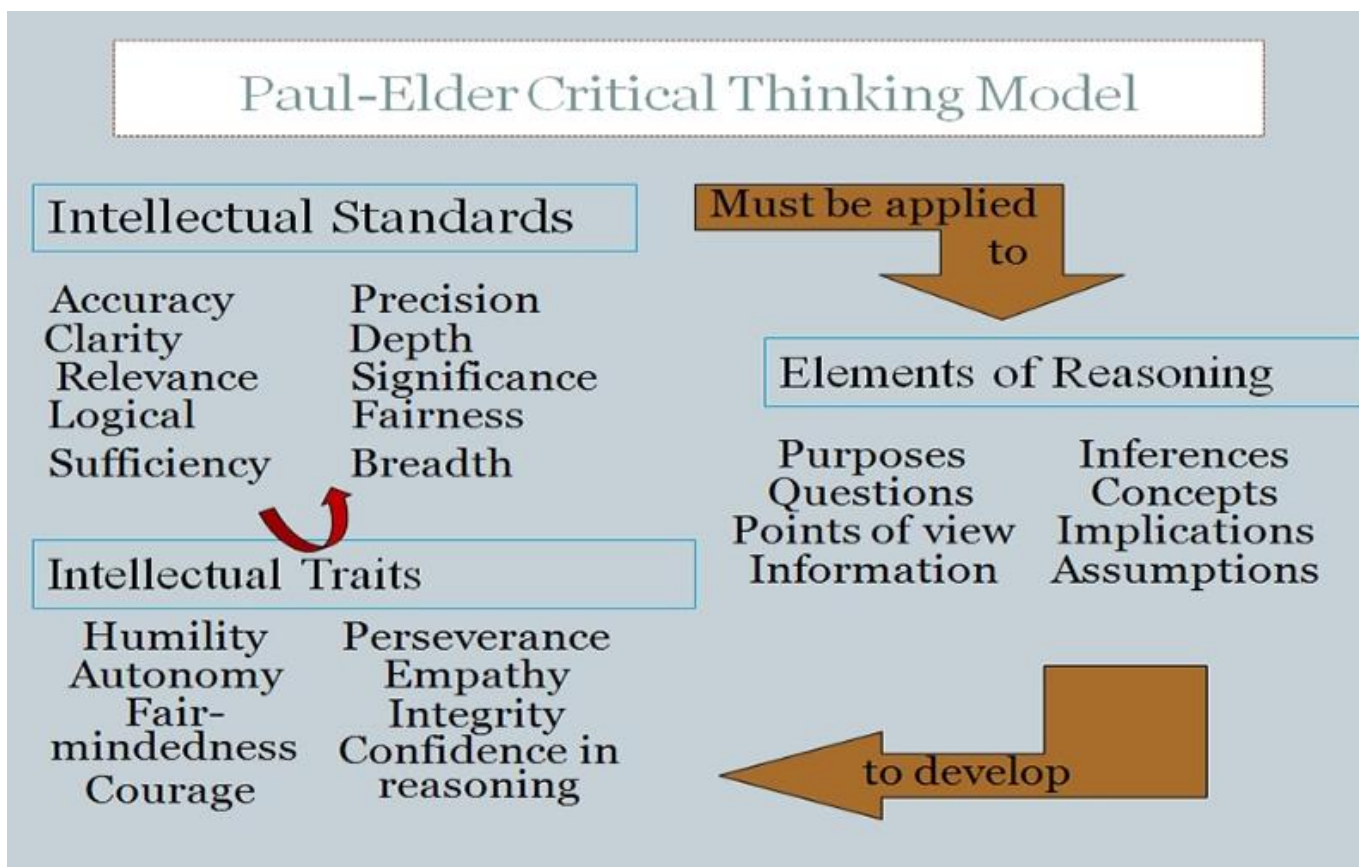
With this curriculum shift Baron (2017) noted that students demonstrate improvement in higher order skills such as problem solving and thinking, as well as decreasing the knowledge to practice gap. Additionally, tools such as Knoop's (1984) analytical steps used in this research can be implemented in the use of student-centered strategies such as clinical cases so that the strategy implementation is standardized and all the students benefit optimally from the teaching strategy. Elder and Paul's theory highlights six steps in critical thinking that educators can use as they guide students through the critical thinking process. These steps are Knowledge,

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Comprehension, Application, Analysis, Synthesis, Evaluate (Elmansy, 2017). It is imperative in the transition of curriculum, that educators create or structure the learning exercises so that they allow students to outline the main issues within the topic (knowledge), understand the topic by engaging the available literature (comprehension), examine the information acquired and link it with previous information on the topic (application), identify solutions to the issues identified (analysis), create a plan of action (synthesis), and implement and evaluate the outcome (evaluation) (Elmansy, 2017). These steps as suggested by Elder and Paul, will facilitate critical thinking in students and thus can enhance its growth in our students, but also across disciplines.

Figure 14

Elder and Paul's six steps of critical thinking
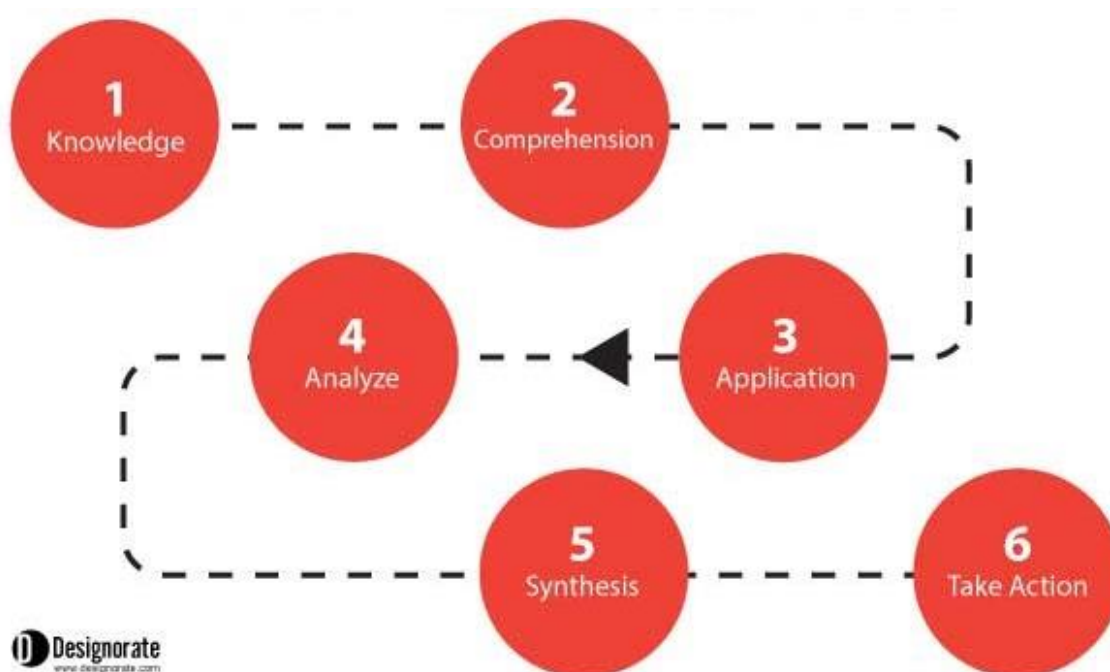
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Section 2: Limitations and Areas for Further Research

A limitation of this study was that it was implemented over a short period of two sessions for the testing of the strategies. This period may be too short to ascertain the full impact these strategies can have on student nurse's critical thinking skills. Another limitation is that the strategies were tested with only one group of students and thus is limited in its ability to be generalized.

However, as a result of its implementation, many answers about the University student's level of critical thinking were revealed, and areas for further exploration identified. One of the identified areas was that there is a need for an extended period to test the strategies implemented to ascertain their effect on student's critical thinking development. Also, because our students had difficulty articulating what critical thinking was, some of their responses in the focus groups could be due to lack of knowledge about critical thinking as posited by Kruger and Dunning (1999) and thus requires further examination. Is it that they know what critical thinking entails but was unable to articulate same, are they aware that they currently engage in course activities and objectives that allow for critical thinking, or is it that they are truly lack information on critical thinking and thus our improvement of students in the area of critical thinking must start from a very basic stage? These and other areas require further exploration.

The benefits of orientation programs in nursing helps in improving content acquisition, critical skills development and proficiency in nursing have been demonstrated by research (Durham & Alden, 2008). Therefore, research into the outcome of the orientation program for new students and their introduction into critical thinking can also be done to identify the effectiveness of the orientation and the challenges students experience.

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Section 3: Final thoughts

Critical thinking is a necessary skill of registered nurses that must be developed and nurtured in nursing students so that they can acquire mastery level and utilize the skill in the management of their patients. From the above, it was demonstrated that when there is a deficit in critical thinking abilities, the patient outcome can be poor. Research in this area is void locally and thus, this research was timely and has contributed to the knowledge and needs of the local professional community. The use of a mixed method approach was appropriate for this study as it gave the holistic view required to understand this complex topic, and allowed for the use of various methods and tools to achieve this. Using this approach allowed me as the researcher to understand how one method can be used to complement or support findings of another, as the methodology allowed for triangulation of data collected to create findings that are trustworthy and applicable across disciplines.

This study was implemented to ascertain the level of critical thinking of our student nurses, as well as what obstruct and promote their critical thinking development. Two teaching strategies were also tested to ascertain its impact on the development of critical thinking in our students. From the findings, it was noted that faculty and administrators have to refocus priorities as currently, student critical thinking level is, at its best, at a moderate level. Our student's inability to clearly articulate what is critical thinking was surprising, as was their heavy dependence and preference for teacher-centered teaching methodology, even though they appreciated the benefits of the student-centered tested strategies.

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As a nursing educator, the findings of this study have already influenced the researcher's practice regarding the choice of teaching and assessment strategies used and having a greater appreciation for the role of theories such as Ausubel and Elder and Paul within the classroom. It has opened various areas for future research to assist our students it attaining mastery in critical thinking.

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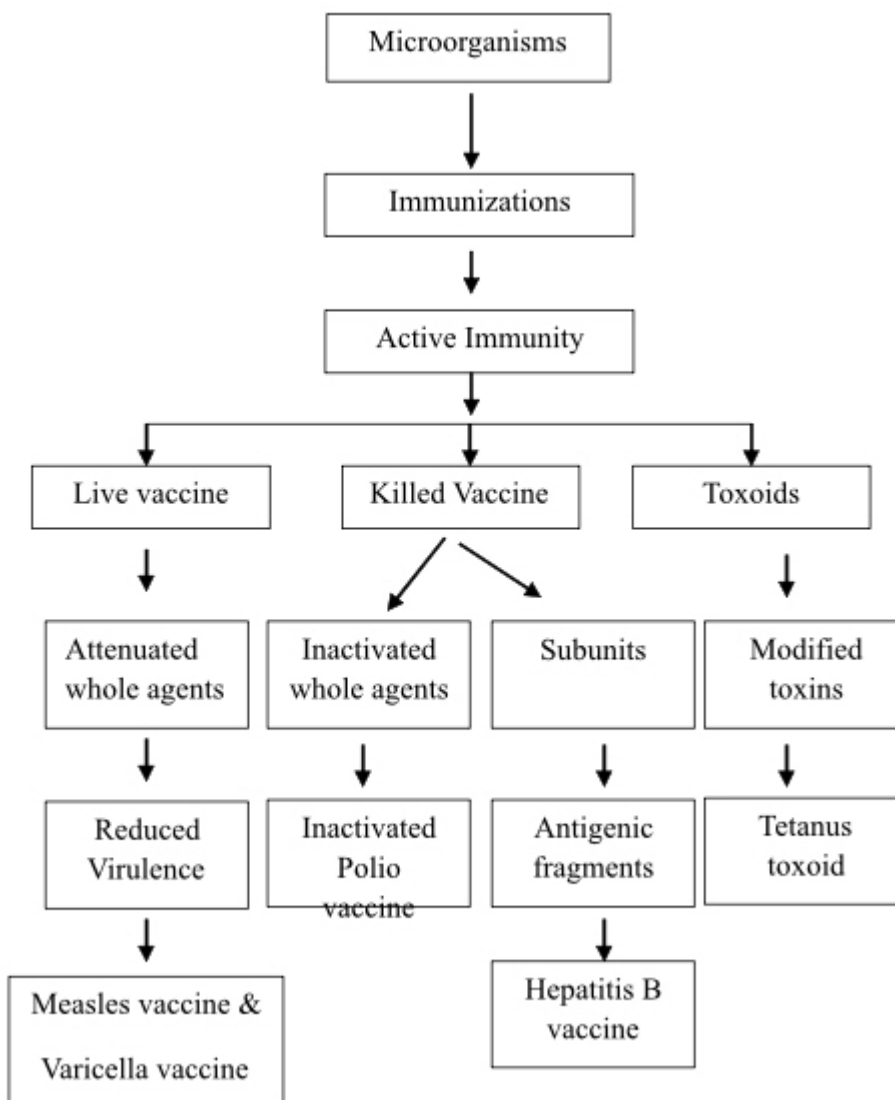33749661202&origin=inward&txGid=6a79752c226ffb85f911a43d3915e72d

CRITICAL THINKING IN STUDENT NURSES

List of Appendices

Appendix A

<u>Immunization- Active Immunity Concept Map</u>

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                    ┌─────────────────────┐
                    │   Microorganisms    │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │   Immunizations     │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │   Active Immunity   │
                    └─────────────────────┘
                              │
            ┌─────────────────┼─────────────────┐
            ▼                 ▼                 ▼
     ┌────────────┐   ┌───────────────┐   ┌──────────┐
     │Live vaccine│   │ Killed Vaccine│   │ Toxoids  │
     └────────────┘   └───────────────┘   └──────────┘
            │            ╱           ╲          │
            ▼           ▼             ▼         ▼
   ┌───────────────┐ ┌──────────────┐ ┌─────────┐ ┌──────────┐
   │  Attenuated   │ │  Inactivated │ │ Subunits│ │ Modified │
   │ whole agents  │ │ whole agents │ │         │ │  toxins  │
   └───────────────┘ └──────────────┘ └─────────┘ └──────────┘
            │            │               │            │
            ▼            ▼               ▼            ▼
   ┌───────────────┐ ┌──────────────┐ ┌──────────┐ ┌──────────┐
   │    Reduced    │ │  Inactivated │ │Antigenic │ │ Tetanus  │
   │   Virulence   │ │     Polio    │ │fragments │ │  toxoid  │
   │               │ │    vaccine   │ │          │ │          │
   └───────────────┘ └──────────────┘ └──────────┘ └──────────┘
            │                            │
            ▼                            ▼
   ┌───────────────┐             ┌──────────────┐
   │Measles vaccine│             │  Hepatitis B │
   │       &       │             │    vaccine   │
   │Varicella      │             │              │
   │  vaccine      │             └──────────────┘
   └───────────────┘
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CRITICAL THINKING IN STUDENT NURSES

Appendix B

von Willebrand Disease Case Study

PATIENT HISTORY:

Mr. John is a 26-year-old man who is brought to the A & E department with a history of Epistaxis. He is a known hypertensive patient on medication and adheres well to his treatment regime. During the history taking by the admitting nurse, the patient notes that he bleeds for prolonged periods and was diagnosed with von Willebrand Disease as a child. He adds that he was diagnosed as having Type 2 von Willebrand Disease.

PHYSICAL EXAMINATION:

GENERAL: Alert, in no apparent distress, communicating well.

HEENT*:* Oozing blood from the left nostril

Remainder of exam within normal limits (notably, no petechia, bruises, joint swelling)

INITIAL LABORATORY TESTS:

Hemoglobin	15.3 g/dl
WBC	7.9 x 10^9/L
Platelets	368 x 10^9/L
PT	12.3 s
APTT	47.2 s

Questions

1. What is von Willebrand Disease?

2. What are the types of von Willebrand Disease and what are the differences between the types?

3. Describe how von Willebrand factor aids in hemostasis.

4. Explain why Mr. John will experience mild bleeding as oppose to severe bleeding.

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5. Discuss the treatment goals for this patient.

6. Identify three nursing diagnosis for this patient.

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Appendix C

Immunity Pre/Post Test Questions

Name: _____

Immunization Pre/Post-Test Quiz

Instructions: Please circle the letter that corresponds to the correct answer

1. The process of introduction of weakened pathogen into human body is called

A. Immunization
B. Vaccination
C. Attenuation
D. None of these

2. A living microbe with reduced virulence that is used for vaccination is considered:

A. Attenuated
B. A toxoid
C. Dormant
D. Denatured

3. A vaccine can be

A. An antigenic protein
B. Weakened pathogen
C. Live attenuated pathogen
D. All of these

4. A class of protein, functions as an antibody, present in cells and serum of immune system, called

A. Myoglobin
B. Immunoglobin
C. Hemoglobin
D. Globular proteins

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5. Which of the following is an advantage to passive immunity compared to active immunity?

A. Passive immunity is long-lasting
B. Passive immunity does not interfere with the development immune responses from live vaccines
C. Passive immunity protects almost immediately
D. Passive immunity develops in response to infection or after giving a vaccine or toxoid

6. Which of the following is NOT an example of active immunity?

A. Administration of recombinant immunogenic protein
B. Administration of a live attenuated viral vaccine
C. Administration of high titer immune globulin
D. Infection with natural disease

7. Which of the following is/are true regarding live attenuated vaccines?
A) Live attenuated vaccines generally have milder reactions versus inactivated vaccines
B) The injectable live attenuated vaccines usually produce immunity with one dose
C) They are stronger versions of the "wild" virus
D) All of the above

8. What symptom below would be considered 'unusual' after receiving a vaccination?

A. High-pitched crying in babies
B. Soreness at the injection site
C. Fever
D. Mild rash

9. How often do adults need to get a Tetanus booster shot?
A. When injured
B. Every 5 years
C. Every 10 years
D. Only once

10. The MMR vaccine is first given at what age?
A. One-year-old
B. At birth
C. Twelve weeks
D. 13 years' old

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Appendix D

Von Willebrand Factor Disease Pre/Post Test Questions

Name: _____

Instructions: Please circle the letter that corresponds to the correct answer

1. Mr. John is diagnosed with a bleeding disorder called Von Willebrand Factor disease. The nurse during a teaching session is explaining the disease to the patient. She notes that Von Willebrand Factor has two main function. These are:

A. Carrier protein for factor VIII and bind platelets to collagen fibers
B. Carrier protein for factor VIII and degranulation of platelets
C. Carrier protein for factor XI and aids in platelet adhesion
D. Carrier protein for factor XI and promotes platelet aggregation

2. The nurse is explaining that Von Willebrand Factor function as a carrier protein. Therefore, which of the following will you expect with Von Willebrand Factor disease?

A. Bleeding because of the inability to form new epithelial cells.
B. Bleeding because of the inability to form a platelet plug.
C. Bleeding because of the inability to vasoconstrict.
D. Bleeding because of the inability to coagulate.

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3. The nurse explains that Von Willebrand Factor disease can be categorized into different types. She described that Mr. John Von Willebrand Factor disease is occurring because he has alterations in the vWF structure and function of his Von Willebrand Factor. Which of the following is most likely the type of disease Mr. John has?

A. Type1
B. Type 2
C. Type 3
D. Type 4

4. Mr. John being diagnosed with the Von Willebrand Factor type identified above, it is expected that he will?

A. Severe hemorrhage into body cavities
B. Mild bleeding symptoms
C. Hematoma and hemarthroses
D. Spontaneous hemorrhage

5. What is the goal of treatment for Mr. John?

A. Ensure patient pain is under control
B. Correct both bleeding time and coagulation abnormalities
C. Administer the missing factor within 24 hours of admission
D. Reduce inflammation of the joints due to bleeding in the joints

6. What is the most common way a person will end up with von Willebrand's disease?

A. He inherited the gene from a parent
B. He developed the disease later in life for unknown reasons
C. He acquired the disease due to hormonal changes later in life
D. He was exposed to chemicals that caused a gene mutation

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Appendix E

Table 1. Checklist for Researchers Attempting to Improve the Trustworthiness of a Content Analysis Study.

Phase of the content analysis study	Questions to check

Preparation phase	Data collection method
	    How do I collect the most suitable data for my content analysis?
	    Is this method the best available to answer the target research question?
	    Should I use either descriptive or semi-structured questions?
	    Self-awareness: what are my skills as a researcher?
	    How do I pre-test my data collection method?
	Sampling strategy
	    What is the best sampling method for my study?
	    Who are the best informants for my study?
	    What criteria should be used to select the participants?
	    Is my sample appropriate?
	    Is my data well saturated?
	Selecting the unit of analysis
	    What is the unit of analysis?
	    Is the unit of analysis too narrow or too broad?

Organization phase	Categorization and abstraction
	    How should the concepts or categories be created?
	    Is there still too many concepts?
	    Is there any overlap between categories?
	Interpretation
	    What is the degree of interpretation in the analysis?
	    How do I ensure that the data accurately represent the information that the participants provided?
	Representativeness
	    How to I check the trustworthiness of the analysis process?
	    How do I check the representativeness of the data as a whole?

Reporting phase	Reporting results
	    Are the results reported systematically and logically?
	    How are connections between the data and results reported?
	    Is the content and structure of concepts presented in a clear and understandable way?
	    Can the reader evaluate the transferability of the results (are the data, sampling method, and participants described in a detailed manner)?
	    Are quotations used systematically?
	    How well do the categories cover the data?
	    Are there similarities within and differences between categories?
	    Is scientific language used to convey the results?
	Reporting analysis process
	    Is there a full description of the analysis process?
	    Is the trustworthiness of the content analysis discussed based on some criteria?

Elo, Kääriäinen, Pölkki, Utriainen, and Kyngäs (2014).

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Appendix F

Outline for implementing content analysis

1) Copy and read through the transcript - make brief notes in the margin when interesting or relevant information is found.

2) Go through the notes made in the margins and list the different types of information found.

3) Read through the list and categorise each item in a way that offers a description of what it is about.

4) Identify whether or not the categories can be linked any way and list them as major categories (or themes) and / or minor categories (or themes).

5) Compare and contrast the various major and minor categories.

6) Repeat the first five stages again for each transcript.

7) When all of the transcripts are completed, collect all of the categories or themes and examine each in detail and consider if it fits and its relevance.

8) Once all the transcript data is categorised into minor and major categories/themes, review in order to ensure that the information is categorised as it should be.

9) Review all of the categories and ascertain whether some categories can be merged or if some need to them be sub-categorised.

10) Return to the original transcripts and ensure that all the information that needs to be categorised has been so (University of Leicester, n.d..).

Appendix G

Knoop's (1984) analytical steps for the use of case studies:

1. Identify the problem. Self-regulation instructional case studies.

2. Determine the underlying causes and symptoms of the problem.

3. Identify any unstated assumptions you are making and determine whether they are justifiable.

4. Brainstorm and list several strategies for resolution of case.

5. Evaluate each alternative, and then choose and rank your top 3 strategies according to effectiveness.

6. List your top three recommendations and present a rationale for each. (Lee, 2007)

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Appendix H

University of Liverpool ethics approval

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Dear Pamela,		
I am pleased to inform you that the EdD. Virtual Programme Research Ethics Committee (VPREC) has approved your application for ethical approval for your study. Details and conditions of the approval can be found below.		
Sub-Committee:	EdD. Virtual Programme Research Ethics Committee (VPREC)	
Review type:	Expedited	
PI:	Pamela Paynter-Armour	
School:	HLC	
Title:	Bridging the Theory to Practice Gap: Improving Critical Thinking Skills in BScN Nursing Students	
First Reviewer:	Dr. Mary Johnson	
Second Reviewer:	Dr. Ruolan Wang	
Other members of the Committee	Dr. Lucilla Crosta	
Date of Approval:	August 16, 2018	
The application was APPROVED subject to the following conditions:		
Conditions		
1	Mandatory	M: All serious adverse events must be reported to the VPREC within 24 hours of their occurrence, via the EdD Thesis Primary Supervisor.

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UNIVERSITY OF LIVERPOOL | ONLINE PROGRAMMES

This approval applies for the duration of the research. If it is proposed to extend the duration of the study as specified in the application form, the Sub-Committee should be notified. If it is proposed to make an amendment to the research, you should notify the Sub-Committee by following the Notice of Amendment procedure outlined at http://www.liv.ac.uk/media/livacuk/researchethics/notice%20of%20amendment.doc.

Where your research includes elements that are not conducted in the UK, approval to proceed is further conditional upon a thorough risk assessment of the site and local permission to carry out the research, including, where such a body exists, local research ethics committee approval. No documentation of local permission is required (a) if the researcher will simply be asking organizations to distribute research invitations on the researcher's behalf, or (b) if the researcher is using only public means to identify/contact participants. When medical, educational, or business records are analysed or used to identify potential research participants, the site needs to explicitly approve access to data for research purposes (even if the researcher normally has access to that data to perform his or her job).

Please note that the approval to proceed depends also on research proposal approval.

Kind regards,

Lucilla Crosta

Chair, EdD. VPREC

CRITICAL THINKING IN STUDENT NURSES

Appendix I

University of the Southern Caribbean Ethics Approval

UNIVERSITY *of the*
SOUTHERN CARIBBEAN

Office of Research and Innovation

P.O. BOX 175,
PORT OF SPAIN,
TRINIDAD, WI

Ms. Pamela Paynter-Armour

Instructor

Department of Nursing

School of Science, Technology and Allied Health

University of the Southern Caribbean

April 16, 2018

Dear Ms Paynter-Armour

Your documentation submitted for approval by the USC Institutional Review Board (IRB) to conduct your study at USC has been reviewed for completeness. As Chair of the IRB, I wish to confirm that this study conforms to the research standards, ethical expectations, and legal parameters of the University of the Southern Caribbean and Trinidad and Tobago. Permission is therefore granted to conduct the study under the auspices of USC. This approval is given for the period of one year. Further, the USC IRB requires that any changes of protocol or procedures to what has been submitted presently, must receive permission from the IRB prior to continuation of your research.

Regards

Gersha Pierre

Director of Quality Assurance & Chair, Institutional Review Board

BEYOND EXCELLENCE