The Impact of Structured Debriefing, Following Simulation, on BSN Student Development of Clinical Reasoning and Clinical Judgment Skills

Robin Weaver

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THE IMPACT OF STRUCTURED DEBREIFING, FOLLOWING SIMULATION, ON
BSN STUDENT DEVELOPMENT OF CLINICAL REASONING AND CLINICAL
JUDGMENT SKILLS

A Dissertation
Submitted to the School of Nursing

Duquesne University

In partial fulfillment of the requirements for
the degree of Doctor of Philosophy

By
Robin R. Weaver

August 2014
THE IMPACT OF STRUCTURED DEBRIEFING, FOLLOWING SIMULATION, ON
BSN STUDENT DEVELOPMENT OF CLINICAL REASONING AND CLINICAL
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ABSTRACT

THE IMPACT OF STRUCTURED DEBRIEFING, FOLLOWING SIMULATION, ON BSN STUDENT DEVELOPMENT OF CLINICAL REASONING AND CLINICAL JUDGMENT SKILLS

By
Robin R. Weaver, MSN, RN, CNE, PhDc

August 2014

Dissertation supervised by Lynn Simko, PhD, RN

The necessity of appropriate clinical reasoning and clinical judgment skills is recognized as essential for the development of a competent practitioner. In response to the Institute of Medicine (IOM) report which called for a re-evaluation of the educational processes used to prepare practitioners, nursing educators have embraced the use of simulation technology as an innovative approach to enhance student learning. Simulation has been recognized as a vehicle to support student development of knowledge, skills, and attitudes necessary to become a competent practitioner. Recognized in the literature as the most essential element of simulation, debriefing practices vary throughout nursing education. Recently an increasing presence, yet still minimal amount of evidenced-based literature, is available to guide debriefing practice. This quasi-experimental pretest, post-
test design study with subsequent open-ended follow-up questions analyzed the impact a specific structured debriefing approach had on student development of clinical reasoning and clinical judgment skills. The theoretical underpinnings of this study include Kolb’s Experiential Learning Theory, as well as, Gibb’s reflective cycle. The structured debriefing method utilized for this study was Dreifuerst’s (2009) Debriefing for Meaningful Learning© (DML). The study was conducted with (N=93) participants enrolled in a medical-surgical nursing course within their junior year in a northeastern Pennsylvania Baccalaureate nursing program. Changes in clinical reasoning and clinical judgment were measured based upon scores achieve on the Health Sciences Reasoning Test© (HSRT) and the California Critical Thinking Disposition Inventory © (CCTDI) test. In addition, four supplemental questions were posed to students within the experimental group to obtain feedback regarding their perception of the DML© method.

The intent of the study was to determine if an improvement in critical thinking, clinical reasoning, and clinical judgment skills would result if students were exposed to the DML© method for debriefing. The data did not reveal statistically significant findings when comparing the mean overall scores of the experimental and control groups as indicated by the HSRT ©and CCTDI© mean scores. However, responses to the open-ended follow-up questions indicated a perceived improved quality of learning experience resultant from the utilization of the DML© method.
DEDICATION

This work is dedicated to my loving family for all of their patience and support during my doctoral journey. To my husband, Bob, daughter, Nicole, and son, Derek, I would like to thank you for your willingness to allow me to sacrifice family time to complete this work. Through this journey, I hope I have instilled the value of education, perseverance, and the importance of striving to achieve personal goals.

Also, I would like to thank my parents, Melvin and Eva Ringer, for instilling the importance of hard work and higher education.

In addition, I would like to dedicate this work to members of my doctoral cohort, your stories and advice have motivated me to maintain a steady course toward the realization of completing this work. I would be remiss if I did not thank Dr. Kristine Dreifuerst for her doctoral research which inspired me to pursue conducting this research. Her guiding instruction and expertise was invaluable.

Finally, I would like to dedicate this work to the many students I have met along my journey who inspired me to explore teaching/learning strategies to best facilitate meaningful learning.
ACKNOWLEDGEMENTS

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Chapter 1: Introduction

Background

Achieving a consistent reliable method for improving student nurses’ competencies has been a long-standing challenge for nurse educators. Further, schools of nursing are expected to utilize teaching methodologies which will enhance the development of knowledge, skills, and attitudes that have been defined as essential for practitioners (Cronenwett et al., 2007). Improved competency of practitioners facilitates improved patient safety. A renewed focus on fostering a culture of safety resultant of competent care has become an initiative of health care and nursing education since the Institute of Medicine (IOM) released its report, *To Err is Human: Building a Safer Health System* (Institute of Medicine, 1999; Mariani, e.al., 2012). The Institute of Medicine (IOM) has supported the use of innovative teaching strategies such as simulation technology as this technology is perceived to support the development of skills which lead to improved patient safety (Institute of Medicine, 1999). Nurse educators recognize that competency in nursing is more than just mastering skills; rather, students must understand concepts and rationales that support the skills learned. Thus, nurse educators are challenged to develop methodologies that will capture thought processes used to make clinical judgments. Nurse educators have begun to rely on the use of simulation as a teaching/learning methodology to foster the recognition and growth of clinical reasoning skills (Gantt & Webb-Corbett, 2010). Traditional clinical experiences are typically task-oriented, whereas, simulation experiences can be manipulated to incorporate development of problem solving and clinical reasoning in addition to completion of skills. A well-organized simulation scenario including
The subsequent debriefing can provide a focused learning experience not overshadowed by the need to complete tasks (Bakalis & Watson, 2005; Baxter & Rideout, 2006; Dillard et al., 2009). Further, the use of simulation provides the ability to “standardize particular patient interactions, design goal oriented clinical experiences, create a learner-focused safe environment, and ensure learning is not hindered by service responsibilities” (Neill & Wotton, 2011, p. e161). Additionally, use of simulation provides a risk-free environment in which students can provide care independently without fearing harm of a “real patient.” Students become more aware and invested in their performance via this hands-on experience (Neill & Wotton, 2011). Components of simulation include preparatory gathering of patient data, participation in the simulation scenario, and subsequent [simulation] debriefing. However, it has been suggested that the debriefing portion of the simulation experience is the most essential factor for facilitating the development of clinical reasoning and judgment skills (Parker & Myrick, 2010; Shinnick, Woo, Horwich, & Steadman, 2011; Zigmont, Kappus, & Sudikoff, 2011). Zigmont, Kappus, and Sudikoff (2011) suggested that debriefing immediately following simulation facilitates optimal learning from the experience. It is during this phase that educator guided reflection allows learners to evaluate their performance and form revised mental models of performance that guides future learner behaviors. This process of having a concrete experience, reflecting on the experience, and developing mental models (hypotheses) to apply to future experiences follows the process of experiential learning described by Kolb (Zigmont, Kappus, & Sudikoff, 2011).

Notably, debriefing sessions within nursing programs are typically conducted in a group setting rather than on an individual basis. Further, students are encouraged to
assume specific roles during a simulation scenario and to work collaboratively with their peers during the simulation experience. Allowing students to participate in simulation as a group encourages teamwork and allows students to consider the unfolding events from a different perspective related to the specific role assigned. Although one-on-one debriefing sessions may ensure students feeling as though they are receiving individualized instruction, the elements of teamwork, collaboration, and group think may be lost. Additionally, the literature is beginning to explore if participants benefit more from directly participating or just observing simulations. Results of a study by Kaplan, Abraham, and Gary (2012) indicated that there was no difference in testing outcomes between the active participant and the observer group, suggesting simulation provides a valuable learning activity regardless of whether the students actively participated in the experience or not (Kaplan, Abraham, & Gary, 2012). A group setting for debriefing allows for more collaboration and the potential for students to learn from each other’s unique interpretation of unfolding events. Thus, for purposes of this study, all simulation and debriefing experiences will occur in a group setting.

The reflective nature of the debriefing situation facilitates student ownership of the learning experience (Parker & Myrick, 2010; Shinnick et al., 2011; Zigmont et al., 2011). The debriefing experience provides time for the students and faculty to reflect on the simulation scenario in order to re-examine the decisions and actions that occurred during the scenario. Thus, it is proposed that the reflective thinking which occurs during debriefing assists participants in attaining a grasp of clinical reasoning and clinical judgment necessary to determine clinical decisions. However, additional research is needed to provide empirical evidence to support this claim. Furthermore, findings of
research can be used to guide the development of best practices for simulation debriefing (Dreifuerst, 2009; Neill & Wotton, 2011).

Dreifuerst (2010) developed the Debriefing for Meaningful Learning© (DML) method of debriefing in order to provide an organized and structured debriefing methodology to foster student clinical reasoning and clinical judgment skills. The DML method was evaluated by Dreifuerst to measure a change in clinical reasoning skills as indicated by scores on the Health Sciences Reasoning Test (HSRT). Based on the results of this study, the researcher indicated that the DML method demonstrated promise in positively influencing the development of clinical reasoning skills of students (Dreifuerst, 2012). However, limitations of the study included concerns that the HSRT tool alone was not adequate to measure clinical reasoning in a clinical context, problem-based experiential situation. Another limitation cited was the fact that the researcher was not able to randomize the control and experimental groups due to restrictions within the study site. For these reasons, concerns were raised regarding the ability to generalize the results of the study to other school of nursing populations (Dreifuerst, 2012). Thus, the conclusion included that additional testing of the DML method would be beneficial to further the body of science related to simulation debriefing in the context of impacting student clinical reasoning and clinical judgment skills.

**Purpose of study**

Although literature exists to suggest that debriefing is essential to complete learning activities associated with simulation, there is minimal evidenced-based information to support or refute this stance. Further, although recently more research has been competed to explore how best to facilitate a debriefing experience, the studies are still
minimal in number. The purpose of the study was to determine the impact a structured 
debriefing method, Debriefing for Meaningful Learning© (DML), could have on student 
clinical reasoning and clinical judgment skills in a pre-licensure baccalaureate nursing 
program.

**Research Questions**

The control and experimental group utilized within this study were established as 
follows. The control group utilized for this research study consisted of groups of 
students, randomly assigned to clinical groups by the hosting facility, who underwent 
debriefing sessions traditional to the hosting facility. Traditional debriefing sessions 
were facilitated by faculty of the hosting facility. These traditional debriefing sessions 
were guided by pre-established objectives and suggested general questions such as, what 
went well? And, what could you have been differently? The students assigned to the 
experimental group were students randomly assigned to specific clinical group by the 
hosting facility. Students within the experimental group underwent the Debriefing for 
Meaningful Learning© (DML) method of debriefing for all sessions. All debriefing 
sessions using the DML© method were facilitated by the primary investigator of this 
study. DML sessions recognized the same objectives for the simulation learning 
experience as were established by the hosting facility; however, the questions and 
discussions were allowed to unfold during the debriefing session as driven by the 
students. As suggested by Dreifuerst (2010), the DML sessions were 2-3 times the length 
of the simulation scenario provided.
Research Questions

1. What impact does the use of Debriefing for Meaningful learning© (DML) following simulation have on the development of clinical reasoning and clinical judgment skills of pre-licensure RN students?

2. Do the scores of students in the control group differ significantly on the Health Sciences Reasoning Test (HSRT) when compared to the experimental group?

3. Do the scores of students in the control group differ significantly on the California Critical Thinking Disposition Inventory (CCTDI) when compared to the experimental group?

4. What impact does the use of the DML method have on the perceived quality of the simulation and debriefing experience as described by pre-licensure RN students?

Operational Definitions

Within the literature, terms such as critical thinking, clinical reasoning, and clinical judgment are frequently used interchangeably. In order to achieve clarity in this study, specific definitions are provided. In addition, the terms reflective thinking, simulated clinical experience, simulation debriefing, and Debriefing for Meaningful Learning© are defined as indicated below. Note that the International Nursing Association for Clinical Simulation and Learning (INACSL) has become a driving force in the development of the use of simulation within nursing and nursing education. As an organization representing nurse educators’ efforts to develop simulation, INACSL has attempted to offer a standardized language which includes recognized definitions for many terms associated with the use of simulation. Therefore, for purposes of this study
those definitions recognized by INACSL were used when the definitions meet the needs of the study.

**Critical Thinking**

Critical thinking is “a disciplined process that requires validation of data, including any assumptions that may influence thoughts and actions; and then careful reflection on the entire process while evaluating the effectiveness of what has been determined as the necessary action(s) to take. This process entails purposeful, goal-directed thinking and is based on scientific principles and methods (evidence) rather than assumptions and/or conjecture” (The INASCL Board of Directors, 2011, p. S4; see also Alfaro-Fever, 1995; Benner, 2004; Jackson & Ignatavicius, 2004).

**Clinical Reasoning**

Clinical reasoning is defined as “the ability to gather and comprehend data while recalling knowledge, skills (technical and nontechnical), and attitudes about a situation as it unfolds. After analysis, information is put together into a meaningful whole when applying the information to new situations” (The INASCL Board of Directors, 2011, p. S4; Alfaro-Fever, 1995; Benner, & Sutphen, 2007).

**Clinical Judgment**

Clinical judgment is defined as “the art of making a series of decisions in situations, based on various types of knowledge, in a way that allows the individual to recognize salient aspects of or changes in a clinical situation, interpret their meaning, respond appropriately, and reflect on the effectiveness of the intervention” (The INASCL Board of Director, 2011, p. S3-S4; see also del Bueno, 1994; Dillard et al., 2009; Jackson, Ignatavicius, & Case, 2004; Lasater, 2007; Tanner, 2006).
Reflective Thinking

Reflective thinking is defined as “the engagement of self-monitoring that occurs during or after a simulation experience. Considered an essential component of experiential learning, it promotes the discovery of new knowledge with the intent of applying this knowledge to future situations. Reflective thinking is necessary for metacognitive skill acquisition and clinical judgment and has the potential to decrease the gap between theory and practice. Reflection requires the creativity and conscious self-evaluation to deal with unique patient situations” (The INASCL Board of Directors, 2011, p. S6; Kolb, 1984; Kuiper & Pesut, 2004; Ruth-Sahd, 2003).

Simulated Clinical Experience

The simulated clinical experience is described as a clinical experience which “includes pre-briefing, the clinical scenario, and debriefing. It is the engagement part of a clinical scenario” (The IASCL Board of Directors, 2011, p. S6).

Debriefing (or traditional debriefing)

Debriefing has been described in varying manners throughout the literature. Dependent on the facilitator conducting the debriefing session, debriefing may be brief or specific, structured or unstructured, formal or informal. For purposes of this research, debriefing will be defined as “an activity that follows a simulation experience and is led by a facilitator. Participants’ reflective thinking is encouraged, and feedback is provided regarding the participants’ performance while various aspects of the completed simulation are discussed. Participants are encouraged to explore emotions and question, reflect, and provide feedback to one another. The purpose of debriefing is to move
toward assimilation and accommodation to future simulations” (The INASCL Board of Director, 2011).

**Simulation Debriefing**

This researcher has defined simulation debriefing as the reflective activity following a simulation experience. A facilitator leads this activity for the purposes of evaluating actions and outcomes within the simulation experience; exploring emotions resulting from the simulation experience; answering participant questions; and identifying concepts of reasoning processes which can be applied to future patient care scenarios.

**Debriefing for Meaningful Learning©**

Debriefing for Meaningful Learning© was described by Dreifuerst as “a specific and consistent method of debriefing. It begins with a systematic process to release emotions from the simulation experience and moves into a critical analysis of the events” (Dreifuerst, 2012, p. 327). For this research, DML is defined as further described by Dreifuerst as “a systematic process for debriefing in which teachers and students explicate different aspects of reflection and generate new meanings from simulated experiences” (Dreifuerst, 2012, p. 326).

**Assumptions**

For the purposes of this study, the primary researcher has expressed the following assumptions:

- Experiential learning and reflective learning provide a more effective learning strategy.
• Although traditional clinical experiences provide the optimal learning opportunities for student nurses, use of simulation technology within an educational program is a reasonable alternative.

• The use of simulated clinical experiences is not intended to replace the traditional clinical experience, rather, to provide an alternative clinical experience, which can be manipulated, and to capture desired learning experiences.

• Simulation clinical experiences and subsequent debriefing sessions supplement traditional clinical experiences for students.

• Simulated clinical experiences provide a practical opportunity for students to apply concepts learned within the classroom to a clinical situation.

• Currently, there is a study being conducted, sponsored by the National State Board of Nursing, which is examining the efficacy of replacing clinical hours with simulated clinical experiences. Results of this study are not yet available.

• Students learn from the ability to make independent clinical decisions in a simulated clinical setting.

• Simulation debriefing allows students to assimilate concepts learned within a simulation clinical environment.

• Nurse educators and students will benefit from the development of a framework for debriefing which will enhance learning outcomes.

• Traditional methods of measuring critical thinking, clinical reasoning, and clinical judgment have not been proven successful.

• The Health Science Reasoning Test (HSRT) and the California Critical Thinking Disposition Inventory (CCTDI) provide a reliable measure of critical thinking and
clinical reasoning skills of nursing students based on methods utilized to develop these tools (Appendix A).

- For an educational experience to be comprehensively evaluated, student perspectives of the teaching strategy must be evaluated.
- More research is needed to evaluate the learning outcomes and student perspectives related to simulation debriefing.

**Limitations**

- A convenience sample from one school of nursing was utilized for this study.
- The sample size may be limited due to the availability of subjects, thereby limiting generalizability of the results.
- It is noted that it is anticipated that there were 110 students total but this number is split into two sections (55 students in each section), further, each section was taught by a different didactic instructor. Even though the content covered in both sections was the same, the teaching style between the two instructors may vary.
- Due to curricular constraints, it may be difficult to control the confounding variables: would be age, GPA, previous academic experience prior to enrolling in the nursing program, English as a second language, student exposure to varying clinical instructors, and the fact that didactic is taught by a different instructor for each section. Statistical analysis was completed to control for the confounding variables.
- Although results of the HSRT and CCTDI tests will not affect student progression within their nursing program, some students may experience test anxiety related to taking these examinations.
• The impact of previous clinical experiences is difficult to control within this study.

• Also, it was difficult to control the impact of having more than one faculty member facilitating the simulation debriefing sessions within the control groups. Thus, it may be difficult to link change in performance on the HSRT and CCTDI due to the intervention alone.

• Additionally, it was difficult to control the impact of having the investigator conducting all DML sessions in the experimental groups. Thus, it may be difficult to link change in performance on the HRST and CCTDI due to the intervention alone.

**Significance of the study**

The ultimate goal of nurse educators is to prepare nursing students to function as safe, competent practitioners. The importance of this goal has been reinforced by a focus on improved quality and safety of care provided within today’s complex healthcare system. The Quality and Safety Education for Nurses (QSEN) initiative stresses the importance of facilitating the acquisition of Knowledge, Skills and Attitudes (KSAs) necessary to promote the development of a safe practitioner (Anonymous, 2011). Further, this initiative has called for the development of innovative strategies to facilitate student mastery of KSAs in order to improve competency and preparedness of new practitioners (Jarzemsky, McCarthy, & Ellis, 2010). Clinical reasoning and clinical judgment skills are essential to the preparation of a safe and effective practitioner. Barriers to education such as limited clinical sites, unstable patient census, inability to control learning opportunities, as well as difficulty supervising large numbers of students...
exist in a traditional clinical site. Given these challenges, many nurse educators have embraced the usage of innovative strategies such as simulation to assist in meeting the goal of developing clinical reasoning and clinical judgment in their students. Complications arising from the rapid adoption of simulation and debriefing methodologies are the inconsistencies of terminology and recommended usage of such technology within nursing education. Additionally, limited literature is available which addresses how best to effectively integrate simulation and debriefing within a curriculum. Debriefing is a component of simulation that has been identified as the pivotal, if not the most critical component involved in facilitating the development of clinical reasoning and clinical judgment skills. The literature has identified the importance of the role of debriefing within simulation; however, empirical studies regarding how to effectively conduct simulation debriefing, though increasing recently, remains limited in number at best. The intent of this study was to add to the body of knowledge in nursing by investigating the impact of using structured debriefing as a methodology to facilitate student clinical reasoning and clinical judgment skills. Further, the goal of this study was to contribute to the establishment of best practice guidelines relative to the use of the DML method for simulation debriefing to facilitate the development of student clinical reasoning and clinical judgment skills.
Chapter 2

Introduction

Clinical reasoning and clinical judgment skills have been identified as essential skills necessary for a practitioner to derive appropriate clinical decisions. Practitioners and students must utilize these skills in order to become safe practitioners (Parker & Myrick, 2010; Shinnick et al., 2011; Zigmont et al., 2011). As simulation technology has been adopted in many nursing programs, it has been suggested that the debriefing portion of the simulation experience is the most essential component for facilitating the development of necessary clinical reasoning and clinical judgment skills (Parker & Myrick, 2010; Shinnick et al., 2011; Zigmont et al., 2011). This chapter will explore the cognitive, metacognitive, problem-solving and reflective thinking required to support the development of clinical reasoning and clinical judgment skills. Additionally, this chapter will describe the application of Kolb’s Experiential Learning theory (1984) and Gibb’s Reflective Cycle (1988) as a guiding framework for which to investigate the practice of simulation debriefing. Also, this chapter will discuss the concepts of meaningful learning, debriefing for meaningful learning, and structured debriefing as the underlying premises being explored. Finally, this chapter will explore the research completed to date related to simulation debriefing and the need for this research as identified by the gaps in the literature addressing this practice.

Cognitive, Metacognitive, and Problem-solving Thinking

The development of nursing knowledge requires cognitive, metacognitive, and problem solving skills. Benner’s (1984) from Novice to Expert theory established the groundwork to describe how a nurse becomes “expert” in nursing. The use of intuition in
relation to problem-solving that Benner identified may have related to the metacognitive processes utilized when making clinical reasoning and clinical judgment decisions (Benner, 1984). The intuitive grasp of the situation is not based on “wild hunches”; rather, it is based on the clinician’s grasp of the clinical situation. Recognition of clinical situations “moves from abstract textbook accounts of general features to an experience-based response to the situation” improving the clinician’s grasp of a clinical situation (Benner, 2004, p. 190). A sense of salience allows the practitioner to determine more plausible solutions to a given clinical situation. According to Benner (2004) “The proficient practitioner develops a richer sense of the ends and possibilities of practice based on shared notions of good practice within the profession” (Benner, 2004, p. 190).

Metacognitive processes build upon prior knowledge, the individual’s ability to organize new information, interpret clinical presentations, and make judgments based on the information presented. Cognitive psychology explains that teaching and learning requires processing of information. It has been found that an instructor processes information within the context of a discipline, utilizing affective and cognitive components of learning; whereas students process the cognitive, metacognitive and affective information (Chartier, 2001).

**Theoretical Framework**

**Reflection**

The simulation experience and subsequent debriefing or “post-experience analysis” represent the key component of simulation-based learning (Zigmont et al., 2011, p. 52). Promoting the use of reflection within the simulation and debriefing process enhances the participant’s learning. The use of reflection allows participants to
identify mental models that led to cognitive processes utilized during the simulation experience. Based upon this reflection, participants can identify cognitive processes which led to the behavior exhibited. Upon skillful facilitated discussion of the simulation experience, learners can assimilate the information gained and apply this new knowledge to future practice situations (Zigmont et al., 2011). In 1988, Gibbs developed the Reflective Cycle which describes how an individual systematically breaks down phases of an activity such as a simulation experience. According to Gibbs (1988), the reflective cycle phases include: description, feelings, evaluation, analysis, conclusion, and action plan. When reflecting upon a simulation activity, an individual recalls what happened as well as the emotions experienced during the activity. Thus, during a debriefing session, it is beneficial to first ask the participants to identify emotions experienced during the simulation. This facilitates the participant moving beyond the emotions to concentrate on the various activities which guided the unfolding of the simulated clinical experience. After evaluating the good and bad, an individual calls upon their basis of knowledge to analyze the situation. Based upon this analysis, an individual is able to conclude whether the actions taken were the most appropriate or if some other action would have been better suited for the situation. Finally, the individual reflecting on the experience can propose a course of action in the event that they are faced with a similar situation in the future (Gibbs, 1988). The reflective cycle provides a theory upon which the debriefing process can be conducted following a simulation experience.

**Experiential Learning**

Kolb’s Experiential Learning cycle (1984) provides a holistic theory upon which to base the potential for learning associated with the use of simulation and debriefing.
Kolb’s theory (1984) suggests that active participation provides a more effective learning experience. The Experiential Learning Theory (ELT) defines learning as “the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience” (Kolb, 1984, p. 41). The ELT describes the learning that results from Reflective Observation (RO) and Active Experimentation (AE) drawn from exposure to a Concrete Experience (CE) and Abstract Conceptualization (AC). Kolb (1984) continued his work as he developed a learning style inventory which described core characteristics that learners exhibit as a preferred learning style. The inventory includes assimilating, converging, and accommodating. Because of the flexibility associated with Kolb’s description of how individuals learn, Kolb’s theory can be readily applied to many disciplines. Additionally, Kolb’s theory incorporates the importance of experiencing, reflecting, thinking and acting. These are applicable experiential and cognitive processes that explain the learning process which occurs during simulation and simulation debriefing experiences.

**Components of Debriefing for Meaningful Learning**

**Guided Reflection**

Instructor led guided reflection during debriefing allows students to explore events which occurred during the simulation to enhance the thinking-on-action activity. Additionally, reflective thinking facilitated during simulation debriefing allows students the opportunity to problem-solve after the fact without fear of harming a patient which builds upon the thinking-on-action activity (Shinnick et al., 2011). Reflective thinking facilitated during debriefing assists learners to develop and integrate insights from a current situation and apply them later to subsequent situations (Rudolph, Simon, Raemer,
Structured reflection during debriefing allows students to analyze their actions, to self-correct, and to assimilate new experiences with prior ones. Facilitation of this guided reflection assists students to achieve an understanding of concepts learned during the simulation and debriefing experience which will add to thinking-beyond-action (Dreifuerst, 2009; Rudolph et al., 2008).

**Meaningful learning**

Constructivism theory focuses on an active-learner-centered experience which emphasizes the construction of new knowledge by the learner. Constructivist theory proposes that learners gain new meaning by incorporating new knowledge with past experiences or knowledge. “Ausubel’s Assimilation Theory of Cognitive Learning (1963) guides research and instructional design to facilitate meaningful learning” (Novak, 2002, p. 548). Ausubel’s distinguished between rote learning and memorization of knowledge arbitrarily and meaningful learning for which the learner consciously integrates new knowledge to knowledge that the learner already possessed (Ausubel, 1963; Novak, 2002).

**Debriefing for meaningful learning**

The Debriefing for Meaningful Learning© (DML) method utilizes active learning to facilitate the students’ application of prior knowledge and experience to the simulation thus facilitating clinical reasoning skill development. Students are encouraged to think-in-action, think-on-action, and think-beyond-action during the debriefing session. This guided reflection breaks down the invisible barriers by revealing frames of reference on which students base their reasoning processes. DML is grounded in educational theory that incorporates experiential learning, reflective learning, and problem-based learning in
a constructivist framework that uses narrative pedagogy. A simple worksheet is used to guide student reflection through the debriefing process to enhance consistency of the debriefing sessions. Further, the worksheet guides the E6 framework (engage, evaluate, explore, explain, elaborate, and extend) by using a concept mapping approach (Dreifuerst, 2010). Meaningful learning involves incorporation of concepts and propositions into a cognitive structure.

**Concept Mapping**

Concept maps serve as metacognitive tools which improve learning over time. Further, concept mapping assists learners in achieving more meaningful learning by modifying student knowledge structures (Novak, 2002). Concept maps provide a visual representation of the simulation scenario and frames the decision-making process utilized. The use of concept maps assist faculty in gaining a greater understanding of the students’ reasoning processes in order to discern faulty reasoning. Further, the use of concept maps assists the learning through the process of understanding the clinical situation and contextual circumstances influencing the decision-making process (Dreifuerst, 2010).

**Structured Debriefing**

Structure of a debriefing session is enhanced by the use of a worksheet and concept mapping methodology. Upon initiation of the debriefing session, students are encouraged to remove the emotions associated with the simulation experience by asking, “What went right?” “What went wrong?” and “Given the opportunity, what would you do differently?” Upon eliminating the emotion, the facilitator returns to the start of the worksheet and focuses on recalling details of the patient’s story. This naming of the
patient and patient story provide a mental model reference on which to base future application of knowledge learned. Next, concept maps are used to frame decisions and the DML worksheet explores options and explains alternatives. Subsequent discussion focuses on identifying the key problem within the scenario. The visual representation of the patient’s clinical situation which unfolded during the simulation provides a tool which allows students to interpret relationships between key concepts. Using concept mapping, students can explore what went right and what went wrong. Additionally, student development of concept maps can identify correct and incorrect student clinical reasoning and judgments (Dreifuerst, 2010).

The DML method for debriefing provides a structure and process by which faculty can consistently facilitate student learning during debriefing. The DML worksheet (Appendix B) provides a written structure for faculty to follow throughout the guided reflection process utilized by the students during debriefing. The guided reflection and use of concept mapping facilitates the metacognitive processes used by students to allow the development of clinical reasoning and clinical judgment skills.

**Purpose of Debriefing**

The purpose of debriefing is to provide time for the students and faculty to reflect on the simulation scenario, and re-examine the decisions and actions that occurred during the simulation scenario. Debriefing promotes reflective thinking to assist participants in attaining a grasp of clinical reasoning/clinical judgment utilized to determine the most appropriate clinical action. Further the purpose of debriefing is to “move toward assimilation and accommodation [of the knowledge gained during simulation] in order to transfer learning to future situations” (The IASCL Board of Directors, 2011, p. 55).
Although literature exists to suggest that debriefing is essential to complete the learning activities associated with simulation, there is minimal evidenced-based information to support this stance. Minimal empirical research is available to guide the development of best practices for simulation debriefing (Dreifuerst, 2009; Neill & Wotton, 2011). The hierarchy of evidence provides a structure regarding levels of research which support the establishment of evidenced-based practices within the field of nursing (Dinsdale, 2008; Higgs, & Jones, 2000; Ho, Peterson, & Masoudi, 2008). The purpose of this research is to add to the hierarchy of evidence related to simulation debriefing by investigating the impact the use of structured debriefing has on the development of clinical reasoning and clinical judgment skills.

**Research Completed Related to Simulation Debriefing**

A literature review was conducted via the Cumulative Index of Nursing and Allied Health Literature (CINAHL) database using keywords debrief and simulation. Additionally, the search was limited to articles from 1998-2013 written in English. The search revealed eighty-eight articles; however, only seventy-five were research based. After eliminating duplication seventy-four articles remained. Upon analysis, it was found that a large number of articles focused on the use of simulation with limited reference to the debriefing process. After eliminating studies which focused on simulation and retaining only those which focused on debriefing, seventeen articles remained to meet the search criteria. However, four non-research articles reflecting discussion of debriefing and/or a literature review were retained along with the seventeen research articles, totaling twenty-one articles for consideration.
There were eight qualitative, six quantitative, three mixed method studies, and three other articles examined for this study. The eight qualitative articles utilized sample sizes that ranged from 9-100 participants. Participants were nurse educators, nursing students, medical residents, midwives, and obstetricians; however, nursing students made up the majority of the sample. Qualitative studies investigated issues such as: whether debriefing was important; impact of faculty demeanor; whether usage of checklists aided in rating skill performance; if simulation and debriefing could be effective to promote team training; if student learning differed based on participation versus observation; and whether oral discussion, journaling or blogging were viewed as favorable for debriefing. Within all of the studies, debriefing was noted as being an integral component facilitating learning.

**Qualitative Research**

Brackenreg (2004) completed a qualitative descriptive study of faculty whose purpose of this study was to examine faculty’s perceived effectiveness of debriefing as related to the structured or unstructured environment of the debriefing session. Sampling for the study was derived from 48 nurse-educator respondents who self-reported about experiential learning activities. Of the 48 initial respondents, nine faculty (n=9) who mentioned action and/or reflective stage within experiential learning were chosen to participate in the study. The nine participants were interviewed via telephone. Researchers concluded that experiential learning coupled with reflective learning was perceived by faculty as being a more effective teaching strategy. Four out of nine participants recounted the importance of structure during the debriefing stage, whereas,
five of nine participants reported that they utilized a more laissez faire approach to
debriefing (Brackenreg, 2004).

Clay, Que, Petrusa, Sebasitan, and Govert (2007) conducted a qualitative
descriptive study to assess if a checklist would improve resident performance and
consistency of practice with respect to published standards of care within an intensive
care unit (ICU) environment. Eighteen (n=18) medical residents participated in the
study. Checklists incorporating best practices as determined within the literature were
developed to explicitly define expectations of residents during their ICU rotation. Five
“best practice” checklists were developed and used to evaluate resident performance to
determine consistency of practice. The study concluded that debriefing sessions using
checklists were effective for assessing resident performance and consistency of practice
as determined by standards of practice (Clay et al., 2007).

Lasater (2007) completed a qualitative exploratory study involving an analysis of
focus group data. The purpose of this study was to describe the participant’s experience
during the high-fidelity simulation as it related to students’ development of clinical
judgment skills. Forty-eight (n=48) students participated within the study. All students
were invited to participate in a focus group; however, only nontraditional students
volunteered for this activity. Lasater served as facilitator for the focus group utilizing a
list of predetermined questions as prompts. The focus group identified reflection on
learning as a key component to the success of the simulation debriefing process.
Additionally, it was suggested by the focus group that clear standards for evaluation are
important for the success of the experience. Lasater noted that the younger students may
have experienced the simulation differently than the nontraditional students. Students
identified simulation as a vehicle to facilitate the connection of clinical to theory and offered an opportunity to practice psychomotor skills. Additionally, students were impressed with the “realism” simulation offered. Finally, students were pleased with the “breadth of experience gained in the simulation laboratory” (Lasater, 2007, p. 273). Limitations identified included lack of perceived realism as the pre-recorded voice for the manikin did not match gender to the scenario, the simulator offered no visual or nonverbal communications, and certain neurological symptoms could not be accomplished i.e. reflexes and pupillary responses to stimuli (Lasater, 2007).

Cantrell (2008) used a qualitative descriptive design to evaluate the perceived benefit of debriefing by providing an immediate verbal debriefing session as well as a more structured debriefing session two weeks later during which participants reviewed a video-taped recording of the simulation experience. Eleven (n=11) senior level BSN students participated in the study. Two qualitative focus group interviews were conducted by the study’s investigator to assess differences in debriefing methodology. The study revealed that students’ stress level during simulation was directly related to the demeanor of the faculty member providing cuing. The authors of the study concluded that debriefing following simulation is an effective teaching and learning strategy; adequate preparatory work on the part of students is essential prior to the simulation experience; and faculty demeanor as related to the type of feedback provided was essential to the learning experience (Cantrell 2008).

Kuiper, Heinrich, Matthias, Graham, and Bell-Kotwall (2008) conducted a descriptive study which explored the impact that simulation technology had on situated cognition of undergraduate nursing students. The study proposed that debriefing with a
clinical reasoning model, the Outcome Present State-Test (OPT) model, can enhance reflection and support the growth of clinical reasoning and judgment following simulation experiences. The sample included (n=44) medical-surgical nursing students enrolled in a BSN program. During the study students were expected to complete an OPT worksheet to evaluate several traditional clinical situations as well as a four one-hour simulated clinical scenario, debriefing, and completion of an OPT worksheet. Students were expected to complete the OPT worksheet which contained five areas: reasoning web, patient story, outcome-present state, judgment, and frame. The OPT worksheet was turned into faculty to be evaluated. OPT worksheets from the traditional clinical experiences were compared to OPT worksheets from the simulated experiences. No significant differences in mean scores were noted between the two OPT worksheet situations. No significant results were found when completing a paired t-test between the two groups. However, overall scores were higher for simulation OPT worksheets in the following areas: listing interventions, recording lab data, making judgments regarding tests, and connecting present-outcome states and NANDA diagnosis. Additionally, students were asked to provide narrative responses to open-ended questions. The researchers concluded higher-order cognitive skills and reflection were used during simulation experiences (Kuiper et al., 2008).

Freeth et al. (2009) conducted a qualitative study of 55 participants (n=55) consisting of senior midwives, obstetricians, and obstetric anesthetists. The purpose of the study was to describe a simulation-based, interprofessional continuing education scenario designed to promote team training. Participants described the simulation as effective in clarifying role expectations, the importance of communication, and
leadership in a crisis situation. Upon analysis of video recordings of the simulations during debriefing, simulation was found to provide effective team training (Freeth et al., 2009).

Reed, Ravert, Andres, and Hudakl (2010) conducted a descriptive qualitative study to assess student preference of debriefing methods (discussion, journaling, or blogging). One hundred (n=100) participants completed a Debriefing Experience Scale tool, to determine student preference of debriefing methods. The researcher concluded that in order to promote optimal student learning it is important to gain an improved understanding of student’s preferred debriefing method (Reed, Ravert, Andrew, & Hudak, 2010).

Kaplan, Abraham, and Gary (2012) conducted a qualitative study to assess students’ (n=92) perceived satisfaction with simulation, comparing experiences of those who participated with those who observed the simulation. Both groups of students participated in a debriefing session following the simulation experience. A Problem-Based Learning (PBL) strategy was used to guide students through the simulation experience. Results of the study indicated that there was no difference in testing outcomes between the active participant and the observer group, suggesting simulation provides a valuable learning activity regardless of whether the students actively participated in the experience or not (Kaplan, et al., 2012).

**Quantitative Research**

The six quantitative studies identified utilized samples of 37-162 participants which included nursing students, anesthesiologists, and members of an interdisciplinary team. Boet (2011) utilized a pretest, post-test design to evaluate effectiveness of self-
debriefing as opposed to instructor facilitated debriefing for anesthesiologist residents. Participants were oriented to the Anesthetist’s Non-Technical Skills (ANTS) system for self-assessment. The self-assessing group evaluated their performance based on review of a video-taped recording of the simulation experience. The instructor-guided group also reviewed a taped recording of the simulation experience. The instructor leading the debriefing session was described as an “expert instructor;” however, a more detailed description of the debriefing method utilized was not provided. Both groups participated in a 20-minute debriefing session. Following the debriefing sessions, all subjects participated in a second similar simulation experience. Two evaluators with expertise in simulation and crisis resource management principles evaluated all subjects using the ANTS scoring system. A two way, mixed design ANOVA used to analyze findings detected a significant difference in test scores overall $F(1, 48) = 13.28, p < .01$; however, no difference was noted between the debriefing modalities $F(1, 48) = 0.31, p = .58$. Furthermore, no significant difference was noted between the debriefing groups in the four subcategories of task management, team working, situation awareness, and decision making (Boet et al., 2011).

Chronister and Brown (2012) investigated whether verbal feedback or video-assisted verbal discussion promoted more reflection during debriefing. A comparative crossover design was used to evaluate whether knowledge retention, quality and efficiency of skills differed between the two debriefing styles. A convenience sample of 37 BSN students enrolled in their senior-level critical care course were randomly assigned to the two groups. The quality of students’ skills was measured in accordance with the Emergency Response Performance Tool (ERPT). Knowledge retention was
measured via a 10-point multiple choice exam. The ERPT scores improved significantly between the first and second simulation experience. The ERPT scores for group 1, video-assisted verbal (VA+ V), improved more from baseline but were not statistically significant (p = .71), indicating quality of skills was not significantly affected by debriefing method. The pretest knowledge score from week six was compared to the post-test score of week seven. The pretest mean of 6.3 in group 1 (VA+ V) decreased to 4.95; whereas, the mean score for group 2, verbal (V) increased slightly from 5.14 to 5.57. The change in scores between the two groups was found to be statistically significant (p = .008). The researcher concluded although VA + V improved response time for initiating care interventions within a given situation, greater knowledge retention occurred specifically related to verbal debriefing as opposed to the video-assisted verbal debriefing. The researched suggested that the unanticipated results, knowledge change scores, may have been related to the timing of the administration of the post-test. Also, the results may have been related to the fact that the time needed to preview the video may have detracted from the time allowed for verbal discussion. The researcher recommended that more research is needed to compare differences in debriefing methodologies (Chronister & Brown, 2012).

Chung (2011) investigated the cardiopulmonary resuscitation (CPR) team dynamics and performance between a conventional simulation training group and a script-based training group. Seventy participants were divided into 14 groups of 5 members. The control group received traditional didactic lecture, simulation, and debriefing; whereas, the script group received training using a script. All simulations were video-taped and events were compared in terms of team dynamics and performance.
Both groups showed a significant improvement in leadership scores after training as indicated by the following results C: 58.2 +/- 9.2 versus 67.2 +/- 9.5, p = 0.007; S: 57.9 +/- 8.1 versus 65.4 +/- 12.1, p = 0.034. However, no significant improvements in performance scores were noted between the groups. There was no improvement in team dynamics between the two groups results as follows, C: 9.1 +/- 12.6 versus S: 7.4 +/- 13.7, p = 0.715. Also, no improvement in performance between groups was identified, C: 5.5 +/- 11.4 versus S: 4.7 +/- 9.6, p = 0.838. Finally, no significant difference existed in total scores, C: 14.6 +/- 20.1 versus S: 12.2 +/- 19.5, p = 0.726. The researcher concluded that script-based CPR team training resulted in similar result outcome as obtained with traditional simulation training (Chung et al., 2011).

Gordon and Buckley (2009) conducted a study with 55 medical-surgical graduate students to evaluate students’ recognition of symptoms in patients demonstrating acutely deteriorating conditions and student initiation of early intervention of necessary patient care. The study focused on the results of the use of simulation. However, it was during the debriefing sessions that individual roles of the team leader and group members were identified. After participation in the simulation and debriefing training, participants reported increased confidence in their ability to recognize an unstable patient and identify priorities of care (p = .02 and < .001). Additionally, students were asked to rate how they found the simulation experiences aided their ability to respond to clinical emergencies. Discussing case management after the simulation experience was identified as the most beneficial component of the exercise. The researcher concluded that debriefing following simulation reinforced participants’ actions and behaviors (Gordon & Buckley, 2009).
Wotton, Davis, Button, and Kelton (2010) utilized a quantitative tool to explore student perceptions regarding the use of high-fidelity simulation (HFS), followed by the use of three open-ended questions to clarify the quantitative responses. A large convenience sample (n=300) of third year nursing students participated in this study. Three HFS scenarios were presented to the students in order to determine student perceptions of the experience. The total number of participants for each of the three scenarios ranged from 250 for scenario three to 297 for scenario one. Participants were asked to complete an eleven-item instructor-developed test, which utilized a 5-point Likert-type scale to evaluate the simulation experience. Additionally, participants were asked three open-ended questions. The researcher reported that students expressed that the debriefing session aided in clarifying elements of the simulation that they had previously not fully understood. Also, the debriefing session helped them to develop a rationale for actions and gain a greater understanding of medication management that occurred during the simulation. Additionally, the researched concluded that HFS and debriefing can serve as an effective adjunct within the curriculum to bridge the gap between theory and practice. Strengths and limitations of this study were not identified (Wotton et al., 2010).

Shinnick et al.. (2011) conducted a study with 162 nursing students to determine where in a simulation experience the greater knowledge gain occurred. A two-group, repeated measure, experimental design was used to examine knowledge gained between two groups of students. One group of students participated in a hands-on simulation while a second group of students participated in a hands-on simulation followed by a debriefing session. Knowledge scores decreased from pretest to post-test for the hands-on
only group M = -5.63, SD = 3.89, p < 0.001; whereas, they dramatically improved with the hands-on and debriefing group M = 6.75, SD = 4.32, p < 0.001. The researcher recommended additional studies to measure the impact of debriefing (Shinnick et al., 2011).

**Mixed Method Research**

Three mixed design studies utilized sample sizes ranging from 55-238 participants. All three studies included nursing students as the sample demographic. Childs and Sepples (2006) utilized the Education Practice Scale for Simulation (EPSS), a 16-item instrument which used a 5-point rating scale to determine what educational practices, i.e. active learning, collaboration, diverse ways of learning, and high expectations, were present during simulation. Also, participants were asked to complete the Simulation Design Scale (SDS) which was a 20-item scale to evaluate simulation: objectives, support, problem-solving, feedback and fidelity. Finally, participants were asked to complete an instrument developed by the University of Southern Maine to rate confidence gained, usefulness of the simulation, and feelings about the teaching method used. Researchers indicated that establishing clear objectives for the simulation experience was of vital importance. Additionally, participants referred to the level of complexity and fidelity as being important. Participants rated receiving feedback as the most important component of the experience. Qualitatively, results indicated that the debriefing period following the simulations needed to be of an adequate length to discuss the simulation experience and to facilitate learning. As a result of this study, researchers stated that the following elements will be addressed in future simulation endeavors: Careful planning and attention to detail is essential; voice-recordings used during
simulation should match the gender of the simulator; it is important to allow adequate time for the simulations to unfold; it is essential to allow adequate time for debriefing; group sizes should be small; each station should have its own room; and an adequate number of faculty need to be available to assist with instruction during the sessions (Childs & Sepples, 2006).

Dreifuerst (2012) conducted a quasi-experimental, pre-test, post-test study utilizing 238 nursing students to investigate if using a structured debriefing rather than unstructured debriefing methodology resulted in improved student development of clinical reasoning and clinical judgment skills. Additionally, students’ perception of the quality of the debriefing process was compared between the two groups. The pre-test, post-test results of the HSRT indicated a statistically significant difference between scores of the structured and unstructured debriefing groups. The difference in mean scores from pre-test to post-test were analyzed to be significant, $F(1.237) = 28.55$, $p \leq 0.05$, and the covariate was significant related to the debriefing method, $F(1.237) = 623.91$, $p \leq 0.05$, with a large effect size of 0.84. Nonparametrical tests were used to analyze results of the Debriefing Assessment for Simulation in Healthcare-Student Version (DASH-SV) and Debriefing for Meaningful Learning Supplemental Questions (DMLSQ) scores. The $Z$-values for both instruments were significant with $p < 0.05$. Also, the mean aggregate DASH-SV scores were significant ($Z = -11.99$, $p \leq 0.001$). This result indicated that students perceived a difference in quality between the structured debriefing group and the control group. Finally, analysis of the HSRT, DASH-SV and DMLSQ scores was done to determine if an association existed between perceived debriefing quality and changes in student clinical reasoning skills. A simple regression
analysis demonstrated a statistical significance in 9 of 11 item scores. The two items which did not demonstrate statistical significance were the DMLSQ scores and DASH-SV element one. As a result of this study, the researcher concluded that a structured debriefing method, specifically, Debriefing for Meaningful Learning© (DML), provided an improved learning experience to support the development of clinical reasoning skills. The researcher recommended additional studies to support generalizability of the findings (Dreifuerst, 2010, 2012).

Mariani, et al. (2012) utilized the Lasater Clinical Judgment Rubric instrument (LCJR), to determine if a structured debriefing session (specifically DML) improved the development of clinical judgments skills as opposed to the control group who were provided an unstructured debriefing experience. Results of the study concluded that there was no statistically significant difference in LCJR scores of students exposed to the DML as compared to those students exposed to a less structured debriefing session. A RM-ANOVA did not demonstrate a statistical significance between the scored of the experimental (DML) and control group (traditional debriefing) with F (1, 84) = 0.009, p= .92, time main effect, F (1, 84) = .33, p = .562 group x time interaction effect, F (1, 84) – 0.213, p = .64. Additionally, a 2 X 2 RM-MANOVA was calculated to determine if a statistical significance in results could be found on existing subscales; however, no statistical significance was found. Additionally, focus group interviews were conducted to assess student perception of debriefing methods. Qualitative findings indicated that a structured debriefing experience fostered reflection and meaningful learning among students. Mariani suggested that the lack of statistical significance may have been related to an inadequate statistical power or other limitations. Qualitative results supported the
notion that a structured debriefing was perceived to have provided more beneficial overall learning and synthesis of clinical knowledge. Finally, the researcher recommended additional studies should be conducted with a rigorous design to provide further empirical evidence of the quantifiable and perceptual effectiveness of structured debriefing (Mariani et al., 2012).

**Descriptive Articles**

The remaining four articles found within the literature provided literature reviews and discussions regarding theoretical foundations for simulation. Zigmont et al. (2011) proposed the 3D Model for simulation and debriefing. Factors within this model addressed individual learning needs, the learning experience, and the environment in which learning occurred. As per the authors of the article, adult learning theory explains that adult learners decide what and when they need to learn; they are intrinsically motivated; they bring prior knowledge and experiences to the learning environment; and they use analogical reasoning within the learning process. The 3D Model incorporated Kolb’s Experiential Learning Cycle, which stated that active participation or having a “concrete experience” facilitates the learning process (Zigmont et al., 2011, p. 50). The 3D authors concluded that clear, useful objectives relevant to practice are needed in order for a debriefing experience to be effective. In addition, the learning experience needs to provide enough challenge to the participants to keep them engaged. Finally, the 3D Model emphasized the need to offer an environment that is perceived as a safe place to practice. The 3D Model of Debriefing identified three components to the debriefing process: defusing, discovering, and deepening. A pre-briefing session was suggested as necessary in order to establish ground rules for the debriefing session. The defusing
phase was described as an opportunity for the learner to express the perceived impact of the simulation experience. The discovering phase facilitated “reflective observation” and “abstract conceptualization” associated with the experience. The deepening phase “help[ed] the learner connect new learning to potential changes in practice within a greater context” (Zigmont et al., 2011, p. 50). The researchers recommended that the debriefing session end with a final review of the objectives learned during the debriefing session (Zigmont et al., 2011). To date, no studies have been printed which have tested this theory.

The remaining three articles by Waxman (2010), Wicker (2010), and Neil & Wooton (2011) examined simulation and debriefing utilized in nursing education. Waxman (2010) reviewed 6 articles which revealed that a safe environment is essential for effective debriefing, open-ended questions aid debriefing, debriefing is more effective if it immediately follows simulation, and debriefing should be as long as or twice as long as the simulation exercise. Wicker (2010) provided a discussion article which supported the need for establishing a safe learning environment to optimize learning. Finally, Neil & Wooton (2011) conducted a literature review which incorporated all of the studies and articles reflected within the literature review conducted for this study (Waxman, 2010; Wickers, 2010; Wotton, 2010; Neill & Wooton, 2011).

**Summary of Research Gaps**

All of the mixed and quantitative studies examined within this literature review utilized different instruments and statistical approaches to analyze data collected. Of the mixed and quantitative studies examined the Dreifuerst (2010) and Mariani et al. (2012) studies specifically considered the impact that a structured and unstructured debriefing
session had on student development of clinical reasoning skill. Dreifuerst utilized the HSRT to measure differences in clinical reasoning; whereas, Mariani et al. (2012) examined the change in clinical reasoning as reflected in Lasater Clinical Judgment Rubric scores. Also, Dreifuerst (2012) used the DASH-SV to ascertain differences in students’ perceived quality of the debriefing methodology used. This information was supplemented by the DMLSQ instrument used to capture the qualitative data related to students’ perception of the quality of the debriefing session (Dreifuerst, 2012; Mariani et al., 2012). Results between Dreifuerst (2010) and Mariani et al. (2010) were inconsistent. Dreifuerst’s results recognized a significant impact on the development of clinical reasoning skills related to the use of the DML method. Mariani’s study results did not achieve a statistically significant result; however, qualitative data suggested potential for the method. The reason for this discrepancy could be related to sample size or it could be related to the data collection instruments utilized within the studies. However, the theoretical basis for the DML method supports the processes present in a debriefing session and is worthy of further investigation.

Brackenreg (2004) was the only qualitative study that investigated how nurse educators structured debriefing. Telephone interviews were conducted with nine nurse educators to ascertain their perception of the debriefing methods utilized. Three educators employed a structured, preplanned approach utilizing reflection to accomplish predetermined outcomes. Five educators preferred an unstructured approach and one educator utilized more of a discussion method rather than a true debriefing methodology. The study revealed that participants possessed varying levels of knowledge of theory to underpin the debriefing process. Further, structured debriefing was rated as optimal;
however, Brackenreg (2004) the researchers recommended the need for further research to determine the dynamics of experiential debriefing learning.

Results of a 2010 survey of United States and International Nursing Association for Clinical Simulation and Learning (INACSL) members indicated that in order to add to the body of science of nursing, it is advisable that conceptual frameworks or theories be developed to guide the practice of simulation or be integrated within existing nursing theory. A theoretical framework provides structure for which to support the development and evolution of a practice. Researchers can pose hypotheses regarding simulation usage, test the hypotheses posed, and suggest recommendations based on the research completed. This establishes a body of knowledge associated with a particular teaching strategy such as simulation and/or debriefing. As additional research is completed, evidence can be established to support or refute a researcher’s claims. In addition, a conceptual framework or theory offers a starting point for which further development and revision of practice can be established. Without a conceptual framework or theory, research on any subject can become fragmented a best. Also, significant differences in practices regarding the use of debriefing were found within the literature. It is for these reasons that concern exists regarding the lack of a unifying framework or theory for which to organize research related to simulation and simulation debriefing (Gore, Van Gele, Ravert, & Mabire, 2012).

**Summary**

For the present study, Kolb’s Experiential theory (1984) and Gibb’s Reflective Cycle (1988) will be utilized as the theoretical frameworks to guide research on simulation debriefing. Kolb’s Experiential Learning theory (1984) provides a framework which
supports the active learning environment experienced during simulation and simulation debriefing. Also, it captures the process a learner undertakes as they incorporate old and new knowledge to further their understanding of necessary clinical reasoning skills. Gibb’s Reflective Cycle (1988) captures the reflective thought processes undertaken during simulation debriefing that are needed in order to recall what happened during the simulation experience. Furthermore, Gibb’s Reflective Cycle (1988) supports the participant’s development of concepts of learning resulting from the simulation experience (Gibbs, 1988; Kolb, 1984).

As the “science” of simulation and simulation debriefing has evolved the research methodologies have also evolved. Initial studies were exploratory in nature, utilizing primarily a qualitative methodology. Later studies used mixed, quantitative, and qualitative methodologies in order to establish greater generalization capacity of study results.

Considering the findings of this literature review, it is unclear if using a structured debriefing methodology results in different learner outcomes than utilization of an unstructured debriefing methodology. As nurse educators continue to utilize simulation and associated debriefing as an innovative teaching strategy, it is imperative that empirical evidence is developed to guide best practices for these teaching strategies. There is a significant amount of literature evaluating the use of simulation; however, limited empirical evidence to definitively investigate the debriefing component of the simulation experience. Within the literature, the debriefing session following simulation has been identified as the most important component of the simulation experience; however, further investigation is needed to provide guidance regarding how to perform a
debriefing session to optimize student development of clinical reasoning and clinical judgment skills.

Debriefing is an essential component of simulation as it promotes reflective thinking which ultimately leads to the determination of clinical decisions. In order to evaluate the effectiveness of structured debriefing for enhancing the development of clinical reasoning skills, one should consider the nature of cognitive processes encouraged within a simulation debriefing session. Additionally, it is important to build upon prior research related to debriefing methodologies. As with any teaching strategy, it is important to establish best practices in order to enhance the effectiveness of the teaching method. Quantitative research can be used to provide statistical information to support or dispute the effectiveness of debriefing methodologies.
III. Chapter 3: Methodology

Study Design

A quasi-experimental, pre-test, post-test design was used for this study to test the impact of utilizing the Debriefing for Meaningful Learning© (DML) method of debriefing following simulation experiences with pre-licensure BSN junior level students. Demographic data were collected to analyze homogeneity of the sample. Quantitative data was collected via analysis of HRST and CCTDI scores pre and post intervention to assess the impact the DML method for debriefing had on student nurses’ development of clinical reasoning skills and clinical judgment skills within a simulation environment. Additionally, follow-up open-ended qualitative questions related to the DML worksheet were posed to the experimental group to further assess students’ perceived quality of the DML method of debriefing.

Sample

A convenience sample of junior level baccalaureate degree students from a Northeastern private university was enrolled in this study. The sample of pre-licensure BSN students was distributed between an experimental or control group. In order to obtain desired power a sample size assuming an alpha of .05 two-tailed test, with desired power of 80, a minimum of 81 student participants was needed for this study. All student participants were enrolled in a medical-surgical nursing class and had exposure to previous simulation experiences. Students within each clinical group, randomly established by faculty members of the hosting facility, were randomly assigned to an experimental or control group. The experimental group was exposed to the DML© method of debriefing; whereas, the control group was provided a more traditional...
debriefing session. The traditional debriefing sessions provided from this institution were conducted according to the style or preference of the faculty facilitator. Typically, facilitators of the traditional debriefing sessions posed questions such as: What did you think of the experience? What do you feel went well? What do you think you could have done better? Do you have any questions? Facilitators were instructed to review the unfolding events which occurred during the simulation experience with the students. The host facility did provide suggested questions to review during the debriefing session. However, no further specific instruction was provided to the facilitator or student in regard to how, specifically, the sessions should be conducted. The HSRT and CCTDI tools developed by Facione & Facione (2012) were to be administered to all participants in order to establish the degree of clinical reasoning prior to and following debriefing sessions. Following baseline testing via the HSRT and CCTDI instruments, students participated in three separate simulation and simulation debriefing experiences (control and experimental) within their medical-surgical nursing course. However, the home institution implemented a significant change in the school’s curriculum to be initiated in the spring semester. Due to the change in curriculum, it was unclear when students would be able to complete the third simulation experience that had been planned. Thus, it was decided to complete data collection following the second rather than the third simulation and simulation debriefing experience. Beginning a month following completion of the final simulation and simulation debriefing experience, the HSRT and CCTDI were re-administered in order to analyze the impact that the debriefing experiences had on students’ development of clinical reasoning and clinical judgment skills. The resultant data, student scores, was utilized to answer the research questions of
this study (Insight assessments, 2012; Facione, Facione, & Sanchez, 1994; Facione & Facione, 2008). Finally, four opened-ended follow-up questions were posed to the students from the experimental group to further assess student perceived satisfaction with the DML method and accompanying DML worksheet to supplement the quantitative data collected.

**Data Collection Instruments**

**Health Sciences Reasoning Test (HSRT)©**

The HSRT© tool is a proprietary tool which measures clinical reasoning, critical thinking and clinical decision-making in a health-clinical context. The HSRT© tool is well established and recognized for measuring reasoning capacity. The HSRT© tool is not specific to nursing; however, it applies to nursing due to its health-clinical context. This copyrighted tool poses 33 multiple choice questions that reflect five scales needed for clinical reasoning: analysis, inference, evaluation, deduction, and induction. Additionally, a total score will be provided© to describe the overall strength in using core reasoning skills necessary to form reflective judgments about what to believe or what to do. The reported internal consistency for the HSRT© test is the Kuder Richardson 20 (KR 20) coefficient for instruments with dichotomously scored items. The reliability coefficient ranges between.78 to.82. The data from ongoing validation studies produced internal consistency estimates of the KR 20 ranging from.68 to.80. (Insight assessments, 2012; Facione, 2013). The KR 20 (comparable to Cronbach’s alpha) determines internal consistency reliability for measures with dichotomous choices. Although the Cronbach’s alpha is used commonly with nursing research and can be used for dichotomously and
non-dichotomous scored instruments and scales the reliability for this instrument was determined by the KR 20.

**Critical Thinking Disposition Inventory (CCTDI)**

The CCTDI© assesses the degree to which respondents agree or disagree with statements expressing familiar opinions, beliefs, values, expectations, and perceptions as they relate to the reflective formation of reasoned judgments. The CCTDI© measures seven factors that influence an individual’s capacity to learn and effectively apply critical thinking skills. The CCTDI© is based on “expert consensus characterization of the ‘ideal critical thinker’ articulated in the APA Delphi Report” (Insight assessments, 2012, discussion section 2). The alpha K20 coefficient of the CCTDI tool, developed by Facione and Facione, has a reported internal consistency of .8 for the overall score. The subscales internal consistencies were CT- Confidence .70, Systematicity .60, Truth-seeking .56, Analyticity .55, Inquisitiveness .40, and open-mindedness .43 (Gupta, Iranfar, Iranfar, Mehraban, & Montazeri, 2012). Construct validity of the CCTDI instrument has demonstrated strong correlations with other instruments that purport to include a measure of critical thinking or higher-order reasoning as a component of their scores. High correlations with standardized tests, such as GRE have been demonstrated. The GRE Total Score were: Pearson r = .719, p< .001; GRE Analytic r = .708, p<.001; GRE Verbal r = .716, p< .001; GRE Quantitative, r = .582, p <.001 (Insight assessments, 2012). Construct validity is evidenced by demonstration of improvement in students’ CCTDI test scores after they have completed an educational program training which included critical thinking or clinical reasoning. Barak, Bennhaim, and Zoller (2007) completed a study evaluating purposeful teaching for the promotion of higher-order
thinking skills, results of which demonstrated improved CCTDI scores throughout the three year study (Barak, Bennhaim, & Zoller, 2007). Carter (2008) completed a quantitative study examining critical thinking dispositions in online nursing education. Carter’s (2008) study stated that the “Cronbach’s alpha internal reliability indices of the seven scales … [of CCTDI] ranged from .71 to .80 and had been consistently replicated. Additionally, the alpha reliability for the overall instrument measuring disposition for critical thinking was reported to be .91” (Carter, 2008, p. 8).

**Debriefing for Meaningful Learning© (DML) Method**

This study utilized a single intervention variable DML© to assess the impact that a structured simulation debriefing method, as a part of a simulation, had on the development of student clinical reasoning and clinical judgment skills. The DML© method was developed by Dreifuerst in her 2010 study. According to Dreifuerst (2010), the DML© model was based on the theoretical framework of the Reflective Cycle (Dreifuerst, 2010; Gibbs, 1988); the Interactive Nature of Significant Learning (Dreifuerst, 2010; Dreifuerst, 2012; Zubialde, Eubank, & Fink, 2007); and elements of the E-5 DML© Faculty Guide (Bybee, 2011; Dreifuerst, 2012). Bybee’s model (as cited by Dreifuerst, 2010), is based on principles of constructivism and encourages active participation within a learning process to facilitate effectiveness. Bybee’s model describes phases of learning: engage, explore, explain, elaborate, and evaluate. Bybee’s Model provides a set of organizing principles to guide how science should be taught (Bybee, 1989).

Additionally, the theoretical underpinnings of this study included Kolb’s (1984) Theory of Experiential Learning which has been described as a four-cycle process which
is initiated by a concrete experience, followed by observation and reflection leading to formation of abstract concepts which result in an individual forming hypotheses to be applied to future actions leading to additional new experiences. Further, Kolb postulated a linkage between the memberships within a profession and preferred learning styles (Cavanagh, Hogan, & Ramgopal, 1995). Kolb’s (1984) work focused on learning that results from experience which occurs when testing assumptions. Discussion during debriefing encourages reflection on how students tested self-determined assumptions during a simulation experience. The DML method provides structure by prescribing sections in a worksheet that includes identification of emotions experienced during the simulation; information necessary to frame the simulation depicted; identified priority nursing diagnosis and patient problem; goals central to the priority patient concern; nursing interventions offered during the simulation; patient (manikin) response to interventions conducted; a concept map to provide a pictorial depiction of the patient problems/concerns; and a final section which focuses on “thinking in action,” “thinking on action,” and “thinking beyond action” (Dreifuerst, 2012).

**Frames**

Debriefing serves as a formative assessment revealing the “frames” which individuals draw upon to make decisions. Findings from cognitive science, social psychology, and anthropology discuss how a peoples’ perceived reality factors into decision making processes. Clinical frames play a critical role in making decisions within medical situations. To conduct a formative assessment of a student’s actions, the instructor must bring the student’s “frames” to the forefront to analyze actions. After
analysis, the instructor facilitates students in identifying errors and forming new “frames” of thought to take on to subsequent clinical situations (Rudolph et al., 2008).

**Thinking-in-Action, On-Action, and Beyond-Action**

“Thinking-in-action” refers to a person’s ability to assess and assimilate information in order to determine the presumed best clinical decisions at the time of a clinical situation (Dreifuerst, 2010; Shön, 1987). “Thinking-on-action” requires reflection following the clinical situation, during which time a clinician identifies the thought processes utilized when making clinical decisions. Further, “thinking-on-action” requires analysis of whether or not the action taken was best in the given situation (Dreifuerst, 2010; Shön, 1987). “Thinking-in-action” is influenced by previous knowledge and hands-on experience. Additionally, when “thinking-on-action,” the clinician may consider various other options that may have been utilized during the clinical situation to facilitate an improved patient response. “Thinking-beyond-action” is an activity which allows clinicians to identify concepts learned during a clinical situation that can be applied to future clinical situations (Dreifuerst, 2010; Shon, 1987). All of these elements are central to the learning experience facilitated through the use of the DML method during debriefing experiences. These elements are intended to assist the clinician in identifying actions taken, considering alternative actions, and facilitating clinicians in learning concepts that can be carried forth during future clinical experiences (Dreifuerst, 2012). Schon (1987) proposed that reflection-in-action will assist students to learn how to draw upon their knowledge base to guide decisions within their respective profession. Further, Schon (1987) encouraged active coaching by teachers to allow
students to make mistakes, learn to seek help, and learn to refine their approach to
decision-making via incorporating reflection-in-action (Dreifuerst, 2010; Schon, 1987).

Concept Mapping

   In the 2010, Nursing: Scope and Standard of Practice, the American Nurses
Association (ANA) stated that “nursing process in practice is not linear […] rather it relies
on bi-directional feedback loops from each component” (ANA, p. 3). Ausubel’s
Assimilation Theory of Cognitive Learning provides guidance for instructional design to
facilitate meaningful learning contributing to the theoretical basis for concept maps
(Novak, 2002; Schuster, 2003). Concept mapping provides a non-linear vehicle which
allows participants to collect, interpret, analyze, draw conclusions, present, and evaluate
patient information (Schuster, 2003). The DML method incorporates the use of concept
mapping within its strategy for learning. Individual learners are able to store information
within their short-term memory for approximately 20 minutes (All, Huycke, & Fisher,
2003). However, as educators the goal is to assist individuals to remember information
learned for a much greater period of time. Memory storage can be enhanced by
cognitively constructing concepts, propositions, schema and visual images. Hence, by
using concept maps to develop pictorial images of a clinical scenario, learners can
establish relationships from the information presented. This activity of developing
relationships from information presented aids the learner in organizing knowledge into
meaningful units, thus forming concepts that enter into long-term memory (All, Huycke,
& Fisher, 2003). Instructional strategies utilizing conceptual frameworks and
constructive feedback support the use of concept mapping as a teaching strategy. As
learners become more actively involved in their own learning, “meaningful learning is

**Data Collection Procedure**

Students received information about the research study by the information included within the study’s consent form (Appendix D) and for which all consenting participants signed. All students from the sample participated in simulation and subsequent simulation debriefing as a component of their course regardless of agreeing or not agreeing to participate in the study. Students who agreed to participate in the study were asked to complete a demographic questionnaire, participate in some form of post simulation debriefing, and complete pre and post HSRT© and CCTDI© tests. Additionally, students assigned to the experimental group were asked four follow-up questions specifically related to the DML debriefing method. Consent was obtained as approved by the Institutional Review Board at Duquesne University in Pittsburgh, Pennsylvania. Subjects were assigned a participant identification number to maintain anonymity. A paper and pencil version of the HSRT© and CCTDI© tests were administered prior to students engaging in selected simulations and simulation debriefing experiences. The HSRT© tool is a 33-item test which required 50 minutes for completion per tool administration guidelines. The HSRT© tool was re-administered within one month following student completion of the final simulation experience. In addition, upon completion of the final simulation experience the CCTDI©, a 75-item tool, which required 30 minutes for completion (as recommended by the tool administration guidelines) was administered to all participants. Though 89 participants
completed the HRST© test post simulation debriefing, only 82 participants agreed to complete the CCTDI© tool. Finally, all students from the experimental group completed the four open-ended follow-up questions.

A convenience sample of junior level baccalaureate degree students from a Northeastern private university were enrolled in this study. Consenting participants were assigned randomly to a control or experimental group for which they remained throughout the study. All study participants had been exposed to simulation as a teaching learning strategy during their previous coursework. They were enrolled in a medical-surgical course during the time that the study was completed. Two simulation experiences utilized over a period of 4 months were included within the students’ medical-surgical nursing course; however, student grades were not impacted through participation in the study. Notably students were not graded for their performance within the simulation and debriefing experiences. The first simulation experience occurred during the first week of September 2013 and focused on the care of a post-op patient as well as associated safety concerns. The second simulation experience occurred during the second week of November 2013 and focused on care of a patient with Hyperosmolar Nonketotic Coma (HHNC). The third and final simulation experience previously planned to occur within the next level medical-surgical nursing course during February 2014 was not completed due to a significant change in the hosting school’s curriculum which did not allow for the February simulation experience. As two separate simulation and simulation debriefing experiences were completed by all participants, care was taken to ensure that the control and experimental groups remained intact. Each simulation experience was 15-20 minutes in duration and was followed immediately by the
designated debriefing method. Debriefing sessions for the less structured approach were allowed to occur for the amount of time necessary as determined by the faculty facilitator; however, a minimum 20-30 minutes was required for all debriefing sessions. The DML sessions were 40 to 60 minutes in length dependent upon the length of time that the simulation experience required. As recommended in the DML method, the debriefing sessions were 2 to 3 times the length of time of the simulation experience. High-fidelity manikins were utilized for all sessions. Simulation scenarios were developed by the school hosting the study. Themes of the scenarios focused on medical-surgical patient situations. Scenarios were facilitated by faculty members of the site location as well as the primary investigator. The lead facilitator of each simulation served as the lead facilitator of the debriefing sessions within the control groups. The primary investigator of this study assisted with simulation scenarios in the experimental groups and served as lead facilitator for all DML sessions. All faculty members who assisted with managing simulation scenarios had previous experience working with simulation exercises. During the scenarios, students were assigned the role of primary nurse, secondary nurse, nurse’s aide, family member or observer. Following each scenario, students and faculty left the area of the simulation to better ensure the focus of the participants. The DML worksheet was used as a guide within the experimental group sessions. Student participants in the control group received customary debriefing using the institution’s resources. Customary debriefing followed a minimal structured methodology, in that objectives and suggested debriefing questions were provided for the facilitator, however, no further direction was provided to the facilitators regarding how to conduct the debriefing sessions.
Table 1: Schedule of Events and Testing of Study Participants

<table>
<thead>
<tr>
<th>Group</th>
<th>Administer HSRT© &amp; CCTDI©</th>
<th>Simulation #1</th>
<th>Simulation #2</th>
<th>Administer HSRT© &amp; CCTDI©</th>
<th>Follow-up questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>August 30</td>
<td>September 3, 4 or 5</td>
<td>November 10, 11 or 12</td>
<td>December</td>
<td>December</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control group</td>
<td>August 30</td>
<td>September 3, 4 or 5</td>
<td>November 10, 11 or 12</td>
<td>December</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The HSRT© and CCTDI© were administered to all participants prior to the first simulation scenario utilized within the study. All students (those in the control and experimental groups) underwent a simulation and debriefing experience at the beginning of the fall semester. All students participated in a second simulation debriefing experience within two months of the first simulation. Care was taken to ensure that the control and experimental student groups were maintained throughout the simulation and debriefing experiences. In order to limit interference with the school’s curriculum schedule, the HRST© and CCTDI© tests were administered in December 2013 and January 2014 following the final simulation and simulation debriefing session. Students were allotted 50 minutes for the HSRT© and 30 minutes for the CCTDI© post-test which were administered to all participants to collect post intervention scores. Additionally, only students from the experimental group were asked to complete the four open-ended follow-up questions upon completion of the final simulation debriefing experience as they posed questions specific to the DML method and DML worksheet used. Because there was a minimum of three months between pre and post-test data collection,
familiarity with the test items were not of concern. Finally, participants within the experimental group were asked four follow-up questions (Appendix C) to evaluate the DML worksheet and components of the DML method utilized in the experimental group.

**Protection of Human Subjects**

Protection of human subject participants was achieved as guided by the Duquesne University Institutional Review Board policies and procedures for expedited research. Approval for the initial proposal was obtained from the hosting facility prior to beginning the study. All participants signed a consent form (Appendix D) prior to initiating the study. Also, they were informed that agreeing or declining participation in the study would have no impact on their status within their nursing program. In addition, students were required to participate in the simulation experiences regardless of whether they enrolled in the study or not. Additionally, all participants were informed of the right to withdraw from the study at any time if they should so desire.

**Procedure for Data Analysis**

Demographic data i.e. age, gender, highest level of education, marital status, English as a second language, and prior exposure to a different nursing program was collected to describe the sample of participants (Appendix E). Using SPSS 22.0 software, analysis of homogeneity of the sample was established. The frequency distributions, calculation of means, and summaries of descriptive data was generated along with Pearson Product Moment Correlation coefficients. Statistical comparisons between groups were carried out using students’ paired t-test and adjusted for inequality of variances between the experimental and control groups. One-way ANOVA multiple comparison test was also
completed. The statistical data determined was utilized to analyze the data and to answer the research questions.

To analyze the data in relation to the research questions, the control and experimental groups’ mean scores on the HSRT and CCTDI from pre and post-tests were compared to identify any statistically significant changes. Further, the amount of change of participants’ mean scores on the HSRT and CCTDI tests was compared between the control and experimental groups. Finally, responses on the follow-up questionnaire were analyzed to determine the students’ perception of the quality of the DML sessions.

The desired sample size was determined for pre and post comparisons of an experimental and control group. A priori, desired sample size, assuming an expected improvement in pre and post of 10% was set at N=81. Further, an alpha or significance level p = .05, for a two-tailed test, with a power of 80 were set as the parameter for determining the desired medium effect sample size. The confounding variable of the students receiving didactic instruction from two different faculty members was controlled by assigning the same proportion of participants from the didactic sections within the control and experimental group.

Table 2: Sample Size Required for a Statistically Significant Difference

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>23.7</td>
<td>5.4</td>
<td>81</td>
</tr>
<tr>
<td>Post</td>
<td>26.1</td>
<td>5.4</td>
<td></td>
</tr>
</tbody>
</table>
Summary

This chapter described the methodology which was used for this research. It provided a detailed description of how participants were recruited, how consent was obtained, and how protection of human subjects was addressed. A detailed account of statistical methodology to be used to ensure homogeneity of the sample was provided. The chapter provided a description of components of DML© method which was utilized within the experimental group. Also, this chapter provided a description of each instrument to be utilized for data collection i.e. HSRT©, CCTDI©, demographic questionnaire, as well as, the follow-up questions posed to the experimental group. Justification of how statistical data was analyzed was presented based on the assumption of normality of the sample recruited. Results of the data analysis and implication for research questions are presented in subsequent chapters.
IV. Chapter 4: Data Analysis

This study investigated the impact structured debriefing using the Debriefing for Meaningful Learning© (DML), following simulation, had on baccalaureate students’ development of clinical reasoning and clinical judgment skills. Specifically, the study investigated the impact of DML© had on the development of BSN student development of clinical reasoning and clinical judgment skills. The impact of using the DML© method was measured by the use of three instruments: the Health Science Reasoning Test© (HSRT), the California Critical Thinking Disposition Inventory© (CCTDI), and qualitatively via four open-ended questions.

This is the third study completed which examined the impact that the DML method of debriefing had on student development of clinical reasoning and clinical judgment skills. The first study was completed by Dr. Kristine Driefuerst (2009) who was the originator of the DML method. Dr. Driefuerst’s study was completed as a dissertation study in fulfillment of her PhD. Dr. Driefurst utilized the HSRT, DASH-SV, and supplemental questions (DMLSQ) to determine the impact DML had on student development of clinical reasoning and clinical judgment skills. Dr. Driefuerst’s study was conduct with a sample size of N=238 and yielded statistically significant results for both the HSRT and DASH-SV instruments. Additionally, responses to the DMLSQ were positive (Driefuerst, 2009). Dr. Mariani, et al. (2012) completed the second study examining the impact of the DML method. The Mariani, et al. (2012) study utilized the Lasater Clinical Rubric Instrument to provide measurement of the outcomes. In addition, focus group interviews were conducted to discuss the participants reaction to the usage of the DML method. This study utilized a significantly smaller sample size of 86 junior
level students. Although a higher mean clinical judgment score of the intervention group was higher than the control group and improved over time, the results were not statistically significant. Additionally, the focus group interviews suggested that students perceived the structured debriefing as being learner-focused and provided a holistic approach to enhance the learning experience (Mariani, et al., 2012).

This study had a desired sample size of N=93 participants from a different university setting than was utilized in the previous two studies. This study differs from the previous two studies as it utilized the HSRT and CCTDI instruments to measure the outcomes associated with the use of the DML method. In addition, this study posed four open-ended questions to assess the participant’s perceived quality of the DML method.

Descriptive and inferential statistics were used to answer the four research questions in this study. To explore the first three questions, a t-test was run to compare the difference in mean between the control and experimental group on the HSRT© and CCTDI© pre-tests. A one-way repeated measures analysis of variance (ANOVA) test was completed to compare the difference in mean between the HSRT© pre-tests and post-tests results for both the experimental and control group. Then, an ANOVA was completed to assess the amount of difference between the difference in pre and post scores on the CCTDI© test for both experimental and control groups. Note that due to attrition, data was imputed by replacing absent scores with the average mean scores of all participants on the respective tools (HSRT© and CCTDI©) to account for the 12 missing results prior to completing the ANOVA analysis (Baraldi & Enders, 2010).

The HSRT© and CCTDI© tests were re-administered to all participants following completion of two simulation and simulation debriefing sessions. Simulation and
simulation debriefing sessions were conducted over a three month period of time (September 2013 and November 2013). Administration of the HRST© and CCTDI© post-tests occurred greater than one month from the time of the pre-test, thus, recall of the questions was not of concern.

The final research question was assessed by administering open-ended questions to the experimental group one month following completion of the final debriefing session. Responses were categorized into themes for initial analysis regarding students’ perceived quality of the DML© method. After further analysis, major themes were derived to determine the quality of the DML© method as perceived by the participants.

**Sample**

Nursing students enrolled in a medical-surgical nursing course which utilized simulation as a teaching strategy were the target population for this research. This population was selected because it had prior exposure to the use of simulation and the course required students to demonstrate critical thinking, clinical reasoning and clinical decision-making in an acute care setting. A convenience sample of 93 baccalaureate students in their junior year of an Eastern Pennsylvania University participated in the study.

There were 102 students enrolled in the medical-surgical nursing course targeted for this study. All students were invited to participate in the study but only 93 students consented to enroll. Prior to initiating the study, a priori, sample size $p = .05$, for a two-tailed test with desired power of 80 was established as the parameter for the study. Ninety-three student participants met the minimum desired sample size requirement. All ninety-three participants were assigned to either the control or experimental group based,
in part, on how clinical groups were configured. Thus, fifty were assigned to the experimental group and forty-three were assigned to the control group. Upon completing the two debriefing sessions, time was scheduled for students to retake the HSRT© and CCTDI© tests. Tests were administered on different days. As a result of attrition and testing on separate days the number of students completing the HSRT test was less than the number of students completing the CCTDI test (Table 3).

Table 3: Sample Size and Attrition

<table>
<thead>
<tr>
<th></th>
<th>Total participants (n=93)</th>
<th>Lost to attrition HSRT</th>
<th>Lost to attrition CCTDI</th>
<th>Invited to complete open-ended questions</th>
<th>Completed open-ended questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigned to control group</td>
<td>43</td>
<td>7</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Assigned to experimental group</td>
<td>50</td>
<td>5</td>
<td>2</td>
<td>48</td>
<td>47</td>
</tr>
</tbody>
</table>

Demographics of the participants were collected for both control and experimental group. The majority of participants in both the experimental and control groups were female (89%, n= 93). Participants’ age distribution was as follows: 84% were 20 years old or less, 15% were age 21-30, and 1% indicated an age of 31-40. Eight-eight percent of participants were self-reported to be Caucasian, 3% as African American, 3% as Asian, and 5% as other. Ninety-nine percent of participants indicated that they were single and 1% self-reported to be married. Ninety-seven percent reported English to be their primary language while 3% reported English as a second language. Ninety-eight percent reported their highest education level to include some college credits while 1% reported holding a baccalaureate degree and 1% reported holding a master’s degree. Ninety-seven percent reported no prior enrollment in another nursing
program while 3% reported having been previously enrolled in another nursing program (Table 4).

Table 4: Demographics of the Total Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Sample N= 93</th>
<th>Experimental N= 50</th>
<th>Control N= 43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 years of age or less</td>
<td>84%</td>
<td>88%</td>
<td>81%</td>
</tr>
<tr>
<td>21-30 years of age</td>
<td>15%</td>
<td>12%</td>
<td>19%</td>
</tr>
<tr>
<td>31–40 years of age</td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>89%</td>
<td>98%</td>
<td>88%</td>
</tr>
<tr>
<td>Male</td>
<td>11%</td>
<td>2%</td>
<td>12%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>3%</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>Asian</td>
<td>3%</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>89%</td>
<td>90%</td>
<td>86%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>99%</td>
<td>98%</td>
<td>100%</td>
</tr>
<tr>
<td>Married or Domestic Partner</td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Primary Language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English as Primary Language</td>
<td>97%</td>
<td>98%</td>
<td>95%</td>
</tr>
<tr>
<td>English as a Second Language</td>
<td>3%</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>Educational Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some College Credits</td>
<td>98%</td>
<td>98%</td>
<td>98%</td>
</tr>
</tbody>
</table>
A 2012 survey by the National League for Nursing, as of 2012 describes characteristics typical of students enrolled in a BSN program are as follows: 16% of students are over the age of 30, 86% are female, 14% are male, 12% are African American, 8% are Asian, 6% are Hispanic, 1% are Indian and 6% are reported as other. Thus, characteristics of the study sample are relatively comparable to national statistics except for the typical age. The majority of study participants (84%) were age 20 or under, 15% were age 21-31, and only 1% were over the age of 30.

The placement of participants within the control or experimental group was randomly assigned to the extent that clinical groups, as assigned by the hosting facility, were assigned to either the control or experimental group. Forty-three student participants were assigned to the control group while fifty student participants were assigned to the experimental group. The control group (n=43) received a traditional simulation debriefing experience following simulation. The experimental group (n=50) received DML following simulation.
Research Question One

What impact does the use of Debriefing for Meaningful learning© (DML) following simulation have on the development of clinical reasoning and clinical judgment skills of pre-licensure RN students?

Data Analysis

A quantitative analysis of the data was completed using SPSS 22.0 software to run statistical tests. CCTDI scores were normally distributed for the experimental group with a skewness of -.050 (SE = .337) and kurtosis of .334 (SE = .662) and for the control group with a skewness of .463 (.361) and kurtosis of -.755 (SE = .709). HSRT scores were normally distributed for the experimental group with a skewness of -.405 (SE = .337) and kurtosis of .543 (SE = .662) and for the control group a skewness of -.781 (SE = .361 and kurtosis of .374 (SE = .709).

The CCTDI scores were normally distributed for the experimental group and control group, as assessed by the Shapero- Wilk’s test with p > .05 (Larson, R. & Farber, B, 2003; Razali & Wah, 2011). Due to the small sample size when splitting the control (n=43) and experimental (n=50) groups from the total sample (N=93), the Kolmogorov-Smirnov was also examined to establish normality. Normal distribution for the experimental and control groups by the Kolmogorov-Smirnov test was established with a p > .05 (Table 5). A visual inspection of their histograms, normal Q-Q plots and box plots showed that the test scores were approximately normally distributed for both control and experimental group (Doane & Seward, 2011). A Mann-Whitney U test was run to determine if there were differences in CCTDI scores between the experimental and control groups. Distributions of the CCTDI scores for the groups were not similar, as
assessed by visual inspection. CCTDI scores for the experimental group (mean rank = 290.16) were statistically significantly lower than for the control group (mean rank = 304.28), \( u = 1298, z = 1.719, p = 0.086 \) using an exact sampling distribution for \( U \) (Dineen & Blaksely, 1973).

Table 5: CCTDI normalcy

<table>
<thead>
<tr>
<th>Group-type</th>
<th>Kolmogorov-Smirnov(^a)</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Df</td>
</tr>
<tr>
<td>Overall CCTDI</td>
<td>Experimental</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>.12</td>
</tr>
</tbody>
</table>

The HSRT scores were normally distributed for the experimental group, as assessed by the Shapero-Wilks test \( p > 0.05 \) but not for the control group \( p < .05 \) (Larson, R. & Farber, B, 2003; Razali & Wah, 2011). Due to the small sample size when splitting the control (\( n=43 \)) and experimental (\( n = 50 \)) groups from the total sample (\( N=93 \)), the Kolmogorov-Smirnov was examined to establish normality (Table 6). A visual inspection of their histograms, normal Q-Q plots and box plots showed that the test scores were approximately normally distributed for both control and experimental group. (Doane & Seward, 2011). A Mann–Whitney U test was run to determine if there were differences in HSRT scores between the experimental and control groups. Median HSRT scores were not statistically significantly different between the groups, \( U = 1213, z = 1.068, p = .285 \), using an exact sampling distribution for \( U \) (Dineen & Blakesley, 1973).
Table 6: HSRT normalcy

<table>
<thead>
<tr>
<th>Group-type</th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Df</td>
</tr>
<tr>
<td>Overall HSRT</td>
<td>Experimental</td>
<td>.091</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>.152</td>
</tr>
</tbody>
</table>

Next, homogeneity of variance was completed to assess any significant difference between the pretest score on the CCTDI and HSRT between the control and experimental group. A Levine's test verified the equality in the CCTDI pre-test, \( F(1, 91) = 3.486, p = .065 \); and the HSRT pre-test \( F(1, 91) = 3.242, p = .075 \) (Table 7).

Table 7: Levene’s Homogeneity for HSRT & CCTDI

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall HSRT</td>
<td>3.24</td>
<td>1</td>
<td>91</td>
<td>.08</td>
</tr>
<tr>
<td>Post- Overall HSRT</td>
<td>.078</td>
<td>1</td>
<td>91</td>
<td>.78</td>
</tr>
<tr>
<td>Overall CCTDI</td>
<td>3.49</td>
<td>1</td>
<td>91</td>
<td>.07</td>
</tr>
<tr>
<td>Post- Overall CCTDI</td>
<td>4.45</td>
<td>1</td>
<td>91</td>
<td>.04</td>
</tr>
</tbody>
</table>

A RM-ANOVA was conducted to determine whether there were statistically significant difference in clinical reasoning and clinical judgment skills as measured by pre-test, post-test overall score. There were no outliers and data was normally distributed as assessed by box plots and Shapiro-Wilks test (\( p > .05 \)). The assumption of sphericity was met as assessed by Mauchly’s Test of Sphericity. Participant scores on the HSRT over time resulted in the following findings, \( F(1, 91) = 3.397, p = .069 \), with means score decreasing from \( 19.8 \pm 3.982 \text{ mg/mL} \) pre-intervention to \( 16.8 \pm 0.4713 \) post...
intervention. Per results, the debriefing intervention did not elicit statistically significant changes in participant pre and post-test scores.

A RM-ANOVA was conducted to determine whether there were statistically significant difference in clinical reasoning and clinical judgment skills as measured by pre-test, post-test overall score on the CCTDI test. There were no outliers and data was normally distributed as assessed by box plots and Mann Whitney U (p < .05). The assumption of sphericity was met, as assessed by Mauchly’s Test of Sphericity. Participant’s scores on the CCTDI test over time, F (1, 91) = 1.053, p = .308, with CCTDI scores decreasing from 296.69 ± 31.89 pre-intervention to 289.28 ± 32.541 post intervention. The debriefing intervention did not elicit statistically significant changes in CCTDI overall scores over time.

A repeated measure ANOVA (RM-ANOVA) was completed to assess the difference between the difference in pre and post scores on the CCTDI and HSRT tests. Baseline scores on the HSRT and CCTDI were obtained in for participants of both the control and experimental group prior to participating in a simulation and simulation debriefing session. The HSRT and CCTDI tests was re-administered to all participants following completion of two simulation and simulation debriefing sessions over a period of 3 month respectively. CCTDI pre-test for the experimental (N=50, M=290.16, SD 28.43); CCTDI post-test (N= 50, M= 285.22, SD 28.529). Control group CCTDI pre-test (N=43, M= 304.28, SD = 34.273); CCTDI post-test (N= 43, M = 294.00, SD = 36.436). The participant’s CCTDI overall scores F (1, 91) = 1.053, p = .308 which does not indicate a significant difference in pre and post scores between the control and experimental group. The overall HSRT scores were F (1, 91) = 3.397, p = .06. The
HSRT pre-test for the experimental group (N= 50, M = 19.42, SD 4.531); HSRT post-test (N= 50, M = 17.20, SD = 4.836). Control group HSRT pre-test scores (N= 43, M = 20.23, SD = 3.3228); post-test scores (N= 43, M= 16.33, SD = 4.576) results are listed below (Tables 8 & 9).  Greenhouse- Geisser interaction within-subjects effect for HSRT pre and post p = .069  Results of this interaction effect indicate that the tests given did not reveal a significant difference in mean scores between the control and experimental group. These results suggest that there was no significant impact on participant development of clinical reasoning and clinical judgment skills (Tables 10 & 11).

Table 8: Comparison of CCTDI and HSRT Means

<table>
<thead>
<tr>
<th></th>
<th>CCTDI</th>
<th>HSRT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>50</td>
<td>290.16</td>
</tr>
<tr>
<td>Control</td>
<td>43</td>
<td>304.28</td>
</tr>
</tbody>
</table>

Table 9: Comparison of Pre and Post Means for CCTDI and HSRT

<table>
<thead>
<tr>
<th></th>
<th>CCTDI</th>
<th>HSRT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>50</td>
<td>290.16</td>
</tr>
<tr>
<td>Post-test</td>
<td>50</td>
<td>285.22</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>43</td>
<td>304.28</td>
</tr>
<tr>
<td>Post-test</td>
<td>43</td>
<td>294.00</td>
</tr>
</tbody>
</table>
Table 10: HSRT time interaction result

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>433.93</td>
<td>1</td>
<td>433.93</td>
<td>44.82</td>
<td>.000</td>
<td>.33</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>433.93</td>
<td>1.00</td>
<td>433.93</td>
<td>44.82</td>
<td>.000</td>
<td>.33</td>
</tr>
<tr>
<td>Time* Group type</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
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<td>1</td>
<td>32.90</td>
<td>3.40</td>
<td>.07</td>
<td>.04</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>32.90</td>
<td>1.00</td>
<td>32.90</td>
<td>3.40</td>
<td>.07</td>
<td>.04</td>
</tr>
<tr>
<td>Error (time)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>881.10</td>
<td>91</td>
<td>9.68</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>881.10</td>
<td>91.00</td>
<td>9.68</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

*indicated time interacting with group type

Table 11: CCTDI time interaction result

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>2677.33</td>
<td>1</td>
<td>2677.3</td>
<td>8.55</td>
<td>.000</td>
<td>.09</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>2677.33</td>
<td>1.00</td>
<td>2677.3</td>
<td>8.55</td>
<td>.000</td>
<td>.09</td>
</tr>
<tr>
<td>Time* Group type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>329.50</td>
<td>1</td>
<td>329.50</td>
<td>1.05</td>
<td>.31</td>
<td>.01</td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>329.50</td>
<td>1.00</td>
<td>329.50</td>
<td>1.05</td>
<td>.31</td>
<td>.01</td>
</tr>
<tr>
<td>Error (time)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphericity Assumed</td>
<td>28487.74</td>
<td>91</td>
<td>313.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenhouse-Geisser</td>
<td>28487.74</td>
<td>91.00</td>
<td>313.05</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*indicated time interacting with group type
To further analyze the data, the five subcategories (induction, deduction, analysis, inference, and evaluation) for the HSRT© test were examined to determine if any significant changes occurred. The subcategories for the CCTDI© include: Truth-seeking, Open-mindedness, Inquisitiveness, Analyticity, Systematicity, Confidence in Reasoning, and Maturity of Judgment. Analysis of these results including potential extraneous factors will be discussed in the next chapter.

**Research Question Two**

Do the scores of students in the control group differ significantly on the Health Sciences Reasoning Test© (HSRT) when compared to the experimental group?

The second question in this study was analyzed by completing a RM-ANOVA to assess the difference between the difference in pre-test and post-test scores on the HSRT© test. A baseline score on the HSRT© test was obtained in for participants of both the control and experimental group prior to participating in a simulation and simulation debriefing session. All participants completed two simulation and simulation debriefing sessions over a period of three months. The HSRT© was re-administered to all participants 6 weeks following completion of two simulation and simulation debriefing sessions.

The HSRT© was used to measure a change in clinical reasoning by baccalaureate nursing students who participated in this study. It was administered to 93 participants prior to the simulation debriefing studies and subsequently to 81 participants upon completion of the simulation debriefing experiences. The data was imputed to account for the 12 participants lost through attrition. Of the 12 students lost through attrition five participants were no longer students in the program and seven students were absent during testing and expressed no interest in remaining within the study. The overall score
on the HSRT results indicate $F(1, 91) = 3.40$, $p = .07$. Pre-test data for the total sample ($N=93, M=19.8, SD = .413$) provided a baseline for participants of both control and experimental group. The post-test data for the total sample ($N=93, M=16.80, SD = .49$) depicted the overall score HSRT© for both groups after completing the simulation and simulation debriefing experiences. The HSRT© pre-test mean score for the experimental group was ($N= 50, M = 19.42, SD 4.53$); and the HSRT© post-test mean score was ($N= 50, M = 17.20, SD = 4.836$). Control group HSRT© pre-test mean score was ($N= 43, M = 20.23, SD = 3.32$); and the post-test mean score was ($N= 43, M= 16.33, SD = 4.58$). Greenhouse-Geisser interaction within-subjects effect for HSRT© pre and post $p = .07$. This data reflects a slight decrease in mean score for both groups which was not a desired effect. These results suggest that there was no significant impact of the simulations and debriefings on participant clinical reasoning and clinical judgment skills. Further analysis of these results including potential extraneous factors will be discussed in the next chapter.

The overall scores by both groups on the HSRT tool were used as the basis for the comparison of the group’s performance. To further assess the results the HSRT tool subcategory scores were examined. The HSRT tool subcategories include: induction, deduction, analysis, inference, and evaluation. The mean scores for each of these categories reflected a corresponding decrease in mean (Tables 12 & 13). Although the decrease in score overall and within the subcategories is somewhat inexplicable considering the students completed an entire semester of didactic and clinical experience in addition to the simulation experience, it is interesting to note that the decrease in scores was less in the experimental group then the control group. The decrease in score may be
related to the timing of the post-testing as it was greater than one month following the simulation experiences and was scheduled during the first week of the new semester, following an extended holiday break.

Table 12: Complete HSRT Category Results for Combined Control and Experimental

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Induction</th>
<th>Deduction</th>
<th>Analysis</th>
<th>Inference</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>19.8</td>
<td>6.8</td>
<td>5.8</td>
<td>3.8</td>
<td>4.1</td>
<td>4.2</td>
</tr>
<tr>
<td>Post-test</td>
<td>16.8</td>
<td>5.8</td>
<td>4.8</td>
<td>3.2</td>
<td>3.1</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Table 13: Complete HSRT Category Results for Control

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Induction</th>
<th>Deduction</th>
<th>Analysis</th>
<th>Inference</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Pretest</td>
<td>20.23</td>
<td>7.09</td>
<td>5.88</td>
<td>3.63</td>
<td>4.30</td>
<td>4.35</td>
</tr>
<tr>
<td>Control Post-test</td>
<td>16.83</td>
<td>5.79</td>
<td>4.56</td>
<td>3.09</td>
<td>3.09</td>
<td>3.47</td>
</tr>
<tr>
<td>Difference</td>
<td>(3.4)</td>
<td>(1.3)</td>
<td>(1.32)</td>
<td>(0.54)</td>
<td>(1.21)</td>
<td>(0.88)</td>
</tr>
<tr>
<td>Experimental Pretest</td>
<td>19.42</td>
<td>6.56</td>
<td>5.66</td>
<td>3.86</td>
<td>3.94</td>
<td>4.12</td>
</tr>
<tr>
<td>Experimental Post-test</td>
<td>17.20</td>
<td>5.86</td>
<td>5.06</td>
<td>3.34</td>
<td>3.20</td>
<td>3.66</td>
</tr>
<tr>
<td>Difference</td>
<td>(2.22)</td>
<td>(0.7)</td>
<td>(0.6)</td>
<td>(0.52)</td>
<td>(0.74)</td>
<td>(0.46)</td>
</tr>
</tbody>
</table>

**Research Question Three**

Do the scores of students in the control group differ significantly on the California Critical Thinking Disposition Inventory (CCTDI) when compared to the experimental group?

The third question in this study was analyzed by completing a RM-ANOVA to assess the amount of difference between the difference in pre and post scores on the CCTDI test. A baseline score on the CCTDI test was obtained in both the control and experimental
group prior to participating in a simulation and simulation debriefing session. The CCTDI was re-administered to all participants 4 weeks following completion of two simulation and simulation debriefing sessions.

The CCTDI assesses the degree to which respondents agree or disagree with statements expressing familiar opinions, beliefs, values, expectations, and perceptions as they relate to the reflective formation of reasoned judgments. The CCTDI measures seven factors that influence an individual’s capacity to learn and effectively apply critical thinking skills (Insight assessments, 2012).

The overall score on the CCTDI results indicate $F(1, 91) = 1.05, p = .31$. The pre-test data for the total sample ($N=93, M=296.98, SD = 31.89$) provides a baseline for participants of both control and experimental group. The post-test data for the total sample ($N=85, M=289.28, SD = 32.54$) depicts the overall score for both groups after completing the simulation and simulation debriefing experiences. The CCTDI pre-tests scores for the experimental group ($N=50, M=290.16, SD = 28.43$) and CCTDI post-test for the experimental group ($N=50, M=285.22, SD = 28.53$) reflected a decrease in mean. The Control group CCTDI pre-test scores ($N=43, M=304.28, SD = 34.27$) and CCTDI post-test ($N=43, M=294.00, SD = 36.44$) reflected a decrease in mean score. Greenhouse-Geisser interaction within-subjects effect for CCTDI pre and post revealed $p = .31$ which does not indicate a significant difference in pre and post scores between the control and experimental group. Although the decrease in pre test and post-test scores is somewhat inexplicable due to all participants completing didactic and clinical instruction for an entire nursing course in addition to the simulation experiences, it could be related to
scheduling for post scores. The post-test exam was scheduled 4 weeks following the final simulation experience and one week prior to final exams.

Further analysis of the data considered participant performance in the CCTDI subcategories reflected in mean scores (table 14 & 15) truth-seeking, open-mindedness, inquisitiveness, analyticity, systematicity, confidence in reasoning, and maturity of judgment.

Table 14: Subcategories of CCTDI Total Sample

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Truth-seeking</th>
<th>Open-mindedness</th>
<th>Inquisitiveness</th>
<th>Analyticity</th>
<th>Systematicity</th>
<th>Confidence in reasoning</th>
<th>Maturity of judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>296.69</td>
<td>36.73</td>
<td>43.48</td>
<td>45.89</td>
<td>42.87</td>
<td>40.16</td>
<td>42.66</td>
<td>45.04</td>
</tr>
<tr>
<td>Post-test</td>
<td>289.28</td>
<td>38.16</td>
<td>41.66</td>
<td>43.69</td>
<td>41.59</td>
<td>39.27</td>
<td>41.16</td>
<td>43.96</td>
</tr>
</tbody>
</table>

Table 15: Subcategories of CCTDI for Experimental and Control Groups

<table>
<thead>
<tr>
<th></th>
<th>Truth-seeking</th>
<th>Open-mindedness</th>
<th>Inquisitiveness</th>
<th>Analyticity</th>
<th>Systematicity</th>
<th>Confidence in reasoning</th>
<th>Maturity of judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>290.16</td>
<td>36.38</td>
<td>42.68</td>
<td>44.56</td>
<td>42.28</td>
<td>38.64</td>
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<td>41.50</td>
<td>43.12</td>
<td>41.32</td>
<td>38.28</td>
<td>40.24</td>
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<td>Difference</td>
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<td>1.22</td>
<td>(1.18)</td>
<td>(1.44)</td>
<td>(0.96)</td>
<td>(0.36)</td>
<td>(1.36)</td>
</tr>
<tr>
<td>Pretest</td>
<td>304.28</td>
<td>37.14</td>
<td>44.42</td>
<td>47.44</td>
<td>43.56</td>
<td>41.93</td>
<td>43.88</td>
</tr>
<tr>
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<td>294.00</td>
<td>38.81</td>
<td>41.84</td>
<td>44.35</td>
<td>41.91</td>
<td>40.42</td>
<td>42.23</td>
</tr>
<tr>
<td>Difference</td>
<td>(10.28)</td>
<td>1.67</td>
<td>(2.58)</td>
<td>(3.09)</td>
<td>(1.65)</td>
<td>(1.51)</td>
<td>(1.65)</td>
</tr>
</tbody>
</table>
The RM-ANOVA results did not reveal a statistically significant difference. The interaction effect between the control and experimental group on the CCTDI overall score with a p value of .308. Additionally, there was not statistical significance in the subcategories of the CCTDI test results. However, it was interesting to note that the decrease in scores was less in all categories except truth seeking for the experimental group as compared to the control group. In the truth-seeking category the mean score increased for both groups. Further analysis of these results including potential extraneous factors will be discussed in the next chapter.

**Research Question Four**

What impact does the use of the DML method have on the perceived quality of the simulation and debriefing experience as described by pre-licensure RN students?

The forth question was assessed through posing open-ended questions to participants from the experimental group. Responses were subsequently analyzing according to themes of responses. Initially, participant responses to the four open-ended questions were grouped into general themes for interpretation. Next, the responses were further analyzed to identify a more condensed list of major themes. Finally, a quantitative analysis was completed based on the percentage of frequency of themes identified from the responses obtained.

After completion of the quantitative post-tests open-ended questions were posed to the experimental group to access their perception of the quality of the DML method utilized. The majority of participants responded favorably to the DML method for debriefing. Major themes identified include: the methodology facilitated organization; aided in connecting concepts; helped to identify what was done right and what could be
done better; facilitated in applying class to clinical setting; facilitated development of critical thinking; facilitated reflective thinking; connected class to clinical; improved understanding of clinical signs and symptoms/treatments; improved confidence; facilitated decision-making; entailed a favorable length of debriefing session; allowed reflection on group and individual performance; facilitated improvement in thought processes and general knowledge; and provided preparation for future simulations and/or clinical experiences. Participant responses interpreted as negative included the following major themes: Liked discussion better than filing out worksheet; didn’t learn anything new; not satisfied with length either too long or too short; allowed reflection on group performance but not individual performance; conversely, allowed reflection on individual performance but not group performance; promoted reflection when participating directly in simulation scenario but not when observing; and focused on discussion rather than reflection. More detailed theme categorization is provided in table 16.

Table 16: General themes of students’ perceived quality of DML method

<table>
<thead>
<tr>
<th>Question 1: Did you feel the worksheet was helpful during the DML debriefing session? Explain:</th>
<th>Question 2: Do you believe you gained knowledge during the simulation debriefing session that will be useful when you encounter a patient with the same or similar clinical situation depicted in the simulation? Explain:</th>
</tr>
</thead>
<tbody>
<tr>
<td>77% Positive themed</td>
<td>96% Positive themed</td>
</tr>
<tr>
<td>Organized for better understanding</td>
<td>Connected concepts for to apply to future/gained knowledge</td>
</tr>
<tr>
<td>Connected concepts/see big picture/comprehensive/put in perspective</td>
<td>Gained knowledge re: electrolytes/labs/clinical signs &amp; symptoms</td>
</tr>
<tr>
<td>Why actions right or wrong</td>
<td>Identify what was done right and wrong</td>
</tr>
<tr>
<td>Aided critically thinking/clinical reasoning through situation</td>
<td>Connected class to practice</td>
</tr>
<tr>
<td>Facilitated reflection/analysis of what could have been done differently</td>
<td>Improved recollection of material learned/hands-on practice</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Helped identify errors/mistakes</td>
<td>Improved critical thinking/ “thinking outside the box”</td>
</tr>
<tr>
<td>Good resource tool for future simulations</td>
<td>Allowed to practice response to emergency situations/ how to systematically approach emergencies</td>
</tr>
<tr>
<td>Identified what actions to do differently/ what actions to change</td>
<td>Explored “what ifs”</td>
</tr>
<tr>
<td>Identified strengths &amp; weaknesses</td>
<td>Reinforced complications/signs &amp; symptoms to look for</td>
</tr>
<tr>
<td>Helped identify results/outcomes of actions</td>
<td>Identified priorities</td>
</tr>
<tr>
<td>Connected class to lab</td>
<td>Improved confidence</td>
</tr>
<tr>
<td>Clarified misunderstandings</td>
<td>Talked through decision-making process thinking out loud</td>
</tr>
<tr>
<td>Facilitated identification of priorities</td>
<td>Facilitated “thinking on the spot”</td>
</tr>
<tr>
<td>Provided reassurance of what we knew</td>
<td>Improved understanding of treatments and side effects</td>
</tr>
<tr>
<td><strong>23% Negative themed</strong></td>
<td>Felt realistic</td>
</tr>
<tr>
<td>Discussion better than using worksheet</td>
<td>Provided thorough review of everyone’s role during simulation</td>
</tr>
<tr>
<td>Didn’t use worksheet</td>
<td>Organized how to provide care</td>
</tr>
<tr>
<td>Only liked concept map section</td>
<td>Identified what was missed</td>
</tr>
<tr>
<td>Used as a guide but didn’t like writing</td>
<td>Understand what and whys</td>
</tr>
<tr>
<td>Confused about what information to put is each section</td>
<td><strong>4% Non-committal themed</strong></td>
</tr>
<tr>
<td>I didn’t learn anything new</td>
<td>Didn’t learn new info just connected everything together</td>
</tr>
<tr>
<td></td>
<td>Just a reminder of what was already learned</td>
</tr>
</tbody>
</table>

74
<table>
<thead>
<tr>
<th>Question 3: Did you feel the debriefing session allotted enough time to thoroughly discuss the simulation experience? Explain:</th>
<th>Question 4: Did you use reflective thinking (meaning, did you consciously self-evaluate your performance) during the simulation(s) and simulation debriefing session(s)? Explain:</th>
</tr>
</thead>
<tbody>
<tr>
<td>94% Positive themed</td>
<td>96% Positive themed</td>
</tr>
<tr>
<td>Covered everything in time allotted/ Thorough review</td>
<td>Reflected on what was right &amp; wrong/could do better/ strengths &amp; weakness</td>
</tr>
<tr>
<td>After awhile became repetitious</td>
<td>Reflected on group and individual performance</td>
</tr>
<tr>
<td>Wasn’t rushed/ wasn’t too long</td>
<td>Reflected on my thought processes and my general knowledge</td>
</tr>
<tr>
<td>Not too long/succinct</td>
<td>Reflection helped prepare for future simulations</td>
</tr>
<tr>
<td>More than enough time/didn’t need more time</td>
<td>Reflected on interventions</td>
</tr>
<tr>
<td>A bit lengthy but worth it</td>
<td>Worksheet facilitated reflection</td>
</tr>
<tr>
<td>Plenty of time to discuss strengths and weaknesses</td>
<td>Recognized need for improvement based on reflection</td>
</tr>
<tr>
<td>Able to discuss key points</td>
<td>I was consciously aware of performance during performance</td>
</tr>
<tr>
<td>Walked out with complete understanding of scenario</td>
<td>I was nervous and wanted to “take things back”</td>
</tr>
<tr>
<td>Our group finished early</td>
<td>Reflection helped to critique performance</td>
</tr>
<tr>
<td>Covered a “good amount in time allotted”</td>
<td>“Reflection is what debriefing is all about”</td>
</tr>
<tr>
<td>Time allowed to discuss areas for improvement</td>
<td>Improved awareness of “better decisions” in the clinical setting.</td>
</tr>
<tr>
<td><strong>Negative themed 3 out of 47 (4%)</strong></td>
<td><strong>Negative themed 3 out of 47 (4%)</strong></td>
</tr>
<tr>
<td>We were rushed at the end</td>
<td>Helped to hear other peoples’ evaluations</td>
</tr>
<tr>
<td>There is never enough time to cover everything</td>
<td></td>
</tr>
</tbody>
</table>
We went over the time allotted
Reflection used when actually participating in the simulation but not when observing
Focused on discussion rather than reflection
It was a group effort not for personal reflection

In conclusion, the qualitative responses evoked from the participants indicated participants perceived the DML sessions to improve the quality of the simulation and simulation debriefing experience. Participant’s responses indicated that the DML method improved their organization of thoughts, provided a framework to analyze events, promoted reflective thinking, and facilitated clinical reasoning and judgment skills.

The next chapter will summarize and discuss the finding in the context of the use of a structured debriefing strategy to impact student development of clinical reasoning and clinical judgment skills.
V. Chapter 5: Summary, Discussion, and Conclusions

This chapter consists of a summary of this study, a discussion of the findings, an overview of the limitations, as well as, implications for nursing education and recommendations for future research. The intent of this chapter is to further explain the findings, relate them to prior research findings about simulation debriefing, and suggest future research needs within the context of nursing education.

Summary

The purpose of this study was to describe the process providing a faculty-guided structured simulation debriefing session grounded in Kolb’s Experiential Theory and Gibb’s reflective cycle as a means to influence student development of clinical reasoning and clinical judgment skills. The goal of the study was to test the effect of a structured debriefing process on student development of clinical reasoning and clinical judgment goals resultant of student performance on the HSRT and CCTDI pre-post exams. Additionally, the goal was to examine the participant’s perceived benefit and effectiveness of the DML method as reflected in participant responses to posed qualitative type questions.

Debriefing following simulation has been identified as an essential element to facilitate the development of thinking skills of participants, however, little research is available to support or refute this claim within the fields of nursing and nursing education. Although there is an increasing body of evidence-based practice literature on debriefing, there is further need to describe the most effective method for which to provide a debriefing session.
The DML method utilized for debriefing participants of this study was developed by Dreifuerst (2010) to support the development of critical thinking, clinical reasoning and clinical judgment skills of student, graduate and practicing nurses. The DML method recognizes the importance of framing a clinical situation in consideration of an individual’s knowledge base and past experience and relating this information to identification of a pending clinical situation. In addition, this methodology incorporates reflective thought and concept mapping to analyze events within an unfolding simulated clinical situation. Finally, the DML method focuses on thinking-in action, on-action and beyond-action to facilitate participant development of cognitive and metacognitive skills to be applied to future clinical encounters.

Dreifuerst’s DML model (figure 1) illustrates elements of simulation learning which includes, “clinical context and client story; nursing process; knowledge, skills, and attitudes; thinking-in-action, thinking-on-action, and thinking-beyond-action; and facilitated debriefing to enhance clinical reasoning in students nurses through meaningful learning” (Dreifuerst, 2010, p. 130). Dreifuerst described the DML model being derived from a constructivism perspective grounded in Gibb’s Reflective Cycle (Gibbs et al., 1988) framework, Fink’s significant learning (2003), and Bybee et al.’s E-5 Framework (Bybee et al., 1989). In addition to the influencing elements discussed by Dreifuerst in the development of the DML method, the model reflects elements of Kolb’s Experiential learning Theory (1984), specifically the fact that the methodology concepts of active learning with the learner being the focus of the experience rather than the instructor/facilitator. Kolb’s model acknowledges how an individual’s experience may impact how a person thinks and forms knowledge. Finally, Kolb’s theory recognizes the
importance of providing structure to enhance the development of metacognitive skills to enhance the learning process (Kolb, 1984).
Figure 1 DML Model (Dreifuerst, 2010)
This study examines four questions, the first research question inquired about the impact that the DML method of debriefing had on participant development of clinical reasoning and clinical judgment skills. Research question one posed, what impact does the use of Debriefing for Meaningful learning© (DML) following simulation have on the development of clinical reasoning and clinical judgment skills of pre-licensure RN students? The outcome for this research question was measured by the results of both the HSRT and CCTDI tests, as well as, the follow-up open-ended questions. Data resulting from the pre-post-test results from the HSRT and CCTDI tests did not provide a statistically significant relationship between the utilization of the DML model for debriefing. Overall scores on the HSRT and CCTDI declined for both control and experimental groups in the post-test phase of the study. However, it is notable that the decrease in overall mean scores, as well as, subcategories within both the HSRT and CCTDI decreased less for the experimental group than the control group. This lesser decrease in mean score for the experimental group would suggest better clinical reasoning skills of this group’s members than those of the control group who did not have exposure to the DML method. Notably, one category on the CCTDI test, truth-seeking category, reflected an increased in both groups’ post-test scores. Responses from the open-ended questions were not congruent with the results on the HSRT and CCTDI tests. Although the responses to the open-ended questions indicated a positive response, specifically a perceived benefit of the DML method, the results of the HSRT and CCTDI tests did not result in statistically significant results. Specific responses will be discussed further when examining the forth research question.
Also, it was notable that seven participant’s scores on the HSRT dropped drastically (by 50% or more) from the pre to post-test scores. If these scores were imputed with the average score as was done with the attrition scores, the overall scores would have revealed experimental group mean score of 19.42 pretest to 18.08 post intervention; control group mean overall score of 20.23 pretest to 16.93 post intervention. Also, the difference between the pre and post intervention score comparison between the control and experimental group would have resulted in a p value would have been \( p = .017 \) which would have been statistically significant. However, if the outliers pre and post interventions scores had been dropped from the sample the overall scores would have revealed the experimental group mean of 19.89 pretest to 18.17 post intervention; the control group overall mean score would have been 20.05 pretest to 16.92 post intervention. Also, the p value comparing the comparison in pre and post intervention score differences between the groups would have resulted in a p value of .089 which would not have been interpreted as a statistically significant difference. When further analyzing the scores identified as outliers for the HSRT exam, it was noted that the raw scores for six of the seven participants decreased on the CCTDI pre and post intervention exam. Only one of the seven participants identified scored higher on the post intervention exam for the CCTDI in comparison to their pre score. The student who’s scored higher on the post intervention CCTDI exam was from the experimental group. The significant change in the nursing program’s curriculum which occurred during the study may have distracted some participants, thus, resulting in a decrease in performance on the post-tests.
The second research question examined whether the pre-post-test means improved more significantly on the HSRT for those students exposed to the DML method as opposed to tradition debriefing. Research question two, do the scores of students in the control group differ significantly on the Health Sciences Reasoning Test (HSRT) when compared to the experimental group? The outcome was measured by the results of overall HSRT pre-test, post-test comparison of means. This question was further explored by examining the subcategories of the HSRT: Induction, deduction, analysis, inference and evaluation. No statistically significant differences in means were noted between the control and experimental group were found within the subcategories, rather the scores decreased in both groups in the post-test results. However, the decrease in scores within the two groups was less in the experimental group than the control group.

The third research question examined whether the pre-post-test mean scores on the CCTDI improved more significantly for those students exposed to the DML method as opposed to tradition debriefing. Research question three, do the scores of students in the control group differ significantly on the California Critical Thinking Disposition Inventory (CCTDI) when compared to the experimental group? The outcome was measured by the results of overall CCTDI pre-test, post-test comparison of means. In addition, this question was further explored by examining the subcategories of the CCTDI test: Truth-seeking, Open-mindedness, Inquisitiveness, Analyticity, Systematicity, Confidence in Reasoning, and Maturity of Judgment. No statistically significant difference between pre and post-test scores on the CCTDI test’s subcategories was noted. Although the post score for both groups decreased, the decrease in mean scores was more notable in the control group. Additionally, the truth-seeking score for
both groups increased but this change was not statistically significant. The truth-seeking pre-score for the experimental group of 36.38 increased to 37.60 which was a difference of 1.22, whereas, the truth-seeking pre-score for the control group of 37.14 increased to a post-score of 38.81 which was a difference of 1.67. The truth-seeking result was not statistically significant but interesting to note as the only category for which the score increased.

The fourth and final question investigated whether the pre-licensure RN students perceived an increase in the quality of the simulation debriefing experience when using the DML method. Research question four, what impact does the use of the DML method have on the perceived quality of the simulation and debriefing experience as described by pre-licensure RN students? A quantitative analysis of the open-ended questions revealed that the majority of participants from the experimental group perceived the DML method and accompanying worksheet to provide structure, assistance with organizing thoughts, and a mechanism for self and group reflection related to the unfolding events that occurred during the simulation sessions.

Furthermore, recurring themes noted from participants’ responses indicated that participants perceived utilization of the DML method improved their organization of thoughts, provided a framework to analyze events, promoted reflective thinking, and facilitated clinical reasoning and judgment skills.

**Discussion**

The goal of nursing education is to offer teaching strategies which will best prepare a graduate to function as a competent practitioner. The use of simulation technologies has become a widely accepted innovative teaching strategy which promotes
active participation and provides experience in applying practical skills, as well as,
developing cognitive skills. Simulation provides the opportunity for student to function
more independently in a clinical setting than they can in a traditional clinical setting as
there is no risk of harm to patients for any errors that may occur. Within the literature
debriefing has been identified as the key element to the simulation experience to identify
the teachable moments which occurred during the simulation scenario. The intent of this
study was to provide an evidence-based link for the type of debriefing session utilized to
best promote the development of clinical reasoning and clinical judgment skills. In
addition, the intent of the study was to study the potential outcomes of student clinical
reasoning skills as a result of using the DML method for debriefing following simulation.
Although, the statistical evidence of the pre-test, post-test results on the HSRT and
CCTDI tool did not provide significant results, the qualitative responses obtained by the
follow-up questions did not agree with the quantitative findings measured by the HSRT
and CCTDI. The qualitative responses from the participants reflected a perceived
appreciation regarding the quality of the debriefing experience when using the DML
method.

The final research question was assessed by posing four open-ended questions to
further investigate the benefit of the DML method. Based on the responses provided by
the participants the DML worksheet was found to be beneficial by the majority of the
participants. Further, participants referred to the benefits the worksheet offered by
providing organization for thinking, connecting concepts, identifying correct actions and
areas for improvement. Also, the participants stated that the worksheet promoted
reflective thinking. The only negative comments related to student feeling some
confusion as to the best area for which to document information. A majority of students stated that the debriefing session facilitated recognition of knowledge. Additionally, students indicated that the DML sessions identified knowledge that could be applied to future clinical situations. The majority of students indicated the length of the debriefing session was appropriate with only two students claiming the length was either too long or too short. Most of the students indicated that the DML method, as well as, the DML worksheet promoted reflective thinking and critiquing of the simulation experience. Only one student commented that they felt they did not reflect as much if they observed the simulation scenario rather than actively participated as an actor in the simulation scenario. Only one student commented that the debriefing focused too much on the group actions rather than individual actions while another student commented the session focused on the individual more than the group. The positive comments offered by the participants did not match the lack of statistically significant results of the quantitative data but did clearly indicate a perceived value of the DML method.

Implications for Nursing

Nursing education has long been challenged to develop effective instructional methodologies to promote critical thinking, clinical reasoning and clinical judgment skills. Key to accomplishing these tasks is identifying the metacognitive processes necessary to support such skills. The DML method, grounded in narrative pedagogy and a constructionist framework supports the building of knowledge. Additionally, relating Kolb’s Experiential Theory (1984) to the DML method provides the necessary emphasis on active, learner focused learning. Also, Kolb’s theory outlines the need to provide structure to enhance the development of metacognitive skills. By aiding students in
understanding when and how they are learning, students will be better prepared to make complex decisions. In addition, relating the DML method to Gibb’s Reflective Cycle provides the theoretical support to appreciate the importance of reflective thinking. Reflective thinking is needed to properly analyze cognitive skills and actions taken within the decision-making process. The ability to reflect in-action, on-action, and beyond action can promote the development of a competent practitioner.

**Limitations**

Several limitations were identified within this study. The first challenge discovered was the relative lack of available, valid instruments to examine clinical thinking and clinical reasoning skills. The HSRT utilized in this study was developed to assess healthcare professionals reasoning skills; however, it is not specific to the field of nursing. Thus the instrument may not adequately measure the thought processes required of a nurse in a clinical situation. Historically, the HSRT tool development was based in assessing critical thinking (Facione & Facione). Though critical thinking capacity is an element of clinical reasoning and clinical judgment it is not specific for the complexity of thought required to think-like-a-nurse. Another limitation of the HSRT tool is the fact that it is a propriety tool which requires a charge for usage. This fee can become costly, dependent on the number of participants in a study which may prohibit utilization in some studies.

Similar to the limitations of the HSRT tool, the CCTDI is also a proprietary tool which requires a fee for usage. The CCTDI measures seven factors that influence an individual’s capacity to learn and effectively apply critical thinking skills. Specifically, the CCTDI assesses the degree to which respondents agree or disagree with statements.
expressing familiar opinions, beliefs, values, expectations, and perceptions as they relate to the reflective formation of reasoned judgments (Insight assessments, 2012).

Selection of the sample was another limitation of the study. All available students within the junior level of the school of nursing program were invited to participate in the study, however, were not completely randomized to the control or experimental group. Rather, students were assigned to the control or experimental group based upon placement associated with their clinical groups.

Another limitation to the study was the need to adjust the study at a midpoint time period. The original intent was to offer three simulation and simulation debriefing sessions prior to retesting the students with the HSRT and CCTDI tools. However, the host school made a decision to make a significant change in the curriculum which prohibited a third simulation session within a reasonable amount of time. Thus, a decision was made to test the students after only two sessions. In addition to losing the third simulation experience, the retesting of the students required re-testing of the students around the time of the final exams for their course. The stress of the final exams may have impacted the student’s interest in engaging in an optimal performance on the HSRT and CCTDI tools. This may account for the apparent perceived benefit of the DML method not agreeing with the lack of statistical significance of the quantitative findings.

Another limitation was the relative small size of the population (N = 93). This may account, at least in part, for the lack of statistical significance identified within the study. This limitation is in contrast to Dreifuerst’s study in which statistically significant
findings were found within a sample size of 238 participants. Notably, it is often difficult to find a large sample size within a pre-licensure school of nursing.

Finally, another limitation of the study was the fact that the researcher provided all DML sessions while an experience facilitator from the host facility conducted debriefing in the non-structured sessions. It is possible that the skill of the debriefing for both types of session could have impacted the results of the study. It would be beneficial to assess any change in outcomes if more than one facilitator conducted the DML sessions to assess the consistency of the outcomes of the process.

**Recommendation for future research**

The perceived improved quality of the DML method as reflected in the qualitative type questions contrasted the lack of statistical significance of the quantitative finding. Thus, further research to explore the quality and impact of the DML method is recommended. Additionally, inconsistent findings between this study and Dreifuerst’s (2010) study both of which investigated the impact of DML on student development of clinical reasoning and judgment skills as measured by HSRT scores warrants the need for further research. Although this study did not provide statistically significance results, the Dreifuerst (2010) study did report statistically significant results as measured by the HSRT tool. In addition, future research is needed to test the DML method in another school setting and/or possibly a multisite setting in order to add to the generalizability of the study. It would be interesting to examine the impact of the DML method during a period of time in which students are not exposed to didactic and/or clinical experiences simultaneously, i.e. a simulation only course. Future research is needed to test the impact of the DML method after a greater number of exposures rather than just one or two
sessions. Additionally, repeating this study, whether concurrently or sequentially, would allow for a larger sample size to be assessed which could improve statistical significance of results. Repeating this study utilizing one or more DML debriefers would add to the depth of the results as it would eliminate individual debriefing expertise as a confounding variable. Finally, the need to develop a measurement tool more specific to the field of nursing is needed.

Conclusion

The findings of this research study contribute to the body of knowledge for nursing related to simulation and simulation debriefing. The study attempted to recreate, in part, Dreifuerst’s study in 2010 in order to allow for a comparison of results. Although the quantitative piece of the study did not produce statistically significant results, the quantitative analysis of the qualitative-type follow-up questions clearly indicated that the participants perceived the DML method to be a quality debriefing process. These results warrant future investigation.
References


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Appendix A

Permission to use the Health Sciences Reasoning Test (HSRT) & California Critical Thinking Disposition Inventory (CCTDI)

Health Sciences Reasoning Test (HSRT) & California Critical Thinking Disposition Inventory (CCTDI)

The proprietor of the tool does not allow inclusion of a sample of the HSRT or CCTDI tools within a filed dissertation or IRB submission. However, the proprietor of the tools state that it is reasonable for the committee members to be able to review the items in any surveys that will be given to the study participants. Thus, two online previews of the test instrument(s) and a PDF copy of the Test Manual(s) are included with the purchase of an instrument preview pack.

Arrangements for authorized members of a review committee or IRB panel may use one of these previews to view the test in its entirety through our encrypted on-line e-testing system. A login/password will be provided for review purposes. If the IRB requires additional online previews, they can be purchased at the current research discount price. A charge will be assessed for the number of views of the instrument(s) used.

“Doctoral students should also tell these committees that they must approve the instrument in its totality, as there is no possibility of editing or deleting individual questions or test items. IRB Chairs and dissertation directors are invited to use the Contact Us Form or call 650-697-5628 if they wish to discuss this”

Appendix B

Permission to use the Debriefing for Meaningful Learning© (DML)

and accompanying worksheet

The DML worksheet is protected by copyright laws cannot be published within this appendix. The developer of the instrument, Dr. Kristine Dreifuerst, has given permission for usage of this instrument within this dissertation research. If interested in viewing the actual instrument, one may use the citation listed below:


http://hdl.handle.net/1805/2459
July 5, 2012

Ms. Robin Weaver MSN,
RN, CNE Director, School
of Nursing
Ohio Valley General Hospital, School of
Nursing 25 Heckel Road
McKees Rocks, PA 15136

Dear Ms. Weaver,

This letter acknowledges that I have given you permission to use Debriefing for Meaningful Learning© (DML) for your dissertation research. You have agreed to attend facilitator training sessions in this debriefing method and the use of the associated worksheets prior to implementing your study.

DML is a copyright product. You have my permission to use the method and the worksheets for debriefing for your research and with students in your school of nursing. You may not adapt or change the forms without sending me the change and getting written permission from me for any change prior to implementation.

Here is the original citation for DML:


Thank you for your interest in using DML for your own research. I wish you well in your doctoral studies!

Sincerely,

Kristina Thomas Dreifuerst PhD, RN, ACNS-BC, APNP, CNE
Assistant Professor

Department of Environments for Health
1111 Middle Drive,
NUW435 Indianapolis, IN
46202-5107
Telephone: 317-278-6064 Fax: 317-274-2411
Appendix C

Follow-up questions
Follow-up questions

1. Did you feel using the DML worksheet was beneficial during the debriefing session(s)? Explain.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. Do you believe you gained knowledge during the simulation debriefing session(s) that will be useful when you encounter a patient with the same or similar clinical situation depicted in the simulation? Explain.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. Did you feel the debriefing session(s) allotted enough time to thoroughly discuss the simulation experience? Discuss.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

4. Did you use reflective thinking (Meaning did you consciously self-evaluate your performance) during the simulation(s) and simulation debriefing session(s)? Explain.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
Appendix D

Consent
CONSENT TO PARTICIPATE IN A RESEARCH STUDY

TITLE: The Impact of Debriefing on Pre-licensure RN Student Development of Clinical Reasoning/Clinical Judgment Skills

INVESTIGATOR: Robin R. Weaver, MSN, RN, CNE
PhD Student, Duquesne University, Pittsburgh, PA
577 Scott Ridge Road
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Clinical Associate Professor
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Pittsburgh, PA 15282
(412) 396-5096

SOURCE OF SUPPORT: This study is being performed as partial fulfillment of the requirements for the doctoral degree in Nursing at Duquesne University.

PURPOSE: You are being asked to participate in a research project that seeks to investigate the impact debriefing methodologies, following simulation, have on the development of clinical reasoning and clinical judgment skills. You will be randomly assigned to a specific type of debriefing group, experimental or traditional, in order for the study to compare debriefing methodologies. Participants will be required to answer five basic demographic questions. Also, participants will be asked to complete two multiple choice-type examination which will take 50 minutes and 30 minutes respectively. Additionally, you may be asked 4 follow-up questions that should take less than 10 minutes. These are the only requests that will be made of you.
RISKS AND BENEFITS: Participation will have no impact on course grade or progression in the nursing program. There are no risks greater than those encountered in everyday life. Although there are no benefits to you for participating in this study, you will have the knowledge and satisfaction that the nursing education community may benefit from understanding of the effects of debriefing following simulation related to the development of clinical reasoning and clinical judgment skills of pre-licensure RN students.

COMPENSATION: There is no compensation offered to the participants of this study.

CONFIDENTIALITY: Your name will never appear on any survey or research instruments. No identity will be made in the data analysis. All written materials and consent forms will be stored in a locked file in the researcher's home. Your response(s) will only appear in statistical data summaries. All materials will be destroyed at the completion of the research.

RIGHT TO WITHDRAW: You are under no obligation to participate in this study. You are free to withdraw your consent to participate at any time. Additionally, regardless of whether you decide to participate or not participate, your decision will have no effect on your course grade or progression in the program.

SUMMARY OF RESULTS: A summary of the results of this research will be supplied to you, at no cost, upon request.

VOLUNTARY CONSENT: I have read the above statements and understand what is being requested of me. I also understand that my participation is voluntary and that I am free to withdraw my consent at any time, for any reason. On these terms, I certify that I am willing to participate in this research project.

I understand that should I have any further questions about my participation in this study, I may call Robin Weaver, Principle Investigator (724)368-4082, and Dr. Lynn Simko, Clinical Associate Professor (412) 396-5096, and Dr. Linda Goodfellow, Chair of the Duquesne University Institutional Review Board (412) 396-6548.

________________________  ___________________________  ___________________________
Participant's Signature                                           Date

________________________  ___________________________
Researcher's Signature                                             Date
Appendix E

Demographic Questions
Demographic Data

Please circle the appropriate answer the following questions:

<table>
<thead>
<tr>
<th>Age</th>
<th>Highest Level of Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 21</td>
<td>Some college credits</td>
</tr>
<tr>
<td>21-30</td>
<td>Vocational school</td>
</tr>
<tr>
<td>31-40</td>
<td>Associates Degree</td>
</tr>
<tr>
<td>41-50</td>
<td>Baccalaureate Degree</td>
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<tr>
<td>51-60</td>
<td>Master’s Degree</td>
</tr>
<tr>
<td>Over 60</td>
<td>Doctoral Degree</td>
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<table>
<thead>
<tr>
<th>Race</th>
<th>Marital Status</th>
</tr>
</thead>
<tbody>
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<td>Single</td>
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<tr>
<td>Asian</td>
<td>Married or Domestic</td>
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<td>Divorced</td>
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<tr>
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<td>Widowed</td>
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<td>Other</td>
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<table>
<thead>
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<th>Gender</th>
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<tbody>
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<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
</tr>
</tbody>
</table>

Is English your first language?  Yes  No

Were you ever previously enrolled in another RN nursing program before entering Duquesne University’s nursing program?  Yes  No