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USE OF VIDEO-ENHANCED DEBRIEFING IN CLINICAL NURSING SKILL
ACQUISITION: INDWELLING URINARY CATHETERIZATION AS AN EXEMPLAR

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Education
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ABSTRACT

Nursing students struggle to acquire and maintain clinical psychomotor skills. Hiring agencies bear the cost of retraining graduate nurses inept with skills learned early in their nursing curriculum. Improperly performed clinical skills pose a risk to patient safety, resulting in pain and suffering for the patient. This empirical study aimed to determine if video-enhanced debriefing (VED) improved initial skill validation scores, skill feedback, satisfaction with learning, and reduced skill decay among first-semester, pre-licensure BSN students performing female indwelling urinary catheterization (IUC) in a simulated clinical setting compared to no debriefing. Participants received standard instruction, then video-recorded their IUC skill. Participants randomized into the VED group individually participated in an advocacy/inquiry debriefing with the principal investigator while viewing their performance video. Both groups completed a summative IUC skill validation per standard course instruction and submitted their skill performance ratings. All participants completed a survey including their perceived IUC knowledge, amount of skill practice, learning satisfaction with VED, and an evaluation of their skill performance feedback. All participants re-recorded their IUC skill and received performances ratings with the same instruments again ten weeks after the initial skill validation. The analysis revealed that VED did not improve nursing skills, knowledge, practice, or perceptions of the learning experience compared to the video-only group. Nursing students in the VED condition did rate their skill performance feedback higher than those in the video-only group. Students improved performance in both conditions, showing that learning via video is an effective teaching strategy to enhance student's satisfaction with learning, to engage in repetitive practice with feedback, and to improve learning.

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LIST OF ABBREVIATIONS

BSN	Bachelor of Science in Nursing
CAUTI	Catheter acquired urinary tract infection
CG	Control group
DASH©	Debriefing Assessment for Simulation in Healthcare
DP	Deliberate practice
EG	Experimental group
INACSL	International Nursing Association for Clinical Simulation and Learning
IRB	Institutional Review Board
IRR	Inter-rater reliability
IUC	Indwelling urinary catheterization
KSA	Knowledge, skills, and attitude
OSATS	Objective Structured Assessment of Technical Skill
PI	Principal Investigator
RN	Registered Nurse
SLSS	Student Satisfaction of Learning Survey
T1	Initial skill validation testing
T2	Repeat time-delayed skill validation testing
VED	Video-enhanced debriefing

CHAPTER ONE: INTRODUCTION

Problem Statement

The U.S. Department of Health and Human Services set a target to decrease catheter-acquired urinary tract infections (CAUTI) by 25% by December 2020 (Office of Disease Prevention and Health Promotion, 2019). The *2014 National and State Healthcare-Associate Infections Interim Progress Report* noted this goal was not close to being met in this interim report (Centers for Disease Control and Prevention, 2016). CAUTI accounted for one-third of healthcare-acquired infections resulting in significant morbidity and mortality (Klevens et al., 2007). Improper indwelling urinary catheterization (IUC) insertion technique is one cause of CAUTI; therefore, only those competent in aseptic IUC insertion should perform the skill (Gould, Umscheid, Agarwal, Kuntz, & Pegues, 2009).

Nursing students learn this IUC clinical skill and demonstrate the safe performance of this skill in a laboratory setting, but they struggle to maintain the competency of the skill beyond their initial skill validation (Gonzalez & Sole, 2014; Missen, McKenna, & Beauchamp, 2016). Many nursing administrators find that graduates of nursing schools are not proficient with clinical nursing skills, such as aseptic IUC insertion, to enter the nursing profession (Bennett, 2017; Missen et al., 2016; Wolff, Regan, Pesut, & Black, 2010). The nurse's baseline goal is to ensure patient safety; implementing nursing skills without error is imperative for patient safety.

Students attending a large, southern state university enrolled in the pre-licensure Bachelor of Science in Nursing (BSN) programs learn basic clinical skills as a curricular requirement. *The Essentials of Baccalaureate Education for Professional Nursing Practice* (American Association of Colleges of Nursing, 2008) is the guiding document specifying the standards and criteria a

BSN curriculum must meet for accreditation through the Commission on Collegiate Nursing Education linked to the American Association of Colleges of Nursing. This document stipulates that a BSN curriculum must prepare the student to be a safe nurse generalist who can apply basic scientific principles common to all current and future clinical skills (American Association of Colleges of Nursing, 2008).

Students learn and correctly demonstrate basic clinical nursing skills in the first semester of nursing school, but many do not remember how to perform the complicated skill in subsequent semesters correctly (Gonzalez & Sole, 2014; Missen et al., 2016). Skill decay refers to the inability to maintain the competency of a trained skill over time of nonuse (Arthur, Bennett, Stanush, & McNelly, 1998). Skill decay is a problem in many healthcare curricula (Cecilio-Fernandes, Cnossen, Jaarsma, & Tio, 2018; Ericsson, 2015; Gonzalez & Kardong-Edgren, 2017; Jones et al., 2017). If curricular changes are not made to improve training in sterile technique, then skill decay will continue, placing patient's safety at risk as new nurses emerge into the field. Therefore, in this study, an intervention to reduce skill decay among nursing students performing a clinical skill was examined.

Conceptual Framework

Practice and feedback are essential for learning, especially for a clinical skill such as indwelling urinary catheter (IUC) insertion (Bosse et al., 2015; Ericsson, Krampe, & Tesch-Römer, 1993; Issenberg, McGaghie, Petrusa, Gordon, & Scalese, 2005; Lioce et al., 2015; Oermann, Muckler, & Morgan, 2016). Repeated practice of clinical skill is an essential teaching strategy to ensure long-term memory of the skill (Oermann et al., 2016). Deliberate practice (DP) is a theory that Ericsson et al. (1993) developed to explain the methods of improving skill performance for the expert performance of a specific task (Lopreiato et al., 2016). Ericsson et al.

(1993) differentiated expert performance from amateur/novice performance by the expert's ability to rapidly move "chunks" of information from short-term to long-term memory. An expert acquires the ability to anticipate and correct for potential challenges and changes to normal conditions which may arise during task completion (Ericsson et al., 1993). Essential aspects of DP are purposeful practice and expert feedback. Repetitive practice, continuously repeating the skill, alone does not lead to skill improvement; however, purposeful practice leads to skill improvement. Repetition of a task without constructive expert feedback does not improve accuracy and performance. Students require precise instructions about the task, expert feedback about errors, and a corrective action plan which includes deliberate practice to develop improved skill performance (Ericsson et al., 1993).

A second theory that explains how to reduce skill decay when teaching clinical skills is the inclusion of reflective practice through debriefing. The International Nursing Association for Clinical Simulation and Learning (INACSL) describes debriefing as the reflective part of the simulation pedagogy led by a trained instructor where the learner reflects upon their actions, assimilates the information, and cognitively reframes the information (INACSL Standards Committee, 2016a). Reflection allows the student to learn from their previous experiences, think about and reflect on those experiences based on a current situation, and then identify knowledge that will be helpful in future experiences (Husebø, O'Regan, & Nestel, 2015). Learning comes from the debriefing, as this is where the learner reflects on and modifies their mental model (Zigmont, Kappus, & Sudikoff, 2011).

Background

A clinical nursing skill, such as sterile technique, is a psychomotor skill requiring the nurse to use kinesthetic or physical movement "proficiently, smoothly, and consistently under

varying conditions and within appropriate time limits” (INACSL Standards Committee, 2016e, p. S44). Sterile technique is a procedure to eliminate the transmission of microorganisms from entering an aseptic area (without microorganisms). A person using a sterile technique follows basic principles to ensure microorganisms do not enter the area. Many clinical nursing skills, such as IUC insertion, require sterile technique (Potter, Perry, Stockert, & Hall, 2017a). The skill requires several critical steps:

- explaining the procedure and positioning the patient; preparation of drainage equipment
- preparation of the patient’s skin and mucous membranes
- opening a sterile pack which contains several pieces of sterile equipment, donning sterile gloves, manipulating lubricant and the catheter itself while maintaining sterility, inserting the catheter
- connecting it with the drainage system, all while maintaining sterile technique.

When students incorrectly perform the sterile technique, they place the patient’s safety at risk when performing this skill.

Nursing students learn and demonstrate this skill during their nursing curriculum in a simulated clinical environment. Often, clinical agencies such as hospitals do not allow student nurses to perform some clinical skills because of feared liability (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). Without being able to practice the skills in a simulated or actual clinical setting, students forget how to perform the clinical skill. This problem affects the students, as they must relearn the skill upon graduation when they enter the workforce as a Registered Nurse (RN) (Gonzalez & Sole, 2014). The graduate’s employer must bear the cost of retraining the new hire to ensure their competence. Ultimately, the patient receiving care is most

affected when a nurse is incompetent at implementing a clinical skill. Improperly performed clinical skills pose a risk to patient safety, which could result in pain and suffering for the patient.

A nursing student must acquire the knowledge, skill, and attitude (KSA) associated with the performance of each clinical skill. Faculty and advisors who participate in Quality and Safety Education for Nurses (QSEN) convey the minimum KSA competencies required of a nursing student before becoming an RN. These competencies are in areas of safety, evidence-based practice, patient-centered care, and quality improvement that is required of pre-licensure students (Cronenwett et al., 2007). A nursing curriculum must include KSA learning domains and minimum competencies.

In the lecture setting, instructors teach and assess the cognitive knowledge related to the clinical skills, including the rationale and use of the skills and theory behind each step in the procedure. Students learn, practice, and return-demonstrate the psychomotor skill in the simulated clinical lab. A long-term care facility (i.e., nursing home) is the clinical setting where this school's students apply the KSA competencies to the learned skill. INACSL Standards Committee (2016e) compares Bloom's Revised Taxonomy to the knowledge, skill, and attitude competencies required of nurses. Knowledge includes factual and conceptual information from the cognitive domain. Skill refers to procedural knowledge from the psychomotor domain. Attitude contains metacognitive knowledge from the affective domain (INACSL Standards Committee, 2016e).

A student has "learned" the skill once they can demonstrate the accurate performance of the skill consistently over time. A one-time performance may not demonstrate learning of the skill (Oermann et al., 2016). Formative and summative assessment of the skill is vital for providing student feedback and assessing their mastery learning of the skill (Ericsson, 2015;

Issenberg et al., 2005; McGaghie, Issenberg, Petrusa, & Scalese, 2010; Oermann et al., 2016).

Formative assessment or evaluation is the feedback the learner receives about their progress toward a goal to improve the task performance (INACSL Standards Committee, 2016e).

Summative assessment, or evaluation, is feedback the learner receives about their performance measured against predetermined criteria, often resulting in a grade (INACSL Standards Committee, 2016e).

Effective feedback guides the learner by providing them information about their performance. Feedback should ensure the safety of the student's psychological needs (Rudolph, Simon, Raemer, & Eppich, 2008). Archer (2010) describes several types and methods of feedback. Facilitative feedback allows the student to evaluate their performance to decide how to adjust their performance to improve task learning. The best feedback is face-to-face with a person trained in providing feedback. The learner must be willing to receive feedback, trust the person providing the feedback, and the feedback must meet the learner's goals to improve performance (Archer, 2010).

Debriefing is one method of providing feedback. Differing from feedback, debriefing occurs between two or more people guided by an instructor. Debriefing encourages a two-way discussion of performance exploring the reasoning of the learner's actions. This analysis of actions allows the learner to identify knowledge gaps and formulate a plan to improve their future practice (Cheng et al., 2014). Through the debriefing process, the learner improves their self-efficacy and self-awareness of professional best practices ensuring patient safety, allowing them to integrate KSA into practice (INACSL Standards Committee, 2016a).

Video-enhanced debriefing (VED) is the use of video as a component of the feedback to facilitate debriefing. Ali and Miller (2018), in an integrative review of the literature, found VED

for psychomotor skill acquisition improved learning outcomes. Brimble (2008) reported that students positively reacted to the use of video assessment for visual feedback, self-evaluation, and improved objectivity. Watts, Rush, and Wright (2009) noted the use of video assessment as a positive teaching innovation improving the student's ability to self-reflect and recognize areas to improve. Yoo, Son, Kim, and Park (2009) concluded the use of video assessment improved student's retention of the skill and improved student satisfaction with learning skills. Finally, in a blinded, randomized study, the use of VED was shown to improve skill acquisition. For these reasons, the use of VED may improve nursing student's ability to learn the KSA associated with IUC insertion resulting in longer retention of the information and a more satisfying learning experience.

Organizational Context

The nursing school in this study is one of Florida's 12 public universities and enrolled 66,000 students in 2017. Students admitted to the university score high on the SAT, with an average of 1300 for the fall 2017 freshman (CollegeSimply.com, 2019). The Commission on Collegiate Nursing Education (American Association of Colleges of Nursing, 2016) accredited the nursing program's Bachelor of Science in Nursing (BSN) program.

The Florida Board of Nursing approved the nursing school (Florida Board of Nursing, 2019). Graduates of the pre-licensure BSN program are eligible to take the National Council Licensure Examination for Registered Nurses (NCLEX-RN®), the exam graduates must pass to work as a Registered Nurse (RN). The NCLEX-RN® pass rate for this nursing school was 95.58% in 2017 and 92.15% in 2016. In comparison, another Florida university nursing school had a pass rate of 86.76% in 2017 and 89.69% in 2016. A third Florida university nursing school

had a pass rate of 92.57% in 2017 and 94.31% in 2016. The national NCLEX-RN® average pass rate in 2017 was 84.24% and 81.68% in 2016 (FL HealthSource, 2015).

Once admitted to this five-semester program in the fall, students complete 65 credits for graduation. The first semester, students enroll in 15 credit hours. Essentials of Nursing Practice is a three-credit lecture course. Essentials of Nursing Practice Lab is a one-credit hour course meeting for two-hour weekly simulated clinical labs. Essentials of Nursing Practice Clinical is a two-credit hour course containing 90-contact hours at a long-term care facility for five weeks during the second half of the fall semester.

Students only receive instruction on the essential clinical nursing skills during their first semester of the program. Also, clinical agencies do not allow students to perform many of the psychomotor skills in the clinical setting throughout their five-semester curriculum. Therefore, the students must deeply learn the skills in the first semester must as they will not have the opportunity to perform these skills until they are hired for their first job as an RN two years later.

The focus of this study is the student's learning that occurs in the psychomotor lab course. The lab is a simulated clinical setting using simulation as the pedagogy for teaching the skill. Simulation is "a technique that creates a situation or environment to allow persons to experience a representation of a real event for practice, learning, evaluation, testing, or to gain an understanding of systems or human actions" (Lopreiato et al., 2016, p. 33). The setting for the psychomotor portion of this skills course is in an eight-bed simulated hospital setting (skills lab) with each bed containing a Life/form® GERi™ or KERi™ Complete Nursing Skills Manikin. These task-trainers are manikins simulating a patient's full body, including anatomically correct genitalia and articulating legs that students can position for the demonstration of the skills. Each

student purchases a “nurse pack” containing the disposable supplies required for learning and practicing the IUC insertion skill.

During this first-semester lecture course, students receive instruction on the principles of sterile gloving, sterile technique, and indwelling urinary catheterization through assigned readings, a video demonstration of the procedure, classroom discussion, and a written multiple-choice examination. In the simulated clinical skills lab, students in groups receive an instructor demonstration of the sterile technique, indwelling urinary catheterization, including sterile gloving. Two different course sections are taught simultaneously in the same lab space over a 110-minute time block. Each lab section has one instructor to 10-12 students; therefore, the 110-minute lab period has two instructors with 20-24 students in the learning space. The course setting is a simulated ward-style hospital setting in a lab divided by a wall with four beds on each side. This configuration allows three to four students per bed with one instructor on each side of the wall. The section instructor supervises the practice and return demonstration of their assigned 10-12 students in the separated four-bed area.

During the didactic portion of the course, students receive the skills checklist grading rubric for sterile gloving and female indwelling urinary catheter. The 120-minute skills lab lesson consists of the instructor demonstration of the skill, and then the students break up into groups of three to four per bed to practice the skill under the supervision of their course section instructor. Following the lab period, students are encouraged to continue to practice on their own until the summative evaluation three weeks later. Demonstration of minimum proficiency of sterile female IUC insertion is a requirement to pass the lab component of the course, and for the continuation in the nursing program.

Students have at least one opportunity to access the clinical lab setting for an hour of practice over three weeks. A person who may not be an instructor, or a nurse, or even familiar with the grading rubric may be present for the open lab, or students attend the open lab without an instructor. The role of the lab personnel present during the open lab is for the safety and security of the students and simulation lab facilities. Therefore, students do not receive any feedback about their skill performance from an instructor until their summative skill assessment.

Students return to their assigned instructor at an assigned time to demonstrate their sterile, IUC insertion on the same manikin used during learning and practice. The student demonstrates the skill alone in the physical presence of the instructor without any assistance or use of notes. The instructor rates the student's performance in real-time according to the same grading rubric the student received at the time of instruction.

Significance

Reasons for skill decay may include a lack of deliberate practice and the lack of debriefing with the student about their skill performance. Because of the lack of integrating deliberate practice and reflective learning when teaching clinical skills, students may not learn the skill deeply enough to maintain competency. This study helps improve nursing education by examining if an innovative method, video-enhanced debriefing (VED), used while teaching the IUC clinical skill reduces skill decay. VED has the potential to improve deliberate practice by providing the student visual feedback along with debriefing.

Purpose of This Study

The purpose of this study was to examine an intervention to improve initial skill validation scores, reduce skill decay, improve clinical skill feedback, and enhance satisfaction with learning among nursing students performing the clinical nursing skill of female indwelling

urinary catheterization. Incorrect performance of this skill places patient's safety at risk. The goal of this study was to evaluate an innovative teaching method, VED, that would improve student's summative IUC skill grade the first semester and maintain their level of competency beyond initial skill acquisition. A secondary goal of this study was to evaluate the student's reaction to the use of VED when learning the IUC skill.

Research Questions

1. In first-year pre-licensure nursing students, does the use of video-enhanced debriefing (VED) decrease skill decay when compared to no VED?
2. Are first-year pre-licensure nursing students satisfied with the use of video-enhanced debriefing as a teaching method for improving psychomotor skill acquisition?

Key Terms and Concepts

Advocacy/inquiry debriefing: A method of debriefing a learner by the instructor communicating observations of performance or key information of the situation to the learner, then inquiring of the learner their rationale or perspective of the actions (Lopreiato et al., 2016).

Catheter acquired urinary tract infection: A common healthcare-associated infection of the urinary system resulting from a tube inserted into the urethra to drains urine (catheter) (U. S. Department of Health and Human Services, 2017).

Cognitive learning: The interrelationship of the knowledge dimensions (factual, conceptual, procedural, and metacognitive) and the cognitive processes dimension (remember, understand, apply, analyze, evaluate, and create) needed to allow the learner to make sense of the

information to promote successful problem solving for retaining information and transferring information to future experiences (Anderson et al., 2001).

Competence: One's capacity to execute a skill in comparison to defined criteria (INACSL Standards Committee, 2016e). To be considered competent, one must consistently over time perform the skill accurately and in a timely manner (Oermann et al., 2016).

Debriefing: An instructor-guided meeting to provide formal feedback using an evidence-based debriefing model occurring with the learner after an objective-based learning experience. The session allows the learner to engage in reflective thinking to facilitate assimilation and accommodation of learning to strengthen their critical thinking to improve clinical performance for future experiences (INACSL Standards Committee, 2016e; Lopreiato et al., 2016).

Deliberate practice: A psychological theory describing a systematic method to improve performance by the effortful repetition of a skill while adjusting components of that skill based on feedback from an instructor and personal self-reflection motivating the learner's innate desire to improve (Ericsson et al., 1993; Lopreiato et al., 2016).

Experiential learning: A "structured way that allows the learner to ... form a direct relationship with the subject matter...requiring the learner play an active role in the experience, followed by reflection as a method for processing, understanding, and making sense of it" (Vadeboncoeur, 2007, p. 760).

Expert: An expert is one who is judged according to their peers as having superior knowledge, characteristics, and skills differing from a beginner, developed through intense practice and education (Ericsson, 2018).

Expert performance: A superior level of mastery that one can perform consistently perform at superior levels with little preparation. Expert performance requires “the acquisition of complex integrated systems of representations for the execution, monitoring, planning, and analysis of performance” (Ericsson, 2008, p. 993).

Feedback: Constructive, specific information provided to the learner about their performance for improvement (Lopreiato et al., 2016).

Formative assessment: The feedback, assessment, or evaluation received about one’s progress toward a goal to improve the task (INACSL Standards Committee, 2016e).

Indwelling urinary catheterization: The introduction of a tube, usually made from silicone or latex, that is inserted through the urethra and held in the bladder by inflating a balloon. The catheter continuously drains urine into a collection device for assessment.

Knowledge, skills, and attitude: The knowledge representing the cognitive (factual and conceptual knowledge), psychomotor (procedural knowledge), and affective (attitude and metacognitive knowledge) domains required of nursing professionals in the areas of safety,

evidence-based practice, patient-centered care, and quality improvement (Cronenwett et al., 2007; INACSL Standards Committee, 2016a).

Long-term memory: “Where relatively permanent knowledge is stored in the information-processing model” (Fetsco & McClure, 2005, p. 479).

Psychomotor or clinical skill: Movement-oriented activities with an underlying rationale involving critical thinking (Oermann et al., 2016). Although cognition is required, the goal is coordinating the muscular-skeletal movements to produce fine and gross motor skills (Tenbrink, 2007).

Reflective thinking: A process guided by the instructor to allow learners “conscious consideration of the meanings and implications of the events...to make meaning out of the experience, to identify questions generated by the experience, and ultimately, to assimilate the knowledge, skills, and attitudes uncovered through the experience with pre-existing knowledge” (Lopreiato et al., 2016, p. 29).

Short-term memory or working memory: “the component of the information-processing model responsible for the temporary storage of information and thinking and problem solving” (Fetsco & McClure, 2005, p. 483).

Simulated clinical setting or skills lab: “The physical setting where simulation activities may take place, inclusive of the people and equipment that forms part of the simulation experience” (Lopreiato et al., 2016, p. 34).

Simulation: An educational technique “that creates a situation or environment to allow persons to experience a representation of a real event for practice, learning, evaluation, testing, or to gain an understanding of systems or human actions” (Lopreiato et al., 2016, p. 33).

Skill decay: Skill decay the inability to maintain competency in a skill. Skill decay was defined for the study as the inability to maintain competency in the sterile indwelling urinary catheterization (IUC) skill two to four months after the student’s initial skill validation.

Skill validation: The summative assessment, evaluation, or feedback the learner receives about their performance as measured against a predetermined criterion (INACSL Standards Committee, 2016e).

Sterile or aseptic technique: A procedure followed according to basic principles to eliminate the transmission of microorganisms from entering an area without microorganisms.

Satisfaction of learning: The extent which students enjoy the learning experience and feel the experience improved their learning and performance (Adamson, 2015). A measurement of the student’s attitudes and beliefs about a learning experience (Franklin, Burns, & Lee, 2014).

Video-enhanced debriefing: The instructor utilizes the participant's video recorded procedure to identify elements of the skill that are important and structures the debriefing around these components. The use of video offers an accurate, objective view of the procedure (Grant, Moss, Epps, & Watts, 2010).

CHAPTER TWO: REVIEW OF LITERATURE

Introduction

This chapter presents the rationale for researching the use of Video-Enhanced Debriefing (VED) in the acquisition and retention of a clinical psychomotor nursing skill, sterile indwelling urinary catheterization (IUC). The factors for learning a clinical psychomotor skill, and those influences resulting in skill decay are explored along with their relationships between deliberate practice theory (Ericsson et al., 1993), the use of simulation pedagogy with debriefing as reflective practice (Schön, 1983), and student satisfaction with learning. This study builds upon the existing knowledge and conceptual frameworks of how deliberate practice (Ericsson et al., 1993), experiential learning (Kolb, 1984), and reflective practice (Schön, 1983) improve skill performance.

The use of VED has become a recent focus in simulation pedagogy literature for improving debriefing, including an integrative review of the literature revealing VED themes in debriefing effectiveness, learning outcomes, and learner's perceptions (Ali & Miller, 2018). Also prevalent is the use of video for feedback in skill acquisition among medical students (Farquharson, Cresswell, Beard, & Chan, 2013; Friedman, Siddiqui, Mahmoud, & Davies, 2013; Nesbitt, Phillips, Searle, & Stansby, 2015a; Wittler, Hartman, Manthey, Hiestand, & Askew, 2016). There is limited research on the use of video for the acquisition of clinical psychomotor nursing skills, and these studies are mostly qualitative, supporting the innovation. A gap in the literature exists on the use of debriefing, especially VED, in nursing psychomotor skill acquisition and the minimization of skill decay. The goal of this study was to build on existing knowledge and to fill a gap in the use of VED to minimize skill decay through a quantitative,

experimental design. Additionally, this study adds a quantitative measure to analyze student's satisfaction of facilitation using VED.

The clinical psychomotor skill used as the exemplar to analyze the use of VED was IUC. Catheter-acquired urinary tract infection (CAUTI) accounts for one-third of healthcare-acquired infections resulting in significant morbidity and mortality (Klevens et al., 2007). Improper IUC insertion technique is one cause of CAUTI; therefore, only those competent in aseptic IUC insertion should perform the skill (Gould et al., 2009). Nursing students learn this IUC clinical skill and demonstrate the safe performance of this skill in a laboratory setting, but they struggle to maintain the competency of the skill beyond their initial skill validation (Gonzalez & Sole, 2014; Missen et al., 2016). Since the incorrect performance of this skill places patient's safety at risk, it is imperative to explore evidence-based teaching methods to improve nursing student's demonstration and retention of clinical nursing skills.

When students do not retain their ability to perform a previously learned procedure safely, skill decay occurs. Reasons for skill decay may include a lack of deliberate practice and the lack of debriefing with the student about their skill performance during original skill learning. Because of the lack of integrating deliberate practice and reflective learning when teaching clinical skills, students may not learn the skill deeply enough to maintain competency. The goal of this study was to evaluate an innovative teaching method, VED, to improve student's summative IUC skill grade in the first semester and then maintain their level of competency ten weeks later. A secondary goal of this study was to evaluate the student's reaction to the use of VED when learning the IUC skill.

This chapter contains the description of various components required in psychomotor skill acquisition, including the phases of learning a psychomotor skill found in the literature.

Also discussed are internal and external factors influencing skill learning. Once the student learns the skill, the student must be able to retain skill competence. Given these points, the techniques described in the literature to decrease skill decay follows.

Deliberate practice (DP) theory (Ericsson et al., 1993) describes how a student acquires and retains skill competency. DP is one of the conceptual frameworks of this study. This literature review includes a section containing the background information about DP, how DP allows achievement of expertise, and the various types of practice. The DP section will include DP research pertinent to this study and concludes with a summary of DP characteristics.

DP theory underpins how instructors frequently teach psychomotor skills via simulation. To provide background information for this study, a basic introduction about simulation pedagogy follows the DP section. To clarify an understanding of simulation, the discussion includes the historical roots of simulation in healthcare. Accompanying the historical roots of simulation, two additional education theories supporting simulation will conclude the healthcare simulation background. The educational theories, Experimental Learning (EL) theory (Kolb, 1984) and Reflective Practice (RP) theory (Schön, 1983), are also conceptual frameworks for this study. These theories underpin the empirically based guiding documents for simulation pedagogy including the International Nursing Association for Clinical Simulation and Learning (INACSL) Standards Committee (2016f) *Standards of Best Practice: Simulation*SM.

The most critical part of the simulation is debriefing (Sawyer, Eppich, Brett-Fleegler, Grant, & Cheng, 2016). The review contains a description of the INACSL Standards Committee (2016a) *INACSL Standards of Best Practice: Simulation*SM: *Debriefing* and a method to evaluate the effectiveness of debriefing using *Debriefing Assessment for Simulation in Healthcare*© (DASH©) (Simon, Raemer, & Rudolph, 2010a). Many empirically based methods of debriefing

are available; however, a discussion about *Debriefing for Good Judgement* (Rudolph, Simon, Rivard, Dufresne, & Raemer, 2007) ensues as it is the debriefing method used in this study.

The use of video is an adjunct to debriefing and considered to be an innovative teaching strategy when utilized in the learning of a psychomotor nursing skill. A section in this review contains a discussion of other studies supporting the use of video. Additionally, this literature review addresses research regarding the student's satisfaction with the use of video as an innovative teaching strategy. Students must have a positive reaction to the learning to pique their interest in enduring the boring, repetitive practice as explained by the first level of Kirkpatrick's framework (Kirkpatrick & Kirkpatrick, 2006). Concluding the literature review is a discussion of the various components related to satisfaction with learning as organized by *Student Satisfaction of Learning Survey* (SSLS) (National League for Nursing, 2005) instrument used in this study.

The clinical psychomotor skill exemplar in this study is IUC, a standard procedure cited in many fundamentals of nursing textbooks. An indwelling urinary catheter is a thin, pliable tube inserted under strict sterile conditions (catheterization) through the urinary meatus and into the bladder. Once the catheter is in the bladder, then an inflated, water-filled balloon at the end of the catheter holds the catheter in the bladder to continuously drain urine. A collection device connects to the catheter for the exact measurement of urine output. Patients requiring the insertion of an IUC include those needing the precise measurement of their intake and output, those who are critically ill, those temporarily without control of their bladder, or those undergoing various surgical procedures (Thompson, 2017).

The nurse inserts an IUC using sterile technique. Sterile technique is a procedure to eliminate the transmission of microorganisms from entering an aseptic area (without

microorganisms). A person using a sterile technique follows basic aseptic principles to ensure microorganisms do not enter the area (Potter et al., 2017a). The sterile technique allows the nurse to manipulate the equipment without contaminating any of the equipment with microorganisms. The nurse must apply several principals of sterile technique:

- Objects are only sterile if touched by other sterile objects.
- A sterile field can only have sterile objects added to the field.
- If the object goes outside of the nurse's vision or below the nurse's waist, the object is unsterile.
- Exposure to air for a long time causes the field to become unsterile.
- If the sterile field becomes wet, then the field is unsterile.
- The one-inch border around a sterile field or container is unsterile (Potter et al., 2017a).

Nurses must demonstrate the knowledge, skill, and attitude (KSA) for safely performing psychomotor skills to minimize risk to patients (American Association of Colleges of Nursing, 2008). Fundamentals of nursing textbooks contain detailed procedural steps for inserting an IUC (Berman, Snyder, & Frandsen, 2016; Potter, Perry, Stockert, & Hall, 2017b; Taylor, Lillis, Lynn, & LeMone, 2015). Hoyt (2019) conducted a literature review of articles from 2012-2017 to determine the most critical aspects of the IUC insertion skill. These articles contained information about the development of IUC evaluation tools, discussion of IUC insertion techniques, and studies where the dependent variable used an IUC evaluation tool as an instrument. The most critical elements for proper IUC insertion cited in more than 75% of the articles were: maintenance of asepsis, hand hygiene, aseptic meatus cleansing, lubrication of catheter, and proper use of sterile gloves (Hoyt, 2019).

To measure students' competency with sterile IUC procedure, the instructor uses a grading rubric. A grading rubric is a legally defensible policy to assign a grade based on performance adopted by the curriculum (Downing, Tekian, & Yudkowsky, 2006; Kardong-Edgren & Mulcock, 2016). In the context of healthcare education, a skill grading rubric often is a determinant if a student has demonstrated minimum competency to pass a course or if the student has enough skill knowledge and dexterity to safely perform the skill in a clinical setting under the strict supervision of a licensed practitioner. A student who does not demonstrate this minimal competency does not pass the skills test. Faculty with evidence-based clinical expertise in the skill must follow a "systematic, reproducible, absolute, and unbiased process" to determine a passing score (Downing et al., 2006, p. 51). Raters using the IUC insertion tool must receive training for the use of the evaluation tool to ensure consistency (Cizek, Bunch, & Koons, 2004; McKinley & Norcini, 2014).

Skill Acquisition

Nurses learn psychomotor skills in nursing school, usually through a simulated environment, and must transfer these skills to an actual patient in the clinical setting. Often students are taught the skill in one semester, and they are expected to retain this learning for months to years after the teaching session. Measurement of learning the psychomotor skills is through the performance of the skills. However, learning is not the same as performance; learning is a permanent change in behavior allowing the transfer of the skills into practice (Soderstrom & Bjork, 2015). A student may be able to demonstrate the performance of the skill at one time and place (i.e., first semester in a simulated clinical environment) but not be able to demonstrate the skill after some time (i.e., a subsequent semester). By understanding the theoretical underpinnings of how nursing students learn these skills, instructional strategies can

be optimized to promote deeper learning, retention, and the ability to demonstrate skill performance later.

There are three phases of psychomotor skill learning: declarative, associative, and the autonomous phase (Langan-Fox, Armstrong, Balvin, & Anglim, 2002). The first phase, declarative, focuses on the cognitive aspects of the skill. This phase is often cognitively demanding requiring memory, reasoning, and knowledge retrieval (Langan-Fox et al., 2002). In this phase of clinical skill learning, the instructor discusses the skill, the use of the equipment, the steps of the procedure, and the rationale behind the steps. Students often first observe the skill during this stage. Students often learn psychomotor skills by either their instructor demonstrating the skill or by viewing a video of the demonstration (Oermann et al., 2016).

The second stage of psychomotor skill learning is the associative phase (Langan-Fox et al., 2002). In this stage, students develop rules about skill performance through stimulus-response systems while performing the skill. Students do not require as much cognitive processing as during the declarative stage. During this phase, students begin to improve their skill performance through practice and continuous refinements of the performance (Oermann et al., 2016). This dissertation aimed to fill the gap in literature analyzing if using VED during the associative stage promotes deeper learning resulting in longer skill retention (i.e., less skill decay).

The final stage of psychomotor skill acquisition is the autonomous stage occurring when the learner can demonstrate the skill more automatically and by using very little cognitive demand. The learner does not need to dedicate much conscious effort into completing the task at this stage (Langan-Fox et al., 2002). Student's skill becomes consistent, error-free, and smooth; movement is automatic (Oermann et al., 2016). To understand how VED influences the

autonomous stage over time, one purpose of this research was to measure the extent of error-free performance a student demonstrates when the skill is initially learned and then compared to their skill performance during a subsequent semester.

Internal and external factors influence student's progression through these three stages of psychomotor skill learning. Understanding students' affective processes when learning and performing psychomotor skills may provide insight into teaching strategies to help students learn (Aldridge, 2017). Internal processes and characteristics such as the learner's level of consciousness, cognitive abilities, emotional status, metacognition, motivation, and memory influence learning (Langan-Fox et al., 2002). External influences also affect psychomotor skill learning. These influences include interruptions when learning, the learner's goals, the practice format of the skill, and the task's characteristics (Langan-Fox et al., 2002). The learner's goals are essential external influences as they facilitate the learner's self-regulation, including self-evaluation, which assigns more cognitive abilities to the task (Langan-Fox et al., 2002). In this study, the intervention was reflective practice using VED. After VED, the learner, with the guidance of the debriefer, set a learning goal and a plan to achieve this goal. A final external influence in this study was the task characteristic. A task may contain closed-looped characteristics, a skill with a definite beginning and end, such as the IUC insertion. Closed-loop tasks, such as IUC, are measured more accurately than complex cognitive tasks (Arthur et al., 1998).

Skill Decay

Also crucial to skill acquisition is the minimization of skill decay. Skill decay, the loss of skills after periods of non-use, occurs when initial training or learning was inadequate (Arthur et al., 1998). Students demonstrate initial competence, but often do not retain competence of the

skill (Gonzalez & Sole, 2014; Greenberger, Reches, & Riba, 2005; Jones et al., 2017; Oermann et al., 2016). The longer the period of nonuse of a skill, the higher the skill decay; therefore, researchers have identified the prevention of skill decay as a priority research area (Adamson, 2015; Arthur et al., 1998; Cecilio-Fernandes et al., 2018; Gonzalez & Kardong-Edgren, 2017; Gonzalez & Sole, 2014; Ross, Bruderle, & Meakim, 2015).

Techniques that have statistical significance in decreasing skill decay are just-in-time training (Branzetti et al., 2017), spacing the training sessions over multiple times (Cecilio-Fernandes et al., 2018), deliberate practice (Kovacs, Bullock, Ackroyd-Stolarz, Cain, & Petrie, 2000; Wayne, Siddall, et al., 2006), and instructor feedback (Kovacs et al., 2000). The results from this research help fill the gap of skill decay research through the analysis of VED.

Causes of skill decay, other than a period of not using the skill, include the methods for initial learning and testing of the skill (Arthur et al., 1998). Arthur et al. (1998) conducted a meta-analysis of quantitative data from empirical studies with the largest effect sizes for factors related to skill decay or retention. The authors found overlearning, training beyond the requirement for initial skill learning, was a critical factor in minimizing skill decay.

Overlearning decreased stress and anxiety during skill performance, therefore increasing student's self-efficacy. Overlearning decreased the amount of effort a student required to perform the task by strengthening the response-stimulus connection (Arthur et al., 1998). However, overlearning for a cognitive task was not effective in long-term memory (Rohrer, Taylor, Pashler, Wixted, & Cepeda, 2005). The opportunity to video record one's skill performance may allow more practice decreasing non-use, and the video provides an opportunity for overlearning the task to reduce skill decay. Deliberate practice is one method to reduce skill

decay by improving the initial learning, ensuring the skill is repeatedly practiced, allowing students to overlearn the skill.

Deliberate Practice

Deliberate Practice (DP) is a learned skill to manipulate one's limited mental processes and physical constraints to improve individual performance (Ericsson et al., 1993). DP provides the conceptual framework for this study. DP is rooted in educational and genetic theories posited by researchers such as Galton, Thorndike, Gagné, and Bloom (Ericsson et al., 1993). An expert is one who is judged according to their peers as having superior knowledge, characteristics, and skills differing from a beginner; they developed their attributes through intense practice and education (Ericsson, 2018). Ericsson and Pool (2016) theorize with DP that one's mental capabilities are adaptable, allowing anyone to develop skill expertise. One achieves this adaptability through purposeful and deliberate practice, and one's expertise is not an innate talent (Ericsson, 2018).

Mindset theory also supports this adaptability of the mind. Mindset is one's "implicit theories about the malleability of human characteristics—on their academic and social resilience" (Yeager & Dweck, 2012, p. 302). Mindset is on a continuum between a fixed mindset and a growth mindset. With a fixed mindset or entity theory of intelligence, students perceive that their intelligence and intellectual ability are unchangeable. Characteristics of this mindset are a tendency to give up, a desire to look smart, and a focus on measuring the amount of one's ability. Those with a growth mindset, who hold an incremental theory about ability, believe that intelligence and intellectual ability can grow over time. Those with the growth mindset focus on learning and growing (Yeager & Dweck, 2012).

Contrary to the theory of intellectual malleability, arguments exist that one can reach an expert status without numerous hours of practice and that one's intelligence, environmental factors, and inherited traits determine the level of performance one can achieve (Hambrick et al., 2014). Ackerman (2014) and Detterman (2014) support the use of DP to enhance expertise; however, they cited studies demonstrating that a person's ability to develop expertise was bound by their innate talent, physical limits, and mental capabilities. Despite these two different perspectives on how one reaches expertise, DP is a method of training to improve an individual's performance whether they believe their ability is a product of their skillfulness to change or their inherent characteristics.

Achieving expertise. Before one can improve skill performance, a learner must have a mental representation of the skill. A mental representation, also called schema or frame, is a mental model of information learned. Piaget (1952) stated that people gain knowledge as schemata and learn through an assimilation and accommodation process. When presented with new information, the learner compares this new information to existing schemata; if the information does not fit, then the student experiences cognitive disequilibrium (Gredler, 1992). Accommodation occurs when the learner, including feedback from the instructor, processes the information and creates a new schema (Sadideen & Kneebone, 2012).

When learners receive information, they place the schema into their working memory. This working memory has a small capacity for storage, and one can only recall the information for a brief period. The learner must process the information in their working memory and store the information into their long-term memory. Long-term memory can hold a large amount of information for an extended amount of time (Ericsson et al., 1993). DP is consistent with the Cognitive Theory of Multimedia Learning (Mayer & Moreno, 2003); to deeply learn the

material, the learner must develop strategies to process information from their short-term working memory and move the information to their long-term memory. When completing complex tasks, the learner must draw upon the information stored. If this complex problem requires a large amount of information stored in the capacity-limited short-term memory, then the learner experiences a high cognitive load, resulting in difficulty retrieving the information required (Sweller, 1988). Researchers identified an interrelationship between cognitive load theory and deliberate practice for attaining expertise (van Gog, Ericsson, Rikers, & Paas, 2005). By training with DP, these mental representations allow one to determine the interaction between various components of the skill quickly. When the individual can rapidly retrieve information from their memory, they anticipate alternative events and begin to plan actions in advance.

Types of practice. Specific types of practice facilitate deep learning and rapid retrieval of these mental representations. Through studying training methods of elite Olympic athletes, expert musicians, and master chess players, researchers differentiated three types of practice: naïve practice, purposeful practice, and deliberate practice (Ericsson & Pool, 2016). Naïve practice is repetitive practice without a goal. This type of practice occurred when one continuously repeats a skill over time (repetition). The amount of time one practices does not improve performance (Ericsson, 2008; Ericsson & Pool, 2016). Naïve practice allows a learner to reach an adequate level of practice, but they become stagnant at a set level of skill (Ericsson & Pool, 2016). Researchers concluded from a systematic review of the literature that physicians who have been in practice longer, in the absence of DP, actually have a lower quality of care (Choudhry, Fletcher, & Soumerai, 2005; Ericsson, 2004). A different type of practice is required to maintain or improve skills.

The second type of practice, purposeful practice, is more sophisticated than naïve practice. Purposeful practice contains four characteristics: goal setting, focus, feedback, and disruption of homeostasis (Ericsson & Pool, 2016). First, one must practice with the intent of reaching a specific, measurable goal. Second, purposeful practice is focused. This intense focus initiates the changes in mental processes. The third characteristic of purposeful practice is that the learner must receive immediate feedback. This feedback allows the learner to experiment with which components of performance need to change to reach their goal. The final characteristic of purposeful practice is that one must move away from their comfortable level of skill ability. One must reach outside their comfort zone, homeostasis, to improve performance. One must follow all of these characteristics while maintaining motivation (Ericsson & Pool, 2016).

Complementary, but separate from purposeful practice is deliberate practice. DP can occur in fields with defined objective measurements, where the performers in the field are motivated to practice and improve, the field is highly developed, and the field has instructors with sophisticated teaching techniques allowing the improvement in the skill (Ericsson & Pool, 2016). DP differs from purposeful practice in that DP requires a knowledgeable instructor to provide the learner feedback, an individualized plan to improve, and the opportunity to repeat the critical aspects of the performance. DP allows the learner to improve their performance according to the established goals based on the feedback. DP allows the learner to fail, readjust their approach to the skill, and try again for better task performance. Ericsson et al. (1993) also explained the repetition of a task without constructive feedback does not improve the learner's accuracy or performance of the task. A feedback method common to professional sports is videotaping the learner's performance. This video adds to the instructor's feedback of the

learner's performance by identifying aspects of the procedure, which could be enhanced by further training (Ericsson, 2004).

DP has three constraints: resource, motivation, and effort. The resource constraint holds that for DP to occur, the practice requires teacher and learner time, proper training materials, and proper facilities. The second constraint is motivation. "DP requires effort and is not inherently enjoyable" (Ericsson et al., 1993, p. 368). The learner must be internally motivated by the desire to improve performance. The final constraint is the effort. DP training must be in short periods daily over a prolonged period. During DP, the learner must exert their full attention to the task, which due to the intensity can only be tolerated for short periods (Ericsson et al., 1993).

In summary, Ericsson et al. (1993) described the characteristics of DP to improve a learner's cognitive knowledge, self-efficacy, and motor improvement of a task:

- The learner must receive constructive feedback to improve their skill performance
- The learner needs to receive immediate feedback about their performance results
- The learner must have a well-defined goal to improve their performance
- Improvement of the learner's performance depends on their motivation to improve
- The amount of effort the learner exerts to improve their performance is important
- The learner must know the correct performance of the task
- The learner receives no external rewards (i.e., recognition or increase pay) for completing the task; instead, the reward is an improvement in their performance
- DP requires effortful practice that is often unenjoyable (Ericsson et al., 1993, p. 368).

Deliberate practice (DP) is vital to minimize skill decay (Gonzalez & Kardong-Edgren, 2017; Ross et al., 2015; Wayne, Siddall, et al., 2006). A longitudinal, observational study using an Advanced Cardiac Life Support (ACLS) training program for internal medicine residents ($n =$

38) analyzed initial skill acquisition and rate of skill decay of those taught with DP (Wayne, Siddall, et al., 2006). The residents repeated skill testing at six months and 14 months after initial validation. Researchers noted no statistical significance difference ($p > .5$) of performance scores across the three testing times; meaning the students did not experience skill decay. The authors concluded that DP contributed to a reduction of skill decay (Wayne, Siddall, et al., 2006).

A descriptive, correlational study of 81 practicing registered nurses evaluated the relationship of experience, education, deliberate practice, and competence variables of expertise, to identify the variable contributing most to competence (Bathish, Wilson, & Potempa, 2018). Participants completed the Deliberate Practice in Nursing Questionnaire (Bathish, Aebersold, Fogg, & Potempa, 2016), Nursing Competence Scale (Meretoja, Isoaho, & Leino-Kilpi, 2004), and demographic information including years of experience working in critical care and educational preparation. Deliberate practice significantly correlated with nursing competence using multiple regression analysis ($p = .01$). The authors concluded that this study provided empirical evidence to support the use of DP in the acquisition of clinical skills (Bathish et al., 2018).

In a systematic review of literature of best practices in medical education, DP ranks as an essential feature (Issenberg et al., 2005; McGaghie et al., 2010; McGaghie, Issenberg, Petrusa, & Scalese, 2016). This dissertation in practice applies DP as the theoretical framework, especially the feedback and reflective practice components of DP, to understand further how video feedback enhances skill acquisition. A gap in research exists identifying instructional design formats with DP for learners of varying abilities in a specified domain (van Gog et al., 2005). This dissertation aims to bridge the gap with an instructional technique using principals of DP to improve and maintain skill acquisition in the clinical nursing skill domain.

Simulation

A widely accepted method for applying DP to teaching clinical nursing skills, such as IUC, is using simulation. Simulation is a pedagogical approach for psychomotor skills training that promotes active learning, development of skills and competencies, in a safe-controlled setting without placing patients at risk (Decker, Caballero, & McClanahan, 2014). Simulation has been proposed as a solution to ensure all nursing students receive equal, high-quality clinical experiences without posing a risk to an actual patient (Hayden et al., 2014; McGaghie et al., 2016). Simulation combined with deliberate practice for clinical skill learning is preferable over traditional clinical education learning on patients (McGaghie et al., 2016).

Simulation is a training method to closely replicate the clinical environment (fidelity) where learners can practice, learn, and receive an evaluation of their skill progression. Various typologies of simulators exist ranging from basic task trainers to technically sophisticated virtual reality. Task trainers are useful for representing the human body for learning and testing of clinical psychomotor skills (Decker et al., 2014). The simulators for this study were low-technology, static, task trainer full-body manikins.

Healthcare Simulation Background

The use of simulation as a pedagogy for healthcare education dates to the 16th century, and in the early 1900s, manikin-based simulators became available for purchase (Decker et al., 2014). Simulation has been a significant training tool for the military, aviation, and other professions (Issenberg et al., 2005). The need to improve patient safety and the quality of healthcare has driven the implementation of simulation in healthcare education (Decker et al., 2014; Issenberg et al., 2005).

Education theories work together to explain how people learn and describe the best methods of teaching with simulation. Blending several theories provides an educator a toolkit to structure teaching activities to promote student learning. A theory is vital to inform educators about decisions for selecting teaching methods (Nestel & Bearman, 2015). The use of simulation as pedagogy has theoretical underpinnings from the works of Dewey, Bandura, Kolb, and Schön. Simulation encompasses concepts from social learning theory, experiential learning theory, and reflective learning experiences by creating an interrelationship between the environment, student, and the teacher (Decker et al., 2014). The simulation itself must be experiential learning, learner-centered, and contain collaborative interaction with the instructor. Learners must perceive the experience as clinically authentic, allowing for the learner to feel as though they are caring for an actual live patient. The learner must feel the instructor interaction built on trust (Jeffries, 2015). The National League of Nursing (NLN) Jefferies Simulation Theory (Jeffries, 2015, 2016) provides an empirically-based framework based on educational theories and best practices to describe the implementation of simulation as a teaching strategy (Jeffries, 2015, 2016).

The International Nursing Association for Clinical Simulation and Learning (INACSL) is one of the world's leaders in simulation pedagogy, providing empirically-based INACSL Standards Committee (2016f) *Standards of Best Practice: Simulation*TM. INACSL members are educators, researchers, and clinical healthcare providers (industry) from all over the world (INACSL Standards Committee, 2016f). The Society for Simulation in Healthcare (SSH) is the other international leader for the advancement of simulation to improve healthcare education and patient safety. This organization includes physicians, nurses, allied health, emergency medical services, researchers, and educators collaborating to improve patient outcomes through the use of simulation (Society for Simulation in Healthcare, 2018). The NLN Jefferies Simulation Theory

(Jeffries, 2015, 2016), INACSL Standards Committee (2016f) *Standards of Best Practice: Simulation™*, and the Society for Simulation in Healthcare (2018) provide the empirically based guidelines for using simulation pedagogy that is deeply rooted in experiential learning and reflective practice education theories.

Experiential learning theory. An underlying theory for simulation is Experiential Learning (EL). Kolb (1984) explained EL was rooted in theories from L. S. Vygotsky, John Dewey, Kurt Lewin, and Jean Piaget. The theory describes the learning process using knowledge from psychology, philosophy, and physiology disciplines. Kolb (1984) posits learning results from a person's experience; therefore, one's experience equates to the learning achieved through higher education. "Learning is the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). Experience-based learning activities such as simulations, role-playing, and field placements are common instructional methods in higher education and a preferred method of instruction by many adults (Kolb, 1984).

As summarized by Decker et al. (2014), Kolb (1984) described learning as a relationship between the environment and students as a cycle consisting of four components: the concrete experience, reflective observation, abstract conceptualization, and active experimentation. Simulation-based learning provides an excellent, safe stage for a student to acquire knowledge based on this cycle (Decker et al., 2014). The concrete experience was the simulated clinical scenario in which a patient required the IUC procedure. Students then reflected upon the experience finding personal meaning during the simulation, also consistent with reflection-in-action (Schön, 1983). In the third stage, abstract conceptualization, students applied their reflection of the knowledge to the simulated event to look for meaningful patterns. Finally, students assimilated the information and accommodated the knowledge into new understandings

as active experimentation. Debriefing, described in a later section, occurs after a simulated clinical scenario with a facilitator guiding students through the stages of EL resulting in accommodation of new knowledge.

Critics of EL theory suggest the theory ignores one's cognitive load and motivation to learn, and the theory lacks the ability for empirical testing (Houge Mackenzie, Son, & Hollenhorst, 2014; Schenck & Cruickshank, 2015). Despite the limitations of EL, researchers argue EL activities improve the transition of knowledge from the classroom, to the clinical setting (Ham & O'Rourke, 2004; Hill, 2017; Zigmont et al., 2015). EL is widely recognized as one theory supporting simulation pedagogy (Alinier, 2011; Brett-Fleegler et al., 2012; Jeffries, 2015; Nestel & Bearman, 2015).

Reflective Practice. Important in EL is reflective practice, another theory critical to simulation pedagogy. Reflective practice is a learned technique allowing one to use reflection to improve their cognition, resulting in skill improvement (Thompson & Pascal, 2012). This improved thought advances one from merely memorizing facts, to allow the learner to develop intuition through the integration of theory and practice. In other words, the learner applies theory to novel situations in practice. Reflective practice contains the blending of theory and practice, active learning, participative learning, and the questioning of situations with an open mind. Reflective learning is not just the reflection of the activity, but rather the analysis and understanding of the activity to contribute to one's learning (Thompson & Pascal, 2012). When students reflect on their learning, they process the reflected information and how the knowledge affected them. Students then develop a personally meaningful representation of that information (Díaz, Maruca, Kuhnly, Jeffries, & Grabon, 2015).

Schön (1983) stated reflective practice involves reflection-in-action and reflection-on-action. Reflection-in-action occurs when one is engaged in the task, and the learner is reflecting while engaged with the events (Dreifuerst, 2015). As a student performs their skill, they reflect on their understanding of the sterile technique and procedural concepts. Reflection-on-action allows the learner to advance their understanding of the concepts and test those concepts (Thompson & Pascal, 2012). Once a student completes a sterile IUC skill, then they reflect on the skill integrating the concepts of sterile technique and the procedural steps of the skill comparing their performance to the concepts. Another element, reflection-for-action, was added by Thompson and Pascal (2012) to explain one's planning process for thinking ahead, planning the next action, and using available resources. Planning often occurs at the end of a debriefing when the facilitator challenges students to think about future, similar, yet more challenging situations to apply the newly accommodated information.

John Dewey (1933), Donald Schön (1983), and David Kolb (1984) works influenced reflective theory. Reflective thinking was defined by Dewey (1933), as “active, persistent, and careful considerations of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends” (p. 118). Schön (1983, p. 21) moved away from traditional learning of theory, which he felt focused on “technical rationality,” using theory to solve predictable problems. Technical rationality equates to student's understanding of the terminology associated with IUC, principals of sterile technique, and the knowledge of how to perform the skill. Instead of focusing on technical rationality, Schön (1983) discussed learning using research-based knowledge to fit “swampy lowlands,” or areas of confusing, actual practice situations (Schön, 1983, p. 43). Learning occurs when students apply their knowledge to actual (or simulated) clinical situations, that often contain unpredicted

elements not discussed in the textbook theory. Kolb (1984) incorporated reflective theory into his four-stage cyclic experiential learning theory, discussed in a previous section. Each of his four stages requires reflection on the learning to improve actions (Dreifuerst, Horton-Deutsch, & Henao, 2014).

Benefits of reflective practice include increased professionalism through changes in one's knowledge, skill, and attitude resulting in an improvement in their practice (Dreifuerst et al., 2014; Mann, Gordon, & MacLeod, 2009). Reflective practice allows one to deal with the gaps between research and practice (Kinsella, 2010). Reflective practice is a method of teaching metacognition to students (Dreifuerst, 2009) and a method to facilitate deep learning (Davies, 2012; Mann et al., 2009). Reflective practice promotes lifelong learning in a variety of professions by motivating one's self-directed learning (Davies, 2012; Mann et al., 2009; Trede & Smith, 2012).

The limitations of reflective practice include one's difficulty with analyzing their decisions and feelings relating to experiences. Also, the process is felt by some to be time-consuming, especially if they are not familiar with the process. Some are uncertain of which experiences should employ reflective practice (Davies, 2012). In another study, researchers found that the relationship between students and the instructor may compromise reflective practice if a respectfully reciprocal relationship was not established, especially if the instructor's techniques felt critical to students (Trede & Smith, 2012). Another difficulty of reflective practice is the inconsistent definitions of reflective practice throughout literature among various professions (Mann et al., 2009). Reflective practice in the literature is more prevalent when a complex experience is the focus of learning; however, variation exists for the definition of a

complex, challenging experience thus limiting the comparison of research findings (Mann et al., 2009).

Several methods and models exist for applying reflective practice to advance learning. Students can improve their reflective practice skill as evidenced by an increase in reflective thinking scores after receiving reflective thinking instruction compared to students without instruction (Mann et al., 2009). As reflective practice is a learned process, a teacher can guide learners through the reflection (Davies, 2012). A person can review a learning experience chronologically, or they can choose significant events from the experience to begin their reflection (Dreifuerst, 2009). Regardless of the reflective practice method used, Dreifuerst (2009) explains that the first stage of reflection is to identify the learner's emotions toward the experience, and emotions can improve or disrupt a learning experience. An instructor must guide the learner to explore their reactions to the learning experience to allow meaningful learning to occur (Dreifuerst, 2009)

Gibbs's reflective cycle (Gibbs, 1988) is a model of reflective practice containing six stages, each leading to the next (Husebø et al., 2015). The theory was influenced by Kolb (1984) with his experiential learning theory and the writings of Dewey (1933) on reflective thought. Gibbs's focused research on improving teaching methods to advance student's learning. Gibbs's reflective cycle is a framework to be applied after the learning experience. Key concepts of the learning experience guide the creation of questions to cue the learner. The learner's thoughts and feelings are important to the process. The goal of the reflective cycle is to guide learners in identifying strategies for future, similar experiences (Husebø et al., 2015). Gibbs's reflective cycle follows six stages after the learning experience (Husebø et al., 2015):

1. Asking the learners to provide a simple description of the learning experience without the instructor being judgmental.
2. Guiding the learner to provide a statement of their feelings and thoughts about the experience. These thoughts and feelings influence the learner's motivation toward learning.
3. Having the learner provide an evaluation of what they felt was good and bad about the experience.
4. The learner analyzes the experience, including information from outside experiences which were similar or different. This analysis includes cognitive knowledge applied to the situation.
5. The learner concludes with any actions that could have been done during the experience.
6. Finally, the learner develops an action plan to determine what to do the next time the learner is in a comparable situation (Husebø et al., 2015).

Gibbs's reflective cycle is just one method of guiding a student through reflective practice of a learning experience; the debriefing section describes other methods. After a simulation-based learning experience, the learners engage in a reflective practice, called debriefing.

Debriefing and Feedback

Debriefing is a form of reflective practice and is a critical component of any simulated learning experience (Sawyer et al., 2016). The part of simulation using reflective learning is the debriefing. INACSL Standards Committee (2016a) defines debriefing as the reflective part of the simulation pedagogy lead by a trained debriefer when the learner reflects upon their actions,

assimilates the information, and cognitively reframes the information. Debriefing, which occurs after the simulated clinical experience, is the most important part of the simulation where most of the learning occurs (Fanning & Gaba, 2007; Issenberg et al., 2005; McGaghie et al., 2010, 2016; Raemer et al., 2011). Through the debriefing process, the learner improves their self-awareness and self-efficacy of best practices, which ensures patient safety and allows them to transfer knowledge, skills, and attitudes (KSA) to practice (INACSL Standards Committee, 2016a).

Facilitated debriefing is a reflective practice providing the learner to think-in-action, think-on-action, and thinking-beyond-action (Dreifuerst, 2009). Debriefing allows the learner to understand, analyze, and synthesize actions, thoughts, and feelings. The purpose of the debriefing is for the learner to change their behavior to improve their clinical practice (Cheng et al., 2014). Debriefing is a teaching-learning strategy (Cantrell, 2008; Cheng et al., 2014). Husebø et al. (2015) stated reflective practice through debriefing allows students to learn from their previous experiences, think about and reflect on those experiences based on a current situation, and then identify knowledge which will be helpful in future experiences. Reflective practice involves cognitive processes, a goal for self-improvement, and the review and recreation of ideas to improve practice (Husebø et al., 2015).

When using debriefing as a teaching-learning strategy, INACSL Standards Committee (2016a) provides a living document stating empirically-based criteria for best practices in debriefing. INACSL Standards Committee (2016a) *Criterion 1* states a trained, competent debriefer facilitates debriefing. The debriefer must be formally trained through recognized coursework, actively maintain skill by completing ongoing debriefing education, and continuously receive performance feedback from participants and peer debriefers. This feedback must be through a validated instrument such as Simon et al. (2010a) Debriefing Assessment for

Simulation in Healthcare (DASH)© instrument (INACSL Standards Committee, 2016a). For this study, the principal investigator conducting the debriefing in the intervention group received extensive training in debriefing and has numerous positive student and peer-expert DASH© evaluations. This study examined the outcomes of those receiving VED as compared to regular skill instruction without formal debriefing.

As part of the debriefing technique, the trained debriefer must adhere to the INACSL Standards Committee (2016a) *Criterion 2* to ensure learning through open, trusted communication ensuring the psychological safety of the learner. Requirements of this criteria include student orientation to the debriefing process, establishing a code of conduct with students to ensure confidentiality, and psychological safety of students for engaging communication of feedback reflecting on student's actions to improve their KSA performance (INACSL Standards Committee, 2016a). As stated earlier, minimizing student anxiety is imperative to learning psychomotor skills (Aldridge, 2017; Arthur et al., 1998; Sawyer et al., 2016). Ensuring the psychological safety of the learner facilitates decreased anxiety allowing improved learning. This psychological safety is vital as debriefing is interactive communication between the facilitator and learner reflecting on the activity. Feedback is a component of debriefing where the facilitator is providing the learner information about their behavior. In the debriefing, the learner has an active role in the discussion (Cheng et al., 2014). Debriefing is not commonly included in clinical skills labs (Vihos et al., 2017); thus this study adds to the current body of literature by analyzing the outcomes of debriefing in a clinical skills lab.

Although the best method of debriefing may be uncertain (Sawyer et al., 2012); debriefing must follow an empirically based theoretical framework (INACSL Standards Committee, 2016a). Many methods of simulation debriefing are prevalent in the literature (Gantt,

Overton, Avery, Swanson, & Elhammoumi, 2018); however, identifying the most effective method of debriefing is scarce (Willard, 2014). Current, acceptable methods of debriefing summarized by INACSL Standards Committee (2016a) include Plus-Delta, Gather, Analyze, Summarize (Cheng et al., 2014), Debriefing with Good Judgement (Rudolph, Simon, Dufresne, & Raemer, 2006), PEARLS (Eppich & Cheng, 2015), and Debriefing for Meaningful Learning (Dreifuerst, 2009).

Debriefing with Good Judgement. An example of a debriefing framework supported in the literature is “Debriefing with Good Judgement” (DGJ) (Dreifuerst, 2009; Rudolph et al., 2007). The debriefing framework in this study was DGJ (Rudolph et al., 2007). DGJ is experiential learning where a facilitator guides the learner through the reflection of the activities. This framework is based on Schön’s reflective practice and has three components: frame, action, and results. First, learners apply “meaning” to information in frames or “schemata.” These frames are invisible to the teacher. Instructors also have their frames of understanding the information. The second and third components, action, and results, are observable. Incorrect actions may result from how the learner interprets the frame. The learner may have performed the correct action based on their interpretation of what was happening in the frame (Rudolph et al., 2007).

Rudolph et al. (2007) explain that DGJ is an advocacy/inquiry debriefing framework. This framework posits advocacy is the hypothesis behind an observation, and inquiry is a question about how students saw the situation (or frame). The focus of the debrief is understanding the rationale and norms the learner and teacher have of the frame. This method tries to explore why learners took actions. Steps in this process are first for the instructor to notice the learner’s result. Second, the instructor observes the actions and their results. Third,

the instructor discovers with the learner their understanding by asking questions to reveal how the learner interpreted the frames. Through this advocacy and inquiry process, a process for change is built to trigger learning (Rudolph et al., 2007). This debriefing technique can use video replay to enhance a student's self-reflection on their actions and provide a reference for the instructor to inquire about a student's understanding of the frames.

Willard (2014) investigated whether DGJ had a significant difference in nursing student's learning experience as compared to unstructured debriefing (Willard, 2014). Results indicated a statistically significant ($p = .017$) preference for DGJ as compared to the school's standard debriefing method with a medium effect size ($d = .52$). The success of the project resulted in the creation of simulation-based training workshops in DGJ at the school (Willard, 2014).

One concern with debriefing is the student's psychological safety. When students feel judged, learning is impaired (McDermott, 2017). McDermott (2017) conducted a quality improvement project at a nursing school to evaluate if DGJ improved debriefing. Nursing students ($n = 125$) engaged in simulation debriefing with DGJ to evaluate this type of debriefing on student's psychosocial safety. Most students positively reacted to DGJ with scores of 4.9 out of five points. Comments from students included the DGJ allowed "improved learning and insight," ability to "focus on reflection," and feeling the debriefing was "less judgmental than previous simulations" (McDermott, 2017, p. 6). The researcher concluded that DGJ decreased anxiety and increased student's satisfaction.

The Use of Video as an Innovative Teaching Strategy

Researchers describe videotaping as a method to improve performance, self-reflection, and enhance debriefing (Ali & Miller, 2018; Strand, Gulbrandsen, Slettebø, & Nåden, 2016; Winters, Hauck, Riggs, Clawson, & Collins, 2003). Ali and Miller (2018) reported improved

learning outcomes for psychomotor skills using video-enhanced debriefing. Strand et al. (2016) noted that video recording skill performances allowed a method for self-reflection and evaluation to improve psychomotor skill competency.

Appropriate feedback techniques include face-to-face, numeric, checklist, scoring, or video replay (INACSL Standards Committee, 2016a). Many advocate the use of video to enhance debriefing (Arafeh, Hansen, & Nichols, 2010; Boet et al., 2011; Cheng et al., 2014; Sawyer et al., 2016); however, current literature provides mixed findings to support video enhanced debriefing as the “gold standard” (Levett-Jones & Lapkin, 2014). The facilitator guiding the debriefing process may use video as objective evidence of student’s performance in meeting the learning outcomes. A video of the learner’s performance was meaningful for the learner in a case of unsatisfactory performance or in a case of outstanding performance (Sawyer et al., 2016).

Besides the mixed findings supporting the usage of video, the literature was also inconsistent regarding the method of VED integration in simulation (Ali & Miller, 2018; Cheng et al., 2014). In an integrative review of the literature, Ali and Miller (2018) noted that the use of video in debriefing ranged from using the entire video to using specific clips of the video. These researchers also noted the variation in the amount of time spent reviewing the video during debriefing. Another variation in the literature was video use in a facilitated debrief or if video use was for self-debriefing. Boet et al. (2011) found that both video-assisted debriefings with an instructor and without an instructor, as in self-debriefing, resulted in improved crisis management skills. Although research on debriefing with the use of video varied between the simulation’s objective and the use of the video during the debriefing, the consensus was that the use of video improved learning outcomes.

Video to Enhance Skill Performance

As previously discussed, nurses' performance of skills is imperative for patient safety, especially for the reduction of CAUTI by improving skill performance of IUC. The use of video may improve skill performance. A blinded, randomized trial of 32 novice undergraduate medical students learning suturing compared general performance scores using Objective Structured Assessment of Technical Skills (Martin et al., 1997) between three groups: lecture of common mistakes found with skill, unsupervised video feedback, and individualized student feedback with video (Nesbitt et al., 2015a). All three groups showed statistically significant improvement in skills scores: lecture ($p = .007$), unsupervised video feedback ($p = .003$), and individualized student feedback with video ($p = .0001$). However, the general performance scores demonstrated improved statistical significance between the groups using video (both individualized and unassisted) as compared to standardized lecture feedback (Nesbitt et al., 2015a).

In a study with nursing students, a pilot study conducted by Chronister and Brown (2012) compared the use of verbal and verbal with video debriefing among 37 senior BSN students participating in a critical care simulation. The results indicated a statistically significant decreased time initiating the cardiac resuscitation skill ($p = .028$) in the group with video-assisted debriefing; however, both groups improved their assessment ($p = .025$), and the video-assisted debriefing group did not show a statistically significant gain over the control group ($p = .71$). Researchers concluded that verbal feedback might increase knowledge, but verbal and video feedback may positively influence assessment and psychomotor quality and speed (Chronister & Brown, 2012). Although this study demonstrates some improvement using video with the cardiac resuscitation procedure, it is unknown how video-assisted debriefing affects a complex sterile procedure skill.

Byrne et al. (2002) conducted a randomized control trial examining the effects of video compared to no video on anesthesiology resident's time to solve the problem. A convenience sample of 32 residents was equally divided into two groups. The control group received no video, but a brief explanation between each of five simulations. The experimental group was shown a video of their performance and received a brief explanation between each of the simulations. Although the experimental group demonstrated less median time to solve the problem (0.68) compared to the group without video (1.18), the difference was not statistically significant ($p > .05$). The researchers concluded that the lack of statistical significance might be a result of how they measured performance rather than lack of effectiveness of the video (Byrne et al., 2002).

Video has been used in physical education and sports to provide the learner visual objective feedback about their performance. In a study of 27 students learning overhand throw with the non-dominant arm, one group received verbal feedback about performance, and the other group received the verbal feedback in addition to watching a video of their performance (Kernodle, Johnson, & Arnold, 2001). The distance thrown, throwing mechanics, and throwing form was assessed in the two groups. There was no significant difference between the group for distance thrown at posttest; however, the group who received only oral feedback retained information for throwing form better. Researchers concluded that one reason the video did not enhance learning was the video provided too much information for the beginner to process (Kernodle et al., 2001).

A comparison of verbal feedback, video and verbal feedback, and no feedback on the effects of how the feedback method motivated repetitive practice and learning breaststroke was conducted (Ferracioli, Ferracioli, & Castro, 2013). Participants answered a questionnaire to

assess the effect of the feedback on motivation. Instructors provided performance scores. Both the verbal and verbal plus video groups were more motivated than the group without feedback. All groups improved performance, but the group receiving only verbal feedback was significantly higher than the group without any feedback. Researchers concluded the videotape feedback was no more effective than verbal feedback for motivating swimmers to engage in the tiring, repetitive practice. The researchers did feel the motivation assessment may not have captured all aspects of the learner's motivation. Both verbal and verbal plus video group had a significant increase in learning compared to the group without any feedback; however, there was no significant difference between the verbal and verbal plus video groups. Researchers felt one explanation for the video not being superior to verbal was the video provided too many stimuli to the beginning learner. The researchers concluded that video and verbal feedback are useful tools for motivating learners to overcome a tiring task (Ferracioli et al., 2013).

Another study found the use of video to be a more effective form of feedback for physical education students learning hurdles in track (Palao, Hastie, Guerrero Cruz, & Ortega, 2015). The use of verbal feedback from teachers, verbal teacher feedback and video of the performance, and video with peer feedback were compared to evaluate effects on skill execution, technique, knowledge gained, and level of practice. Each method demonstrated improvements in different areas. The video with teacher feedback resulted in significant improvement in skill, technique, knowledge, and level of practice. Those who received the video and peer feedback had significant improvement in technique and level of practice, but not knowledge. Those who received video and teacher feedback had significantly greater outcomes, although teachers expressed anxiety using video as an instructional method. Instructors provided qualitative feedback stating they did not feel prepared to use the technology; however, they felt the use of

video did motivate student's interest in learning. The researchers concluded that the quality of the feedback received from the instructor might be more valuable than the increased quantity of feedback given between peers. It was also felt that the students might not have been able to identify errors. The video may have led to more active engagement among the students. In summary, the researchers felt the use of video might support learning; however, if the instructor must have positive attitudes toward the use of video in the classroom (Palao et al., 2015).

Strand et al. (2016) in a qualitative study of first-year BSN students examined how the use of video recording affected their learning of psychomotor skills. The skills in this study were hand washing, occupied bed making, and intramuscular injections. A participant described the benefit of using video in psychomotor skill development as "sometimes I do not understand my performance until I see it on the video playback. If words do not make sense, the footage provides reflection and meaning" (Strand et al., 2016, p. 2577). Students felt the use of video recording was effective in improving their psychomotor skill learning (Strand et al., 2016). This study provided evidence to support the use of video in psychomotor skill acquisition but did not include quantitative data or contain data using a sterile procedure.

Yoo, Yoo, and Lee (2010) compared the use of self-reflection of a video recording to a written evaluation on the competency of the IUC skill among a group of 40 nursing students. The experimental group video-recorded their IUC skill and self-reflected on their performance using the course skills checklist. Self-reflection with video group performed higher ($p < .0001$) on skill competency than the control group receiving only written feedback of their skill. The researchers concluded that the video recording self-assessment group retained the information longer, possibly because of more engagement in active learning through the use of the video (Yoo et al., 2010).

Despite the variation in research results of the types of feedback (video, video with expert verbal feedback, video with peer feedback, video with self-reflection, and feedback without video), all researchers support the use of providing feedback to learners for improving skill. Based on published literature describing the benefits of video on psychomotor skill learning outcomes, Hoyt (2016) conducted a pilot study for two semesters on the use of video assessment to validate student's sterile technique. A poster presentation with "Professor Rounds" of this pilot project was presented and well received in Grapevine, Texas at the 2016 INACSL Conference. The study compared the use of student-submitted video recordings for grading to the previous customary live instructor course evaluation method of student's IUC skill performance. The pass rate for the five semesters using live instructor skill validation before the pilot evaluation method was 75%. The first-time success rate increased from 75% to 83% with students submitting their video for summative course grading (Hoyt, 2016).

Besides the improved first-time skill performance rate, another advantage of this grading pilot included student's stating that they practiced the skill more using video verification than if an instructor validated their performance live. Students explained they spent more time practicing the skill while trying to capture a perfect recording of their IUC insertion technique. Students reported they felt confident with the skill submission as they could self-evaluate their performance before the instructor received the video, thus reducing anxiety (Hoyt, 2016).

The pilot did have limitations. While re-recording the skill to improve performance was a positive attribute, students occasionally spent time re-recording a skill due to inept videography ability or technical challenges. Also, improper recording occasionally did not provide a clear video angle to determine if contamination of the sterile field occurred (Hoyt, 2016). This pilot

was the impetus for researching the further benefits of using video in psychomotor skill acquisition.

Video to Enhance Reflective Practice

Although the literature specific to the use of video-enhanced debriefing for psychomotor skill acquisition was limited, researchers analyzed the use of video in the reflective practice stage of simulation-based learning (i.e., debriefing). Advantages of using video with debriefing were that the video added objective data, in real time, to the discussion (Arafeh et al., 2010), provided a platform to begin conversation about the simulation performance (Grant et al., 2010), improvement of student's reflective practice (Strand et al., 2016), and provision of visual reinforcement (Chronister & Brown, 2012).

Watts et al. (2009) noted the use of video assessment as a positive teaching innovation, improving student's ability to self-reflect and recognize areas to improve. By learning how to self-regulate when learning a psychomotor skill, the nurse learns a critical component for expert practice and life-long learning. This study did show one negative attribute of self-reflection of one's skill performance. If a student were unable to identify they made a mistake (i.e., they thought the performance was perfect when an error existed), then students would continue to repeat the mistake causing difficulty "unlearning" the behavior in the future (Watts et al., 2009).

Researchers have also found that the use of video in debriefing did not have significant effects on learning. In a study of 42 anesthesia residents comparing oral feedback, video-assisted verbal feedback, and no debriefing in a simulated learning experience for improving non-psychomotor skill outcomes (crisis resource management), researchers did not find improvement in the group without feedback (Savoldelli et al., 2006). The groups receiving feedback (either oral or video) did demonstrate significant improvement ($p = .005$) in crisis resource

management. No significant difference was found between the group receiving oral and video-assisted oral feedback. Savoldelli et al. (2006) study did demonstrate the benefit of debriefing (oral or video-assisted oral) over no instructor debriefing. As their study's focus was crisis resource management, a gap still exists if the use of video in debriefing enhances reflective practice and learning outcomes for psychomotor skill acquisition.

Another randomized control study comparing oral feedback to video-assisted feedback on outcomes in neonatal resuscitation resulted in no educationally significant difference ($p = .59$) between the groups (Sawyer et al., 2012). In contrast to the Savoldelli et al. (2006) study, Sawyer et al. (2012) did not include a group without debriefing, as authors felt the omission of debriefing from any simulation-based learning experience resulted in minimal educational benefit. As with the Savoldelli et al. (2006) study, a specific psychomotor skill performance was not the focus for using video-enhanced debriefing for reflective practice. The video intervention alone may affect the reflective practice and satisfaction with learning as a novel, innovative technology teaching intervention.

Student Perception of Satisfaction with Video Debriefing

As with the inconsistency and scarcity of literature regarding the most effective type of debriefing with psychomotor skills previously discussed, Nesbitt et al. (2015a) found few studies regarding student's attitudes toward feedback methods for psychomotor skill acquisition. Cheng et al. (2014) conducted a review of the literature of debriefing methods identifying characteristics of effective debriefing methods in studies May 2011 through December 2012. Of the 71 studies reporting the use of video playback during the debriefing, four compared the use of video-assisted debriefing with no video-assisted debriefing. The studies reported time and process, but not student satisfaction with video. These authors noted that the use of debriefing is uncommon

when learning procedural skills; therefore, research is warranted on the use of debriefing when learning psychomotor skills (Cheng et al., 2014).

A randomized study of 32 medical students performing suturing compared student satisfaction of feedback between three groups: general lecture feedback of common mistakes, self-reflective video feedback, and individualized instructor feedback with video (Nesbitt, Phillips, Searle, & Stansby, 2015b). Participants provided feedback regarding satisfaction through three statements on a questionnaire using a 5-point Likert scale. Those randomized into either group receiving video feedback (self-debriefing or instructor guided) demonstrated significance satisfaction of feedback in comparison to the non-video standard lecture feedback. Individual video-assisted and self-debriefing video feedback both demonstrated statistically significant ratings over lecture debriefing for how the feedback positively impacted future performance and student's satisfaction of feedback method. Researchers also collected participants perceptions of the feedback from an open-ended question regarding the advantages and disadvantages of types of feedback. Some advantages of individual video feedback presented were the ability to receive feedback for a specific area of weaknesses and mistakes requiring improvement. The most common disadvantage had to do with the significant amount of time consumed with individual feedback. Those receiving self-debriefing video feedback (i.e., they viewed their video without instructor feedback) stated the advantages were that they could compare their performance video to an expert video, and they had an opportunity to detect their errors. The disadvantage of unassisted video feedback was the lack of expert feedback to detect their unknown errors (Nesbitt et al., 2015b). This current study complements these results by determining a novice nursing student's perception of instructional method satisfaction using VED when learning a sterile technique.

Hargiss and Royle (2015) conducted a quantitative, quasi-experimental study comparing video-assisted and oral debriefings on the effect of the student's opinion of the debriefing experience. Participants were first-semester, baccalaureate nursing. A convenience sample of 40 students was equally divided into the oral debriefing and video debriefing groups. The simulation was a three-hour unfolding case scenario. Both groups used Tanner's Clinical Judgement Model for the debriefing framework. No statistically significant difference between the two methods of debriefing was found (Hargiss & Royle, 2015).

Additionally, a study analyzed the perceptions of 24 nursing students learning pediatric nursing skills with video recording (Brimble, 2008). Students in the study positively reacted to the use of video assessment for the visual feedback, self-evaluation, and improved grading objectivity. Before the use of the video, researchers categorized common themes reported by participants about their feelings using video, such as concern with making mistakes, feeling nervous, their "performance being affected by filming" or feeling "being judged by others" (Brimble, 2008, p. 28). Post-video implementation themes were more positive regarding the use of video for learning psychomotor skills. These themes included improvement in practice, "increase confidence," "learn by watching others," "objectivity," and "good teaching and learning method" (Brimble, 2008, p. 29). The researchers concluded that the use of video in clinical skills was useful, but additional research would facilitate definitive conclusions. Despite student's reluctance to using video as a teaching tool due to increased anxiety, students felt the benefits of video outweighed the initial anxiety (Brimble, 2008; Strand et al., 2016).

Although the research studies in the literature show mixed findings for the effectiveness of video in various educational settings among a variety of disciplines, Beseler and Plumb (2018)

combined the various research findings to compile a list of best practices for using video in the classroom for enhancing effectiveness and student satisfaction.

1. The use of video can provide frequent feedback through peer video analysis in large classrooms where the instructor is not able to provide numerous interactions with each student. Using video students perceive they have more attention from their peer-tutor, the students are more involved with active learning, the teacher can work with weaker students, and the use of a peer tutor comforts students who perceive they are weaker.
2. Students should choose their peer tutor to increase their comfort.
3. Students must know the critical components of the skill before practicing.
4. Instructors need to provide a simplified checklist of the critical components for students to focus on. The authors provided a critical component checklist with pictures of the critical steps performed correctly and incorrectly.
5. Students need to be familiar with technology and have many opportunities to use the technology to become comfortable viewing themselves on video.
6. Using the peer tutor technique, the teacher must focus on advising the tutor and not the learner. The teacher should guide the tutor on how to correct the learner.
7. Provide the students with a challenge and deadline for them to set personal goals. The challenge could be as simple as performing a certain number of items on the checklist correctly by a given date.
8. Ensure the students are rotating between performer and tutor position viewing footage of the video between the rotations. Rotating tutor and performer ensures the students utilize the video technique and minimize fatigue during repetitive practice.

9. Show video footage, with student's permission, in slow motion on a screen with a minimum of 40". This slow motion allows students to see critical components they missed in real time (Beseler & Plumb, 2018).

In summary, despite limited literature analyzing student's satisfaction with the use of video to support psychomotor skill acquisition, the two studies described supporting the use of video to enhance student satisfaction, and one study did not show significant differences in satisfaction between the use of video and no video. Guidelines for using video in the classroom based on a literature review was described. This study adds to the body of literature by analyzing the use of video in nursing students, completing a complex skill effect on student satisfaction.

Student Satisfaction with Learning

Important to DP is the learner's motivation to continue to exert effort when the task is not inherently pleasurable. By understanding students' reaction to a simulated learning experience, we may be able to identify factors to improve the learner's perception of the arduous task of continuous, purposeful practice. The IUC insertion for this study was a simulation-based learning experience (SBLE). A standard of simulation pedagogy is to evaluate the SBLE (INACSL Standards Committee, 2016d), and this evaluation is often completed using Kirkpatrick's Framework (INACSL Standards Committee, 2016c).

Kirkpatrick's Framework evaluates the SBLE at steps progressing through levels of reaction, learning, behavior, and finally results (Kirkpatrick, 1996). The first step, reaction, addresses how the learner felt about the learning activity. Measurement at the reaction level may include the topic, instructor, or even the setting, and translates to an assessment of the learner's feelings, but not the actual learning. Assessment of the reaction provides an understanding of the

learner's motivation toward the learning experience. This study focused on the student's satisfaction with an innovative teaching strategy. The second level, learning, is an evaluation of the learner's knowledge, skill, or even their change in attitude gained from the activity. The third level measures the learner's behavior change because of the SBLE, or the transfer of the learning to the clinical setting. The final stage is the evaluation of the improvement in outcomes resulting from the intervention. These results are often on a larger scale, such as the improved outcome of an organization (Kirkpatrick, 1996).

Consistent with evaluation at the first level of the Kirkpatrick Framework, one early benefit revealed by researchers for using simulation in nursing education was student satisfaction with the pedagogy (Weaver, 2011). During the 1990s, the use of high-fidelity (life-like) patient simulators transformed health education (Bradley, 2006). Since this time, researchers using simulation as a pedagogy published findings supporting this expensive teaching method (Bradley, 2006). Outcomes in simulation research often fall into technical (skill), nontechnical (cognitive or interpersonal skills), or the learner's satisfaction with the simulation's perceived importance or quality (Taylor & Geis, 2014). In a descriptive study exploring the use of simulation in nursing education, participants felt simulation pedagogy allowed them to critically think, prepare for "real life," and simulation increased their confidence in skills (Abdo & Ravert, 2005). A separate study used a descriptive, correlational design to analyze student satisfaction of a simulation pedagogy using the National League for Nursing (2005) Student Satisfaction with Learning Scale (SSLS). Data analysis resulted in overall mean satisfaction of 4.5 ($SD = 0.5$) with 5 being the strongest agreement of satisfaction concluding students were satisfied with simulation as a pedagogy (Smith & Roehrs, 2009).

The focus of this study was at Kirkpatrick's first level of reaction and was measured with the National League for Nursing (2005) Student Satisfaction with Learning Scale (SSLS). The SSLS measures students' satisfaction of five elements related to learning in a simulated environment (Jeffries & Rizzolo, 2006). These five elements rating students' instructional satisfaction are: 1) the satisfaction a student has with the teaching method used to meet the educational objective, 2) satisfaction with the variety of learning materials and activities used to promote learning, 3) facilitation of the activity, 4) how the teaching materials motivated students to learn, and 5) how suitable the learning activity was for meeting the objective based on the way the student learns (Franklin et al., 2014). Using these five elements of the National League for Nursing (2005) SSLS as an advanced organizer, this section addresses student's perceptions of learning psychomotor skills using simulation.

Satisfaction with Teaching Methods

Student's perceptions of the helpfulness and effectiveness of the teaching methods used for teaching psychomotor skill were evaluated in this study. Adhering to INACSL Standards Committee (2016d) standards of simulation, assessment of student's reaction to the teaching activity using the Kirkpatrick's Framework provides an understanding of the learner's motivation toward the learning experience (Kirkpatrick & Kirkpatrick, 2006).

A factor for improving student's learning experience is through the use of peers. Peers were found to be a crucial factor in promoting positive psychomotor learning experiences (Aldridge, 2016; Oermann et al., 2016; Wulf, Shea, & Lewthwaite, 2010). BSN participants in a qualitative study reported that the collaboration of peers benefited their psychomotor skill learning (Aldridge, 2016). Participants received the collaborative benefit through performing the skill and observing their peer by video-recording their peer's performance. Thus, the increased

peer collaboration using video recording as a teaching method may improve student's satisfaction. Another study supported the use of peer learning to enhance student satisfaction through a posttest survey study of 97 nursing student's validating each other's psychomotor skills (O'Brien, Talbot, & Santevecchi, 2015). Perceptions of learning experiences with peer-student validation were compared to instructor-validation. Those in the peer-student validation were more satisfied with the skill lab content organization ($p < .04$) and more satisfied with the amount of practice time ($p < .04$). O'Brien et al. (2015) concluded that peer-student validation enhanced nursing student's involvement in learning, increasing their learning satisfaction.

The use of peer video recording as a teaching method also generates increased practice opportunities. The more one practices a psychomotor skill, the less attention they require to perform the skill, resulting in a smoother, more automatic process (Langan-Fox et al., 2002). A student must practice a psychomotor skill to progress through the cognitive, associative, and autonomous stages of motor skill learning as discussed in an earlier section. Repetition of the skill enhances long-term retention of the skill and reduces errors (Oermann et al., 2016).

A review of the literature of nursing student's perceptions of learning psychomotor skills of 96 articles from 1980 to June 2016 found time to learn skills was essential (Aldridge, 2017). A qualitative study of 224 BSN students revealed a common theme that having more time to practice improved student's satisfaction with psychomotor skill learning (Strand, Naden, & Slettebø, 2009). Researchers have stated the importance of DP, addressed in a previous section, and increased time in the curriculum for students to practice skills (Gonzalez & Kardong-Edgren, 2017; Oermann, Molloy, & Vaughn, 2015; Ross et al., 2015).

The Diversity of Learning Materials

Another aspect of student satisfaction of learning is the diversity of learning materials. The use of a simulated clinical lab and life-like manikins are common in nursing education. However, the use of video recording is an innovative teaching strategy, facilitating the learning of a complex psychomotor skill. In a qualitative study of undergraduates learning psychomotor skills, the use of video emerged as a theme to facilitate learning (Aldridge, 2016). A student's video recording of their skills procedure provided a valuable method to critique the skill performance and to provide a reference for the skill in the future. One participant described the contribution of self-recorded video to learning by stating, "I knew that I missed something that I didn't catch—that I had possibly contaminated or touched something I wasn't supposed to—I was able to go back and video the recording and then just catch little things I couldn't catch by myself" (Aldridge, 2016, p. 88). In a separate qualitative study, a group of 470 beginning BSN students used video recording as a learning method in a clinical skills lab (Strand et al., 2016). The researchers reported students felt the use of video promoted self-assessment and reflection; however, a limitation was a risk of repeating an error if students or peer did not detect a mistake (Strand et al., 2016). Finally, a quantitative study of 161 students enrolled in a problem-based learning course was conducted to determine if a diversity of learning materials improved education outcomes (Winkel, Rikers, Loyens, & Schmidt, 2006). The researchers found increased achievement scores and increased study time when a larger quantity and increased diversity of learning resources were available (Winkel et al., 2006). This current study adds to the quantitative literature analyzing the use of video as unique learning material on student satisfaction.

Facilitation

The instructor, often referred to as the facilitator in simulation literature, is the person who manages the simulated learning experience. INACSL Standards Committee (2016b) addressed the importance of facilitation in simulation pedagogy. First, the facilitator must be trained to facilitate simulation experiences and possess the knowledge, skills, and attitudes in simulation pedagogy. To meet this criterion, the facilitator must create a positive, respectful relationship with the learner. Second, based on the learner's level of knowledge, experience, and abilities, the facilitator must be able to adjust the learning experience. Moreover, the facilitator must guide the learner in supporting their educational objectives after the simulated experience, and guide them to apply the learning in the future (INACSL Standards Committee, 2016b). This guidance is consistent with an instructional design principal of a caring and supportive teaching environment supporting adaptive attributions and supporting self-determination theory (Pintrich, 2003).

Aldridge (2016) found the instructor to be a crucial factor in student's psychomotor skill learning experience. The instructor's attitude during skill learning was important. One participant in the qualitative study stated, "instructors in skills in particular *have to be* engaging and encouraging and current...you know, *nice*....Even if you're doing something wrong, be able to speak nicely about it" (Aldridge, 2016, p. 101).

In another qualitative study of nursing students from two universities, six themes important to facilitation were identified (Parsh, 2010). The researcher found that the themes for successful facilitation were the instructor's personality, teaching ability, evaluation, nursing competence, interpersonal relationships, and realism. The researcher concluded that student's knowledge acquisition might be best developed through effective facilitation (Parsh, 2010).

Finally, during the development of The NLN Jefferies Simulation Theory (Jeffries, 2016), evidence-based characteristics of a facilitator emerged from the literature review. The characteristics of the facilitator were felt to affect the simulation significantly. The facilitator must have effective interaction with the student, appropriate feedback in the debriefing, and experience to respond to student's needs (Jeffries, 2016). Although the literature supports the importance of instructor facilitation when learning, a gap exists if the use of VED improves the facilitation learning a psychomotor skill.

Teaching Materials Promoting Motivation

Teaching materials can affect a student's motivation. The SSLS instrument evaluates the extent to which the student is satisfied with how the teaching materials motivate them to want to learn. Students must be satisfied with the learning method. With this in mind, Pintrich (2003) motivational theory can explain factors that prompt a student to move towards a behavior. This theory postulates that if a student believes they can be competent at a task, then they are motivated to learn the task.

In contrast, if one does not feel they can succeed in the task, then their motivation to learn is diminished. Also, this theory posits that if a student is over-confident in their ability to perform a task, they may not be motivated to change their performance (Pintrich, 2003). Consequently, these motivational factors affect student's learning goals for their purpose and desire to engage in a task (Pintrich, 2003). Although the literature discussing the motivational effects of video are scarce, the use of video may be a motivating teaching approach—providing an objective method for assessing the actual performance and opportunities for students with varying levels of confidence to improve.

One of the limited examples demonstrating student's motivation for learning psychomotor skills was in a qualitative study of nine senior, undergraduate nursing students learning these skills (Aldridge, 2016). A theme that some skills were more valued than others emerged. Sterile technique psychomotor skills were felt to be more challenging to learn because "...I have to stop myself and become more aware of my environment, and things I can touch and cannot touch. So this prevented me from learning it as quickly..." (Aldridge, 2016, p. 84). Participants felt since they would perform this skill on an actual human, they valued learning the skill and were motivated to learn the skill in the simulated clinical lab. This research also found a theme regarding the importance of peer recording for critique and reference (Aldridge, 2016). The value student's place on the skills and the skill's perceived complexity motivated students. The use of video provided an objective platform for evaluation of meeting the learning outcome.

Another study focused more on the use of video recording as a motivator. A descriptive and interpretive study with 470 first-semester BSN students investigated the student's experiences learning psychomotor skills with video recording (Strand et al., 2016). Peers conducted the video recording at three separate times with differing skills (handwashing, linen changes, and intramuscular injections). Researchers noted a theme that video promoted self-assessment and reflection by comments such as "Sometimes weakness in practice is difficult to believe until one sees it...,the video helps and provides meaning," and a theme of discovery learning "The digital recordings trigger my learning in a positive way and make me remember...I become aware in a new way" (Strand et al., 2016, p. 2577). The authors concluded the use of video increased student's self-confidence motivating students to learn (Strand et al., 2016).

Lastly, in another study Yoo et al. (2010) compared learning motivation between students ($n = 20$) receiving written feedback about their IUC performance to students ($n = 20$) who self-evaluated their performance of IUC using a video recording of their procedure. The group receiving the self-evaluation of their video recording scored statistically significantly higher ($p = 0.018$) on learning motivation than the control group measured by the Instructional Material Motivation Survey. The authors concluded that the more active participation using video as a teaching method resulted in positive results (Yoo et al., 2010). This study analyzes student's motivation using video during the formative process of learning a complex clinical skill.

Suitability of Simulated Learning Activity

The design of the learning activity used to teach impacts student's satisfaction of learning. First-year BSN students completed an open-ended questionnaire assessing how video positively or negatively affected the learning process (Strand et al., 2016). Researchers found two themes emerging from the data: the use of video promoted self-assessment and reflection, and that the video enhanced their ability to become aware of their kinesthetics while performing the skills. The authors concluded that the use of video recording as a teaching and learning method enhanced the learning of psychomotor skills among nursing students (Strand et al., 2016).

In a study of two convenience groups comparing nursing students and registered nurses, participant satisfaction with the use of video recording was analyzed (Hill, Hooper, & Wahl, 2000). The group of nursing students ($n = 12$) completed intravenous insertion and reported satisfaction with the use of video as a learning activity. The second group of registered nurses ($n = 9$) accessed an indwelling vascular catheter and reported being very satisfied with the use of video as a learning activity. The registered nurses scored higher satisfaction of the learning than

the nursing students. The authors concluded that experienced persons valued the video recording more than novice persons (Hill et al., 2000).

Another study focused on the use of video, more specifically during the debriefing process. Wittler et al. (2016) compared video-assisted debriefing to verbal only feedback in 15 Emergency Medicine novice interns performing a complex sterile procedure, central venous insertion. The two groups reported the same level of satisfaction with the verbal only and video-assisted feedback. The researchers stated given this novice group, any feedback to students may increase the skills performance (Wittler et al., 2016).

In summary, using SBLE to teach IUC may be evaluated and researched at Kirkpatrick's first level, reaction. Peer collaboration improves student's satisfaction with learning as does (Aldridge, 2016; O'Brien et al., 2015) more time for practice (Aldridge, 2017; Oermann et al., 2016; Strand et al., 2009). The use of VED enhances peer collaboration and increases practice time the time for practice also improves student's satisfaction with learning. The use of video is a different learning material also supports student's satisfaction in learning (Aldridge, 2016; Strand et al., 2016; Winkel et al., 2006). Qualitative studies supported the importance of facilitation to student's satisfaction with learning (Aldridge, 2016; Jeffries, 2016; Parsh, 2010). The use of video as a teaching method motivated student's learning (Aldridge, 2016; Strand et al., 2016; Yoo et al., 2010). This study provides more data to analyze the use of video in clinical skill acquisition. Finally, the use of video for learning psychomotor skills was a satisfying learning activity receiving mixed results based on the level of student's experience (Hill et al., 2000; Strand et al., 2016; Wittler et al., 2016). This study adds to the body of literature by analyzing first-semester nursing students satisfaction using VED as a learning activity.

Conclusion

Although researchers recommend limiting the use and duration of use for IUC, there are times when it is medically necessary (Gould, Umscheid, Agarwal, Kuntz, & Pegues, 2010). In these cases, it is imperative that the skill is performed correctly to minimize risk to the patient. The limited opportunities for students to practice this skill in clinical practice with actual patients further minimizes the repeated practice opportunities for students (Hayden et al., 2014). Simulation-based clinical education may provide the only opportunity for students to perform this skill before becoming employed as an RN and responsible for performing the skill accurately and independently without the guidance of an instructor (Hayden et al., 2014; McGaghie et al., 2016). Due to the limited time in the BSN curriculum to focus on clinical skills, it is imperative that the skill is learned correctly and deeply when introduced. Methods to reduce skill decay using concepts from deliberate practice (Ericsson et al., 1993) and reflective practice (Schön, 1983) enhance the initial learning for transferring the skill in long-term memory. A principal of deliberate practice is ensuring the learner stays motivated to purposefully practice the skill, even when they lack motivation (Ericsson et al., 1993). Examining a student's satisfaction with learning recognizes opportunities to improve a student's motivation to learn (Jeffries & Rizzolo, 2006). Innovative teaching strategies, such as the use of VED, may provide a tool to improve student's satisfaction with learning. Debriefing and reflecting on actions of the simulated learning experience are critical components to learning (Fanning & Gaba, 2007; Issenberg et al., 2005; McGaghie et al., 2010, 2016; Raemer et al., 2011) and allowing the learner to reflect on actions to form a plan for deliberate practice. Although researchers advocate for the use of video use during debriefing (Arafeh et al., 2010; Boet et al., 2011; Cheng et al., 2014; Sawyer et al., 2016), a gap in the literature exists exploring the use of debriefing, and more specifically VED,

on acquisition of psychomotor skills. The purpose of this study is to examine the effects of VED, as a method of debriefing in a simulated clinical experience, to enhance initial skill acquisition, reduce skill decay, and improve student satisfaction with instruction.

CHAPTER THREE: METHODOLOGY

This study used an experimental design to test the following hypotheses.

Research Question 1. In first-year pre-licensure nursing students, does the use of video-enhanced debriefing (VED) decrease skill decay when compared to no VED? Skill decay was defined for the study as maintaining competency in the sterile indwelling urinary catheterization (IUC) skill two to four months after the student's initial skill validation.

- Hypothesis 1: Students in the VED group will demonstrate better performance than students in the control group at an initial skill validation (T_1), indicating the VED intervention improved skill performance at the time of learning.
- Hypothesis 2: Students in the VED group will demonstrate a smaller decline in skill performance from their initial skill validation (T_1) to a follow-up skill validation (T_2) than those in the control group, indicating VED group had less skill decay than the control group between T_1 and T_2 .
- Hypothesis 3: There is a positive relationship between self-reported IUC skill knowledge and skill performance (as measured by the Objective Structured Assessment of Technical Skill [OSATS]) at T_1 , indicating cognitive knowledge of the skill predicts initial skill performance.
- Hypothesis 4: There is a positive relationship between experience (as measured by the Experience Questionnaire) and skill performance (as measured by the Objective Structured Assessment of Technical Skill [OSATS]) at T_2 , indicating experience influences skill performance score.

Research Question 2. Are first-year pre-licensure nursing students satisfied with the use of video-enhanced debriefing as a teaching method for improving psychomotor skill acquisition?

- Hypothesis 5: Those in the VED group will provide higher scores on instructor feedback (as measured by DASH©) than those in the control group, indicating students had a better learning experience with VED.
- Hypothesis 6: Those in the VED group will provide more positive evaluations of the psychomotor learning experience (as measured by higher scores on the SSLS) than those in the control group, indicating that the VED provided a more positive psychomotor skill learning experience.

Sampling Method and Rationale

Participants were sampled from students enrolled in an undergraduate nursing course, Essentials of Nursing Practice, at a large, southern university. Participants had to meet the following criteria to be included in the study: pre-licensure students who were enrolled in Essentials of Nursing Practice lab for the first time, over 18 years of age, willing to fully take part in the study, and provided informed consent. Participants also had to be willing to perform a videotaped, sterile indwelling urinary catheterization (IUC) on a manikin in a simulated clinical setting and to participate in a debriefing with the Principal Investigator (PI). Finally, participants had to agree to abide by the “Classroom Behaviors” as described in the school’s handbook. Students were excluded if they were repeating the course, as they may have had more experience with the practice and testing of the skills. Students with experience working in a healthcare setting were also excluded, as their previous familiarity with medical environments may change the experiential learning in comparison to those without healthcare experience. The PI in

consultation with the school's administration identified the students meeting the criteria to participate.

The PI recruited participants by attending an Essentials of Nursing didactic class, where she described the study and extended an invitation for participation. As a reminder to potential participants, the PI followed up with an email to the student's listserv. Those participants provided informed consent prior to participating. After participants video recorded their IUC skill, they were randomly assigned to either the control or experimental group to achieve an equal number of participants in each group.

Unfortunately, similar studies did not report effect sizes (Bosse et al., 2015; Friedman et al., 2013; Wittler et al., 2016); therefore, power analyses were estimated using both small and moderate effect sizes. G*Power© (Faul, 2014) was used to estimate that at least 46 participants were needed to detect a significant treatment effect with 80% power, assuming a moderate effect size ($\eta^2_p = .06$) and moderate correlation ($r = .3$) between the post-test and follow-up assessments. A small treatment effect ($\eta^2_p = .01$) and moderate correlation between assessments ($r = .3$) would require a sample size of 272 participants. Since only 120 nursing students were available for recruitment, this was not an attainable sample size.

Participants and Description

The pre-licensure basic Bachelor of Science in Nursing (BSN) program enrolls students into the Orlando campus program in August. The program averages 126 students, with a current enrollment of 125. Most of the students were White and female.

A total of 51 students participated in this study. Consistent with the historical demographics of this program, most students were White and female. Only students randomized into the VED group received information to schedule the debriefing appointment at a time of

randomization. Although debriefing is best performed immediately after the objective-based learning experience (Cantrell, 2008), due to lack of research personnel, the advocacy/inquiry debriefing with the participant’s performance video occurred less than seven days after the participant recorded their performance. See Table 1 for the demographics of the sample.

Table 1: Study Population Demographics by Treatment

Study Population	Total Study Population	Total Study Population Percent	Received VED (n = 29)	VED Received Percent	Control Group (n = 22)	Control Group Percent
Male	7	13.73	4	13.79	3	13.64
Female	43	84.31	24	82.76	19	86.36
Other/Decline to answer	1	1.96	1	3.45	0	0
Black	3	5.88	3	10.34	0	0
Hispanic	19	37.25	11	37.93	8	36.36
Caucasian	27	52.94	15	51.72	12	54.55
Other/Decline to answer	2	3.92	0	0	2	9.09
Age 32	1	1.96	0	0	1	4.54
Age 22	2	3.92	0	0	2	9.1
Age 21	15	29.41	12	41.38	3	13.64
Age 20	32	62.75	17	58.62	15	68.18
Age 19	1	1.96	0	0	1	4.54

This study contained more Hispanic students than the usual historical demographic trend. Overall, the most frequent age of the participants was 20 years of age, followed by 19 years of age. Age ranged from 19 to 32 years; however, only one participant was 32, and one participant was 19 years of age. As shown in Table 2, the control group contained both outlying age

students. The most frequent age of the participants in both the control and experimental group was 20 years of age. The experimental group had more students age 21 ($n = 12$) than the control group ($n = 3$).

Instrumentation

Demographic information in this study was collected using the *Demographic Survey*. The survey was administered to collect participants' age, sex, and ethnicity. This data was consistent with demographics collected in similar studies (Bosse et al., 2015; Gonzalez & Sole, 2014; Martin et al., 1997). See Appendix B for the instrument.

The *Female Indwelling Urinary Catheterization Grading Rubric* (IUC Grading Rubric) was used to measure participant's performance of the procedure on a scale of 0-60. The rubric contained 22 criteria with points assigned depending on the number of steps in the element. Points ranged from two to six. A minimum score of 48 was required for the student to pass the skill. If the student scored between 48 and 50, then they received remediation from an instructor. If the student scored less than 48, then they received remediation, and the student could repeat the skill exam with two different instructors at least 48 hours later. This tool was the rubric the course instructors adopted for grading the skill. This tool was a teacher-created tool based on the teacher's clinical experience, teaching experience, and Potter et al. (2017b) indwelling urinary catheterization skill checklist. A similar tool has been used for grading over 400 IUC insertion procedures over the past two years without difficulty (D. Breit, Essentials of Nursing Practice Lab course lead instructor, personal communication, November 6, 2018). See Appendix B for the instrument.

The *Objective Structured Assessment of Technical Skill (OSATS)* was a second tool used to evaluate the overall performance of the IUC clinical psychomotor skill. Instructors rated the

student's ability to organize and handle equipment, manipulate equipment fluidly and timely during the skill, and overall performance techniques in six categories on a 5-point scale (1= *no proficiency* to 5= *proficient*). The International Association for Clinical Simulation & Learning (2018) endorsed the tool in a repository of instruments, and the tool is widely used in healthcare curricula to evaluate psychomotor skill. The tool has moderate internal consistency ($\alpha = 0.61-0.74$) for the global ratings (Martin et al., 1997). Inter-rater reliability of using OSATS tool to assess general skill performance across 20 studies ranged from 0.7 to 0.9, even with minimal rater training (Hatala, Cook, Brydges, & Hawkins, 2015). This tool was recommended for formative feedback by Hatala et al. (2015) after a systematic review of studies evaluating the use of the OSATS tool. Faulkner, Regehr, Martin, and Reznick (1996) found a high correlation between faculty ratings using the OSATS tool to discriminate between poor, average, and superior student performances. John Wiley & Son's, Inc. provided permission to use and publish the results of this tool. See Appendix C for permission and Appendix B for the instrument.

The *Perceived Sterile IUC Skill Knowledge Survey* was used to query the participants' self-assessment of their knowledge on the female genitourinary anatomy, materials necessary to insert IUC, and the steps involved with inserting an IUC. Participants answered on a scale of 1= *strongly disagree* that the participant feels knowledgeable, to 4= *strongly agree* that the participant feels knowledgeable. Creation of the instrument was based on similar studies that collected the information in a comparable manner; however, the other researchers did not report validity or reliability information of the instrument in their studies (Bosse et al., 2015; Wittler et al., 2016). Cognitive knowledge is the first step in learning a psychomotor skill (Langan-Fox et al., 2002; Oermann et al., 2016); therefore, assessing the student's perception of their self-reported cognitive skills at the beginning of the psychomotor learning exercise provided insight

into knowledge and preparedness of the participant at time of training. The sum of responses determined the final score. See Appendix B for the instrument.

Data from the *Experience Survey* tool was used to analyze the participant's experience with IUC insertion in a simulated and clinical setting. Participants reported the number of times they performed the IUC procedure in a clinical and simulated setting from the time they first learned the skill in the simulated clinical lab to the repeat time-delay skill testing. Researchers in similar studies also collected this data (Gonzalez & Sole, 2014; Wittler et al., 2016). A participant's experience performing a psychomotor skill results in increased skill performances (Arthur et al., 1998; Ericsson, 2004; Langan-Fox et al., 2002; Oermann et al., 2016). See Appendix B for the instrument.

The *Debriefing Assessment for Simulation in Healthcare (DASH) Student Version*© (Simon et al., 2010a) instrument allowed students to rate the debriefer on the quality of their debriefing. Both groups received an opportunity for self and peer debriefing, instructor feedback during practice, and feedback immediately after initial skill validation. The VED group also had the one-to-one advocacy/inquiry method of debriefing with the PI using the participant's video recorded skill performance. The DASH© instrument for evaluating instructor feedback is an empirically supported tool based on learning theory. The tool was demonstrated to be valid and reliable in a variety of disciplines, participant numbers, educational objectives, and physical or time restraints (Center for Medical Simulation, 2018). The tool contains 29 questions students answer on a 7-point Likert scale over six various elements. The elements on the survey assess the student's perception for how the debriefer set the stage for the learning experience, maintained an engaging context, organized the debriefing, conducted discussion to allow

reflective practice, identification of student's strength and weakness, and finally setting a goal for future performance with the student (Center for Medical Simulation, 2018).

The DASH© tool was endorsed for use by International Association for Clinical Simulation & Learning (2018) and is the tool used at the nursing program for evaluating facilitator debriefing (L. Gonzalez, personal communication, August 1, 2017). Brett-Fleegler et al. (2012) measured the reliability and validity of the tool with 114 instructors using the DASH© tool to rate three different recorded debriefing sessions. The inter-rater reliability using interclass correlation of the combined elements of the tool was 0.74. The relationship between scores on DASH© among the 114 raters had a Cronbach's alpha of 0.89, indicating strong internal consistency among raters (Brett-Fleegler et al., 2012). The Center for Medical Simulation (2018) provided permission to use the DASH© tool and republish findings if they are provided a copy of the results using the tool. See Appendix B for the instrument.

The final instrument in this study was the *Student Satisfaction in Learning* survey (SLSS), which consisted of five Likert-type questions from the National League for Nursing (2005) *Student Satisfaction and Self-Confidence in Learning* survey. The five questions were used to assess the students' satisfaction with how the teaching method facilitated learning. Students respond to the five questions with one of five choices of agreement with the statement (1= *strongly disagree* to 5= *strongly agree*). The average of responses determined the final score. The instrument was shown to be reliable with an overall internal consistency of $\alpha = 0.92$ and sufficient validity for education research among 2200 surveys completed by novice nurses (Franklin et al., 2014). Permission to use the tool was granted through the National League of Nursing for members, of which the PI is a member, conducting educational research (National

League for Nursing, 2018). An analysis of the results showed whether students were satisfied with the use of VED as a teaching method. See Appendix B for the instrument.

Procedures

Approval for recruitment of Essentials of Nursing Practice Lab students and the use of facilities received administrative approval. See Appendix C for documentation. Essentials of Nursing Practice Lab faculty of record were informed of the student's invitation to participate in the study, but the faculty did not have knowledge of which students participated unless the student volunteered the information. The faculty were provided an explanation of the study's purpose and potential benefits to the student, as stated in Institutional Review Board (IRB) application. See Appendix A for IRB application.

Essentials of Nursing Practice Lab students were recruited to participate on October 8, 2018. The PI attended Essentials of Nursing Practice didactic class at an agreed upon time with the course lead as not to disrupt learning. The students were provided with information about the PI, a brief description of the study, how they were chosen for participation in the study, exclusion criteria, requirements of the study, benefits, anonymity and confidentiality, and PI's contact information. The information was also sent electronically via the student cohort's listserv as stated in the IRB application. Participants consented for the research by affirmatively answering the first question on the Qualtrics survey indicating the participant read, understood, and could meet the requirements of the study. The recruitment occurred within the nursing school's building, and the Qualtrics survey was distributed to the student's listserv that they completed at a location of the student's convenience. Any student could decide to participate in the study through November 3, 2018. The PI followed HRP-509 "SOP: Informed Consent Process for Research." See Appendix A Institutional Review Board Application.

Essentials of Nursing Practice Lab instructors scored the participant's IUC skill as a normal course instruction summative assessment. As part of the instructor's usual course assignment, they were invited to participate in training on the use of the *Female Indwelling Urinary Catheterization Grading Rubric* (Grading Rubric) and *Objective Structured Assessment of Technical Skill (OSATS)* instruments for the course. This training served to improve the interrater reliability (IRR) between the instructors scoring participant's skill performance. The PI ensured each instructor had a copy of the Grading Rubric and OSATS instruments. Instructors received a video created by the PI (Hoyt, 2017a) explaining the use of scoring IUC using the Grading Rubric. This was followed by a discussion regarding the use of the Grading Rubric and a discussion of the skill performance expectations. Next, instructors graded a skill performance according to the Grading Rubric while viewing a second video created by the PI of the procedure demonstrated correctly (Hoyt, 2017c). Instructors discussed scores and resolved discrepancies. Finally, all instructors viewed and graded the third video of a sterile IUC insertion created by the PI (Hoyt, 2017b). This third video contained the common errors students make during the performance. Instructors discussed scores and resolve discrepancies. A faculty discussion about the use of the Grading Rubric is part of regular educational practices. The use of the training video, the PI lead discussion, and the addition of OSATS was unique to this study. Training took 90 minutes.

Figure 1 presents the interventions for this study. After IRB approval and student consent in October 2018, all participants received a survey after the Essentials of Nursing Practice "Urinary Elimination" lecture but before the lab section on the content. These students received a link to complete the Demographic Survey, Experience Survey, and Perceived Sterile IUC Skill

Knowledge Survey via Qualtrics at their preferred method of contact. All students received lab instruction as per usual course procedures.

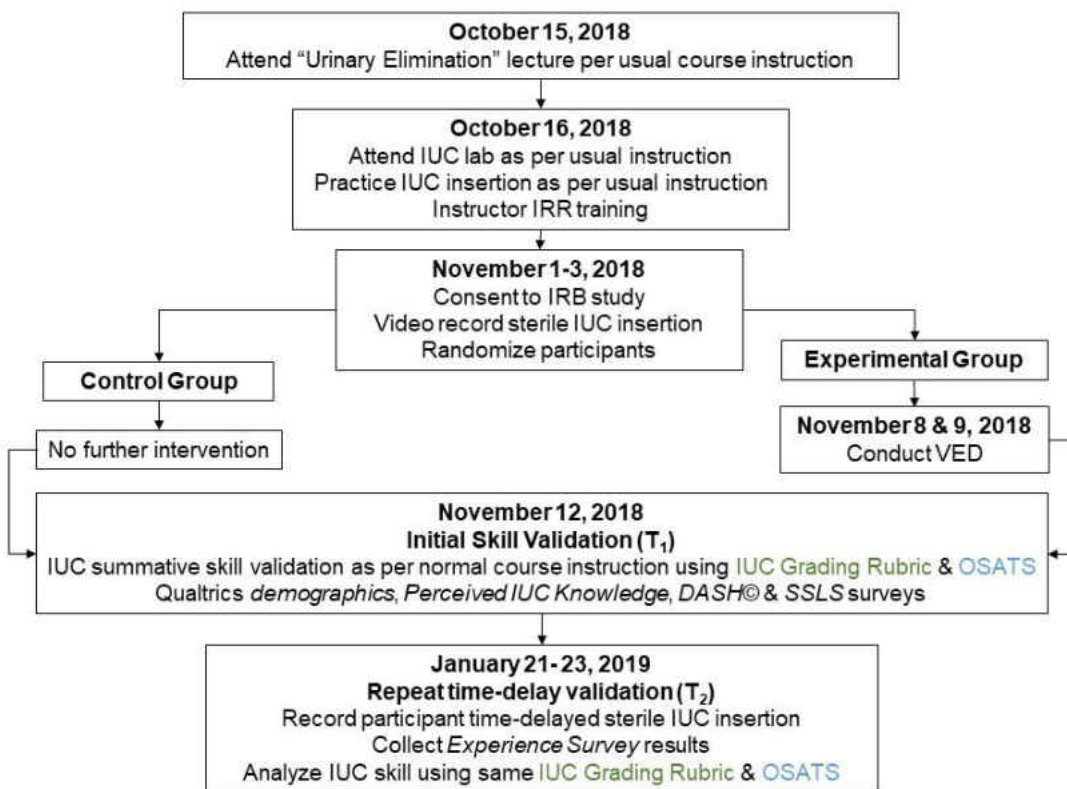


Figure 1: Research Design

In November 2018, all consenting students received a message to schedule a two-hour appointment time to videotape their sterile IUC skill. Appointments were scheduled at a time convenient for the student and when the nursing skills lab and PI were available November 1st and November 3rd, 2018. Students attended the recording session at their scheduled time and received pre-briefing information (scenario and recording instructions). Nursing school

password -protected iPads were used for recording and replaying the video. As per the data management and confidentiality section of the approved IRB procedure, the PI maintained possession of the iPads in a locked file cabinet, in a locked office until the PI uploaded the videos to a password-protected computer prior to May 15, 2019. All iPads were “reset” to “erase all content and settings” after video upload to the PI’s password- protected computer. Any video on the nursing school surveillance recording equipment secured server was stored and erased as per nursing school’s policy.

Participants had their peer video-record their IUC skill as though they were being graded. Upon completion of the recording, participants were provided an opportunity to review their video alone or with a peer. When the participant completed their video and returned the recording device, they were handed a closed envelope containing an information paper assigning them to either the control or experimental group. Envelopes were pre-made, one per student with a video appointment, containing an equal amount of control and experimental group assignments. The envelopes appeared identical and were shuffled prior to recording. Students who received the experimental group assignment received instructions for scheduling the video-enhanced debriefing. The randomization purposefully occurred after normal video recording, as not to influence their performance. Those students randomized into the experimental group attended a scheduled debriefing, and they participated in an advocacy/inquiry method of debriefing while viewing their previously recorded performance video with the PI. Those in the control group did not receive the advocacy/inquiry debriefing with video-enhancement from the PI.

Those randomized into the experimental group returned November 8th or 9th to meet one-to-one with the PI for 15-30 minutes in the PI’s office. The participant was assured the

information shared in the debriefing would be confidential and was meant for the benefit of the student to improve their skill performance. The participant was first asked about how they felt about the skill performance. Then, they were asked if there were any components of the performance they would prefer to spend time discussing. The participant's performance video was displayed on a desktop computer screen in a manner for both participant and PI to view the video. As the video played, the course IUC Grading Rubric was used as a guide to ask about the performance. For each component of the IUC Grading Rubric, the student was asked about what they were thinking as they were performing the step. Any errors in thinking were corrected and discussed. The debriefing followed with asking the student about their goal for improving the procedure the next time and inquiring how and when they will practice the next time.

All participants (control and experimental group) completed the remaining activities. In November 2018, participants received the normal course instruction summative assessment of their sterile IUC insertion skill per Essentials of Nursing Practice Lab syllabus. The instructor assessing the student's skill performance completed the Grading Rubric and OSATS as per normal course procedures. All participants provided the PI with their completed Grading Rubric and OSATS data via Qualtrics. The student then completed Student Satisfaction of Learning and DASH© Student Version Long Form in Qualtrics.

In January 2019, students were provided a Qualtrics link to the Experience Survey along with information to schedule a time to video record their sterile IUC procedure in the nursing skills lab. At this time, participants completed a second video recording using the same procedures as the prior recording in November. The nursing school's password-protected iPads were used for recording the video. As per the data management and confidentiality section, the PI maintained possession of the iPads in a locked file cabinet, in a locked office until the PI

uploaded the videos to a password-protected computer prior to May 15, 2019. All iPads were “reset” to “erase all content and settings” after the video was uploaded to PI’s password-protected computer. Any video on the nursing school surveillance recording equipment secured server was stored and erased as per the nursing school’s policy. The PI evaluated skill performance video using the Grading Rubric and OSATS. See Appendix B for Study Instrumentation.

Data Analysis

This study used quantitative data collection and analyses to answer two research questions. The first research question was answered by analyzing factors to improve and maintain clinical skill acquisition. The second research question was answered by analyzing factors pertaining to the student’s perception of using VED as a teaching technique. IBM SPSS Statistics for Windows, Version 24.0 was used to compute descriptive statistics, test statistical assumptions of parametric statistics, and compute inferential statistics.

Validity

Reporting of instrument reliability and validity is in the data instrumentation section. Uncontrolled events pose a threat to internal validity. The method of initial instruction may vary depending on the instructor, or the behavior of other students in the lab setting may pose a threat to internal validity. The selection of participants may bias results, as only those willing to engage with the VED may volunteer to participate. The threat was minimized by randomizing those willing to participate in experimental and control groups. The amount of experience (practice, simulated, or clinical) a student had with the skill between the T₁ and T₂ testing may threaten the validity of measurement at the repeat testing. To minimize the threat, participants reported the number of times they completed the procedure in simulated and clinical settings.

Participant attrition was another potential threat to validity. Ensuring the best contact information for the participant allowed frequent reminders and communication about upcoming study events to minimize the threat. The instructor's reporting of student performance on the Grading Rubric and OSATS instrument could have been threatened by observer bias, contamination, and the halo effect. Inter-rater training for the use of instruments minimized the threat.

The Student Satisfaction in Learning Survey (SLLS), DASH©, and experience survey questions could have been vulnerable to threats of validity. The student could have misinterpreted the meaning or context of the question. Research bias could occur if students responded to the survey questions with what they perceived the researcher would like to hear. Transparency occurred by allowing participants to ask questions about any aspect of the study's purpose or procedure. The sample for the data was reliant on those randomly chosen to be in the experimental group.

CHAPTER FOUR: RESULTS

Introduction

The purpose of this study was to examine an intervention to improve initial skill validation scores, reduce skill decay, improve clinical skill feedback, and enhance satisfaction with learning among nursing students performing the clinical nursing skill of female indwelling urinary catheterization (IUC). The goal of this study was achieved by the evaluation of an innovative teaching method, video-enhanced debriefing (VED), on the improvement of student's summative IUC skill grade the first semester and their performance of the skill again 10 weeks later. A secondary goal of this study was to evaluate the student's reaction to the use of VED when learning the IUC skill.

This chapter presents the results and data analysis arranged by the two research questions and their corresponding hypotheses. To answer the first research question "In first-year pre-licensure nursing students, does the use of video-enhanced debriefing (VED) decrease skill decay when compared to no VED?" data for Objective Structured Assessment of Technical Skill (OSATS), Female Indwelling Urinary Catheterization Grading Rubric, Experience Survey, and Perceived Sterile IUC Skill Knowledge descriptive statistics are presented first. Finally, descriptive statistics to answer the second research question "Are first-year pre-licensure nursing students satisfied with the use of video-enhanced debriefing as a teaching method for improving psychomotor skill acquisition?" are presented, including DASH© scores and Student Satisfaction with Learning Survey (SSLS) for the control and VED groups.

The statistical analysis is presented with a description followed by the results of the analysis to answer the hypothesis. A p -value $< .05$ was considered statistically significant. All data were analyzed using IBM® SPSS Statistical Software version 24.

Research Question One

Hypothesis 1

Students in the VED group will demonstrate better performance than students in the control group at an initial skill validation (T_1), indicating the VED intervention improved skill performance at the time of learning.

The IUC Grading Rubric and OSATS instruments were used to measure initial skill performance. The separate presentation of each performance instrument follows including the descriptive statistics, then the statistical assumptions, and finally the results of the hypothesis testing.

IUC Grading Rubric Statistical Assumptions

Prior to running an independent samples t -test, assumptions of normality and homogeneity of variances were tested. A Shapiro-Wilks test indicated that the distributions for the procedure performance were not normally distributed for either the control group ($SW(22) = .72, p < .001$) or VED group ($SW(29) = .82, p < .001$). However, the group variances were homogeneous as indicated by Levene's test, $F(1, 49) = 2.06, p = .15$. The statistical assumptions for t -test were not met; therefore, a Mann-Whitney U test was used to examine if there were significant differences in procedure performance between the control group and the VED group.

IUC Grading Rubric Inferential Results

The Mann-Whitney U test was conducted to examine if there were significant differences in IUC Grading Rubric scores between the control group and the VED group. Those in the

control group ($M_{rank} = 26.02$) and intervention groups ($M_{rank} = 25.98$) had similar scores $U = 318.5$, $z = -.01$, $p = .99$, $1-\beta = .08$, indicating that there is an 8% chance there is a significant difference in this sample if the difference actually exists in the population. The descriptive statistics for the IUC Grading Rubric scores at T₁ are presented in Table 2.

Table 2: IUC Grading Rubric Scores at Initial Skills Testing Descriptive Statistics Summary

	<i>n</i>	<i>M</i>	<i>SD</i>	Median	Min	Max
Control Group (no VED)	22	56.41	5.28	59	39	60
Experimental Group (VED)	29	57.03	3.31	59	50	60

OSATS Scores Statistical Assumptions

Prior to running an independent samples *t*-test, assumptions of normality and homogeneity of variances were tested. A Shapiro-Wilks test indicated that the distributions for the procedure performance were not normally distributed for either the control group ($SW(21) = .61$, $p < .001$) or VED group ($SW(29) = .79$, $p < .001$). However, the group variances were homogeneous as indicated by Levene's test, $F(1, 48) = .65$, $p = .21$. The statistical assumptions for a *t*-test were not met; therefore, a Mann-Whitney *U* test was used to examine if there were significant differences in procedure performance between the control group and the VED group.

OSATS Score Inferential Results

The Mann-Whitney *U* test indicated those in the control group ($M_{rank} = 27.00$) and intervention groups ($M_{rank} = 24.41$) had similar scores, $U = 273.00$, $z = -.66$, $p = .51$, $1-\beta = .59$. Therefore, the intervention had no effect on students' IUC clinical psychomotor skills at the

initial skill validation. The descriptive statistics for the OSATS scores at the initial competency are listed in Table 3.

Table 3: OSATS Scores at Initial Skills Testing Descriptive Statistics Summary

	<i>n</i>	<i>M</i>	<i>SD</i>	Median	Min	Max
Control Group (no VED)	21	26.67	6.11	30	8	30
Experimental Group (VED)	29	26.48	4.53	28	14	30

OSATS Missing Data

At the initial skill validation test (T_1), fewer participants in the control group completed OSATS scores ($n = 21$) than in the VED group ($n = 29$). This reported number of participants for the control group OSATS score reflects that one participant did not receive a recorded OSATS score by their evaluator.

Hypothesis Summary

The hypothesis that students in the VED group will demonstrate better performance than students in the control group at an initial skill validation (T_1), indicating the VED intervention improved skill performance at the time of learning was false. There were no statistically significant differences on IUC Grading Rubric ($p = .99$) or OSATS scores ($p = .51$) at initial skills learning between the control group and VED group.

Hypothesis 2

Students in the VED group will demonstrate a smaller decline in skill performance from their initial skill validation (T₁) to a follow-up skill validation (T₂) than those in the control group, indicating VED group had less skill decay than the control group between T₁ and T₂.

IUC Grading Rubric Statistical Assumptions

Prior to running a two-factor split plot analysis of variance (ANOVA), statistical assumptions were tested. A Shapiro-Wilk test was conducted to determine whether the distribution of the IUC Grading Rubric was significantly different from a normal distribution for both the VED and control group at T₁, T₂, and for the change in scores from T₁ to T₂. Results indicated that the distributions for the average IUC Grading Rubric were not normally distributed for either the control group or VED group at T₁ and T₂, but the change in scores was normally distributed as summarized in Table 4.

Table 4: IUC Grading Rubric Shapiro-Wilk Test Results

	<i>df</i>	<i>SW</i>	<i>p</i>
T1			
Control Group (no VED)	22	.72	< .001
Experimental Group (VED)	29	.82	< .001
T2			
Control Group (no VED)	20	.90	.04
Experimental Group (VED)	27	.87	< .001
Change from T1 to T2			
Control Group (no VED)	20	.96	.53
Experimental Group (VED)	27	.97	.62

Levene's test indicated that group variances for the IUC procedure performance were homogeneous at T₁ ($F(1, 49) = 2.06, p = .15$) and T₂ ($F(1, 45) = .02, p = .90$).

IUC Grading Rubric Inferential Results

To analyze whether the treatment condition moderated the change from T₁ to T₂, a two-factor split plot ANOVA was computed. There was not a significant interaction between the treatment condition (with or without VED) and time of observation (T₁ and T₂), $F(1, 44) = 1.52, p = .22$. The difference in IUC Grading Rubric scores from initial skill validation to repeat skill validation was not different for those who did or did not receive the VED intervention. There was not a significant change in scores for all participants from T₁ to T₂, $F(1, 44) = 3.75, p = .06$. Figure 2 illustrates the means for each group and observation. The descriptive statistics of the participants who completed both skill testing sessions for the IUC Grading Rubric scores at T₁, T₂, and the change in scores between T₁ and T₂ are presented in Table 5.

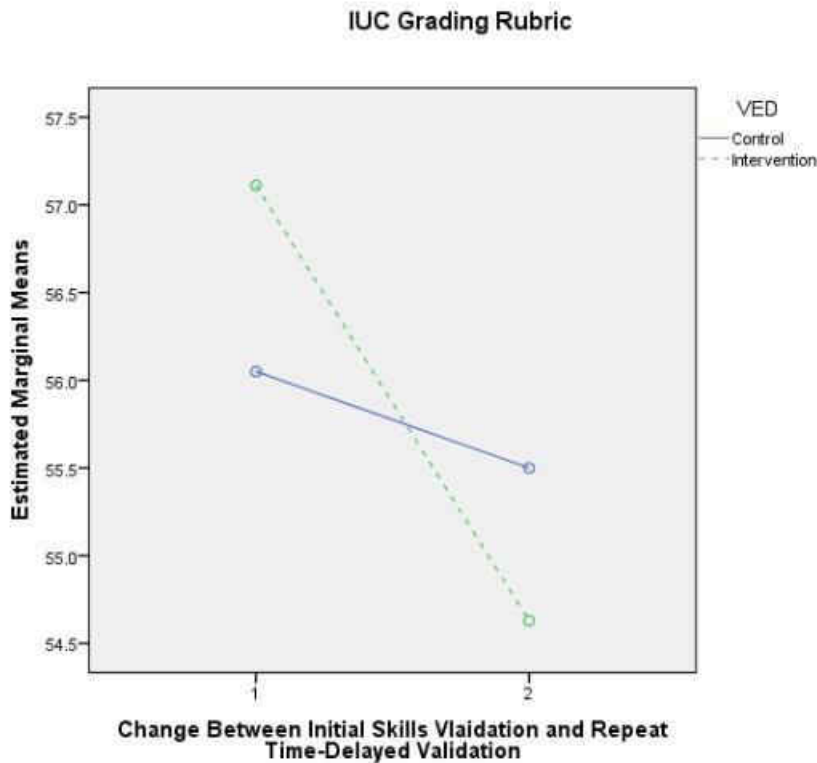


Figure 2: IUC Grading Rubric Means Between T₁ and T₂

Table 5: IUC Grading Rubric Descriptive Statistics Summary

	<i>n</i>	<i>M</i>	<i>SD</i>	Median	Min	Max
T1						
Control Group (no VED)	20	56.05	5.41	59	39	60
Experimental Group (VED)	27	57.11	3.32	59	50	60
T2						
Control Group (no VED)	20	55.50	4.14	56	46	60
Experimental Group (VED)	27	54.63	4.35	55	40	60
Change from T1 to T2						
Control Group (no VED)	20	.56	5.98	0	-13	11
Experimental Group (VED)	27	2.48	4.76	1	-12	6

IUC Grading Rubric Missing Data

T₁ contained less participants in the control group ($n = 22$) than in the VED group ($n = 29$). There were no missing rubrics. At T₂, both the control group and VED group each lost two participants from T₁. The change of scores between T₁ and T₂ were based on those who participated in T₂.

OSATS Statistical Assumptions

A Shapiro-Wilk test was conducted to determine whether the distribution of the OSATS was significantly different from a normal distribution for both the VED and control group at T₁, T₂, and for the change in scores from T₁ to T₂. Results indicated that the distributions for the average OSATS were not normally distributed for either the control group or VED group at any of the times, as summarized in Table 6.

Table 6: OSATS Shapiro-Wilk Test Results

	<i>df</i>	<i>SW</i>	<i>p</i>
T1			
Control Group (no VED)	19	.63	< .001
Experimental Group (VED)	27	.76	< .001
T2			
Control Group (no VED)	19	.77	< .001
Experimental Group (VED)	27	.85	< .001
Change from T1 to T2			
Control Group (no VED)	19	.77	< .001
Experimental Group (VED)	27	.89	.01

Levene's test indicated that group variances for the OSATS were homogeneous for T₁ ($F(1, 44) = .96, p = .33$) and T₂ ($F(1, 44) = .28, p = .60$).

OSATS Inferential Results

There was not a significant interaction between types of treatment (with or without VED) and time of observation (T₁ and T₂), $F(1, 44) = 0.32, p = .57$. The difference in OSATS scores from initial skill validation to repeat skill validation was the same for those who received VED and those who did not receive the intervention. There was a significant difference in OSATS scores for all participants from T₁ to T₂, $F(1, 44) = 5.80, p = .02, \eta^2 = .12, 1-\beta = .16$. Both groups improved from T₁ to T₂. Figure 3 illustrates the means for each group and observation. The descriptive statistics for the OSATS scores at the initial competency (T₁), repeat delayed-time evaluation (T₂), and the change in scores between initial and repeated skills validation are listed in Table 7 for those who participated in both testing sessions.

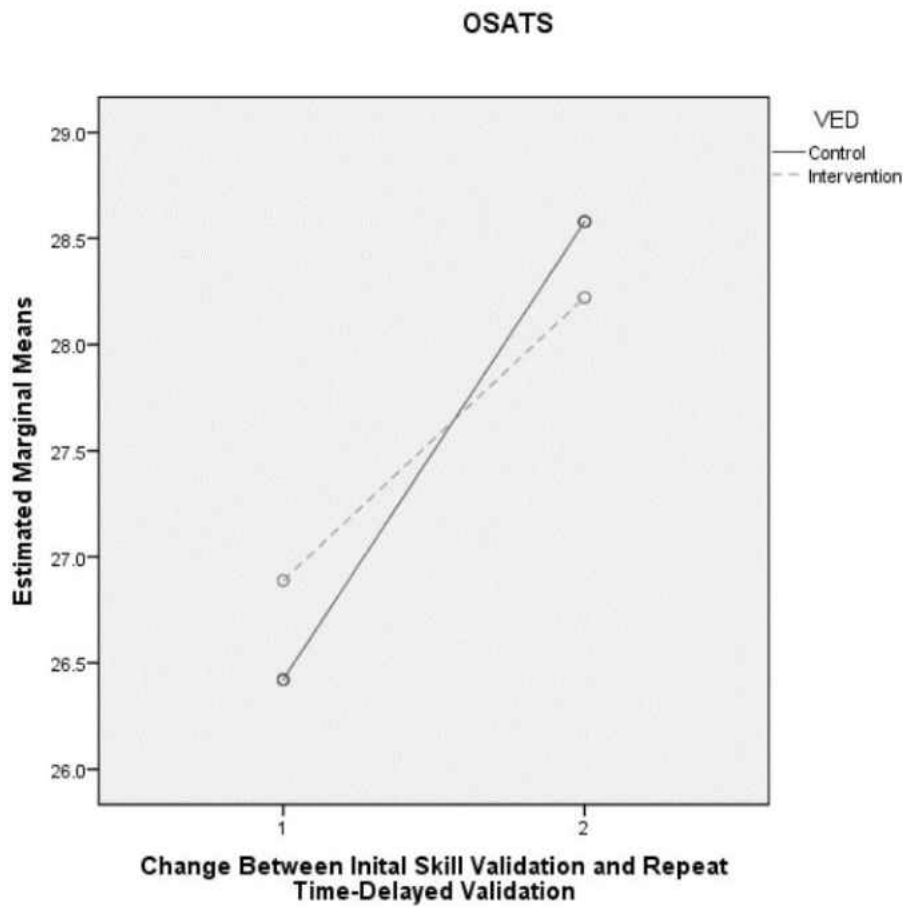


Figure 3: OSATS means between T₁ and T₂

Table 7: OSATS Score Descriptive Statistics Summary

	<i>n</i>	<i>M</i>	<i>SD</i>	Median	Min	Max
T1						
Control Group (no VED)	19	26.42	6.38	30	8	30
Experimental Group (VED)	27	26.89	4.34	28	14	30
T2						
Control Group (no VED)	19	28.58	1.84	30	24	30
Experimental Group (VED)	27	28.22	1.78	28	24	30

	<i>n</i>	<i>M</i>	<i>SD</i>	Median	Min	Max
Change from T1 to T2						
Control Group (no VED)	19	2.16	5.33	0	-3	18
Experimental Group (VED)	27	1.33	4.47	0	-6	16

OSATS Missing Data

At the initial skill validation test (T₁), fewer participants in the control group completed OSATS scores ($n = 21$) than in the VED group ($n = 29$). This reported participant number for the control group OSATS score reflects one participant did not receive a recorded OSATS score by their evaluator. At the time-delayed repeat skill test (T₂), fewer students participated (total $n = 46$, control group $n = 19$, VED group $n = 27$) in comparison to T₁ participants (total $n = 51$, control group $n = 22$, VED group $n = 29$).

Hypothesis Summary

The hypothesis that students in the VED group will demonstrate a smaller decline in skill performance from their initial skill validation (T₁) to a follow-up skill validation (T₂) than those in the control group, indicating the VED group had less skill decay than the control group between T₁ and T₂ was false. There was no statistically significant interaction between treatment type and time for either measure of IUC performance ($p = .22$) or clinical psychomotor skills ($p = .57$).

Hypothesis 3

There is a positive relationship between self-reported IUC skill knowledge and skill performance (as measured by the OSATS) at T₁, indicating cognitive knowledge of the skill predicts initial skill performance.

Descriptive Statistics

Overall, participants scored high on their perceived level of knowledge relating to the skill as they entered the simulated clinical lab to learn the psychomotor portion of the skill.

Descriptive statistics results for all students are summarized in Table 8.

Table 8: Perceived IUC Skill Knowledge and OSATS Scores at Initial Testing

	<i>n</i>	<i>M</i>	<i>SD</i>	Median	Min	Max
Perceived IUC Knowledge	51	8.82	1.55	9	5	12
OSATS Score	50	26.56	5.19	28	8	30

Statistical Assumptions

Prior to running a Pearson's correlation, assumptions of bivariate normality and linearity were assessed. The scatterplot suggests a linear line was the best fit for the data. The scatterplots demonstrate a lack of bivariate normality as the data points are not evenly dispersed above and below a linear regression line. Scatterplots of Perceived IUC Knowledge and initial OSATS testing are presented in Figure 4. Since the assumptions of Pearson's product-moment correlation were violated, Spearman's rho was used to test the relationship between perceived IUC knowledge and IUC clinical psychomotor skills (Burns & Grove, 1997).

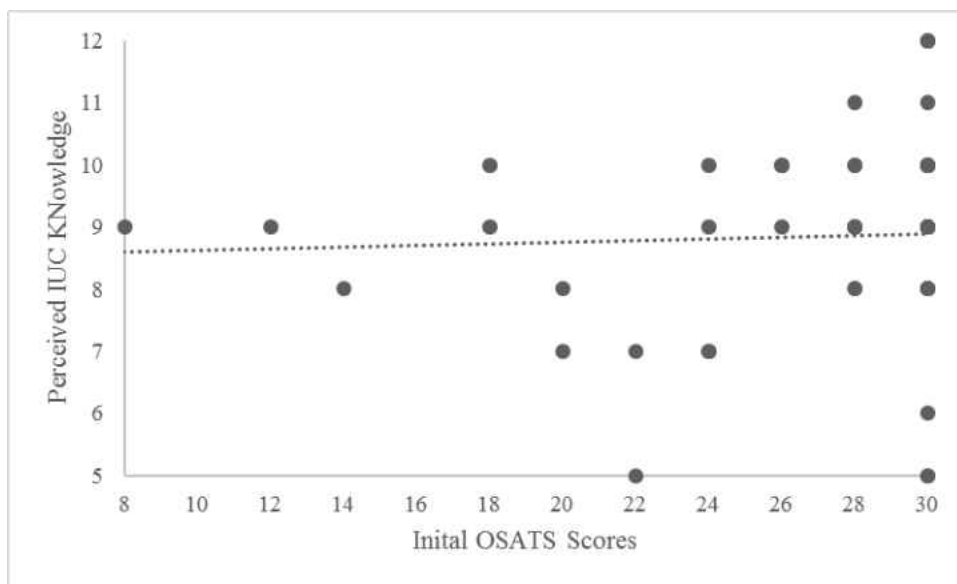


Figure 4: Scatterplot of Perceived IUC Knowledge and Initial OSATS Score for Both Groups

Inferential Results

The correlation between student’s self-reported Perceived IUC Skill Knowledge and initial OSATS score was not statistically significant $r_s(48) = .183, p = .21, 1-\beta = .24$. The hypothesis that there would be a positive relationship between IUC skill knowledge and skill performance (as measured by the OSATS) at the initial skill check off was false.

OSATS Missing Data

At the initial skill validation test (T_1), fewer participants in the control group completed OSATS scores ($n = 21$) than in the VED group ($n = 29$). OSATS score for one participant in the control group was not recorded by an evaluator.

Hypothesis 4

There is a positive relationship between experience (as measured by the Experience Questionnaire) and skill performance (as measured by the Objective Structured Assessment of Technical Skill [OSATS]) at time delay repeat test, indicating experience influences skill performance score.

Descriptive Statistics

Descriptive statistics results for Experience Survey and OSATS scores at the repeat delayed-time evaluation (T₂) are listed in Table 9.

Table 9: Experience Survey and OSATS Scores at Time-Delay Repeat Testing

	<i>n</i>	<i>M</i>	<i>SD</i>	Median	Min	Max
Total reported times practiced	47	3.83	1.94	3	2	15
OSATS Score	47	28.30	1.84	29	24	30

Statistical Assumptions

Prior to running a Pearson's correlation, assumptions of bivariate normality and linearity were assessed. The scatterplot suggests a linear line may be the best fit for data. The scatterplots demonstrate a lack of bivariate normality as the data points are not evenly dispersed above and below a linear regression line. See Figure 5 for the Scatterplot of Experience Survey and Time Delay Repeat OSATS Score for Both Groups. Since the assumptions of Pearson's product-moment correlation were violated, Spearman's rho was used to test the relationship between perceived IUC knowledge and IUC clinical psychomotor skills (Burns & Grove, 1997).

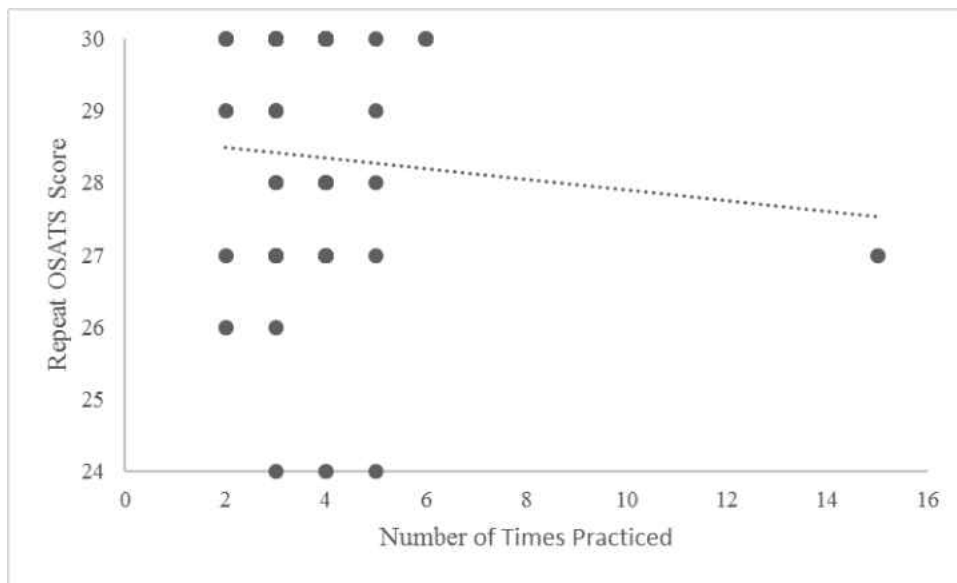


Figure 5: Scatterplot of Experience Survey and Time Delay Repeat OSATS Score for Both Groups

Inferential Results

The correlation between student’s self-reported number of times the skill was practiced and OSATS at time-delayed repeat test was not statistically significant, $r_s(48) = .01, p = .96, 1 - \beta = .10$. The hypothesis that there would be a positive relationship between experience and skill performance at time delay repeat test false.

Research Question Two

Are first-year pre-licensure nursing students satisfied with the use of video-enhanced debriefing as a teaching method for improving psychomotor skill acquisition?

Hypothesis 5

Those in the VED group will provide higher scores on instructor feedback (as measured by DASH©) than those in the control group, indicating students had a better learning experience with VED.

Statistical Assumptions

The independent *t*-test assumes four conditions: the dependent variable is continuous, there is equal variance between the two samples, the sample means are normally distributed for each group, and the observations are independent (Burns & Grove, 1997). The group variances were homogeneous as indicated by Levene's test, $F(1, 27) = 6.83, p = .02$. A Shapiro-Wilks test indicated that the distributions for the DASH© scores were not normal for either the control group ($SW(10) = .84, p = .04$) or the VED group ($SW(19) = .83, p < .001$). The statistical assumptions for *t*-test were not met; therefore, a Mann-Whitney *U* test was used to test for group differences on students' evaluation of the debriefer (Burns & Grove, 1997).

Inferential Results

The Mann-Whitney *U* test indicated those in the control group ($M_{rank} = 10.35$) and VED group ($M_{rank} = 17.45$) had significantly different outcomes on the DASH© Survey Total, $U = 141.5, z = 2.2, p = .03, 1-\beta = .83$. The results support the hypothesis that students preferred instructor feedback in the VED group over that in the control group. Therefore, students had a better-perceived learning experience with VED. Descriptive statistics results for the control group and VED group are summarized in Table 10.

Table 10: DASH© Survey Results

	<i>n</i>	<i>M</i>	<i>SD</i>	Median	Min	Max
Control Group (no VED)	10	172.90	15.79	167.5	152	196
Experimental Group (VED)	19	188.37	8.75	190.0	163	196

Missing Data

Fewer participants in the control group ($n = 10$) than in the VED group completed the DASH© Total ($n = 19$). Incomplete surveys (missing cases) were not included in data analysis. The control group had 54.65% missing cases ($n = 10$) and the VED group had 34.5% missing cases ($n = 10$).

Hypothesis 6

Those in the VED group will provide more positive evaluations of the psychomotor learning experience (as measured by higher scores on the SSLS) than those in the control group, indicating that the VED provided a more positive psychomotor skill learning experience.

Statistical Assumptions

The group variances were homogeneous as indicated by Levene's test, $F(1, 49) = .00, p = .95$. A Shapiro-Wilks test indicated that the distributions for the DASH© scores were not normal for either the control group ($SW(22) = .85, p < .001$) or the VED group ($SW(29) = .87, p < .001$). Additionally, participants completed SSLS surveys independently, but they may have discussed the procedure violating this assumption. The statistical assumptions for a t -test were not met; therefore, a Mann-Whitney U test can detect differences between nonparametric groups with 95% of the power of the t -test (Burns & Grove, 1997).

Inferential Results

The Mann-Whitney U test indicated that those in the control group ($M_{rank} = 26.32$) and intervention groups ($M_{rank} = 25.76$) had similar SSLS scores, $U = 312$, $z = -.14$, $p = .89$, $1-\beta = .05$. The hypothesis was, therefore, false as the VED group did not provide more positive evaluations of the psychomotor learning experience than those in the control group. Descriptive statistics results for the control group and VED group are summarized in Table 11.

Table 11: Student Satisfaction with Learning Survey Descriptive Statistics Summary

	n	M	SD	Median	Min	Max
Control Group (no VED)	22	4.52	.51	4.6	3.2	5.0
Experimental Group (VED)	29	4.51	.46	4.4	3.4	5.0
Total	51	4.51	.48			

Missing Data

Fewer participants in the control group ($n = 22$) than VED group completed the SSLS ($n = 29$). There were no missing surveys; all participants completed the survey.

Secondary Analyses

Table 12 presents the correlations between performance scores, SLSS, DASH©, and demographic variables of the study. This correlation table presents selected evaluation instruments at the initial skill validation (T_1): Objective Structured Assessment of Technical Skill (OSATS), Female Indwelling Urinary Catheterization (IUC) Grading Rubric, Student

Satisfaction with Learning Survey (SSLS), and Debriefing Assessment for Simulation in Healthcare (DASH©) satisfaction. There was a positive correlation between T₁ OSATS Scores and T₁ IUC Grading Rubric Scores, $r(50) = .70, p < .001$. There was also a positive correlation between T₂ OSATS Scores and T₂ IUC Grading Rubric Scores, $r(49) = .60, p < .001$. The positive correlation of IUC Grading Rubric Scores and IUC Grading Rubric Scores demonstrated both scales measuring performance positively correlated. There was a negative correlation between age and T₁ OSATS Scores, $r(50) = -.35, p = 0.01$. There was a positive correlation between DASH© and SLSS, $r(29) = .97, p < .001$. This positive correlation could be because of a correlation between positive clinical feedback on clinical skill performance and the satisfaction of learning.

Table 12: Correlation

Measure	1	2	3	4	5	6	7	8	9
1. T ₁ IUC Rubric	-								
2. T ₁ OSATS	.70***	-							
3. SLSS Total	.12	.19	-						
4. DASH© Total	.19	.27	.57***	-					
5. Age	-.17	-.35**	.08	.22	-				
6. Gender	.01	-.02	.07	.03	.20	-			
7. Race	-.02	-.18	-.08	.25	-.19	-.01	-		
8. T ₂ Rubric	.20	.20	.14	.03	.11	-.08	-.01	-	
9. T ₂ OSATS	.23	.30*	.09	.17	-.04	-.20	-.06	.60***	

* $p < .05$, ** $p < .01$, *** $p < .001$

Summary

Answering the first research question “In first-year pre-licensure nursing students, does the use of video-enhanced debriefing (VED) decrease skill decay when compared to no VED?” the use of VED did not show significant difference at initial skill validation or the reduction of skill decay between initial skill validation and repeat, time-delayed skill validation 10 weeks later. Supporting psychomotor skill learning, there was no significant correlation between the students’ perceived IUC skill knowledge and their initial skill validation score. There also was no significant correlation between students’ self-reported number of times skill was practiced and their repeat, time-delayed skill validation score. Therefore, the use of VED did not result in statistically significant differences between those who received VED and those who video recorded their skill not receiving VED.

As for the second research question, “Are first-year pre-licensure nursing students satisfied with the use of video-enhanced debriefing as a teaching method for improving psychomotor skill acquisition?” the use of VED did result in a significant difference in clinical nursing skill feedback with those receiving VED providing higher scores for feedback. Finally, VED did not show a significant difference in student’s satisfaction of learning psychomotor skills in comparison to those who video-recorded their skill but did not receive VED.

CHAPTER FIVE: DISCUSSION

Introduction

The purpose of this study was to analyze the effects of video-enhanced debriefing (VED) on first-semester nursing students' acquisition and maintenance of a sterile technique clinical skill, indwelling urinary catheterization (IUC). Students' skill performances were evaluated with two performance scales; participants were randomized into VED treatment and control groups; then students completed surveys measuring their knowledge of the skill, the number of times they practiced the skill, satisfaction with VED as an innovative teaching technique as measured with Student Satisfaction in Learning Survey, and their perception of the debriefing received about their skill performance as measured with DASH©. This study contained two research questions and investigated via six hypotheses. The previous chapter presented the analysis of data for each of the study's hypotheses. This chapter includes the discussion of findings for each research question and associated hypotheses in relation to relevant literature. The study's limitations, implications for practice, and recommendations for further research follows.

Summary of the Study

The purpose of this experimental study was to examine the effectiveness of an intervention, VED, to improve initial skill validation scores, reduce skill decay, improve clinical skill feedback, and enhance satisfaction with learning among nursing students performing IUC. First-semester pre-licensure BSN students participated in the study. All participants received standard instruction; additionally, all participants video recorded their IUC skill performance. Following the participants' recording, only those randomized into the experimental group received VED. Participants' skills were evaluated by course instructors using the curriculum

IUC Grading Rubric and an additional OSATS instrument. Each participant completed the Student Satisfaction of Learning Survey (SSLS) and Debriefing Assessment for Simulation in Healthcare Student Version© (DASH©) survey following the summative skill exam. Then, ten weeks later, participants returned to re-record demonstration of the same skill. Differing from the initial skill checkoff when the student's lab instructors graded the performance with the IUC Grading Rubric and OSATS, at the time-delayed, repeat testing the principal investigator evaluated the video-recorded skill performance of each student using the same IUC Grading Rubric and OSATS.

This study contained two research questions supported by six hypotheses regarding a specific form of debriefing, VED, to support nursing students learning a clinical skill in a simulated setting. At this time, few quantitative research studies have been published that include evidence about the effectiveness of VED for reducing skill decay. Students may not learn the skill deeply enough to maintain their competency over time; this is possibly due to a lack of deliberate practice and reflective learning integration. Incorrect performance of this skill places a patient's safety at risk; therefore, the research questions were constructed to explore a method to improve teaching and learning nursing skills to improve patient's safety overall.

The first research question centered on the use of VED to reduce skill decay. The analysis of the effects of VED on students' initial skill validation scores and their repeated skill performance ten weeks later were analyzed. The second research question evaluated the responses students had to VED, specifically the report their skill performance feedback with VED and satisfaction with learning using VED.

Summary of Findings

The first research question centered on the use of VED to reduce skill decay. The results of this study did not provide evidence that VED reduced skill decay compared to a group that used video without expert feedback and debriefing. The second research question focused on the responses students had to VED, specifically whether they perceived they received better skill performance feedback with VED and whether they were more satisfied with learning using VED. Students in the VED group provided significantly higher scores on instructor feedback than those in the control group, indicating students had a better-perceived learning experience with VED. However, those in the VED group did not provide more positive evaluations of the psychomotor learning experience than those in the control group, indicating that students in both groups were equally positive towards both conditions.

Self and Peer-Debriefing Discussion

The discussion of results includes the possibility that the experience with video allowed participants to receive peer and/or self-feedback. Before the summative assessment, during the associative phase of learning a psychomotor skill, the student develops rules about the skill performance through stimulus-response systems while performing the skill (Langan-Fox et al., 2002). Despite the lack of significant score difference between the groups, a reason both groups performed well may be the result of the video experience. Both groups had some form of video experience providing a stimulus-response system. The goal of the intervention was to determine whether expert feedback as part of the advocacy-inquiry debriefing with the video affected student learning. However, as the study progressed, the realization occurred that many students in the non-VED group still received feedback, just not expert feedback. In other words, students received visual feedback of their performance either through self-debriefing by reflecting on

their own skill performance viewing their video, or peer-debriefing by a peer providing performance feedback and encouragement during the filming process or review of the video. During the filming process, students were observed discussing the performance and reviewing videos. Some students reviewed their textbooks and class videos as they were reviewing the video. Many students requested an opportunity to review their video before turning in their recording device. Thus, the intervention in this study was more akin to self/peer feedback versus expert feedback rather than the intended no feedback versus feedback. As the participants recorded their peer's performance video, the principal investigator noted the interaction among peers providing procedure instruction, guidance, correction, and support. Many participants reviewed their performance video, making written notes about their performance. Participants also were seen retrieving written course materials to compare their performance to the course materials.

Experiential learning theory (Kolb, 1984) and reflective practice theory (Schön, 1983) underpins self and peer-debriefing that may have resulted in the high-performance scores in both groups. Researchers discussed that when students view their actual detailed skill performance, they are then better able to reflect upon their actions (Arafeh et al., 2010). In this study, adding the visual stimulus from the video allowed students to objectively see their actions rather than relying on memory of their actions. The added experience of the video in both groups may have improved the ability for students to reflect objectively on their performance and self-adjust to improve their performance. As explained through experiential learning theory (Kolb, 1984), the concrete experience in this study was the simulation; students engaged in reflective observation, applied the reflection to find meaningful patterns, then assimilated and accommodated the information into a new understanding. As explained through Schön (1983), learners had the

opportunity to reflect-in-action as they were performing the skill, and then reflect-on-action after the performance.

Further supporting the evidence found about self-debriefing in this study, Watts et al. (2009) noted the use of video assessment as a positive teaching innovation, improving students' ability to self-reflect and recognize areas for improvement. Nesbitt et al. (2015b) found that video-assisted and self-debriefing video feedback were superior over a lecture debriefing for improving future performance. Yoo et al. (2010) found those who self-reflected on their skill performance video scored higher than those who received only written feedback.

Conversely, the disadvantage of self-debriefing was if the students were not able to identify their errors, then they were unable to correct mistakes (Watts et al., 2009). Self and peer-debriefing lacked expert feedback to detect student's unknown errors (Nesbitt et al., 2015b). Additionally, without expert feedback, students may not know which components of the performance required reflective practice (Davies, 2012). A recommendation for future research would be to capture the characteristics of self and peer-debriefing during the learning process.

The use of video for self and peer-reflection meets the goal of purposeful practice, a type of practice inferior to deliberate practice (DP) (Ericsson et al., 1993). Students met the criteria for purposeful practice by having a measurable, specific goal (proper skill performance measured with the IUC Grading Rubric), being focused (video-captured focused performance of skill), moving out of their comfort zone (learning a new skill), and they received immediate feedback (through self or peer review of their video performance). DP, however, improves performance through expert feedback. Ericsson et al. (1993) also explained the repetition of a task without constructive feedback does not improve the learner's accuracy or performance of the task. This study aimed to use VED as a method for providing DP.

Discussion in Relation to Research Question 1

In first-year pre-licensure nursing students, does the use of video-enhanced debriefing (VED) decrease skill decay when compared to no VED?

Hypothesis 1

Students in the VED group will demonstrate higher performance scores than students in the control group at an initial skill validation (T_1), indicating the VED intervention improved skill performance at the time of learning.

Expert feedback as a component of VED did not improve performance in first-semester nursing students learning a complex psychomotor skill. This finding result contrasts with findings from other researchers who demonstrated a direct improvement in performance related to DP (Bathish et al., 2018; Palao et al., 2015). However, the participants in the Bathish et al. (2018) study were registered nurses, not novice nursing students, as in this study. Palao et al. (2015) concluded the student's lack of knowledge about proper procedure could be a factor of teacher feedback being superior over self-reflection with the video for improving performance; however, the researcher's findings were not reflected in this study as the VED group did not perform higher than the control group.

Findings in this study are consistent with other researchers who did not find a statistically significant improvement in performance between those who received instructor-facilitated video feedback as compared to other forms of video feedback (Chronister & Brown, 2012; Nesbitt et al., 2015a; Sawyer et al., 2012). Comparable to this study, researchers found improvements in all groups receiving any form of video intervention (Chronister & Brown, 2012; Nesbitt et al., 2015a). Byrne et al. (2002) found the use of video compared to no video in anesthesiology residents did not significantly reduce the time to solve a complex problem during anesthesia;

moreover, both groups improved with repeated practice. Kernodle et al. (2001) also did not find a significant difference in performance between those who received video-enhanced verbal feedback in comparison to verbal feedback without video for learning overhand throwing, concluding the student's lack of experience with the skill did not allow them to understand their mistakes.

Students' post-skill lab practice experience may be a factor that influences deliberate practice. Researchers identified an interrelationship between cognitive load theory and deliberate practice for attaining expertise (van Gog et al., 2005). The timing of when students received VED may have affected the usefulness of the VED intervention. If the student was at the beginning of their practice (i.e., they only practiced the skill in the lab before recording the video), then they had less experience and knowledge than someone who recorded their video after two sessions of open lab practice. A person with less practice experience may have identified many performance errors in their debriefing in comparison to someone who already refined aspects of their performance through practice. The more novice students may have felt overwhelmed with the number of corrections their performance required when receiving expert feedback in comparison to someone who required fewer performance corrections. A student may experience cognitive overload at the beginning of practice related to the amount of feedback given. Gonzalez and Kardong-Edgren (2017) explained the importance of avoiding cognitive capacity overload among novice students learning a skill. Future research could capture information about the experience the student has with the skill performance at the time of expert feedback, and the number of corrections discussed in the debriefing.

A final explanation of why VED did not result in increased performance scores may be the variable amounts of time the student practiced between the expert feedback and the graded

skill performance. The VED intervention was purposefully scheduled one week before the skill validation to allow students the time to process the feedback and their new goals set during debriefing. Ericsson et al. (1993) explained a constraint inhibiting DP was teacher and learner time. At the time of VED, some participants stated they did not have any more “open lab time” to practice. A recommendation for future research would be to collect the student’s subsequent practice attempts between receiving feedback and skill validation.

Hypothesis 2

Students in the VED group will demonstrate a smaller decline in skill performance from their initial skill validation (T_1) to a follow-up skill validation (T_2) than those in the control group, indicating VED group had less skill decay than the control group between T_1 and T_2 .

The second hypothesis was not supported. Skill decay, the loss of skills after periods of non-use, occurs when the original training or learning was inadequate; the longer the period of nonuse of a skill, the greater the skill decay (Arthur et al., 1998). Results from this study did not show significant skill decay from the initial skill validation in November 2018 to January 2019. The time lapse for skill decay in other studies varied. Participants who demonstrated IUC skill decay in the Gonzalez and Sole (2014) study received skill validation in a prior semester, but the number of weeks between initial and repeat skill validation was unspecified. Greenberger et al. (2005) recognized skill decay among graduate nurses but did not report the time from initial learning to skill decay. Medical students performing IUC who were away from the clinical area for 14.2 months perceived more skill decay than residents who were away from the clinical area for 6.54 months; however, they did not report actual performance scores to validate the perceptions of skill decay (Jones et al., 2017). In a study of CPR performance, nursing students had significant skill decay between nine and 12 months (Oermann, Kardong-Edgren, & Odom-

Maryon, 2011). A future study could record the rate of skill decay among these two groups of students after one year to analyze if the use of VED impacted skill decay over more time.

Causes of skill decay, other than a period of not using the skill, include the methods for initial learning and testing of the skill (Arthur et al., 1998). Arthur et al. (1998) conducted a meta-analysis of quantitative data from empirical studies with the largest effect sizes for factors related to skill decay or retention. The authors found overlearning, training beyond the requirement for initial skill learning, was a critical factor in minimizing skill decay. Overlearning decreased stress and anxiety during skill performance, therefore increasing student's self-efficacy. Overlearning decreased the amount of effort a student required to perform the task by strengthening the response-stimulus connection (Arthur et al., 1998). The opportunity to video record one's skill performance promotes repetition and an opportunity to overlearn the task, consequently decreasing non-use and reducing skill decay. Overlearning may have occurred in all study participants through video intervention. Another support for why the two groups had similar outcomes in this study was their additional practice attempts generated through the video intervention in both VED and control groups. Cecilio-Fernandes et al. (2018) found spacing the training sessions over multiple times reduced skill decay. Finally, Wayne, Butter, et al. (2006) found that residents learning advanced cardiac life support required varying degrees of practice training to achieve mastery learning.

Researchers found that deliberate practice (DP) is vital to minimize skill decay (Gonzalez & Kardong-Edgren, 2017; Ross et al., 2015; Wayne, Siddall, et al., 2006). This study did not show significant skill decay from initial to repeat skill validation, supporting the benefit of DP in the reduction of skill decay over a ten-week time period. Wayne, Siddall, et al. (2006) reported that the use of simulation for repeated practice with immediate feedback resulted in less skill

decay. Ross et al. (2015) found that the use of peer learning to provide feedback along with increased practice times were the essential components of DP to increase nursing skill performance. McGaghie et al. (2010) emphasized that the essential component of DP for teaching clinical skills were mentally focused, repetitive practice with feedback. Gonzalez and Kardong-Edgren (2017) reported the essential components of DP in early skill acquisition among nursing skills was allowing time for students to master the skill, overlearning of the skill, minimizing cognitive load related to the procedural knowledge of the skill, and ensuring frequent debriefing during the early skill acquisition. These authors emphasize that the use of required or open lab without faculty one-on-one feedback does not support DP (Gonzalez & Kardong-Edgren, 2017). This current study resulted in similar IUC Grading Rubric and OSATS scores at the repeat, time-delayed skill validation among students receiving any form of feedback (self, peer, or expert).

Hypothesis 3

There is a positive relationship between IUC skill knowledge and skill performance (as measured by the OSATS) at T_1 , indicating cognitive knowledge of the skill predicts initial skill performance.

The third hypothesis for this research question addressed the initial stage of learning a psychomotor skill. This declarative phase is when the learner must focus on the cognitive aspects of the skill (Langan-Fox et al., 2002). The hypothesis was that a student's knowledge during the declarative phase would result in a higher initial skill test score. No relationship was found between students' perceived knowledge of the IUC skill and their OSATS score at initial skill testing.

Students at this organization accomplish this declarative, knowledge acquisition phase of psychomotor learning by reading their textbook and watching a video accompanying their textbook that demonstrates the skill before the lecture. Instructors test the student's completion of the baseline preparation knowledge by administering random graded quizzes. Students then attend a lecture discussing the anatomy, physiology, pathophysiology, and nursing theory supporting the skill. Instructors of the course also provided a video of themselves completing the skill in the student's own familiar clinical skills lab using the same simulator students are familiar with to learn and practice the skill. This preparation provides students a mental representation of the skill. Gonzalez and Kardong-Edgren (2017) also recommend these steps and emphasize student's pre-skill knowledge scores should be low. The clinical skills lab is the following day that allows students time to assimilate and accommodate the material before the psychomotor learning. The time period between preparation, lecture, and the skills lab allows the learner to move the information from their short-term memory to their long-term memory, consistent with the processes for learning explained by Piaget (1952), Ericsson et al. (1993), and Mayer and Moreno (2003).

Novice students often feel inexperienced about a skills procedure because of low self-efficacy and not their actual lack of factual knowledge (Wittler et al., 2016). A baseline level of knowledge should be established before the learning experience to quantify change (INACSL Standards Committee, 2016c). By re-assessing after the experience, novice students who perceived little knowledge due to low self-efficacy may have scored higher after recognizing they did possess the necessary knowledge.

Hypothesis 4

There is a positive relationship between experience (as measured by the Experience Questionnaire) and skill performance (as measured by the Objective Structured Assessment of Technical Skill [OSATS]) at T₂, indicating experience influences skill performance score.

Based on DP theory (Ericsson et al., 1993), the fourth hypothesis was those who practiced the skill more would have higher skill performance scores. The second phase of psychomotor skill learning, the associative phase, is when students practice the skill while developing rules through performance feedback (Langan-Fox et al., 2002). Students attended the lab session with a faculty to student ratio of 1:12. The instructor provided a live demonstration of the skills that students would practice during the session; then students divided into groups of three to practice the skill using a low-fidelity simulated human manikin. The expectation was for each student to rotate between practicing the skill while receiving peer feedback and being the peer providing the feedback. The instructor moved between the groups of students to answer questions. Following the lab session, the students were expected to continue to practice in peer groups at home, or during two times the lab was open for student practice.

No relationship was found between the number of times a student practiced the skill (measured by Experience Survey) and their time-delayed repeat OSATS score. This may be because other variables may have impacted the correlation between practice and performance outcome. Internal characteristics such as the learner's emotional status, motivation, and memory impact learning outcomes (Aldridge, 2017; Langan-Fox et al., 2002). All students enrolled in this course, study participants and non-participants, were offered two appointment times in the lab for independent skill practice skills. Many of the appointment times were left unfilled as students stated they had other curricular responsibilities requiring their time or they were too

tired to practice. Participants in this study were allotted extra 30-minute appointment time to video record their skill performance; thus, they had more opportunity to practice than the non-study participants in the course. Despite this extra practice time, the median practice repetitions of both the control group and the VED group was three times before being tested. The median practice repetitions for those in the course who did not participate in the study is unknown.

The specific number of repetitions a student should practice a skill to become competent continues to be unclear in the research, and this practice also depends on the student's internal characteristics. The amount of time one practices does not improve performance (Ericsson, 2008; Ericsson & Pool, 2016); instead, the quality of the practice is more important. Findings from this study support the finding that the quality of practice may be more important than the quantity of practice. Overall, students performed well on their initial skills validation exams despite only practicing the skill a median of three times (median OSATS score of both VED and control group together was 28 out of 30 at initial skill validation). During DP, the learner must exert their full attention to the task because the intensity can only be tolerated for short periods (Ericsson et al., 1993). Thus, an implication for practice is frequent, short times of practice when the learner is emotionally engaged in the task with expert feedback. The student may accomplish this by frequently recording aspects of the skill performance and showing the recording to an expert to receive feedback. Future research could include the third group of students who did not video record their performance and collecting data relating to the student's affective state during practice.

In summary of the first research question, significant differences among the VED group and those who video-recorded their skill performance without receiving VED were not detected in initial skill validation, skill decay, knowledge of IUC skill, or the number of times the skill

was practiced. These findings in this sample are contrary to DP (Ericsson, 1993), which posits expert feedback is important to improve performance scores. Participants had similar scores on initial skill validation and repeat, time-delayed skill validation regardless of participating in the video-enhanced debriefing with the PI. Also, findings in this study with this sample are not consistent with the tenets of DP, which hold that repeated practice is necessary for skill improvement. As discussed in the limitation section, the findings from this study may not represent findings in other populations.

Discussion in Relation to Research Question 2

Are first-year pre-licensure nursing students satisfied with the use of video-enhanced debriefing as a teaching method for improving psychomotor skill acquisition?

Hypothesis 5

Those in the VED group will provide higher scores on instructor feedback (as measured by DASH©) than those in the control group, indicating students had a better learning experience with VED.

Expert feedback is essential for skill performance improvement. The expert feedback the learner receives about their skill performance is also crucial to DP theory (Ericsson et al., 1993). This feedback allows the learner to engage in reflective practice, a theoretical underpinning for debriefing. Simulation experts consider debriefing the most crucial component of simulation (Fanning & Gaba, 2007; Issenberg et al., 2005; McGaghie et al., 2010; Raemer et al., 2011). The Debriefing Assessment for Simulation in Healthcare (DASH)© instrument (Simon et al., 2010a) is a validated instrument completed by students to evaluate the quality of feedback they received from a simulated learning event (INACSL Standards Committee, 2016a). Since debriefing is a *Standard of Simulation Best Practice: SimulationSM* (INACSL Standards Committee, 2016a),

and a crucial component of Deliberate Practice (Ericsson et al., 1993), Reflective Practice (Schön, 1983), and Experiential Learning (Kolb, 1984), then debriefing may also benefit students learning a clinical psychomotor skills taught in a simulated clinical setting.

To this end, the hypothesis was that students who received VED would provide higher scores on the DASH© than those in the control group. This hypothesis was supported. The DASH© measured how well the instructor set the stage for the learning experience, maintained an engaging and organized debrief while identifying performance strength and weaknesses using reflective practice ending in goal setting for future performance (Simon, Raemer, & Rudolph, 2010b). In other words, students felt the use of VED improved their clinical skill feedback.

INACSL Standards Committee (2016a) defines debriefing as the reflective part of the simulation pedagogy led by a trained debriefer when the learner reflects upon their actions, assimilates the information, and cognitively reframes the information. INACSL Standards Committee (2016a) *Criterion 1* states a trained, competent debriefer facilitates debriefing. A likely reason those students in VED group had significantly higher DASH© scores than those in the control group may be the debriefer's level of training for providing the feedback. Those receiving VED received the debriefing from a trained Certified Healthcare Simulation Education (CHSE) debriefer.

This VED occurred during the formative learning of the skill. All participants received instructor feedback on their skill performance after the summative skill evaluation via the IUC Grading Rubric, and some students also received verbal feedback from the instructor post-skill performance. Instructors providing feedback may have never received formal simulation debriefing training. Also, the lab instructor's experience in teaching and providing feedback to

novice nursing students ranged from this being the first course they ever taught to instructors who have taught the class numerous times before.

More students in the VED group completed the DASH© survey than those in the control group. A plausible reason fewer students in the control group completed the DASH© may be that they did not feel they received adequate or formal feedback since they did not receive VED. A few students asked if they needed to complete the DASH© since they did not receive VED. Those in the VED group received private one-to-one feedback using their performance video as objective evidence during an advocacy-inquiry debriefing approach.

These findings suggest that instructors who provide feedback ought to be formally trained to use a theoretically supported framework for debriefing. Although the best method of debriefing may be uncertain (Sawyer et al., 2012); debriefing must follow an empirically based theoretical framework (INACSL Standards Committee, 2016a). The lack of using a consistent and empirically supported framework among the control group may also have led to the higher DASH© scores in the VED group. The lack of a consistent debriefing method between the VED and control groups created an additional limitation of this study. It is unknown to what extent the video playback impacted DASH© or if the method of debriefing influenced students resulting in higher DASH© scores. Those in the VED group received consistent debriefing using Debriefing with Good Judgement (DGJ) (Rudolph et al., 2007), whereas the method of debriefing the control group received is unknown. This study, however, is consistent with Willard (2014) findings that DGJ leads to statically significant higher DASH© scores than standard instruction.

An aspect of using the DGJ framework for promoting positive DASH© scores is the assurance of the student's psychological safety. Psychological safety is the sense of feeling comfortable during a learning experience without fear of embarrassment (Lopreiato et al., 2016).

McDermott (2017) found that DGJ resulted in more psychological safety when providing student feedback than providing feedback about what the student did incorrectly. Those in the VED group received DGJ with the video from an instructor who did not influence the student's course grade. Students may have perceived this neutral instructor as more psychologically safe. Those in the control group received feedback from an instructor after they had graded their performance. The grade-neutral instructor for the VED group may be a variable that contributed to higher DASH© scores in the VED group.

In conclusion, methods of debriefing are reported inconsistently in the literature. The video is an adjunct to the method of debriefing. This study used advocacy/inquiry debriefing with video as an adjunct. Many studies do not state the theoretical method of debriefing, leading the comparison of study results vague. In an integrative review of the literature regarding the effectiveness of video in healthcare debriefing, Ali and Miller (2018) stated the variation and inconsistency in the delivery of video with debriefing impacts the findings. They also stated that many studies did not report the method of debriefing used, causing difficulty comparing outcomes. The next section contains the student's reaction to VED that may also have improved DASH© scores.

Hypothesis 6

Those in the EG will provide more positive evaluations of the psychomotor learning experience (as measured by higher scores on the Student Satisfaction with Learning Survey) than those in the CG, indicating that the VED provided a more positive psychomotor skill learning experience

As students move to the second phase of psychomotor skill learning, the associative phase, DP theory posits the effort required to improve is not pleasurable and that one must be intrinsically motivated to continue to practice (Ericsson et al., 1993). Even though purposeful

practice may not be enjoyable, positive learning experiences may increase a student's satisfaction with learning. Moreover, if the use of VED as an innovative teaching strategy is enjoyable, then this strategy may motivate students to want to engage in the increased repetitive practice. No difference in affective responses was found between the control group and the VED group. Both groups had a positive psychomotor learning experience using video recording, with or without receiving VED.

The findings of this study are consistent with findings from Hargiss and Royle (2015) showing no significant difference in opinions of the debriefing comparing oral to video-assisted debriefing with undergraduate nursing students. The Hargiss and Royle (2015) debriefing was based on a three-hour unfolding case scenario that was different from the clinical psychomotor skill in this study. Hargiss and Royle (2015) also used Tanner's Clinical Judgement Model for the debriefing framework as compared to this study with VED group received Debriefing with Good Judgment (Rudolph et al., 2007). Another difference in this study is that both groups video recorded their skill, thus even if not randomized into the VED group, they had the opportunity to self-debrief or to allow a peer to debrief their performance. Boet et al. (2011) found that both video-assisted debriefings with an instructor and without an instructor, as in self-debriefing, resulted in improved crisis management skills; therefore, it is possible those in the control group also had a positive learning experience from the use of video.

Similarly, Nesbitt et al. (2015b) compared three groups of debriefing in medical students learning to suture. Researchers found that students provided a statistically significant positive quality of feedback using video in either self-debriefing or instructor guided video feedback in comparison to students who received general lecture feedback without video. However, comparing satisfaction among the group receiving instructor video feedback and those who

received self-debriefing video feedback were not significantly different, indicating the use of video alone was effective. This study supports the findings of (Nesbitt et al., 2015b) that no difference in satisfaction between groups receiving formal video debriefing in comparison to those who were able to self-debrief using the video.

This study supports Brimble (2008) finding that despite students' reluctance to using video as a teaching tool due to increased anxiety, students felt the benefits of video outweighed the initial anxiety. Of the 122 participants invited to participate in this study, only 51 initially participated. It is possible that student anxiety related to the use of video may have caused fewer to participate. Many participants in this study stated they were very nervous and embarrassed about seeing their performance when they came for repeat skill testing. Many also apologized about their performance or lack of preparation before the debriefing. Strand et al. (2016) recommended if video recording is used for teaching clinical skills, then the use of video should be initiated early in the curriculum to allow students to become comfortable with the educational modality.

In this study, both the VED and control groups recorded their skill performance. Although the PI was available to record, most participants requested a peer record their skill. Since both groups demonstrated a positive learning experience using video, the collaboration of peers may have been a factor improving student satisfaction with learning. This finding was consistent with findings from Aldridge (2016) stating that participants received the collaborative benefit through performing the skill and observing their peer by video-recording their peer's performance.

Since both groups in this study resulted in a high satisfaction with learning, another factor contributing to positive learning experiences could be the uniqueness of the teaching strategy.

The uniqueness of video as an innovative teaching strategy was consistent with Aldridge (2016) findings that students felt the use of video provided a valuable method to critique their skills. Strand et al. (2016) also reported that students felt the use of video promoted positive learning experiences. The uniqueness of using video in both groups may contribute to higher scores in both groups. Student anecdotal feedback stated they loved the use of video even if they were not chosen to receive the VED.

The use of video in both groups seems to have motivated students to learn. The use of video in both groups was rated high by students on the SLSS instrument as a motivator to engage in the learning activity. This finding aligns with researchers supporting video as a motivator of learning (Aldridge, 2016; Strand, Gulbrandsen, Slettebo, & Naden, 2017; Yoo et al., 2010).

One negative aspect of video-enhanced debriefing is the length of time required for VED versus just providing verbal feedback (Fanning & Gaba, 2007). Since only one person provided the VED in this study, students had to make an appointment with the PI to receive debriefing the week following their recorded skill performance. The time a student had to spend recording the skill and then receiving the VED may be a reason more students did not participate in the study. Of all 29 appointments for the debriefing, 100% of the participants showed up for the 15 to 30-minute skill debriefing. This is a positive finding supporting student's satisfaction in the use of VED.

Limitations

This study contained several limitations in sampling, design, and instrumentation. First, the sample size for this study was adequate to detect a significant treatment effect between the post-test and follow-up assessments as calculated with G*Power© (Faul, 2014). However, out of 120 potential participants, only 51 participated, thus leading to a question of why less than half

the students chose to participate. A threat to external validity was selection bias. It is possible that those who chose to participate were more motivated to improve their skill performance than those who did not participate. This motivation may have impacted the results as the participants may have improved skill performance based on their motivation to improve instead of the intervention. Another explanation for why students chose not to participate may be related to their comfort with the use of video as a teaching modality. Ha (2014) reported student's fear of shame as a negative attitude toward as a limitation of using video as a teaching modality. The unknown factors for why students chose to be in this study may have created a confounding variable unrelated to the VED intervention, thus impacting results.

Participants in this study scored higher on initial IUC Grading Rubric than the PI historically experienced over the past 17 years. From the PI's 17 years of experience with this course, this population of students has scored lower on initial IUC Grading Rubric scores than was reflected in this study's sample. Also, this study sample did not demonstrate skill decay as seen in previous populations the PI has taught. The students in this sample may have demonstrated a Hawthorne effect. The participants were aware that they were participating in a study to improve IUC skill, may have altered their behavior due to the fact they were being observed (McMillian, 2015).

Furthermore, the VED and control groups were uneven. After students consented to participate and recorded their formative skill performance, they received randomization via a sealed envelope. The envelope contained information to make an appointment for VED or a paper informing them they were in the control group and would not need to take any further action. Another flaw in this research design was not having the personnel available to physically confirm the random assignment the participant received and to schedule only those randomized

into the VED group. Contamination bias occurred in one known case when a participant was randomized to the control group, and they chose to ignore their group randomization and received the debriefing. The student stated they were desperate for feedback about their performance. It is plausible to believe that contamination bias may have occurred in others.

In addition to the uneven groups, fewer in the control group than the VED group completed the DASH© survey. Some in the control group started the DASH© but stopped after a few questions. A few participants stated later they thought since they did not receive the VED, then they did not need to complete the DASH©. Clearer instructions for the participants may have mediated the misunderstanding.

Participants also had some confusion if they needed to complete some of the steps on the IUC Grading Rubric for the time-delayed repeat validation. For the time-delayed repeat validation, only 59% of participants in both groups completed the IUC Grading Rubric step “Document in EHR/verbalized: date and time of insertion, type and size of the catheter inserted, mL’s of sterile water used to inflate the balloon and how the patient tolerated the procedure.” Participants stated since they were only demonstrating the “skill part of the procedure,” they did not know they needed to complete the step. Documentation is an ongoing curricular challenge.

Another limitation of this study was with instrumentation. Reporting of instrument reliability and validity is in the instrumentation section. There was a lack of psychometric testing of the teacher-created IUC Grading Rubric instrument. Course instructors tweaked construction of the tool the morning of skills testing. Although inter-rater reliability (IRR) training was conducted with the faculty using the tool, course instructors modified the tool after the IRR training. Also, the method of IRR was completed as an asynchronous event without data collection, resulting in less discussion about using the tool for grading between instructors.

Validity and reliability of the IUC Grading Rubric would have occurred if a more systematic method of IRR occurred after the modification of the final IUC Grading Rubric. As Downing et al. (2006) stated, that faculty with evidence-based clinical expertise in the skill must follow a “systematic, reproducible, absolute, and unbiased process” to determine a passing score (p. 51).

The instructor’s reporting of student performance on the Grading Rubric and OSATS instrument could have been threatened by observer bias. The instructors were not told which students participated in the study by the PI; however, the student may have informed the grading instructor of their study participation. Instructors are also subject to grader fatigue after viewing the same skill numerous times in a limited time. Finally, despite IRR training, instructors may view a performance that is borderline between scores and must decide on a final score that may be different from other instructors.

This study’s survey of the students’ perceptions of knowledge may not have correlated with initial skills validation scores because the survey may not have accurately captured the student’s familiarity with the procedure. The use of a validated and reliable pre/post lab assessing the student’s knowledge may have resulted in a stronger correlation than using self-reported perceived knowledge. Research bias could occur if students responded to the survey questions with what they perceived the researcher would like to hear. The final instrument limitation was that the participants self-reported the number of times they practiced the skill; the collection of more specific characteristics of the practice may have strengthened results. Participants also may have been experienced a halo effect (McMillian, 2015). Those who participated in the study had interaction with the PI, providing an overall positive experience with the use of video in psychomotor skill learning. This may have influenced the participant to respond positively to the DASH© and SSLS instruments.

The study would have been strengthened through the collection of longitude data over at least 14 months to assess the VED intervention on skill decay. As described earlier, researchers in similar studies have been inconsistent with reporting of the amount of time for skill decay. This data could still be collected through a separate IRB study.

The final limitation was that this study was initially designed where all students in the course, study non-participants as well, recorded a video for summative IUC grading at the end of the semester. Therefore, originally, each student had some form of video experience. However, due to circumstances beyond the researcher's control, the use of video recording for summative assessment for students did not occur. Thus, the video was novel in the course and may have influenced study participants' satisfaction with learning compared with non-study participants who did not use video at all in their course.

Both the VED and control group had some form of video experience; therefore, there was no true non-treatment control group. This means both the VED and control group experienced a novel difference in the regular instruction of the class in comparison to those who did not participate in the study. The third group of participants was not possible for this study due to the required sample size exceeded the number of potential participants.

Implications for Practice

Based on the findings from this experimental study, the use of video to enhance DP, regardless of expert feedback, is an effective teaching strategy to enhance student's satisfaction with learning and to engage in repetitive practice with feedback. Introducing video as a teaching intervention early in the semester may allow students to become more comfortable with the teaching modality.

The use of VED increased clinical skill feedback greater than video alone. However, for pedagogical purposes and given time constraints, this study shows that video alone is a powerful pedagogical tool and involving peers in the feedback process may be sufficient to improve learning and increase student satisfaction with their learning. Peer-facilitated practice strategy was shown to support positive outcomes with learning (Aldridge, 2016; O'Brien et al., 2015; Oermann et al., 2016; Palao et al., 2015; Wulf et al., 2010). Peers were found to be an important part of learning psychomotor skills as practicing the skills together in small collaborative groups allowed more time with the skill, whether in observation of the skill performance or conducting the skill. When peers observed the skill performance, they often caught errors and were able to offer suggestions for correction in a more safe, non-threatening manner than if suggestion provided by the instructor. Peers were also found to be emotionally supportive of one another (Aldridge, 2016).

The use of video recording is another method of providing feedback to students when the faculty to student ratio is high or when instructor time is limited. Palao et al. (2015) noted that the quality of the feedback received from the instructor might be more valuable than the increased quantity of feedback given between peers. The researchers also felt that the students might not have been able to identify performance errors. Although this study did not show a significant improvement in skill performance among those who received expert feedback (i.e., the students randomized to the VED group), the use of video during practice could provide the student expert feedback during formative learning. Students could video record each other, and the instructor could view video clips of the critical skill component during the practice phase.

Along with the opportunity video provides to visualize performance objectively, it is crucial for those using video to debrief ensure the student's psychological safety. *INACSL*

Standards of Best Practice: SimulationSM Debriefing contain the evidence-based practices instructors must adhere to when debriefing (INACSL Standards Committee, 2016a). Ensuring instructor training and evaluation of their debriefing is imperative to ensure positive educational outcomes.

Recommendations for Further Research

A recommendation for future research would be to isolate the various types of feedback given to students: self vs. peer vs. expert debriefing. Researchers should continue to investigate the type of debriefing most effective during psychomotor skill acquisition and maintenance. Since debriefing is not commonly included in clinical skills labs (Vihos et al., 2017), the effects of various methods of debriefing on DASH© scores when teaching clinical skills would add to the profession's knowledge regarding best practices for teaching psychomotor skills.

Also, studies could be designed to explore the interrelationship of various student characteristics at the time of debriefing to identify if these factors contribute to improved skill validation scores. These student characteristics include their level of procedural knowledge at the time of debriefing, perceived cognitive load in relation to the number of mistakes identified in their procedure, their stage of expertise at the time of debriefing, the amount and types of practice they received, and the student's time remaining to practice before the next performance evaluation. The analysis of student characteristics and methods of debriefing for clinical skill competence is independent of using video as an adjunct to the debrief.

The use of video as an adjunct to debriefing needs to continue. Ali and Miller (2018) stated the variation and inconsistency reported in published studies regarding the delivery of video with debriefing causing difficulties in comparisons of debriefing to identify best practices of VED. Variations included in published studies were the learner's healthcare field, the level of

learner expertise, and the goal of the simulation (technical vs. non-technical skills), instruments to measure outcomes, and method of empirically based debriefing (i.e., advocacy/inquiry or plus delta). Based on my experience writing this dissertation, the lack of reporting variables consistency in published studies created difficulty to determine best practices.

Finally, as discussed with the above results, future research ought to:

- Record the rate of skill decay among these two groups of students after one year to analyze if the use of VED impacted skill decay over more time.
- Record and analyze the characteristics of the student's subsequent practice attempts between receiving feedback and skill validation.
- Collect and analyze data relating to the student's affective state during practice.
- Analyze factors with a third group of students who did not video record their performance.

Conclusions

The findings in this study expand the body of literature by exploring the effects of VED in the acquisition and maintenance of a complex nursing skill, IUC, among novice nursing students. The use of video for self, peer, or expert debriefing appears to have resulted in positive learning experiences, reduced skill decay, and improved students' satisfaction with learning. The use of video-enhanced debriefing using an advocacy-inquiry method of debriefing and the effect of a trained debriefer who had no influence on the student's course grade was received positively by students. This study supports using simulation pedagogy in teaching and learning psychomotor skills. This use of simulation pedagogy should follow *Standards of Best Practice: SimulationSM* (INACSL Standards Committee, 2016f) that has the theoretical underpinnings of

Deliberate Practice (Ericsson et al., 1993), Experiential Learning (Kolb, 1984), and Reflective Practice (Schön, 1983).

APPENDIX A:
INSTITUTIONAL REVIEW BOARD APPLICATION AND APPROVAL



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Erica Hoyt**

Date: **August 20, 2018**

Dear Researcher:

On 08/20/2018 the IRB approved the following human participant research until 08/19/2019 inclusive:

Type of Review: UCF Initial Review Submission Form
Expedited Review
Project Title: Use of Video Enhanced Debriefing in Clinical Nursing Skill
Acquisition: Indwelling Urinary Catheterization as an Exemplar
Investigator: Erica Hoyt
IRB Number: SBE-18-14161
Funding Agency:
Grant Title:
Research ID: N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

If continuing review approval is not granted before the expiration date of 08/19/2019, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

In the conduct of this research, you are responsible to follow the requirements of the [Investigator Manual](#).

This letter is signed by:

A handwritten signature in black ink, appearing to read "Gillian Morien". The signature is fluid and cursive, with a prominent initial "G" and a long, sweeping tail.

Signature applied by Gillian Morien on 08/20/2018 10:52:49 AM EDT

Designated Reviewer

APPENDIX B:
INSTRUMENTATION

Demographics Survey

What is your 4 digit year of birth?

Which of the following best describes your sexual orientation?

Male

Female

Other or decline to answer

Are you Hispanic, African American, Caucasian, other, or decline to answer.

Hispanic

African American

Caucasian

Other

Decline to answer

Experience Survey

How many times TOTAL have you performed the sterile Indwelling Urinary Catheterization procedure in simulation (this includes when you practice in open lab) and/or in the clinical setting? Answer in numeric format. If you've never performed the sterile indwelling urinary catheterization skill, state 0.

Powered by Qualtrics

Perceived IUC Knowledge Survey

Think back to the day in the NUR3028L lab when you learned the hands-on IUC skill. Answer the next 4 questions regarding your knowledge of IUC insertion after receiving the lecture, but before attending the lab. As a reminder, your answers will remain confidential.

I was knowledgeable of the female genitourinary anatomy before coming into the lab.

- Strongly disagree
- Disagree
- Agree
- Strongly agree

I was knowledgeable of the materials required to insert a sterile indwelling urinary catheter before coming into the lab.

- Strongly disagree
- Disagree
- Agree
- Strongly agree

I was knowledgeable of the steps involved for inserting a sterile indwelling urinary catheter before coming into the lab.

- Strongly disagree
- Disagree
- Agree
- Strongly agree

How did you prepare for this lab?

Skills Lab Demonstration: Sterile Procedure Insertion of Indwelling Urinary Catheter

Student _____ Student Signature _____

Evaluator _____ Instructor _____ Date/Time _____

To Pass this demonstration the student must earn at minimum 48 out of 60 possible points (80%). Remediation is required for a score of 50 or less; remediation and re-demonstration required for a score less than 48.

- 1) Identified patient by 2 identifiers (name and date of birth) **All or none**
 2 0 Comments _____
- 2) Verified order¹ and allergies in EHR²; verifies not allergic to contents of catheter insertion kit³
 3 2 1 0 Comments _____
- 3) Gathers supplies ensuring supplies chosen are correct, intact¹ and not expired²; and catheter appropriate size for patient³
 3 2 1 0 Comments _____
- 4) Introduces self¹ and procedure to patient²
 2 1 0 Comments _____
- 5) Raises the bed to waist height¹; assesses the perineal area following standard precautions², identify meatus, palpate bladder, and completes perineal care if necessary.
 2 1 0 Comments _____
- 6) Prepares the patient for the procedure by placing the patient in the dorsal recumbent position.
 1 0 Comments _____
- 7) Performs hand hygiene. **All or none**
 2 0 Comments _____
- 8) Places the sterile kit on a clean, dry surface at waist height. **All or none**
 2 0 Comments _____
- 9) Maintaining sterile technique¹, opens the sterile kit without flaps closing back over the kit².
If they do both correctly a 4 if only one component then a score of 2
 4 2 0 Comments _____
- 10) Maintaining sterile technique, places sterile drape on the bed between the patient's legs. **1 point for sterile technique, 1 for drape**
 2 1 0 Comments _____
- 11) Maintaining sterile technique, applies sterile gloves. **Deduct 3 points if they break sterile at some point either opening package or actually putting on gloves**
 6 3 0 Comments _____
- 12) Maintaining sterile technique, places fenestrated drape over the patient. **1 point for sterile technique, 1 for drape**
 2 1 0 Comments _____
- 13) Maintaining sterile technique¹, organizes supplies on sterile field²; removes air from the syringe prior to attaching to the balloon port of the catheter³; lubricates catheter⁴.
 4 3 2 1 0 Comments _____

14) Maintaining sterile technique¹, places sterile kit in accessible position to perform procedure².

2 1 0 Comments _____

15) With non-dominant hand, maintains labial retraction throughout the procedure **all or none**

3 0 Comments _____

16) Maintaining sterile technique¹, cleans the urinary meatus using forceps and cotton ball or applicator swab, from clitoris to anus², outer then inner labia, far labial fold³, near labial fold⁴ and middle⁵.

5 4 3 2 1 0 Comments _____

17) Discards cotton/swab after each wipe without crossing the sterile field **one for each swab**

3 2 1 0 Comments _____

18) Holds catheter 2"-4" from the tip¹. Advances the catheter without touching the meatus²

2 1 0 Comments _____

19) Maintaining sterile technique¹, inserts catheter another 1"². Releases non-dominant hand from labia and stabilizes catheter³.

3 2 1 0 Comments _____

20) Inflates balloon according to mL indicated on the catheter¹. Verbalizes how to determine if catheter was inflated in urethra².

2 1 0 Comments _____

21) Secures catheter to client, positioning the drainage bag to an immovable part of the bed¹, below the level of the bladder²; assesses I & O, and verbalizes proper perineal care³

3 2 1 0 Comments _____

22) Document in EHR/verbalized: date and time of insertion, type and size of catheter inserted¹, mL's of sterile water used to inflate the balloon² and how patient tolerated the procedure.

2 1 0 Comments _____

Total Points ____/60

Pass _____ **Marginal: Remediation Required** _____

Fail: Remediation and Re-demonstration Required _____

Additional Comments/Plan of Action:

Objective Structured Assessment of Technical Skill (OSATS) (Martin et al., 1997)

	1	2	3	4	5
Respect for tissue	Frequently used unnecessary force on tissue or caused damage by inappropriate use of instruments		Careful handling of tissue but occasionally caused inadvertent damage		Consistently handled tissue appropriately with minimal damage
Time and motion	Many unnecessary moves		Efficient time/motion but some unnecessary moves		Economy of movement and maximum efficiency
Instrument handling	Repeatedly makes tentative or awkward moves with instruments		Competent use of instruments although occasionally appeared stiff or awkward		Fluid moves with instruments and no awkwardness
Knowledge of Instruments	Frequently asks for the wrong instrument or used an inappropriate instrument		Knew the name of most instruments and used appropriate instrument for the task		Obviously familiar with the instruments required and their names
Use of assistants (if none required, leave blank)	Consistently placed assistants poorly or failed to use assistants		Good use of assistants most of the time		Strategically used assistants to the best advantage at all times
Flow of operation and forward planning	Frequently stopped operating or needed to discuss next move		Demonstrated ability for forward planning with steady progression of operative procedure		Obviously planned course of operation with effortless flow from one move to the next
Knowledge of specific procedure	Deficient knowledge. Needed specific instruction at most operative steps.		Knew all important aspects of the operation.		Demonstrated familiarity with all aspects of the operation.

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Student Satisfaction in Learning (National League for Nursing, 2004)

Instructions: This questionnaire is a series of statements about your personal attitudes about the instruction you received during your simulation activity using video-enhanced debriefing. Each item represents a statement about your attitude toward your satisfaction with learning in obtaining the instruction you need. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. Please indicate your own personal feelings about each statement below by marking the numbers that best describe your attitude or beliefs. Please be truthful and describe your attitude as it really is, not what you would like for it to be. This is anonymous with the results being compiled as a group, not individually.

Mark:

1= STRONGLY DISAGREE with the statement

2= DISAGREE with the statement

3= UNDECIDED- you neither agree or disagree with the statement

4= AGREE with the statement

5= STRONGLY AGREE with the statement

Satisfaction with Current Learning	SD	D	UN	A	SA
1. The teaching methods used in this simulation were helpful and effective.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
2. The simulation provided me with a variety of learning materials and activities to promote my learning the medical surgical curriculum.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
3. I enjoyed how my instructor taught the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
4. The teaching materials used in this simulation were motivating and helped me to learn.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
5. The way my instructor taught the simulation was suitable to the way I learn.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

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Debriefing Assessment for Simulation in Healthcare (DASH) Student Version[®]

Directions: Please summarize your impression of the introduction and debriefing in this simulation-based exercise. Use the following scale to rate the "Behaviors" and the six "Elements." If a listed behavior is impossible to assess (e.g., how the instructor handled upset people if no one got upset), leave it blank and don't let that influence your evaluation. The instructor may do some things well and some things not so well within each Element. Do your best to rate the **overall effectiveness for the whole Element** guided by your observation of the Behaviors that define it. The overall Element rating is not an average of the Behavior Scores; it's your overall impression of how well the Element was executed by the instructor.



Rating Scale

Rating	1	2	3	4	5	6	7
Descriptor	Extremely Ineffective / Detrimental	Consistently Ineffective / Very Poor	Mostly Ineffective / Poor	Somewhat Effective / Average	Mostly Effective / Good	Consistently Effective / Very Good	Extremely Effective / Outstanding

Element 1 assesses the introduction at the beginning of a simulation-based exercise.

Skip this element if you did not participate in the introduction.

If there was no introduction and you felt one was needed to orient you, your rating should reflect this.

Element 1 The instructor set the stage for an engaging learning experience.	Rating Element 1 _____
Behavior	Behavior Score
A. The instructor introduced him/herself, described the simulation environment, what would be expected during the activity, and introduced the learning objectives.	
B. The instructor explained the strengths and weaknesses of the simulation and what I could do to get the most out of simulated clinical experiences.	
C. The instructor attended to logistical details as necessary such as toilet location, food availability, and schedule.	
D. The instructor made me feel stimulated to share my thoughts and questions about the upcoming simulation and debriefing and reassured me that I wouldn't be shamed or humiliated in the process..	

Elements 2 through 6 assess a debriefing.

Element 2 The instructor maintained an engaging context for learning.	Rating Element 2 _____
Behavior	Behavior Score
A. The instructor clarified the purpose of the debriefing, what was expected of me, and the instructor's role in the debriefing.	
B. The instructor acknowledged concerns about realism and helped me learn even though the case(s) were simulated.	
C. I felt that the instructor respected participants.	
D. The focus was on learning and not on making people feel bad about making mistakes.	
E. Participants could share thoughts and emotions without fear of being shamed or humiliated.	

Element 3 The instructor structured the debriefing in an organized way.		Rating Element 3 _____
Behavior		Behavior Score
A. The conversation progressed logically rather than jumping around from point to point.		
B. Near the beginning of the debriefing, I was encouraged to share my genuine reactions to the case(s) and the instructor seemed to take my remarks seriously.		
C. In the middle, the instructor helped me analyze actions and thought processes as we reviewed the case(s).		
D. At the end of the debriefing, there was a summary phase where the instructor helped tie observations together and relate the case(s) to ways I can improve my future clinical practice.		

Element 4 The instructor provoked in-depth discussions that led me to reflect on my performance.		Rating Element 4 _____
Behavior		Behavior Score
A. The instructor used concrete examples—not just abstract or generalized comments—to get me to think about my performance.		
B. The instructor's point of view was clear; I didn't have to guess what the instructor was thinking.		
C. The instructor listened and made people feel heard by trying to include everyone, paraphrasing, and using non verbal actions like eye contact and nodding, etc.		
D. The instructor used video or recorded data to support analysis and learning.		
E. If someone got upset during the debriefing, the instructor was respectful and constructive in trying to help them deal with it.		

Element 5 The instructor identified what I did well or poorly—and why.		Rating Element 5 _____
Behavior		Behavior Score
A. I received concrete feedback on my performance or that of my team based on the instructor's honest and accurate view.		
B. The instructor helped explore what I was thinking or trying to accomplish at key moments.		

Element 6 The instructor helped me see how to improve or how to sustain good performance		Rating Element 6 _____
Behavior		Behavior Score
A. The instructor helped me learn how to improve weak areas or how to repeat good performance.		
B. The instructor was knowledgeable and used that knowledge to help me see how to perform well in the future.		
C. The instructor made sure we covered important topics.		

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APPENDIX C: APPROVALS AND PERMISSIONS



UNIVERSITY OF CENTRAL FLORIDA

College of Nursing
Dean's Office
12201 Research Parkway, Suite 300
Orlando, FL 32826-2210

June 7, 2018

To Whom It May Concern:

This letter serves as approval for Erica Hoyt, contingent upon Institutional Review Board (IRB) approval, to conduct her doctoral dissertation study at the University of Central Florida, College of Nursing. The goal of Ms. Hoyt's study is to determine if the use of enhanced feedback using video as part of deliberate practice results in lower than expected rates of skill decay among nursing students. Ms. Hoyt has approval to invite College of Nursing students to participate in her research as outlined in IRB protocol. I reviewed her proposed research design, and I approve the use of the College of Nursing Simulation, Technology, Innovation, and Modeling facility, manikins, iPads, and CAE recording equipment as to not interfere with the daily operations of the facility and equipment. Ms. Hoyt will reserve the space and equipment according to College of Nursing policy and procedure. The IRB protocol describes participant safety and confidentiality procedures as related to video storage.

Sincerely,

A handwritten signature in black ink, appearing to read "Maureen Covelli", written in a cursive style.

Dr. Maureen Covelli
Associate Dean of Nursing Practice

cc: Syretta Spears, STIM Center Manager

Phone: 407.823.2744 • Fax: 407.823.5675 • Web: nursing.ucf.edu

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Jun 15, 2018

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Type of use	Dissertation/Thesis
Requestor type	University/Academic
Format	Print and electronic
Portion	Figure/table
Number of figures/tables	1
Original Wiley figure/table number(s)	Figure 2 (Detailed global 5-point rating scale and pass/failure score for Objective Structured Assessment of Technical Skill)
Will you be translating?	No
Title of your thesis / dissertation	Use of video enhanced debriefing in clinical nursing skill acquisition
Expected completion date	Jun 2019
Expected size (number of pages)	200
Requestor Location	Mrs. Erica Hoyt 2876 Cedar Crest Dr APOPKA, FL 32712 United States Attn: Mrs. Erica Hoyt
Publisher Tax ID	EU826007151
Total	0.00 USD
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