An Examination of Critical Thinking Skills in Traditional and Simulated Environments for Occupational Therapy Students

by

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An Examination of Critical Thinking Skills in Traditional and
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ABSTRACT

The profession of Occupational Therapy (OT) has traditionally included in-class learning paired with authentic clinical experiences in community settings. Currently, academic OT programs are considering the use of simulation experiences for level I fieldwork as a possible addition to or alternative for traditional clinical experiences. Due to the changing healthcare market, there are significant shortages of traditional level I sites across the country. Therefore, there is a need to explore alternative ways for students to gain clinical skills. There is a minimal body of research for scenario based learning in the form of simulation within occupational therapy. This study is designed to examine the experience of Level I occupational therapy students participating in a combined clinical and simulation experience. It was hypothesized that this simulation experience would build the student’s critical thinking skills, as well as or better than, a traditional level I fieldwork experience. This study was a mixed methods experimental design using the Health Sciences Reasoning Test (HSRT) portion of the California Critical Skills Test (CCST) for pre- and posttesting. Qualitative data were collected based on students’ answers to questions triangulating their expectations for performance, experience within the simulation, and comparison of the simulation to traditional clinical level I experience. Data indicate that, while there is no significant difference in critical thinking skills for students participating in the combined experience as compared to traditional level I experience, the simulation experience added value to the students’ learning and changed their perceptions of their own skills. This has significant implications for occupational therapy education programs. Three models of fieldwork education incorporating simulation were proposed: a combined model, an integrated
model, and a clinical site model. Future research should explore the effects of these models, looking at how they could be applied to all areas of occupational therapy education.
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CHAPTER 1—INTRODUCTION

Introduction

Healthcare professionals in the workplace today engage in complex problem solving consistently throughout their workday. An intensive regime of training is required to ensure that practitioners are skilled in the latest techniques and that they are equipped to handle life or death situations with professional decision-making and competence. The healthcare industry is in a constant state of fluctuation due to changes in policy and innovation that challenge new graduates to learn as many skills as possible within their educational programs. In teaching any healthcare specialists how to practice their profession, it is important to understand the depth of knowledge that each individual must attain to be a competent and knowledgeable practitioner in their field. There is a tremendous responsibility for each practitioner to gain training in making critical decisions that will affect their patients and themselves throughout their careers. Most healthcare professionals receive this training through a combination of didactic learning in the educational setting combined with clinical placements in the field to ensure that the practitioner is competent. However, with the changing face of healthcare, educational programs are having difficulty in finding clinical placements for students to gain that experience. As a result, a nationwide need exists to find alternative ways to ensure that students are able to gain the skills required to enter the profession (Coker, 2010).

Within the field of occupational therapy (OT), these clinical placements are essential to link the didactic portion of the education to actual clinical practice. Occupational therapy is a profession that addresses patient and client rehabilitation through meaningful and purposeful activity (American Occupational Therapy Association
[AOTA], 2014). This includes working on activities of daily living (ADLs) like dressing, grooming, toileting, and bathing, instrumental activities of daily living (IADLs), such as cooking, gardening, home care, and shopping, work, play and leisure activities, and social participation (AOTA, 2014). Occupational therapy has its origins in mental health intervention but practitioners work in hospitals, skilled nursing facilities (SNFs), schools, clinics, and within the community. The broad nature of the profession requires that students in educational programs for OT experience a range of diverse clinical experiences in a variety of settings to ensure that they understand the scope of their practice (ACOTE, 2011). Medical settings, such as the hospital and SNFs, require more complex patient interactions and pose a greater risk for patient and practitioner alike.

Occupational therapy educational programs have a significant role to play in training future professionals. Throughout the educational process, it is the responsibility of the educational program to determine if the student is gaining the necessary skills to work in a complex field that requires on-the-spot decision-making on a daily basis. Within a typical OT program, this involves examining students’ abilities in critical thinking, clinical problem solving, task analysis, and therapeutic use of self. Occupational therapy programs need to ensure that their students are practicing at entry level when they graduate. This is done through a mixture of didactic teaching and clinical experiences that prepare the student into the role of practitioner. Clinical experiences are divided into two types: level I fieldworks, which are short term experiences that expose students to the roles of the practitioner which can take place in a variety of settings; and level II fieldworks, which are 12-week experiences within which the student acts as an
apprentice under the direction of an experienced therapist in order to achieve the skills of an entry level practitioner.

Inside the area of OT education, there is a growing movement toward the use of scenario based simulation experiences as clinical training for students, especially within the hospital and skilled nursing settings (Coker, 2010). While simulation is widely used by professions such as medicine and nursing, this is a new direction for OT as a profession (Clark, 2009; Errington, 2003). Simulation itself is very loosely defined and looks very different within each setting where it is used (Brewer, 2011; Gilliland, Frei, McNeill, & Stovall, 2012; Kane-Gill & Smithburger, 2011; Kim et al., 2006; Kneebone, Nestel, & Darzi, 2007; LeFlore, Anderson, Michael, Engle, & Anderson, 2007; May, Park, & Lee, 2009). Simulation may be video based learning, role-playing interactions, scenarios where students pretend to be patient and therapist, scenarios using professionally trained actors as simulated patients, and the use of high-fidelity manikins to teach patient interaction skills (Cleland, Abe, & Rethans, 2009; Copley, Rodger, Hannay, & Graham, 2010; Gordon, Wilkerson, Shaffer, & Armstrong, 2001; Kneebone et al., 2007; May et al., 2009; Wu & Shea, 2009). The complexity of simulation makes it necessary to define the type of simulation strategy used for educational practice.

This study is designed to compare the critical thinking skills of OT students participating in a patient/therapist role-playing simulation experience to those students participating in traditional level I fieldwork. The exploration includes the student perspective of the simulation experience. This chapter will examine the rationale for the study, theoretical framework, problem statement, significance of the study, purpose statement, research questions, delimitations and limitations, and definition of terms.
Rationale for the Study

Within the scope of training individuals for practice in the healthcare fields, there is a debate over the best way to prepare students for the stressful and unpredictable world of patient care. Most professions requiring intensive patient interaction as a part of daily work also require clinical competencies as a part of their education process (ACOTE, 2011; AOTA, 2007; Baldry-Currens & Bithell, 2000; May et al., 2009; Williams, Brown, Scholes, French, & Archer, 2010). These clinical competencies are often met through a process of having the student interact with patients within a clinical setting, under strict supervision. It is assumed by the professions that these patient interactions serve the purpose of teaching the healthcare professional certain clinical skills that will enable them to be a skilled critical thinker, as well as a safe and competent practitioner with a strong professional identity (Cleland et al., 2009; Errington, 2003). It is widely accepted throughout the medical and allied health professions fields that hands-on experiences are the best way to tie didactic learning to clinical practice (Rodgers, 2007).

With the changing dynamics of healthcare, the opportunity to interact with actual patients is becoming more limited (Aiken, Menaker, & Barsky, 2001). It is well known throughout the healthcare community that there are shortages of clinical placements for students where they can experience true clinical practice (Baldry-Currens & Bithell, 2000; Cleland et al., 2009; Fisher & Savin-Baden, 2002a). This shortage can be attributed to many factors. First, facilities are intensifying the demands on their practitioners with increased expectations for productivity (Fisher & Savin-Baden, 2002b). Next, an increasing litigious risk in the form of malpractice presents concerns for hospitals if students make mistakes while treating patients (Kneebone et al., 2007).
Furthermore, multiple changes to billing regulations through Medicare and private insurance make it significantly more difficult to include students in clinical practice (Aiken et al., 2001; Baldry-Currens & Bithell, 2000; Fisher & Savin-Baden, 2002a; Kneebone et al., 2007). With these barriers, schools responsible for educating medical professionals have begun a search for alternative ways of educating students in building clinical skills.

Within the field of OT, there are two types of clinical experiences, commonly known as fieldwork, that students must complete to be eligible for their board examinations. The American Occupational Therapy Association (AOTA), in their 2011 accreditation standards through the Accreditation Council of Occupational Therapy Education (ACOTE), designates these two experiences as level I and level II fieldwork. Among the educational programs for OT, little to no uniformity exists in level I fieldwork expectations. Most programs send their students out for level I as a “shadowing” or short term observational experience with individual university defined objectives for learning while in the clinic (Hanson, 2012b). A national conversation is going on currently in OT that is examining the need for more hands-on experience for students at level I fieldwork to assist in preparing students for their later clinical experiences in level II fieldwork (Coker, 2010).

One of the ways to educate students in building clinical skills that has become a standard part of nursing and medical practice is scenario-based learning (Cleland et al., 2009). Scenario-based learning involves the creation of cases or “scenarios” to teach students how to problem-solve technical cases and to practice professional behaviors. The use of scenarios includes the use of simulation as practice, setting up opportunities
for students to involve themselves kinesthetically in learning practice skills such as transfers, bed mobility, and patient handling. It can include the use of actual patient cases from books or hospital chart donations, clinical shadowing/experiential exposure, and DVDs or telecommunications (telehealth) as various models for learning clinical skills. The research to this point has consistently shown that students perceive benefit from scenario-based experiences and that they are able to demonstrate gains in clinical reasoning (May et al., 2009). However, in examining the research the outcomes are not consistent due to this broad definition of simulation. For the purposes of this study, simulation is defined as students playing a detailed patient and a student playing a therapist. Cases were developed through donated charts from actual patients in local hospitals and skilled nursing facilities, donated with consent from the patients or their families with all identifying information redacted.

Changes in the Clinical Community

As the clinical community has increased its productivity standards and become increasingly aware of the potential for malpractice litigation, schools have demonstrated a significant decrease in OT level I and II placements. Clinical sites serving medical patients are extremely reluctant to put themselves at risk for lawsuits, and the therapists who supervise students are not willing to risk their positions by not reaching productivity goals. This shortage is forcing schools to reconsider how to most effectively educate their students for entry into the profession in alternative ways that do not include attendance at medical sites (Aiken et al., 2001; Fisher & Savin-Baden, 2002a). A national shortfall of sites has the potential to have a significant impact on OT education. Alternative ways to teach students clinical skills are needed to allow students the
opportunity to practice clinical skills prior to graduation and entry into the profession (Brown & Williams, 2009; Coker, 2010; Fisher & Savin-Baden, 2002b; Hanson, 2012b; Wu & Shea, 2009).

Within the larger arena of healthcare education, many medical and nursing programs are moving to scenario-based learning using simulation as an alternative strategy to link didactic learning with clinical practice during the process of a professional education program. A large body of research exists to support increased benefits from scenario-based learning in building critical thinking skills, developing social and emotional competence, increasing clinical knowledge, building concept maps for treatment, increasing overall professional approach, building basic skills and knowledge, and producing professional competence (Clapper, 2010b; Ennis, 1993; Epstein & Hundert, 2002; Errington, 2003; Galal, Carr-Lopez, Seal, Scot, & Lopez, 2012; Gilliland et al., 2012; Gordon et al., 2001; Hsu, 2004; Kneebone et al., 2005; Kneebone et al., 2007; Liu, Schneider, & Masako, 1997). Within the field of OT simulation is an emerging area of educational practice with little published research supporting the use of simulation for learning clinical skills, developing critical thinking, and attaining professional competence.

**Emerging Occupational Therapy Educational Strategies**

Scenario-based level I fieldwork using simulation in OT is a relatively new educational strategy. With a demonstrated shortage of clinical sites for OT students to engage in hands-on learning for level I fieldwork, the profession needs to develop alternatives for clinical learning. Using alternatives for level I experiences could allow clinical sites to commit to fewer students per year, allowing them to focus on providing
quality level II experiences only (ACOTE, 2009, 2011; Aiken et al., 2001; AOTA, 2007; Baldry-Currens & Bithell, 2000; Fisher & Savin-Baden, 2002a, 2002b; Hanson, 2012a; Roger, Fitzgerald, Davila, Millar, & Allison, 2011). Scenario based simulated learning experiences may be the key to providing an alternative to traditional level I fieldwork experiences. Alternatively, simulation experiences may increase the depth of learning for level I students and assist in increasing the number of available level II sites. Though a sizable body of research has been published supporting simulation in medical education, there is a lack of research to support the use of scenario based learning with a simulation component for OT students, especially as an alternative to traditional level I fieldwork.

**Student Participation in Simulation Experiences**

Moreover, it is thought that there may be potential benefits to students taking on the role of simulated patients, as the experience may result in increased competency for the student when they move into the role of the therapist. Research on simulated patients has determined that individuals acting as patients during teaching develop a more critical relationship with their doctors, likely due to their increased knowledge of how the doctor is trained (Boerjan, Boone, Anthierens, van Weel-Baumgarten, & Deveugele, 2008). It is possible that being a simulated patient as the occupational therapist may increase professional competence due to the idea that now the therapist will understand how it feels to be moved in the bed, to engage in the therapeutic process as the patient, and to feel vulnerable or at risk. If the OT student understands both roles, it is hoped that this will affect their understanding as a practitioner, which will lead to a greater professional competence in future practice.
With all of these factors, it becomes clear that data are needed to determine if students require experiences in a clinical setting to build the necessary skills for practice, or if a combination of clinical observation combined with simulated experiences is an effective way to build those skills. Although there is extensive evidence within the literature justifying simulation as clinical experiences through other healthcare professions, specifically medicine and nursing, the limited data for OT demonstrate the need for a greater understanding of the skills students acquire during level I fieldwork and an examination of the variety of ways that these skills can be obtained.

**Theoretical Framework for the Study**

In the education of occupational therapists, there is an expectation that, by the end of their educational program, students will have achieved entry-level practitioner status (ACOTE, 2011). One of the expectations defined in the Blueprint for Entry Level Education (AOTA, 2009) is clinical reasoning which is defined as a “complex, multifaceted cognitive process used by practitioners to plan, direct, perform, and reflect on intervention” (p. 13). While there is an ongoing debate on how students achieve these skills through their OT program, all graduates from an entry-level OT program are expected to have strong critical thinking skills directed toward complex problem solving during intervention (Lederer, 2007). With these thoughts in mind, there needs to be some determination of how level I fieldwork plays a part in development of these skills through providing students an opportunity for real-time experiences that shape their reasoning.

In examining how students achieve these skills, one must examine how college age students acquire complex skills in the first place. In looking at Knowles’ (1970) Adult Learning Theory, it is thought that students engaged in learning use their own
experiences to frame their understanding as they progress through the curriculum, especially when that learning is problem centered (Clapper, 2010a). Kolb’s (1984) Experiential Learning Theory proposes that learning follows a cycle of concrete experience, followed by reflective observation and abstract conceptualization (Dale, Sullivan, & May, 2008). When applying these theories for education on a practical level for the field of OT, level I fieldwork becomes the concrete experience that leads students to reflect and develop mental frameworks for critical thinking skills for the profession. Using these theoretical frameworks can provide context for using simulation as experience for level I fieldwork if the content of the simulation is connected to the student’s didactic learning.

An additional model that assists in making these connections is Notarianni’s (Notarianni, Curry-Lourenco, Barham, & Palmer, 2009) Progressive Professional Development Model. This model demonstrates that clinical experience must be provided using a variety of contextual differences to ensure that students are able to apply their learning to different situations. This model is currently being used to justify simulation experiences in nursing education and can easily be generalized to other healthcare professions. Examining clinical experiences as opportunities to apply learned skills to build critical thinking is the basis of this study.

**Problem Statement**

The problem scrutinized within this study is the determination of whether a simulation experience can be utilized as a level I experience resulting in a similar or greater gain of critical thinking skills for students in the field of OT. There will also be
an exploration of the student’s impressions around the simulation experience, specifically looking at their comparison of this experience to a traditional level I experience.

While there is a large body of research looking at simulation as a way to build critical thinking skills in medicine and nursing, there is minimal research done on simulation as a teaching tool for OT in building critical thinking or professional competence (Clapper, 2010b; Ennis, 1993; Epstein & Hundert, 2002; Errington, 2003; Galal et al., 2012; Gilliland et al., 2012; Gordon et al., 2001; Hsu, 2004; Kneebone et al., 2005; Kneebone et al., 2007; Liu et al., 1997). With the identified shortage of clinical sites for OT, it becomes necessary to determine if simulation can be used as an effective alternative to clinical experiences in the field. If the simulated experience is able to build critical thinking skills at the same or a greater level than traditional level I fieldwork, it may then be determined that it is a positive alternative model for learning clinical skills.

**Significance of the Study**

This research is designed to explore alternative ways for students to gain level I experiences that will build their critical thinking skills and facilitate clinical reasoning. The Accreditation Council for Occupational Therapy Education (ACOTE, 2011) defines the goal of level I fieldwork experiences as “to introduce students to the fieldwork experience, to apply knowledge to practice, and to develop understanding of the needs of clients” (ACOTE, 2011, p. 33). Additionally, the criteria for level I experiences are that the program:

- Ensure that level I fieldwork is integral to the program’s curriculum design and include experiences designed to enrich didactic coursework through
directed observation and participation in selected aspects of the occupational therapy process (Standard C.1.8).

- Document the criteria and process for selecting fieldwork sites, to include maintaining memoranda of understanding (MOU, Standard C. 1.1). (ACOTE, 2011, p. 33)

Within these definitions, ACOTE has provided a vehicle for students to gather level I experiences in a variety of ways. While the profession has traditionally interpreted these standards as meaning that the students will go out to clinical sites for this level of experience, there have been recent studies questioning the learning occurring at traditional sites and calling for alternative ways to meet these standards (ACOTE, 2009; AOTA, 2007; Hanson, 2012a; Roger et al., 2011). The Accreditation Council for Occupational Therapy Education (ACOTE, 2009) believes that simulation may be a good way for students to gain clinical experience. The Accreditation Council for Occupational Therapy Education has accepted that this is an alternative to traditional level I fieldwork for the profession and is encouraging programs to explore scenario-based learning and simulation in all its forms. The Accreditation Council for Occupational Therapy Education has also asked programs to gather data to provide evidence of student skill acquisition in the different level I settings. Two educational institutions participated in this study. These institutions are identified throughout by their pseudonyms: American University and Coastal Community College. Students participating in this study are all enrolled at American University. Coastal Community College was the simulation site through the use of their nursing bed labs.
Purpose Statement

The purpose of this experiment is to compare the experiences of OT students who are involved in different types of level I fieldwork, contrasting a traditional model with a clinical/simulation combined model. Within this study, traditional level I fieldwork is operationally defined as four clinical rotations within the larger local therapy community (two each trimester for two trimesters). The alternative clinical/simulation level I group is operationally defined as two traditional clinical rotations within the larger local therapy community (one each trimester), and two weekends in the simulated environment at Coastal Community College (first as the patient and then as the therapist), for a total of four experiences. The larger local therapy community is defined as OT sites that have contracts with the university within a 2-hour radius of the university. The goal of this study is to examine the students’ critical thinking skill development over time and to determine the part that level I fieldwork plays in that development. Furthermore, there will be an examination of what specific activities and events occur during scenario-based simulation experiences that students feel further support their learning as compared to students participating in traditional level I experiences. It is the intent of this researcher to increase information on the use of simulation as a safe and hands-on alternative for level I fieldwork.

Research Questions and Hypothesis

This study intends to address the following questions:

- What are the differences in critical thinking abilities, as measured by the Health Sciences Reasoning Test, between students who have a traditional level I experience as compared to students who have an alternative level I
experience of traditional level I combined with a scenario based simulation fieldwork experience?

- How do students perceive the experience of the scenario based simulation experiences as compared to traditional level I fieldwork?

**Research Hypothesis:** The hypothesis for this study is that clinical reasoning scores as measured by the Health Sciences Reasoning Test (HSRT) will be achieved at the same or greater rate for students who participate in the alternative level I experience as for students who participate in traditional level I fieldwork experiences. It is hoped that the students’ answers on the evaluation of the fieldwork experience forms will shed some light on their impressions of learning between traditional level I sites and the alternative scenario-based experience.

**Limitations**

The limitations of this study include the selection of sample and the size of the sample. In selecting students for participation in the study, only OT students from America University were chosen to participate. This convenience sample was chosen out of necessity due to the primary researcher being the fieldwork coordinator at American University. During selection of the participants in this study, students who had failed or dropped out of a class during their first two trimesters were excluded from the study. This is due to the fact that these students do not take their level IA and IB courses in trimester sequence, and so it becomes more difficult to determine if their progress in their critical thinking skills can be attributed to the fieldwork experience. Finally, the sample size is a limiting factor. The size of the intervention sample is limited by the simulation lab size at Coastal Community College. Only 12 students from each trimester were
selected for the intervention group due to these space limitations. Ideally, this leaves a matching sample of students who are getting traditional level I fieldwork. Cohorts at American University are limited to 28 students. Data were taken from three full cohorts, so the sample should be equalized in the data; however, the sample size is smaller than ideal in this type of research. This research should be considered as a pilot study on the use of simulation as an alternative short-term clinical experience for OT students that may indicate some trends and opportunities for follow-up research.

**Delimitations**

This research does not examine the multitude of other skills that are considered when looking at what students are expected to gain from their level I clinical experiences, such as professional judgment, documentation skills, or emergent clinical reasoning. In looking at critical thinking skills, this study is attempting to take one small part of the expectations for level I fieldwork in an attempt to determine comparison data between the two groups. This study is also not able to examine student’s GPA or other scores to see if there are other factors that may influence how the student approaches the fieldwork experience. Finally, there are many factors that contribute to the student experience in level I fieldwork including the level of participation allowed by the supervising therapist, the number of settings the student experiences, and the different types of patient diagnoses the students are exposed to at the sites. There is a tremendous variance in clinical level I sites, supervisors, and situations that it becomes impossible to control what the students are experiencing while out at traditional clinical sites. Some sites are very comprehensive with good teaching models while others are not. The clinical, traditional level I fieldwork does not recommend a prescribed method of teaching and so there is no
consistent way to determine what the students are experiencing. Course objectives are determined by each individual university and, while the sites are aware of the objectives, student experiences are mostly observational. There are rare exceptions for sites that have strong student learning programs for level I fieldwork, but these are few and far between. By and large, student level I fieldwork consists largely of observation with little to no patent interaction.

**Definition of Terms**

*ACOTE standards:* Published comprehensive standards that outline the requirements for education and teaching for OT programs and are used for accreditation of occupational therapy programs. The most recent set of standards was published in 2011.

*Allied Health Professions:* This can be any of a number of healthcare professions that are not nursing or medicine. This includes occupational therapy, physical therapy, speech-language therapy, recreational therapy, music therapy, and so forth.

*Clinical Reasoning:*

A complex phenomenon comprised of an ensemble of contextual and cognitive factors. Contextual factors include health and life circumstances as well as emotional and social factors of both the patient and the therapist. . . . Cognitive factors are skills of wise judgment, reflection, and critical thinking. (Hunh, Black, Jensen, & Deutsch, 2011, p. 181)

*Critical thinking:* “Includes the skills of induction, deduction, evaluation, analysis, and inference” (Hunh et al., 2011, p. 181).
Entry level practitioner: The entry level practitioner is expected to be able to work independently as an occupational therapist. Students completing their OT program are expected to be at entry level for the practice, and are considered to be entry level for their first year of practice.

Health Sciences Reasoning Test (HSRT): A test designed to assess the critical thinking skills of allied health students. The HSRT is a 33-item multiple choice test, administered online that requires the test taker to “analyze, make an inference, evaluate an inference, or justify an evaluation or inference” (Hunh et al., 2011, p. 182).

Healthcare Community/Clinical Community: The local community of sites, clinics, hospitals, and schools that assist in teaching students clinical skills.

Interprofessional learning: Learning experiences that occur between different professions in the same field, for example occupational therapy and physical therapy.

Intraprofessional learning: Learning experiences that occur between different levels of the same profession, for example, occupational therapy and occupational therapy assistants.

Level I fieldwork: Short term clinical experiences. These clinical experiences are required to be linked to the curriculum and have a goal of “enriching the didactic coursework through directed observation and participation in selected aspects of the occupational therapy process” (ACOTE, 2011, p. 33).

Level II fieldwork: Twenty-four weeks of full-time clinical practice under the supervision and mentorship of an occupational therapy professional (ACOTE, 2011)

Productivity: The amount of time a therapist is expected to spend in actual patient contact during a workday. In many facilities, this is 90% of the time.


*Professional competence:* “The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and the community being served” (Epstein & Hundert, 2002, p. 226).

*Shadowing:* Observation of a clinician while at a clinical site. During the shadowing experience, the student does not participate in any aspects of the treatment, but instead follows the clinician around and stands in the background only observing treatment.

*Telehealth:* Therapy from a distance using phone conferencing or some other method of observing and conversing with the patient from a distance. This can also be used as a teaching tool with the therapist completing a treatment session in a live video feed, answering student questions after the treatment session (Brown & Williams, 2009; Liu et al., 1997).

*Therapeutic use of self:* A therapist’s “planned use of his or her personality, insights, perceptions, and judgments as part of the therapeutic process” (Punwar & Peloquin, 2000, p. 285; Taylor, Lee, Kielhofner, & Ketkar, 2009).

**Summary**

This chapter has presented an introduction to the topic, as well as a review of the problem, purpose, and significance of this study. The next chapter continues with a review of the literature surrounding OT level I fieldwork, scenario based learning, simulation, learning theories and frameworks, as well as examinations of clinical reasoning and critical thinking skills and their importance to OT as a profession. It will
be followed by a review of the methodology, an examination and presentation of the data, and a discussion of the results.
CHAPTER 2—LITERATURE REVIEW

Introduction

This chapter provides an overview of the literature surrounding the types of scenario-based learning that are used within medical education and the use of critical thinking skills as a measure of overall preparedness for professional practice in healthcare. Specifically, the definition and use of critical thinking skills as an effective measure of clinical reasoning and overall preparedness for clinical practice will be reviewed. Other dimensions, including specific environments used; the genres for simulation used across medical education; and the educational theories and frameworks defining the origins of scenario-based learning in medical education which demonstrate the complexity of understanding scenario-based learning, will be summarized. This understanding is fundamental to gaining a larger view of the training needs for the medical professions. Furthermore, the context for the measurement of critical thinking skills within traditional and simulated occupational therapy (OT) fieldwork environments to determine if students experience differences in learning based on the type of clinical experience will be addressed.

Overview of Clinical Learning

Hands-on experience is an essential part of clinical training for most medical professions. A significant majority of medical professions require at least some hours of in-clinic or on-site training for their professionals with guidance or mentoring from a senior practitioner (Cleland et al., 2009; Errington, 2003). Traditionally, this has been done following a medical model in which students complete the majority of their didactic course work and then shift to a clinical rotation out in the community at a medical
facility. Within this clinical rotation, students are expected to learn the clinical skills and professional behaviors necessary to be a competent practitioner. Each profession requires a different number of hours spent in clinical rotations to ensure expected competencies with the expected outcome of professional competence. Professional competence is defined as: “the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and the community being served” (Epstein & Hundert, 2002, p. 226). Despite the general assumption that clinical practice will build these abilities, there is no guarantee that simply completing a clinical rotation will provide the individual the opportunities they require to achieve these skills, and, in fact, many sites expect students to possess the early development of the tools of clinical practice prior to their clinical rotations. In an attempt to prepare their students for these clinical rotations, many schools have begun to use scenario-based learning as a teaching tool (Clark, 2009; Schell & Cevero, 1993; Sullivan-Mann, Perron, & Fellner, 2009).

Scenario-based learning, which is sometimes referred to as problem-based learning or case-based learning, is a larger concept that encompasses almost all forms of teaching using real or high-fidelity fabricated cases to build problem solving judgment (Clark, 2009; Errington, 2003). Within this expanded definition, there are many considerations for how scenario-based learning will be used with different professions: including the environment for learning; the origin of the scenario; the expected outcome or skill for learning; and the measurement of that skill. Scenario-based learning has been used with significant positive gains in training police to exhibit improved interactions with traffic stops and tactical situations using training in the classroom combined with
simulated interactions with simulated offenders (Kovacs, 2010). Scenario-based learning has also been used within the Armed Forces to assist in training commanding officers, troops in combat, and technical personnel to better prepare them for high-pressure situations and on-the-spot decision making, using training in simulated crisis situations in the field, often combined with nonlethal ammunition (Clark, 2009). Scenario-based learning through videotaping, playback, and role-playing have been used in teaching, counseling, and in leadership training for many years (Browning, Collins, & Nelson, 2008; Eroz-Tuga, 2013; Olusegun, 2004). These techniques have assisted with building stronger technical skills, as well as assisted professionals in building resources for working with their students and patients. Role-playing has even been used as a simulation technique in hostage negotiation training, with these experiences assisting the negotiators in building stronger active listening skills and strategic techniques (Van Hasselt, Romano, & Vecchi, 2008).

The process of the scenario-based learning has multiple accepted components. Students typically are brought together to engage in the scenario using videos, patients, or role-playing (Hand, 2006; Kneebone et al., 2007; LeFlore et al., 2007; Rodgers, 2007). This often starts with a didactic explanation of the case and essential skill expectations. Specific techniques are reviewed and students complete the learning experience. There has also been research into student stress during the simulation (Admi, 1997). Students engaged in learning about techniques or procedures can become overwhelmed with the complexity of what they are being asked to do (Admi, 1997; Elfrink, Nininger, Rohig, & Lee, 2009). Educators have discussed multiple ways to reduce this anxiety and stress in students. Elfrink and colleagues (2009) proposed that a collaborative learning model
reduced student stress and anxiety, redirecting the focus from the success or failure of the individual student to the group or to the learning process itself. Debriefing at the end of the scenario-based experience as a way to ease student discomfort after engaging within the simulated environment has also been identified as a critical part of the learning process (Admi, 1997; Elfrink et al., 2009; Parker & Myrick, 2010). This is necessary to ensure that the students are able to internalize their learning so that the skills may be integrated and generalized.

Within the field of medicine, the need for scenario-based learning is clear. Clark (2009) identifies that “[Scenario-based learning] generally works best teaching non-routine job tasks that involve judgment and decision making—trouble shooting . . . most forms of analysis” (p. 84). This lends itself well to the profession of medicine where patients themselves are a significant variable and medical professionals are often put in the position of having to make on-the-spot decisions that could be considered life or death for their patients. The use of clinical cases for learning has a long history in medicine and has evolved over time to include the use of simulated patients within simulated clinical settings for experiential learning and clinical reasoning (Cleland et al., 2009; Schell & Cevero, 1993). Medicine, nursing, and pharmacy have taken the use of simulated patients one step further in using manikins to assist in simulating situations that require biophysical reactions, such as working through medical procedures, changes in heart rate, or oxygen/airway trauma (Bray & Hammer, 2011). Through these experiences, both with simulated patients and manikins, there are opportunities for problem solving, group learning, critical thinking, and building of overall professional
competence (Benner, Hughes, & Sutphen, 2008; Coker, 2010; Epstein & Hundert, 2002; Hand, 2006).

In examining how students build critical thinking skills, it is important to understand how teachers achieve shared expectations with their students. For example, in most courses there is a syllabus with objectives and course learning outcomes that can spell out to the students what they are expected to learn by the end of the experience. It is the responsibility of the faculty to clearly communicate these expectations to the students in the course so that there is a shared understanding of how all parts of the learning environment move together (Bensley & Ellsworth, 1992). However, in looking at how students learn, it is not always understood how the actual teaching in the course links with what the student is expected to learn. Often, the way that students are expected to demonstrate their knowledge comes in the form of a written examination that does not allow them to explore the multiple possible answers that are presented when there are complex clinical issues (Bensley & Ellsworth, 1992; Epstein & Hundert, 2002; Krathwohl, 2002; Zorek, Sprague, & Popovich, 2010). To prepare for these examinations, students report that they memorize the content and regurgitate it in a process otherwise known as bulimic learning. Studies on bulimic learning have shown that memorization of the material with expectations for regurgitation on a test create anxiety within students and cause them to eventually feel that they do not know anything (Bensley & Ellsworth, 1992; Zorek et al., 2010). The concept behind bulimic learning is the opposite of building critical thinking skills. When students memorize the answers, they are not engaging their higher brain functions (Zorek et al., 2010). This leads to students who just want the answer given to them, rather than students who think critically.
about what they are doing. These are students who only engage at the lowest levels of Bloom’s taxonomy of learning and who are not able to generalize their learning into an understanding of the bigger picture (Krathwohl, 2002; Weigel & Bonica, 2014).

**Critical Thinking Skills and Overall Professional Competence**

In examining how to measure the outcomes of scenario-based learning, it is first necessary to examine the qualities that are expected of a graduate from a professional program in the medical field. A significant volume of specialized knowledge is expected for practitioners in each area of medicine, nursing, or allied health that is specific to that profession. This volume of knowledge is one of the reasons that so many different healthcare professions exist; there is no way for a single professional to maintain comprehensive knowledge about all areas of medical practice (Hand, 2006). Despite this, all healthcare professions are expected to produce practitioners who demonstrate competence and proficiency in their profession (Wu & Shea, 2009). One of the measures that occurs frequently in the literature is the idea of critical thinking. This is a skill that is not unique to the medical profession, but it is considered to be an essential building block for professional competence. In looking at critical thinking skills, it becomes important to gain a working definition of critical thinking. Within the literature, the accepted definition is “purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based” (Insight Assessment, 2014, p. 5). Further, critical thinking skills are dependent on multiple, varied experiences gained over time, and building critical thinking is important for overall application of technical knowledge and skills in patient care leading to
professional competence (Oermann, 1997). Learning these skills in alternative environments has been found to be effective, “Critical thinking skills may be improved by providing active learning activities and chances to apply the processes of clinical reasoning outside of the classroom” (Lederer, 2007, p. 521). These definitions are consistent with the idea of using scenario-based learning for larger skill acquisition.

Many studies examine ways to build critical thinking skills in professional students. Sullivan-Mann and colleagues (2009) determined that increased simulation experiences led students to have a significantly greater gain in their critical thinking skills than students who had fewer simulated experiences. This is in line with other research that determined that experiential learning is essential to building critical thinking skills and that these critical thinking skills can be combined with clinical reasoning abilities to lead to overall professional competence (Coker, 2010; Ennis, 1993; Oermann, 1997; Schell & Cevero, 1993; Vyas, Ottis, & Caliguri, 2011). Critical thinking and clinical reasoning are skills that are built over time and across the progression of the curriculum with professional programs, with the expectation that students become more proficient as they matriculate and that these skills continue to improve when students enter professional practice (Benner et al., 2008; Lederer, 2007).

While most studies on scenario-based learning discuss critical thinking skills and clinical reasoning as expected outcomes for students, most studies do not use the building of critical thinking skills as a statistical measure of the success of the experience. Many studies use student satisfaction surveys or interviews to determine the student’s perception of the experience or do not measure an outcome at all (Bray & Hammer, 2011; Gilliland et al., 2012; Gordon et al., 2001; Kane-Gill & Smithburger, 2011; Schell 

Cevero, 1993; Shoemaker et al., 2011; Vyas et al., 2011). Some of these studies use observational data to report that students feel that scenario-based learning, specifically simulation, is a positive experience that makes them think of all factors together rather than considering them separately in the classroom (Kneebone et al., 2005). Although these data are gathered using interview and observation, the literature discussion largely concludes that these skills contribute to overall clinical learning and the building of concept maps that lead to development of professional competence (Hsu, 2004). In looking at how these skills are learned, there then needs to be an exploration of the environments for scenario-based learning.

**Scenario-Based Learning: Environments**

According to the literature, it is important to consider the environment where the scenario-based learning takes place (Boerjan et al., 2008; Bray & Hammer, 2011; Brewer, 2011; Clark, 2009; McGaghie, Issenberg, Cohen, Barsuk, & Wayne, 2011). There are multiple environments for learning, and each brings its strengths and weaknesses. The first such environment is in a classroom within an educational environment (Errington, 2010). The second is within a simulation lab set up within the educational environment (Brewer, 2011; Gordon et al., 2001). This is common for nursing schools and medical schools where classrooms are arranged to approximate wards within a hospital or clinic. The third environment is within a real medical facility such as a clinic, hospital, or skilled nursing facility (Gordon & Vozenilek, 2008). The fourth is in a simulation center where the entire training center is set up as a model of a medical ward (Alinier, 2011; LeFlore et al., 2007; Roger et al., 2011; Shoemaker et al., 2011). Each environment has benefits and limitations in working with scenario-based learning. For example, the traditional
classroom environment is one that is very familiar to the student. Within this environment, there is an expectation of knowledge exchange that can reduce a student’s sense of intimidation when exploring scenarios and can lead to greater participation from the student (Errington, 2003). However, this environment can also allow the student to be very passive. In traditional learning environments, the students are typically engaged auditorily and visually, but not often engaged kinesthetically. This can cause a lack of internalization of the information. Research has shown that placing simulation activities in either a real medical environment or a simulated clinical environment can increase the ability to retain and transfer the knowledge gained in the process (Clapper, 2010b).

There is no significant research on building simulation laboratories within a community college or university environment. Several studies describe their research on students within a simulation lab on the local campus, but there is no detailed description of that environment beyond that it was a simulation lab for medical programs (Rutherford-Hemming, 2012; Wu & Shea, 2009). In her article, Creating a Nursing Simulation Laboratory: A Literature Review, Rothgeb (2008) examined the research on designing a nursing simulation classroom and came to the conclusion that, in designing a simulation laboratory classroom, schools needed to consider how these labs would be used and design them according to their individual purpose. In her conclusion, she determined that the literature found the use of simulation lab classrooms was beneficial for student learning but that these labs were expensive to build. In other research on classroom simulation labs, considerable time is spent discussing human patient simulators (manikins) and their uses for simulation, but there is no discussion of what the lab itself looked like (Gordon et al., 2001). It is possible that this gap in research exists
because the general understanding appears to be that the simulation lab classroom will minimally contain hospital beds. Some research assumes that there will be monitors for the manikins, and others that there will be additional equipment such as wheelchairs, walkers, IV equipment, catheter equipment, and other medical treatment equipment available (Cleland et al., 2009; Copley et al., 2010; Gordon et al., 2001; Kneebone et al., 2007; May et al., 2009; Wu & Shea, 2009). The type of simulation lab classroom may not be a defining factor effecting research, but to date there is no research to determine if this is so. Additional research into the description of and type of equipment needed to create the ideal simulation classroom lab would be beneficial to understanding the essential components of creating effective educational experiences.

The simulated clinic and the real medical environment often look very similar. While the simulation center is set up for the singular purpose of training medical professionals to gain specific professional skill sets, it does not create an environment of urgency in performing procedures, which is common in the actual hospital environment (Alinier, 2011). In looking at these two models, both have the advantage that students would be enabled to engage in kinesthetic learning of procedures and critical thinking skills. Each has their place in clinical training. The simulation center does allow students to learn how to treat patients without the risk of injury to the patient. However, there is significant value in building critical thinking when the student is pressured by the seriousness of the situation (Alinier, 2011; Kneebone et al., 2005; Roger et al., 2011; Shoemaker et al., 2011). The concept of the learning environment can be very complex because the models of learning can be easily conducted within different environments. Additionally, most research into scenario-based learning examines the procedures and
student interactions during the teaching and learning process. There is very little research that examines the environment itself during scenario-based learning. Based on a comprehensive search of this literature review, most information was derived from the context of research into other factors of learning. This is a significant limitation in the research, as there is no way to determine if the environment has been kept constant from study to study. In looking at the models of scenario-based learning, it is important to realize that education can and often should be carried out across multiple environments.

**Scenario-Based Learning: Genres and Types**

Many types of experiential learning exist within the healthcare education field, which are used to increase students’ preparedness for entry-level practice. Most programs use experiential learning models to some degree for the following purposes: teaching specific skill sets, emphasizing the messages of clinical practice, providing an anchor for didactic course work, and offering an alternative experience outside of the traditional model (Cleland et al., 2009; Epstein & Hundert, 2002; Fortune, Farnworth, & McKinstry, 2006; Wu & Shea, 2009). Whatever the use of these experiences, the goal is to prepare a student who is better equipped to work with patients and other clinicians in the field.

The first model that is widely used within all medical fields is designing actual clinical or experiential exposure. This can be done in a traditional clinic or hospital, or within a lab that is set-up to simulate the traditional clinic or hospital. Within these settings, students are exposed to patients who require care and treatment. These patients can be real patients admitted to the facility posttraumatic event or surgery, simulated patients who are trained to play the role of a patient admitted to a facility, and even “human patient simulators” which are manikins designed to emulate a patient in order to
Teach a set of skills (Cleland et al., 2009; Copley et al., 2010; Gordon et al., 2001; Kneebone et al., 2007; May et al., 2009; Wu & Shea, 2009). Each patient type and environment has its own set of benefits and drawbacks within the larger clinical environment.

Traditional clinical experiences, defined as actual patients in real environments, have long been the cornerstone of clinical education in the medical fields (Hughes, 2008). The primary example of this is in the field of medicine (MD) where the doctor-in-training completes several years of clinical experience including rotations, internships, residencies, and fellowships (Epstein & Hundert, 2002). Within the field of OT, students are required to complete two types of clinical exposure: Level I fieldwork and level II fieldwork. The purpose of level I fieldwork has traditionally been described as “to introduce students to the fieldwork experience, and develop a basic comfort level with an understanding of the needs of clients” (AOTA, 2007, para. 1). These experiences have most often been interpreted by the clinical mentors as “shadowing” experiences, where the student goes into the clinic to follow a practicing occupational therapist for a set number of hours but does not often have the chance to participate in clinical treatment (Hanson, 2012b). The purpose of level II fieldwork experiences is to prepare the student for entry-level practice as a type of apprenticeship. Occupational therapy students spend 24 weeks at clinical sites completing treatment with actual patients in order to achieve skill competencies and clinical competencies that should meet professional competence (ACOTE, 2011; Epstein & Hundert, 2002). While these traditional clinical experiences have long been thought to be the best practice for preparing students for practice, they also have some risks for both patients and the students themselves.
The risk for traditional clinical experiences can include injury or death for the patient, which is a significant risk to be absorbed by the patient, the supervisor, and the facility. In fact, many facilities only allow students to become observers in situations where there is significant risk to the patient, even if the student is able to perform competently (Gordon et al., 2001; Kneebone et al., 2007; May et al., 2009). This includes patients who are experiencing sudden events like cardiac or airway issues, but it can also include patients who are significant fall risks. There is an expectation that students should be able to practice these skills in a nonrisk based situation, which is one of the reasons that schools and facilities have created simulation experiences. These simulation experiences allow the students to experience the emergency without the risk to the patient (Gordon et al., 2001; Kneebone et al., 2007; May et al., 2009).

One of the ways for students to experience the emergency without the risk is with the use of a simulated patient. A standardized or simulated patient (SP) is defined by the Association of Standardized Patient Educators (ASPE, 2011) as: “[Standardized or simulated patients are] individuals who are trained to portray a patient with a specific condition in a realistic, standardized and repeatable way (where portrayal/presentation varies based only on learner performance)” (para. 1). Simulated patients may be students enrolled in the medical program, community members, or recovered patients who return after recovery to reprise their roles to assist students in learning the specifics of a particular diagnosis. Within the simulated patient expectation is a standard of performance that demonstrates high fidelity and accuracy of portrayal. Their psychomotor response and emotional feedback should change only based on the treatment questions and procedures done by the student. Most simulated patients are
there to portray the patient only, with educational support coming from professional
instructors who give the clinician feedback on their performance throughout the simulated
experience. These simulated patients can be used in real clinics to allow the students to
experience their skills in the “real world” or within a simulated clinical environment,
such as a simulation-lab or classroom set up as a simulated medical environment (Gordon
et al., 2001; Kneebone et al., 2007).

Another group of simulated patients give feedback directly to the clinician during
and after the experience (ASPE, 2011). These simulated patient/instructors are most
often members of the Gynecological Teaching Associates (GTA) or the Male Urogenital
Teaching Associates (MUTA). These organizations originated from groups of simulated
patients coming together to help standardize simulated patient practice (Wallace, 1997).
The use of simulated patients who have been former patients brings a whole different
dimension to the simulation experience. Often these patients act as the teacher, showing
students what a heart murmur sounds like or what quadriplegia actually feels like
biomechanically on the patient (Wallace, 1997). This can be extremely valuable to the
students because they are able to get feedback from the patient themselves on how they
were diagnosed and treated for specific conditions. With intensive coaching and training,
these simulated patients/instructors can teach the students very valuable lessons (Wallace,
1997).

There are some limitations to using simulated patients, including the fact that
simulated patients are not actually in distress. In response to this, the medical field
created Human Patient Simulators (HPS), a more modern technological development of
manikins designed to adhere with a set fidelity to a patient experience (Brewer, 2011;
These manikins are most often used for medical procedures that require biofeedback of some type. Biofeedback can include heart rate, oxygen and pulse, or accurate representations of patient psychomotor reactions to the insertion of catheters or IV placement. The manikins are classified from low tech with basic functions to high tech with multiple reactions and voice simulators (Shoemaker et al., 2011). These manikins are currently being used very successfully to teach nursing and medical procedures: they can be intubated and have IV lines inserted with no risk. This strategy is used with students in nursing, medicine, allied health, and with current practitioners who are required to stay up-to-date in their field (Bray & Hammer, 2011). The findings indicate that the use of the human patient simulators (manikins) leads to greater safety, social-emotional competence, application of knowledge, and increased critical thinking and clinical reasoning skills (Bray & Hammer, 2011; Galal et al., 2012; Vyas et al., 2011; Vyas, McCulloh, Dyer, Gregory, & Higbee, 2012; Wu & Shea, 2009). The real drawback of the human patient simulation manikins is the amount of classroom space they require and their high cost for both purchase and maintenance, which can be prohibitive for many programs (Bray & Hammer, 2011; Rothgeb, 2008).

Simulated patients themselves vary in type, skill, and abilities. Cleland and colleagues (2009) stated that there was a continuum of training for the simulated patients, ranging from patients being given only the briefest of outlines to being extensively trained to give a standardized performance for the student learners. These roles can also be played by a variety of individuals including actors, students, prior patients, laypeople, or volunteers. Some of these patients are reimbursed for their time, while others are participating for the experience in teaching medical professionals the skills needed to
practice. Within the literature, there is no clear definition of who is allowed to portray a simulated patient. Nestel and colleagues (2010) investigated the use of standardized patients and determined that the use of standardized patients is a complex process that requires a team approach with comprehensive understanding of responsibilities across the teams. They recommended establishment of guidelines for individuals playing standardized patients so that they could be sure of the consistency of the experience. The Association for Standardized Patient Educators was formed in 1991 to attempt to further promote the use of standardized patients. They assist with the development of these standardized patients, but they have no definition of who is recommended to portray a standardized patient (ASPE, 2011).

These simulated patients either use created clinical cases as the background for their patient, or the simulation is designed to address a specific medical training issue (Alinier, 2011; Kim et al., 2006; Wallace, 1997). If the simulated patient is working from a created case, there are various ways in which these cases can be obtained. The ASPE has a list of patient interviews by profession that can be used to create an authentic patient. Additionally, Kim and colleagues (2006) examined the literature and defined a framework for developing cases that include five attributes that each case should have to ensure that students are engaging in learning. The case should be: “relevant, realistic, engaging, challenging, and instructional” (Kim et al., 2006, p. 869). They determined that while these attributes were key to developing quality cases, they cautioned that there was not good evidence in the literature to determine if case-based learning would show improvements in professional competence.
On the other hand, simulated patients gain benefits from playing the role, whatever the case problem. Boerjan and colleagues (2008) found that individuals who played a simulated patient in medical interactions had a perceived improvement in medical knowledge. Additionally, they reported that they had a greater understanding of what it meant to be a physician. This, in turn, caused the standardized patients to become more critical of their own doctors and led to a more equal relationship between doctor and patient. It appears that the act of playing a patient changes the patient’s views of medicine, which in turn affects their interactions with their medical practitioner.

Understanding of these results can be improved by a closer examination of the history of using simulated patients and the development of simulated-learning experiences.

**History of Simulated Patients**

The use of patients for simulated experiences has an interesting history. The first recorded use of a standardized patient can be traced back to the early 1960s at the University of Southern California and Dr. Barrows (Wallace, 1997). At the time, it was widely felt that simulated patients were a waste of time and would decrease the scientific view of the field of medicine. Barrows reported that the use of standardized patients significantly increased the clinical competence of his students. In his studies, Barrows used previous patients who had not only experienced disease and treatment, but who were also willing to endure the process again to teach students. He found that the use of standardized patients in unstructured formats allowed students to experiment with their clinical approach, which allowed the students to develop a more confident and well-rounded set of clinical skills (Wallace, 1997). Despite the results, the medical education community at large was unwilling to use simulated patients until the late 1980s
and early 1990s when the medical profession began to shift how they were teaching their students. This shift was due to studies indicating that doctors trained using simulated patients were better prepared for clinical practice (Wallace, 1997). As a teaching model, the use of simulated patients has only been in practice for the past 20-30 years, thus making it a relatively new development in the field of medical education (Kane-Gill & Smithburger, 2011). Chronologically, the next profession to use simulated patients was nursing, soon followed by dentistry, physiotherapy, dietetics, pharmacy, and other allied health professions (Cleland et al., 2009). Within the field of OT, the use of simulated patients has only very recently been discussed as a possibility for clinical experiences for the students since 2009 (Wu & Shea, 2009).

Clearly, there is a benefit to using simulation in teaching necessary skills without the risk of injuring patients. Furthermore, with the benefits to the patients themselves, there is a possibility that playing a patient in a simulation may increase the competency of the individual when they go on to become the professional, although this has not been reported in the literature. There can be some drawbacks, as well. Concerns over simulation as an experience include the idea that students do not take these experiences as seriously, because the students understand that the experience is simulated and there is no real emergency. Despite this, the literature has not borne this out as a problem (Kneebone et al., 2007). In fact, student responses to simulation are resoundingly positive, with students stating that they feel that the simulation allowed them to concentrate on learning the skill as “deliberate practice with feedback,” which has been shown as leading to mastery of the skill (Kneebone et al., 2007, p. 811).
Clapper (2010b) investigated simulation and determined that scripted role-play can be used as a simulation tool. By creating a case and having the students play it for the class as a “skit,” students can gain valuable knowledge of the case and the clinical problem solving process. This can be done at low cost within a classroom situation, and the case can either be real with the characters expanded for role play, or can be created for the same purpose. The act of simulation through role-play or skits has expanded in the field to include telehealth and the use of DVD cases or scenes to demonstrate patient cases and show aspects of treatment. Additionally, students can be videotaped during their engagement in the simulation or role playing to assist them in developing self-analysis skills through reflection and review (Bethea, Castillo, & Harvison, 2014; Eroz-Tuga, 2013; Giles, Carson, Breland, Coker-Bolt, & Bowman, 2014).

Within the field of OT, the uses of DVDs or telecommunications is increasingly becoming a way to expose students to case-based learning within the classroom (Brown & Williams, 2009). These DVD or video exposures are being used to teach students how to identify clinical problems, how to develop treatment plans, and for teaching interprofessional education (Brown & Williams, 2009; Liu et al., 1997; Williams et al., 2010). Students reported that they viewed DVD simulation as being educationally, professionally, and clinically relevant for future practice (Williams et al., 2010). It was also determined by Williams et al. (2010) that the use of DVD simulations came at a significantly reduced cost for universities than other types of simulation. However, while it appears that students feel they benefit from exposure to DVDs and telehealth, they have also reported overwhelmingly that they feel that these types of learning do not replace the hands-on experiences that they get through traditional clinical experiences or through
hands-on patient simulation (Brown & Williams, 2009). Students consistently report that they learn clinical skills best through these different types of hands-on learning, which is consistent with what is known about learning theories for adult education (Clapper, 2010a; Dale et al., 2008; Notarianni et al., 2009).

**Educational Theories and Frameworks**

Many learning theoretical frameworks arise when discussing educating adult learners. The ones that specifically justify the use of scenario-based learning are: Knowles’ (1970) Adult Learning Theory, Kolb’s (1984) Experiential Learning Theory, and Mezirow’s (1991) Transformative Learning Theory. Each of these theories supports hands-on experience for adult learners through examining how adults learn differently from children and by looking at the ways in which adults learn best (Clapper, 2010a). In framing the discussion of adult learning, it is essential to begin with adult learning theory. In developing adult learning theory, Malcolm Knowles introduced the concept of andragogy, which is defined as: “the art and science of helping adults learn” to the lexicon of learning frameworks (Knowles, 1984, p. 43). According to Knowles (1970; Knowles & Associates, 1984) adults go through phases of learning that are different from the ways in which children learn. Adults bring with them their entire educational history as they try to learn something new. This is both a curse and a benefit, in that poor previous classroom experience may set them up negatively as learners but that their life experience will be a tremendous asset. Adults are internal learners and are likely to be more problem centered in their learning than subject centered. Finally, adults learn best when the learning is enmeshed in activities that are interesting and relevant to them, and they know why they are engaging in that learning (Baumgartner, Lee, Birden, & Flowers,
The adult learner approaches learning because he or she realizes that the subject is important and that there is a need to gather the information to address life responsibilities (Clapper, 2010a).

In relating this back to scenario-based learning, there are direct correlations with adult learning theory. Students engaging in, for example, high fidelity simulation in a simulation lab space are required to bring outside experiences in with them. There is high relevance in that the students are learning and demonstrating skills that will be required in medical practice, and the learning is problem centered, focusing on the patient’s problem and likely solutions (Dale et al., 2008; Hand, 2006; Roberts, Gustavs, & Mack, 2012; Rutherford-Hemming, 2012).

Kolb (1984) developed his experiential learning theory to address what he saw as the need to explain learning in practice or in the field. Kolb looked at learning as a cycle beginning with concrete experience. This concrete experience can be a hands-on learning opportunity that allows the student to bring home theoretical learning. After the concrete experience, the students “have a reflective observation that leads them to develop an abstract conceptualization that is tested through active experimentation” (Dale et al., 2008, p. 585.). Completing this cycle brings the student back to readiness for another concrete experience, and the cycle begins again. Through this cycle, the student is allowed to develop higher order learning connected to practical learning experiences (Dale et al., 2008; Raschick, Maypole, & Day, 1998). Relative to experiential learning theory, students use their experiences to form opinions about the world they live and work in and take those opinions to make further decisions. By connecting theory to hands-on experience, the student is using motor learning as the concrete experience. For
example, in learning how to transfer a patient from a bed to a chair in a medical setting, if a student loses control of a simulated patient causing this patient to fall or nearly fall, they remember better what to do and not to do in future transfers. By doing this in a safe setting, the student is set up to connect this concept to future practice and decision making.

The third learning theory is Mezirow’s (1991) transformative learning theory. In examining this theory, the core principle is that of deep learning (i.e., learning outside of memorization of didactic learning or cultural learning). Transformative learning is about “the process of using a prior interpretation of one’s experience in order to guide future action” (Mezirow, 1991, p. 5). In much of medicine, the decision making process is not clear. Medical practitioners are required to make decisions without complete information. Using transformative learning theory, it is clearer how professionals can change their learning through scenario-based experiences. Participation can be a “trigger event” which leads individuals to examine their own processes and beliefs, which can lead to the development of new conclusions that guide future processes (Clapper, 2010a; Hand, 2010). Debriefing after this participation helps to solidify the learning (Admi, 1997; Parker & Myrick, 2010). The combination of these three learning frameworks gives a more comprehensive picture of what is occurring during scenario-based learning on a theoretical level.

There has also been a recent model of education developed specifically around scenario-based learning, which is Notarianni et al.’s (2009) Progressive Professional Development Model (PPDM). This model was developed to provide a framework for educators within clinical professional programs that structures ways to teach students
clinical skills across environments. In this framework, they incorporate aspects of Kersley and Shneiderman’s engagement theory, Reigeluth and Stein’s elaboration theory of instruction, and parts of Benner’s writings on knowledge acquisition (Notarianni et al., 2009). The basis of the PPDM is rooted in nursing education, but further examination of this model shows that it could easily be applied to other healthcare professions. The progressive professional development model’s basic assumption is “that providing opportunities to encounter similar experiences with a variety of contextual differences facilitates a learner’s progress from beginner to professional-level practice” (Notarianni et al., 2009, p. 262). Furthermore, the PPDM states that “the use of virtual and simulated environments and standardized patients in conjunction with clinical experiences offers maximum control of the contextual differences in learning experiences. This control optimizes progressive learning experiences facilitating efficient student progress toward professional practice” (Notarianni et al., 2009, p. 262). Use of this model can help to explain the successful learning experiences for students within scenario-based learning and specifically within simulated environments. The conclusions reinforce the hypothesis that students learning within a hands-on environment examining clinical scenarios with problem solving opportunities, giving structured feedback, will progress to increasing professional competence throughout the experience. The PPDM is an excellent summary of the general conclusions from research on scenario-based learning.

**Benefits of Scenario-Based Learning**

Throughout the literature it has been shown that there are many apparent benefits to scenario-based learning, for students, faculty, educational programs, and to future patients. For students, various research studies have determined that there are benefits to
critical thinking skill building, developing social and emotional competence, growing clinical knowledge, building “concept maps” for treatment, increasing overall professional approach, building basic skills and knowledge, and producing professional competence (Clapper, 2010b; Ennis, 1993; Epstein & Hundert, 2002; Errington, 2003; Galal et al., 2012; Gilliland et al., 2012; Gordon et al., 2001; Hsu, 2004; Kneebone et al., 2005; Kneebone et al., 2007; Liu et al., 1997). Students participating in scenario-based learning report that they enjoy the process and find it to be beneficial for putting together the bigger picture of learning. The skills gained from scenario-based learning are thought to produce a more competent and productive practitioner within the medical field.

Additionally, there appears to be a benefit for patients participating in the simulation process. Whether the patient is simply playing a role that is novel for them or if they are participating from the place of experience in the disease/injury process, simulated patients gain their own critical thinking skills surrounding the role through questioning their medical professionals and gaining a greater understanding of the medical field as a whole (Boerjan et al., 2008; Cleland et al., 2009; May et al., 2009; Nestel et al., 2010; Wallace, 1997). The individuals who have played simulated patients are trained in the role or are playing from experience, but either way they feel that there is a linking of power with their doctors and a greater understanding of the medical process. Simulated patients have shown gains in their ability to self-advocate in a medical context (May et al., 2009; Nestel et al., 2010). A conclusion can be drawn that simulation leads to positive outcomes for the individual playing the simulated patient.

Educational programs have demonstrated benefits from the use of scenario-based learning experiences. Medical, nursing, and allied health programs began to use
scenario-based learning as a teaching strategy because there was an overall feeling that students were missing essential skills as they came into clinical practice (Wallace, 1997). While the use of the various types of scenario-based learning came together slowly, the reaction from the students was very positive. Educational programs were able to better ensure that students had the critical thinking skills and clinical reasoning needed to become competent and professional practitioners (Brewer, 2011; Clapper, 2010b; Errington, 2003; Gordon et al., 2001; Kneebone et al., 2007; Schell & Cevero, 1993). Additionally, scenario-based learning, specifically those with a component of simulation or role-play, became a way for educational programs to link didactic portions of the curriculum to clinical practice, thus giving students a greater understanding of the field as a whole and increasing the development of professional competence. With this linkage, educational programs could better ensure that students were prepared to meet the demands of the medical community at large.

There have been demonstrated benefits to the larger medical community from scenario-based learning. With an increase in types of scenario-based learning, students are arriving to practice more prepared, specifically in areas of interprofessional and intraprofessional team skills, safety, emotional competence, communication skills, practice skills, and professional competence (Epstein & Hundert, 2002; Galal et al., 2012; Gilliland et al., 2012; Kane-Gill & Smithburger, 2011; Miller, Riley, Davis, & Hansen, 2008; Shoemaker et al., 2011; Vyas et al., 2011; Vyas et al., 2012; Wu & Shea, 2009). With these gains shown by students coming into the field for practice, the medical community has demonstrated an increased confidence in student skills in general. With students demonstrating these gains, the medical community began to use these same
techniques to teach professionals continuing education skills, with simulation centers increasing for training professionals in new surgical skills and nursing techniques (Gordon et al., 2001; Hand, 2006; Rutherford-Hemming, 2012).

Within the field of OT, scenario-based learning is relatively new. With a demonstrated shortage of clinical sites for students to engage in hands-on learning in preparation for level I and II fieldwork, there has been an emerging need in the profession to seek alternatives for clinical learning (ACOTE, 2009, 2011; Aiken et al., 2001; AOTA, 2007; Baldry-Currens & Bithell, 2000; Fisher & Savin-Baden, 2011a; Hanson, 2012b; Roger et al., 2011). Within the OT field, there has been intensive discussion of scenario-based learning, with a concentration on simulation and its possible use as an alternative for level I fieldwork to assist with increasing the availability sites for level II experiences. Within this discussion, there have been conversations about how hands-on level I experiences would better prepare students for clinical practice by increasing their professional competence (Hanson, 2012b). While scenario-based learning with simulation as a large part of practice has been shown to significantly benefit medical professional students, there is not a large body of research within OT. The studies that have been done have shown some benefits to students, but the lack of research limits the conclusions that can be drawn for using scenario-based learning for teaching OT students and for using simulation as an alternative for level I fieldwork experiences.

Limitations of Scenario-Based Learning Research

Within the literature, there were different components of scenario-based learning that were identified as possible barriers to implementation: increased cost and lack of funding for simulation or clinical experiential learning; the amount of time that would
be required for programs to implement simulations or other scenario-based learning experiences; lack of resources to implement scenario-based learning experiences (i.e., lack of teachers and space for setting up simulation labs); and lack of community partnerships for teaching scenario-based learning at sites removed from traditional campuses (Bray & Hammer, 2011; Galal et al., 2012; Gordon et al., 2001; Hand, 2006; Kneebone et al., 2005; Rothgeb, 2008). Most research done on scenario-based learning has been done with small sample sizes, and there was no documented uniform way of setting up the environment, expected learning outcomes, or the experience itself. Because of these limitations, there are many caveats placed on the research done, stating that there should be further studies of scenario-based learning that include, for example, larger sample sizes, more diverse sample sizes, or standardized measures of clinical competence (Brewer, 2011; Gilliland et al., 2012; Kane-Gill & Smithburger, 2011; Kim et al., 2006; Kneebone et al., 2007; LeFlore et al., 2007; May et al., 2009). To date, there are gaps in the literature when it comes to defining the environment for simulation, identifying the individual who is able to play a standardized or simulated patient, defining what is being measured from the experience, and the methods for how to use scenario-based learning as a uniform teaching tool.

Summary

Within the field of healthcare, there is a large body of research on scenario-based learning, from which several themes have emerged. In examining simulated or standardized patients, there is no uniform definition, either across professions or even within the same profession (Alinier, 2011; Brewer, 2011; Cleland et al., 2009; Galal et al., 2012; Gilliland et al., 2012; Kneebone et al., 2005; LeFlore et al., 2007; Liu et al.,
There is no standard for these patients, and their roles vary according to the situation. While this may be a positive for student learning, it makes uniformity in research very difficult. It becomes problematic to compare studies using simulated or standardized patients due to the fact that most research defines these roles based entirely on what the students are gaining from the interaction. Further, no uniform tool, instrument, or strategy exists for measuring those gains. Many of the studies done on scenario-based learning use self-reporting measures, such as student satisfaction surveys to determine if students feel that they had a positive experience (Bray & Hammer, 2011; Gilliland et al., 2012; Gordon et al., 2001; Kane-Gill & Smithburger, 2011). Other studies measure emotional competence, critical thinking skills, or reasoning skills but with very small sample sizes, which makes it difficult to draw conclusions about the overall effect (Galal et al., 2012; Kneebone et al., 2007; LeFlore et al., 2007; Liu et al., 1997; Wu & Shea, 2009). While these studies contribute to the overall understanding of what students might achieve from scenario-based learning, it is very complicated to single out one set of skills without making broader connections surrounding the expectations for learning.

The use of simulation in medicine takes many forms and is not well defined. When combined with the fact that there are many definitions of the patient, it becomes a complex task to simply define scenario-based learning or simulation at all. To further complicate the process, there are multiple environments in which scenario-based learning can take place. These environments are not well defined and are not kept consistent across studies, so that individuals attempting to design a scenario-based learning project
for students are left with a wide array of options to try. Due to the fact that there are multiple models for scenario-based learning that all fall under the same definition, there is often confusion as to what model to use with students. It becomes very complex to justify the new use of scenario-based learning in programs based on the existing research.

Considering different healthcare professions, each profession uses simulation and all of its types based on their individual needs at the time. These programs then call what they are doing simulation, even though two experiences may not look the same. This is one of the reasons that scenario-based learning does not have a strong and uniform base in the literature (Brewer, 2011; Gilliland et al., 2012; Kane-Gill & Smithburger, 2011; Kim et al., 2006; Kneebone et al., 2007; LeFlore et al., 2007; May et al., 2009). There are some themes within the individual fields, such as nursing, where they tend to use the human patient simulation manikins in simulation labs for the bulk of experiences and research, although these themes entirely revolve around the purpose of the manikin in the simulation (Bray & Hammer, 2011). It is difficult for this research to easily generalize to other medical fields. Even within fields that are consistent in the type of scenario based learning done, there have been very few outcomes studies that use scientific measurement to determine what standardized skills the students learned from the experience. No rigorous and long-term studies to determine the benefits of scenario-based learning have been completed or reported to date.

What research there is indicates that almost all types of scenario-based learning are beneficial for the students if the learning experiences have some common denominators. Their common denominators include, but are not limited to: opportunities for hands-on experience, significant problem-solving components either guided by the
instructor or through self-learning, intensive opportunities for patient interaction, whether through a standardized/simulated patient or through the use of the manikins, and structured feedback from professors and from patients themselves (Epstein & Hundert, 2002; Galal et al., 2012; Gilliland et al., 2012; Kane-Gill & Smithburger, 2011; Miller et al., 2008; Shoemaker et al., 2011; Vyas et al., 2011; Vyas et al., 2012; Wu & Shea, 2009). Furthermore, there are situations that are beneficial for learning professional interaction skills, including interprofessional learning situations where team communication is a requirement (Shoemaker et al., 2011; Vyas et al., 2012). Finally, it appears that the act of being a simulated patient has a significant effect on the patient’s view of the medical profession, bringing up the possibility that if students were asked to first play the patient in a simulation and then participate as the professional in a simulation, they may gain improved clinical reasoning and critical thinking, because they understand the role and emotional circumstances of the patient in treatment and their role as the medical professional from the patient’s point of view (Boerjan et al., 2008). This could solve multiple difficulties with cost and availability of standardized or simulated patients for programs who wish to include scenario-based learning as a portion of their programmatical learning.

**Conclusion**

Many studies done within the past decade have concluded that there is an increasing shortage of clinical learning placements in the larger medical community for students to gain experience that will allow them to develop clinical skills (Baldry-Currens & Bithell, 2000; Cleland et al., 2009; Fisher & Savin-Baden, 2002a). With this shortage of sites, schools have begun to examine both how to best prepare their students so the
burden of hands-on training is not entirely placed on the clinical sites. In order to train students in clinical skills without using clinical site training, these educational programs have turned to scenario-based learning with an emphasis on simulation for acquisition of clinical skills. In an effort to ensure evidence based practice, educational programs have conducted research to determine if scenario-based learning is an effective tool for connecting didactic coursework to clinical practice skills. This research has shown that scenario-based learning, specifically with an emphasis on simulation in all its forms, is beneficial for clinical skill development. The majority of available research reports that, in addition to program benefits, students find simulated experiences to be very beneficial for understanding the bigger picture and gaining clinical skills. There is an emerging link between simulation and increases in critical thinking skills, clinical reasoning, and overall development of professional competence (Epstein & Hundert, 2002; Galal et al., 2012; Gilliland et al., 2012; Kane-Gill & Smithburger, 2011; Miller et al., 2008; Shoemaker et al., 2011; Vyas et al., 2011; Vyas et al., 2012; Wu & Shea, 2009). These are widely recognized as the skills required within an individual in order for them to become a competent practitioner with a strong professional identity.

This chapter has provided a comprehensive review of the extant literature for scenario-based learning and simulation in the healthcare professions. In the next chapter, there will be a discussion of the methodology that will be used to conduct this study. There will be a synopsis of the research design including examination of the research questions, discussion of the population and sampling strategy, and a review of the data collection tools.
CHAPTER 3—METHODOLOGY

This chapter discusses the methodology used to conduct this study. As discovered in the literature, there is not yet a body of research that examines the use of simulation as a scenario-based teaching tool for occupational therapy (OT) students despite the fact that there is significant research in other health professions including nursing, medicine, and pharmacy (Cleland et al., 2009; Copley et al., 2010; Gordon et al., 2001; Kneebone et al., 2007; May et al., 2009; Wu & Shea, 2009). The use of simulation has been documented as a methodology to increase critical thinking skills for participating students (Bartlett & Cox, 2002; Crea, 2011; Sullivan-Mann et al., 2009). There is also research to indicate that critical thinking skills are foundational skills for overall professional competence, a hallmark of a strong practitioner (Epstein & Hundert, 2002). This chapter provides a synopsis of the research design, including a review of the purpose statement and research questions. Further details will be offered about the setting and context, the sampling strategy and population overview, and the data collection strategies and analysis procedures including a discussion of the Health Sciences Reasoning Test (HSRT). This chapter concludes with a statement of the limitations of this research.

Research Design

This study is a fully randomized controlled pre/post quasi-experimental mixed methods design. The focus for this research is twofold: first, a quantitative analysis of the data gathered through the Health Sciences Reasoning Test (HSRT), a measure of critical thinking skills for health care professionals and students taken online by the students at the beginning of their second trimester and at the end of their third trimester; and second, a qualitative analysis of student feedback on an open-ended survey completed after
participation in the alternative fieldwork experience. The HSRT data gives an analysis of student critical thinking skills in five areas. There is an additional overall score and a percentile comparing student performance to a normed national data set. The five areas of critical thinking are defined in Table 1.

Table 1

**Critical Thinking Skill Subtest Description**

<table>
<thead>
<tr>
<th>Subtest areas</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induction</td>
<td>“Decision making in contexts of uncertainty relies on inductive reasoning. We use inductive reasoning skills when we draw inferences about what we think must probably be true based on analogies, case studies, prior experience, statistical analyses, simulations, hypotheticals, and familiar circumstances, and patterns of behavior.”</td>
</tr>
<tr>
<td>Deduction</td>
<td>“Decision making in precisely defines contexts where rules, operating conditions, core beliefs, values, policies, principles, procedures, and terminology completely determine the outcome depends on strong deductive reasoning skills. Deductive validity is rigorously logical and clear-cut.”</td>
</tr>
<tr>
<td>Analysis</td>
<td>“Analytical reasoning skills enable people to identify assumptions, reasons, and claims, and to examine how they interact in the formation of arguments. We use analysis to gather information from charts, graphs, diagrams, spoken language, and documents.”</td>
</tr>
<tr>
<td>Inference</td>
<td>“Inference skills enable us to draw conclusions from reasons and evidence. We use inference when we offer thoughtful suggestions and hypotheses.”</td>
</tr>
<tr>
<td>Evaluation</td>
<td>“Evaluative reasoning skills enable us to assess the credibility of sources of information and the claims they make. We use these skills to determine the strength or weakness of arguments.”</td>
</tr>
</tbody>
</table>


Data analysis examined student perceptions of the simulation weekend, the summary of their learning experience, and how they compare the alternative experience to
a traditional level I experience. The qualitative portion of this research was used to triangulate the quantitative data and discuss implications for future research in this area. The measurement of critical thinking skills through the HSRT is an appropriate measure for students in the health sciences, as critical thinking skills are a fundamental and foundational skill for overall clinical decision-making and professional competence.

While this study used a population sample of students who completed their second and third terms over the course of 1 year, data collected and analyzed constitute a pilot study in this area, as the N was fewer than 100 students. There are many advantages to doing a mixed methods study, combining quantitative data with a document analysis. The HSRT is a validated measure in investigating the critical thinking skills of health sciences students and may register changes in one or more areas of critical thinking skills between the control and intervention groups. However, the HSRT does not offer the opportunity for the researcher to examine the student’s opinions and emotions surrounding the simulation experience. The analysis of these student surveys can provide insight into the student expectations for a simulation experience and their reflections on using simulated clinical experiences as a replacement or supplement for a traditional level I fieldwork.

**Purpose Statement and Research Questions**

The purpose of this experiment was to compare the experiences of OT students who are involved in traditional level I fieldworks with the experience of those who are participating in the experimental alternative level I group. The traditional level I experience is operationally defined as participating in four clinical rotations within the southern California therapy community (two each trimester for two trimesters). The
alternative level I group is operationally defined as two traditional clinical rotations within the southern California therapy community (one each trimester and two weekends in the simulated environment at a local community college simulation lab, first as the patient and then as the therapist, for a total of four experiences). The goal of this study was to examine student’s critical thinking skill development over time and to determine if the level I fieldwork delivery method has a significant effect on that development. Furthermore, there was an examination of which specific activities and events occur during scenario-based simulation experiences that students feel further support their learning, as compared to participation in traditional level I experiences. It is the intent of this researcher to increase information on the use of simulation as a safe and hands-on alternative for level I fieldwork using this curricular model to design these experiences. This study intended to address the following research questions:

- Are there differences in critical thinking scores, as measured by the Health Sciences Reasoning Test, between occupational therapy students who have a series of traditional level I experiences as compared to students who have an alternative level I experience composed of traditional level I experiences combined with scenario-based simulation fieldwork participation?
- How do occupational therapy students perceive the experience of the scenario-based simulation experiences as compared to traditional level I fieldwork?

Null Hypothesis: There will be no difference ($p < .05$) in scores between the alternative level I experience group and the traditional level I group.
Research Hypothesis: The hypothesis for this study is that critical thinking scores as measured by the Health Sciences Reasoning Test (HSRT) will be achieved at the same or greater rate for students who participate in the alternative level I experience as for students who participate in traditional level I fieldwork experiences. Analysis of the students’ answers on the evaluation of the fieldwork experience forms assisted with understanding the students’ perceptions of the learning similarities and differences at traditional level I sites as compared to the alternative scenario-based experience.

Research Context and Setting

This study was completed at a private university that provides a 2-year masters level program for students in occupational therapy (MOT) in California. The MOT program is accredited by the Accreditation Commission for Occupational Therapy Education (ACOTE), the American accrediting body for OT programs. The ACOTE sets out extensive accreditation standards for OT programs, including the set of standards regulating clinical experiences, also known as fieldwork. These fieldwork experiences are divided into two types, level I and level II fieldwork. Level II fieldwork is an apprenticeship where students spend 24 weeks working full time (40 hours/week) as a clinician under the supervision of an experienced practitioner. Level I fieldwork is a series of short burst fieldwork experiences delivered as a series of 4-day clinical opportunities. During these opportunities, students’ experiences vary from simple shadowing experience to actual clinical treatment opportunities. This variety is determined solely by the site and site supervisor and cannot be controlled by the university. Within these level I experiences, students are expected to link their observations to the didactic coursework as demonstrated by their clinical reasoning and
documentation skills. As students are out in the community being taught by a variety of practitioners who are not trained as educators, the learning is largely self-directed within the experience and may vary across sites. Students turn in reflection assignments, evaluations from the site and/or the supervisor, and documentation notes written on each day of their experience to demonstrate their understanding of what they are observing.

There is currently a national shortage of these level I sites. Clinical sites are experiencing increasing demands on their practitioners including increased productivity levels (i.e., time spent in patient contact) and tightening of legal regulations for privacy and practice within the profession (i.e., the Health Insurance Portability and Accountability Act [HIPAA], 1996). As a result, a national movement is emerging to find alternative ways for students to gain clinical experiences in alternative manners. The ACOTE is seeking research regarding these alternative methods to determine if there are evidence-based alternatives to clinical experiences. Simulation is one option that ACOTE is encouraging educational programs to explore in the hope that schools can continue to offer clinical experiences to their students without such tremendous impact on the local community. Currently, there is little quantitative research on the use of simulation training with OT students.

This MOT program site was chosen due to the fact that the primary researcher is the academic fieldwork coordinator for this program and is responsible for planning and supporting clinical experiences for all students. In the summer of 2012, there was a significant shortage of clinical placements for level I fieldwork within the southern California area due to an outbreak of Norovirus at skilled nursing facilities in the area. During a Norovirus outbreak, facilities do not allow nonemployees into the buildings to
prevent spread of the disease and contamination of the larger population. Due to the outbreak, there were limited sites for students to gain clinical experience. There had been research on simulation within nursing and other health professions as a successful strategy for teaching clinical skills. The university decided that attempting a simulation experience was a better alternative than no experience for students, and the program was developed and piloted on a weekend during the summer term using the simulation hospital wards at a local community college. This program was a 2-day experience that could be completed in a 20-hour weekend, with 4 to 6 hours of preparation from students prior to their participation. The curriculum was designed to simulate a hospital environment, with students completing a full evaluation and three subsequent treatment sessions. Basic skills like transfers, fall prevention, and documentation were all integrated into the curriculum (see Appendix A). Student feedback was overwhelmingly positive, with many students stating that they felt that the simulation experience was a better way for them to gain the necessary clinical skills as a part of the program. Due to this feedback, the pilot continued in the fall with a larger cohort but following the same curriculum. During this time, further inquiry had been done into how simulation was used in OT, and it was determined that initial studies had gathered positive results, but that these studies were largely qualitative and were not able to demonstrate gains in the necessary skills required for clinical experiences in an OT education program.

Institutional Review Board (IRB) approval was sought through American University to initiate a study gathering data on students’ critical thinking skills and their perceptions of using simulation as an alternative clinical experience (see Appendix B). This approval was granted for the spring term in January 2013, ongoing with a renewal
granted in January 2014 (see Appendix C). Data collection began at that time with the cohort beginning their second term in January 2013, with students being randomized to control and intervention groups at that time. All students participating in data collection signed an informed consent form approved by the IRB (see Appendix D). The data were gathered online through the HSRT website. The data gathering process began in January 2013 and continued through April 2014. The timeline for data gathering is documented in Figure 1. Within American University, cohorts of students are identified by color following a cycle. Within this figure, students entering in fall 2012 are the blue cohort, spring 2013 the red cohort, summer 2013 the orange cohort, and fall 2013 the green cohort. Students begin fieldwork in their second term. Data analysis was completed under IRB for San Diego State University (see Appendix E).

During the process of data collection, there have been many changes at the university. While the simulation weekend has remained stable with standardized curriculum and services over the year and a quarter of data collection, the university curriculum has undergone some changes that are unrelated to this study. Changes have occurred based on student feedback on course evaluations, minor changes in accreditation standards through ACOTE, and the sale of the university to a corporate buyer. While it is likely that some of these changes may have had an impact on all students and programs, the focus of this research has remained constant. That is, within each cohort the students have had similar experiences. One group, the red group (began their fieldwork experiences SU13) presented an unusual situation in that a large number of students required remediation. Of the 28 students entering with this class, only 17 remained with their original class through the posttest. This is an atypical attrition rate (typical rate is
**Scenario Based Level I Experience**

<table>
<thead>
<tr>
<th>TASKS</th>
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<th>Summer 2013</th>
<th>Fall 2013</th>
<th>Spring 2014</th>
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<td><strong>Blue Team (SP13)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Prep for fieldwork weekend</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemble packets for fieldwork weekend</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gather list of OTA students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Preparation</td>
<td></td>
<td></td>
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<tr>
<td>Fieldwork Weekend</td>
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</tr>
<tr>
<td>Gather student evaluations</td>
<td></td>
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<td>Pre-test</td>
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<tr>
<td>Assemble packets for fieldwork weekend</td>
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<tr>
<td>Student Preparation</td>
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<tr>
<td>Pre-test</td>
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<tr>
<td>Assemble packets for fieldwork weekend</td>
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</tr>
<tr>
<td>Gather list of OTA students</td>
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<tr>
<td>Student Preparation</td>
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<tr>
<td>Fieldwork Weekend</td>
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<tr>
<td>Gather student evaluations</td>
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<td></td>
</tr>
<tr>
<td>Post-test</td>
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<td>Assemble packets for fieldwork weekend</td>
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<tr>
<td>Gather list of OTA students</td>
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<tr>
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</tr>
<tr>
<td>Gather student evaluations</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*Note: Darker boxes indicate Fieldwork Weekend*

Green class will not participate in data collection

*Figure 1. Gantt chart for timeline.*
attrition of 1 to 2 students per cohort), and the effects of this will likely need to be further clarified and explained once the data are analyzed.

Sample and Sampling Strategy

For each cohort, procedures for sampling were identical. Students were chosen for the intervention or control groups from masters of OT programs during their second term at the university. Prior to their first level I fieldwork experience, students were randomly assigned to the intervention or control group using an online random number generator. Twelve students were assigned to the intervention group participating in the simulation weekend and one traditional level I experience in a local community clinic. The remaining students in the cohort were assigned to the control group participating in two traditional level I fieldwork experiences in community clinical settings. This procedure was carried out over the course of 1 year and 4 months, encompassing three cohorts of students between January 2013 and April 2014. It was not possible to blind students to their group selection, as all students are aware of where other students go for level I fieldwork. Students stayed in their assigned intervention or control groupings throughout the second and third term, with students in the intervention group participating in the simulation weekend twice, first as the patient during their second term and then as the primary treating therapist in their third term. All students who are on a standard course track were included as possible subjects for this study. Students who are repeating coursework due to failing a course or dropping a course were excluded from this study, as students on alternate or part-time tracks do not take their level I fieldwork courses in term sequence. The total number of students participating in this research was originally 76 students, with attrition this number was reduced to 64.
All students signed informed consent at the beginning of this research project. The HSRT was taken online and students were assigned a generated ID number for the pre- and posttest based on their login to the system. The data were released with numerical identifiers but not with student names. Document data were sent in to the clinical education office, and student identifiers were removed prior to the data being released to the primary investigator. All data were handled with confidentiality, and student identities were masked and protected at all times.

**Reliability and Validity of the Health Sciences Reasoning Test (HSRT)**

The HSRT has gained content validity, construct validity, and has met reliability measures for all items as reported in the manual delivered by Insight Assessment (Insight Assessment, 2014). In their manual it is reported that the HSRT has consistent content validity to measure critical thinking skills. Construct validity is reported to be consistent with other measures of critical thinking skills. It is reported that all testing instruments have a high reliability with a “minimum Alpha of .80 for attribute measures” and a KR-20 range of .78 -.82 for the HSRT (Insight Assessment, 2014, p. 63). The HSRT has been validated for use with therapy students by independent researchers (Hunh et al., 2011; Velde, Wittman, & Vos, 2006). At this time, Insight Assessments does not release the individual data for the test items to researchers.

The HSRT does, however, release category score tables for overall scores. These category are shown in Tables 2 and 3.
Table 2

*HSRT Overall Score—Recommended Performance Assessment*

<table>
<thead>
<tr>
<th>Overall score</th>
<th>Not manifested</th>
<th>Weak</th>
<th>Moderate</th>
<th>Strong</th>
<th>Superior</th>
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</thead>
<tbody>
<tr>
<td>33-point forms</td>
<td>0-14</td>
<td>NA</td>
<td>15-20</td>
<td>21-25</td>
<td>26 or higher</td>
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</tbody>
</table>


Table 3

*HSRT Scale Scores—33-Point Assessment*

<table>
<thead>
<tr>
<th>Subtest</th>
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<th>Moderate</th>
<th>Strong</th>
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</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>0-2</td>
<td>3-4</td>
<td>5 or more</td>
</tr>
<tr>
<td>Inference</td>
<td>0-2</td>
<td>3-4</td>
<td>5 or more</td>
</tr>
<tr>
<td>Evaluation</td>
<td>0-2</td>
<td>3-4</td>
<td>5 or more</td>
</tr>
<tr>
<td>Induction</td>
<td>0-4</td>
<td>5-7</td>
<td>8 or more</td>
</tr>
<tr>
<td>Deduction</td>
<td>0-4</td>
<td>5-7</td>
<td>8 or more</td>
</tr>
</tbody>
</table>


**Data Collection Strategies**

This study was an analysis of extant data collected during this project under the IRB from the university administering the educational program. Quantitative data were collected with the Health Sciences Reasoning Test (HSRT). This measure has been determined to be a reliable and valid measure of critical thinking for therapy students (Hunh et al., 2011; Velde et al., 2006). During the beginning of their second term, all
students completed the HSRT portion of the California Critical Skills Test (CCST) as a pretest online. The HSRT is a 30-question, timed assessment that measures students in five areas of critical thinking skills: induction, deduction, analysis, inference, and evaluation that follow Bloom’s taxonomy of skill development. There is also an overall score. Score ranges for each subtest and the overall score are as follows:

- Overall—0 to 33
- Induction—0 to 10
- Deduction—0 to 10
- Analysis—0 to 6
- Inference—0 to 6
- Evaluation—0 to 6

Students repeated the HSRT again after completion of their third term, which constituted the posttest for this study. The quantitative portion of this study measured changes in student’s critical thinking skills over the two terms they are at level I fieldwork. The comparison model is shown in Figure 2.

During this time, the students also completed the student evaluation of the fieldwork experience to provide qualitative data on student expectations of learning for the weekend, comparisons of the simulation experience with traditional experiences, and impressions of the alternative simulation weekend. Qualitative data were not collected from the control group, as the intent of the qualitative data collection was to gain information about the student perceptions of the simulation experience. Students in the control group did not have these experiences and so were not included. These documents were examined to determine if there was any information that could be used to assist in
explaining the conclusions gathered from the quantitative data. Insight Assessments, which hosts the HSRT online testing system, provided all data with student identification numbers in excel spreadsheet format for processing by SPSS.

**Data Analysis**

This study is a quasi-experimental design examining whether students who participated in the alternative simulation fieldwork experience have similar or greater gains in their critical thinking skills as students who participate in traditional level I fieldwork. The independent variable in this study was the placement of the student into the intervention or the control group. The dependent variables were overall performance scores and specific subtests scores for the HSRT looking at change between pre- and posttest scores in all areas. Students reported data for age, gender, and ethnicity in registering for the HSRT. Age and an additional variable of time on test were controlled for during data analysis as they have a large variance. Data were recoded for the independent variable, with control group participation coded as a 1 and intervention participation coded as a 2.
The Statistical Package for the Social Sciences (SPSS) version 22 was used for data analysis. Data were initially analyzed using a dependent *t*-test to examine group mean differences between the means for overall scores and subtests for pretest, posttest, and between cohorts. The data were then analyzed using six individual one-way analysis of covariance (ANCOVA) tests to compare each subtest and overall scores between control and intervention groups, controlling for total time on test, age, and pretest score. For the ANCOVA, an omnibus *F*-test was used to determine if there were any family-wise errors. Levine’s test was used to determine homogeneity of variances between the samples. Exploratory data were analyzed using paired *t*-tests to determine if there were significant differences in pre- and posttest scores for the overall scores, percentile, and the five subtests. Given the relationship between the critical thinking outcome variables assessed in this study, there was an increased likelihood of a family-wise error. As a result, all models were tested at .01 (or .05/5).

Qualitative data were collected in the form of a 13-written response questions, collected after each student participated in the simulation weekend (see Appendix F). This questionnaire was piloted during two simulation fieldwork experiences prior to beginning data collection in the spring of 2013. These questions were formulated, in part, from the student evaluation of the fieldwork experience that is typically used for traditional level I experiences. This questionnaire was filled out by all participating students within the week after the simulation experience and returned to the clinical education associate by email. Students were required to return these questions for credit in the course in which they were participating. For data analysis purposes, the student names and identifying information were removed from these surveys by the clinical
education associate prior to their being reviewed for this research project. Students in all cohorts were informed that their responses would be reviewed without identifying information and that responses would be used to determine student expectations for the simulation fieldwork experience and to examine student perceptions.

Six questions were chosen for analysis. These questions were:

1. Please list at least 5 things that you hope to get out of this fieldwork experience. (This question was filled out prior to the beginning of the weekend to gain a sense of student expectations for learning.)

2. Name 3 new things you learned this weekend.

8. What did you feel most prepared for this weekend?

9. What did you feel least prepared for this weekend?

12. Is there anything else that you would like to let me know about this weekend that would help make it better or a stronger experience next time? Did you find this a valuable experience?

13. How do you feel this compares to a traditional level I experience?

Questions were chosen due to the fact that they gave a comprehensive view on the student experience. Data were analyzed by question using Saturate, an online qualitative data analysis software. The primary researcher initially coded the data, with secondary analysis by another qualified OT faculty who was familiar with the research project. Themes were developed based on triangulation of the codes using a post-positivist worldview, linking responses back to the quantitative data.
Limitations of This Study

There are several limitations to this study that may impact the generalizability of the results. The first possibility revolves around the testing measure itself. While the HSRT is a reliable and valid measurement tool for examining the critical thinking skills of health sciences students, it is possible that it will not be a sensitive enough tool to measure changes in critical thinking skills between groups. Hunh et al. (2011) showed that the HSRT was sensitive enough to discriminate between novice and expert physical therapy students, but within that study the time passed was considerably longer (5 years) than the time within this study. The time between group testing is only 8 months and may not be enough time for students to show gains in specific skills. This may also be confounded by the fact that the number of participants in this study is small, with only 64 students participating. If the number of participants were greater, it may be more likely to show any significant changes. Despite its limitations, the HSRT is the best tool to date that can be used as a discipline specific measure (health sciences) of critical thinking skill building.

Another limitation is that the students are not blinded to their placement in either the control group or the intervention group. It is not possible for students to be blinded in this situation, as all students get handouts letting them know where they are going for their level I fieldwork, and they are all able to see where each member of their cohort is going. When students are educated in a cohort model with all classes taught together, it is very likely that students discuss their experiences in fieldwork placements, and it is not a reasonable expectation that they will keep the details of their experience private. It is therefore possible that this knowledge may have an effect on their performance on the
HSRT, with the control group trying harder to perform on the HSRT in order to demonstrate that their experiences or learning were equally valid. There is no way to control for this type of limitation in these circumstances.

An additional limitation is the author’s participation in this research. While the use of the HSRT is a valid independent measure of students’ critical thinking skills, the primary researcher is intricately involved in this intervention. The primary researcher created the curriculum for the simulation weekend and is the main faculty for the alternative experience. All students are familiar with the primary researcher as the academic fieldwork coordinator of their OT program. This is a significant limitation of this study, as there is a real possibility of perceived or actual bias on the part of the primary researcher. This is an acknowledged limitation, and the use of an outside qualitative tool and consistent testing measures can be used to mitigate these effects. Additionally, an experienced faculty member in the OT program offered to assist in being a secondary reviewer for the qualitative data to ensure that no bias exists in the analysis of the student feedback.

Summary

This study was designed to determine if simulation could be used as an effective alternative for level I fieldwork in terms of building student’s critical thinking skills. This chapter reiterated the research design, purpose, and research questions. It then discussed the sample, sampling method, data collection and analysis procedures, and the limitations of the study. The following chapter reports on the findings of this study and assist in determining if simulation can be a clinical teaching tool that is effectively comparable to traditional level I fieldwork for masters of OT students.
CHAPTER 4—RESULTS

Introduction

The purpose of this research was to focus on combining a quantitative analysis of the data gathered through the Health Sciences Reasoning Test (HSRT), a measure of critical thinking skills for health care professionals and students taken online by the students at the beginning of their second trimester and at the end of their third trimester, with a qualitative analysis of student feedback from open-ended questions answered after participation in the alternative fieldwork experience. The analysis of these data examined student expectations of the simulation weekend, the summary of their learning experience, and how they compared the alternative experience to a traditional level I experience. The qualitative portion of this research was used to triangulate the quantitative data and discuss implications for future research in this area. This chapter first describes the variables within the data, provides an exploration of the overall quantitative data across groups, and compares scores between groups for all score areas on the HSRT through an ANCOVA analysis. Qualitative analysis explores the themes related to student expectations for learning, perceptions of their experience during the simulation, and comparisons between simulation and traditional level I experiences using a post-positivist framework.

Quantitative Data Analysis Results

Data from the quantitative portion of this study were examined using SPSS version 22.0 software for Windows (2014). There were four students who completed the pretest but did not complete the posttest. Data for those four samples were projected using the expectation maximization procedure. Exploratory data were analyzed using
paired samples t-tests to determine if there were differences overall between the pretest and posttest scores in the overall score, the percentile, and the five subtest areas (induction, deduction, analysis, inference, and evaluation) on the HSRT. Based on descriptive data, it was determined that analysis of the between groups data would be conducted via an ANCOVA procedure, controlling for variables of student age and total time on test (pretest time combined with posttest time) due to the fact that these variables varied widely and could have a significant effect on the comparisons of the overall scores.

Homogeneity of slopes was tested using Levine’s test. Given the relationship between the critical thinking outcome variables assessed in this study, there was an increased likelihood of a family-wise error. As a result, all models were tested at .01 (or .05/5).

**Descriptive Statistics**

A total of 61 participants participated in this study. Gender was determined through participant self-identification, with 53 students responding as female and 8 as male. The racial profile consisted of 38 White, Caucasian, or Anglo American; 15 Asian American; 4 Hispanic, Latino or Mexican American; 2 other; and 2 that declined to report their race. Age range for the participants was between 22 and 41 years of age, with a mean age of 26.93. Students were measured across three cohorts over the course of a year. Cohort one consisted of 17 participants, cohort two consisted of 19 participants, and cohort three consisted of 25 participants. In cohort two, there were four participants who completed the pretest but did not complete the posttest. Participants were divided into intervention and control groups randomly, with 34 students across cohorts in the intervention group and 27 students in the control group. See Table 4 for descriptive statistics for population.
As stated previously, the HSRT is a measure of student critical thinking skills. Skills are measured as an overall score with five subtests. The subtests are induction, deduction, analysis, inference, and evaluation. The HSRT also produces a percentile score. The category of percentile score compares individual scores as a ranking, comparing the test-takers to the general population (Insight Assessment, 2014). See Table 5 for descriptive statistics for the HRST.

**Pretest descriptive statistics.** In looking at the pretest data from the HSRT, the score range breakdown is as follows. The overall mean score was 22.46, with a range of 9 to 29 (maximum potential score 33). Percentile overall mean score was 49.0, with a range of 1 to 90 (maximum potential score 99). The induction mean score was 7.89, with a range of 3 to 10 (maximum potential score 10). In deduction, the mean score was 7.13, with a range of 3 to 10 (maximum potential score 10). In analysis, the mean score was 4.56, with a range of 2 to 6 (maximum potential score 6). In inference, the mean score was 3.72, with a score range of 0 to 6 (maximum potential score 6). In evaluation,
Table 5

*Descriptive Statistics—Subtest Scores*

<table>
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<tr>
<th>Subtest</th>
<th>$N$</th>
<th>Minimum</th>
<th>Maximum</th>
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<th>Std. deviation</th>
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<td>6</td>
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<td>50</td>
<td>35.42</td>
<td>9.295</td>
</tr>
</tbody>
</table>

mean score was 5.23, with a score range of 3 to 6 (maximum potential score 6). In looking at time on test, students were given 60 minutes to complete the test. The mean time on test was 38.38 minutes, with a range of 15 to 51 minutes.

**Posttest descriptive statistics.** In looking at the posttest data from the HSRT, the score range breakdown is as follows: The overall mean score was 23.09, with a range of 12 to 30 (maximum potential score 33). Percentile overall mean score was 53.7, with a range of 3 to 97 (maximum potential score 99). The induction mean score was 7.895,
with a range of 5 to 10 (maximum potential score 10). In deduction, the mean score was 7.596 with a range of 2 to 10 (maximum potential score 10). In analysis, the mean score was 4.491, with a range of 2 to 6 (maximum potential score 6). In inference, the mean score was 4.228, with a score range of 1 to 6 (maximum potential score 6). In evaluation, the mean score was 5.14, with a score range of 2 to 6 (maximum potential score 6). In looking at time on test, students were given 60 minutes to complete the test. The mean time on test was 35.42 minutes, with a range of 15 to 50 minutes.

Exploratory Data

Paired samples $t$-tests were used to determine if there were significant differences across groups between the pre- and posttests. Descriptive statistics are outlined in Table 6. While the students made general gains in their scores between the pre- and posttests, and there were gains in their percentile score indicating increases in critical thinking skills as compared to the general population, these increases were not significant. The only areas where students made a significant gain in their critical thinking skills overall was in the subtest Inference score. On the Inference subtest, the mean pretest score was 3.72 ($SD = 1.240$), and the posttest score was 4.228 ($SD = 1.2912$). Using a dependent $t$-test, the data indicated that there was a significant difference between scores on the pretest and posttest, $t = -2.238, df = 60, p = .029$. The effect size for this difference as assessed by Cohen’s D was medium (.2865). See Table 7 for paired $t$-test results.

Analysis of the Data—ANCOVA

The first analysis focused on critical thinking—overall score. A preliminary analysis evaluating the homogeneity of slopes assumption was conducted with the
Table 6

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Mean</th>
<th>N</th>
<th>Std. deviation</th>
<th>Std. error mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Preoverall</td>
<td>22.46</td>
<td>61</td>
<td>3.538</td>
<td>.453</td>
</tr>
<tr>
<td>Postoverall</td>
<td>23.09</td>
<td>61</td>
<td>3.761</td>
<td>.482</td>
</tr>
<tr>
<td>Pair 2</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Prepercent</td>
<td>49.00</td>
<td>61</td>
<td>23.489</td>
<td>3.007</td>
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<tr>
<td>Postpercent</td>
<td>53.70</td>
<td>61</td>
<td>26.160</td>
<td>3.349</td>
</tr>
<tr>
<td>Pair 3</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Preinduction</td>
<td>7.89</td>
<td>61</td>
<td>1.212</td>
<td>.155</td>
</tr>
<tr>
<td>Postinduction</td>
<td>7.895</td>
<td>61</td>
<td>1.1928</td>
<td>.1527</td>
</tr>
<tr>
<td>Pair 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preinduction</td>
<td>7.13</td>
<td>61</td>
<td>1.648</td>
<td>.211</td>
</tr>
<tr>
<td>Postdeduction</td>
<td>7.596</td>
<td>61</td>
<td>1.7688</td>
<td>.2265</td>
</tr>
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<td>Pair 5</td>
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<tr>
<td>Preanalysis</td>
<td>4.56</td>
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<td>1.025</td>
<td>.131</td>
</tr>
<tr>
<td>Postanalysis</td>
<td>4.491</td>
<td>61</td>
<td>1.0508</td>
<td>.1345</td>
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</tr>
<tr>
<td>Preinference</td>
<td>3.72</td>
<td>61</td>
<td>1.240</td>
<td>.159</td>
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<tr>
<td>Postinference</td>
<td>4.228</td>
<td>61</td>
<td>1.2912</td>
<td>.1653</td>
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<td></td>
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<td></td>
</tr>
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<td>.824</td>
<td>.106</td>
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<td>Postevaluation</td>
<td>5.14</td>
<td>61</td>
<td>1.007</td>
<td>.129</td>
</tr>
</tbody>
</table>

covariates for age, pretest score, and time. The variable for time on test (pre and post) did not satisfy this assumption. As a result, this variable was excluded from the model. A subsequent analysis of the homogeneity of slopes assumption indicated that the relationships between the covariates for age: $F = 4.662, MSE = 59.171, p = .035$, partial $n^2 = .097$, and pretest score: $F = 6.118, MSE = 77.644, p = .016$, partial $n^2 = .097$ on the dependent variable (deduction) did not differ significantly as a function of the independent variable (group). The ANCOVA for critical thinking—overall score was not significant, $F(1, 57) = .111, MSE = 1.410, p = .740$ (see Tables 8 and 9).
Table 7

**Paired Samples Test—Subtest T-Test Results**

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Paired differences</th>
<th>95% confidence interval of the difference</th>
<th>95% confidence interval of the difference</th>
<th>Lower</th>
<th>Upper</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preoverall</td>
<td>-.629</td>
<td>4.387</td>
<td>.562</td>
<td>-1.752</td>
<td>.495</td>
<td>-.119</td>
<td>60</td>
<td>.267</td>
</tr>
<tr>
<td>Postoverall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepercent</td>
<td>-4.702</td>
<td>27.697</td>
<td>3.546</td>
<td>-11.795</td>
<td>2.392</td>
<td>-1.326</td>
<td>60</td>
<td>.190</td>
</tr>
<tr>
<td>Postpercent</td>
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<td></td>
<td></td>
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<td></td>
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<td>Pair 3</td>
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<tr>
<td>Preinduction</td>
<td>-.0095</td>
<td>1.5457</td>
<td>.1979</td>
<td>-.4054</td>
<td>.3864</td>
<td>-.048</td>
<td>60</td>
<td>.962</td>
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<td>Postinduction</td>
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<td>60</td>
<td>.111</td>
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</tr>
<tr>
<td>Pair 5</td>
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<td></td>
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<tr>
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<td>.0661</td>
<td>1.2626</td>
<td>.1617</td>
<td>-.2572</td>
<td>.3895</td>
<td>.409</td>
<td>60</td>
<td>.684</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pair 6</td>
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</tr>
<tr>
<td>Preinference</td>
<td>-.5068</td>
<td>1.7689</td>
<td>.2265</td>
<td>-.9598</td>
<td>-.0537</td>
<td>-2.238</td>
<td>60</td>
<td>.029</td>
</tr>
<tr>
<td>Postinference</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preevaluation</td>
<td>.089</td>
<td>1.172</td>
<td>.150</td>
<td>-.211</td>
<td>.389</td>
<td>.594</td>
<td>60</td>
<td>.555</td>
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<tr>
<td>Postevaluation</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

The second analysis focused on critical thinking—induction. A preliminary analysis evaluating the homogeneity of slopes assumption was conducted with the covariates for age, pretest score, and time. For this variable, all assumptions (age, time on test, and pretest score) were satisfied. A subsequent analysis of the homogeneity of slopes assumption indicated that the relationships between the covariates for total time on test: \( F = 2.399, \, MSE = 3.211, \, p = .127 \), partial \( n^2 = .041 \), age: \( F = 1.474, \, MSE = 1.973, \, p = .230 \), partial \( n^2 = .026 \), and pretest score: \( F = 2.019, \, MSE = 2.702, \, p = .161 \),
Table 8

Tests of Between-Subjects Effects Postoverall

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected model</td>
<td>125.176^a</td>
<td>3</td>
<td>41.725</td>
<td>3.288</td>
<td>.027</td>
<td>.148</td>
</tr>
<tr>
<td>Intercept</td>
<td>73.282</td>
<td>1</td>
<td>73.282</td>
<td>5.774</td>
<td>.020</td>
<td>.092</td>
</tr>
<tr>
<td>Age</td>
<td>59.171</td>
<td>1</td>
<td>59.171</td>
<td>4.662</td>
<td>.035</td>
<td>.076</td>
</tr>
<tr>
<td>Preoverall</td>
<td>77.644</td>
<td>1</td>
<td>77.644</td>
<td>6.118</td>
<td>.016</td>
<td>.097</td>
</tr>
<tr>
<td>Group</td>
<td>1.410</td>
<td>1</td>
<td>1.410</td>
<td>.111</td>
<td>.740</td>
<td>.002</td>
</tr>
<tr>
<td>Error</td>
<td>723.385</td>
<td>57</td>
<td>12.691</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>33364.171</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>948.561</td>
<td>60</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

^aR^2 = .148 (adjusted R^2 = .103).

Table 9

Univariate Tests—Dependent Variable: Postoverall

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast</td>
<td>1.410</td>
<td>1</td>
<td>1.410</td>
<td>.111</td>
<td>.740</td>
<td>.002</td>
</tr>
<tr>
<td>Error</td>
<td>723.385</td>
<td>57</td>
<td>12.691</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

partial $\eta^2 = .035$ on the dependent variable (induction) did not differ significantly as a function of the independent variable (group). The ANCOVA for critical thinking—induction was not significant, $F(1, 56) = .027, MSE = .036, p = .871$ (see Tables 10 and 11).

The third analysis focused on critical thinking—deduction. A preliminary analysis evaluating the homogeneity of slopes assumption was conducted with the covariates for age, pretest score, and time. The variable for time on test (pre and post) did not satisfy this assumption. As a result, this variable was excluded from the model. A
Table 10

Tests of Between-Subjects Effects Postinduction

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected model</td>
<td>10.420$^a$</td>
<td>4</td>
<td>2.605</td>
<td>1.946</td>
<td>.115</td>
<td>.122</td>
</tr>
<tr>
<td>Intercept</td>
<td>11.494</td>
<td>1</td>
<td>11.494</td>
<td>8.588</td>
<td>.005</td>
<td>.133</td>
</tr>
<tr>
<td>Age</td>
<td>1.973</td>
<td>1</td>
<td>1.973</td>
<td>1.474</td>
<td>.230</td>
<td>.026</td>
</tr>
<tr>
<td>Total time</td>
<td>3.211</td>
<td>1</td>
<td>3.211</td>
<td>2.399</td>
<td>.127</td>
<td>.041</td>
</tr>
<tr>
<td>Preinduction</td>
<td>2.702</td>
<td>1</td>
<td>2.702</td>
<td>2.019</td>
<td>.161</td>
<td>.035</td>
</tr>
<tr>
<td>Group</td>
<td>.036</td>
<td>1</td>
<td>.036</td>
<td>.027</td>
<td>.871</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>74.948</td>
<td>56</td>
<td>1.338</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3887.307</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>85.368</td>
<td>60</td>
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</tr>
</tbody>
</table>

$^a$R$^2 = .122$ (adjusted R$^2 = .059$).

Table 11

Univariate Tests—Dependent Variable: Postinduction

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast</td>
<td>.036</td>
<td>1</td>
<td>.036</td>
<td>.027</td>
<td>.871</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>74.948</td>
<td>56</td>
<td>1.338</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

subsequent analysis of the homogeneity of slopes assumption indicated that the relationships between the covariates for age, $F = 3.642$, $MSE = 11.045$, $p = .061$, partial $r^2 = .060$ and pretest score, $F = 1.639$, $MSE = 4.969$, $p = .206$, partial $r^2 = .028$ on the dependent variable (deduction) did not differ significantly as a function of the independent variable (group). The ANCOVA for critical thinking—deduction was not significant, $F(1, 57) = .004$, $MSE = .013$, $p = .948$ (see Tables 12 and 13).
Table 12

Tests of Between-Subjects Effects Deduction

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected model</td>
<td>14.876a</td>
<td>3</td>
<td>4.959</td>
<td>1.635</td>
<td>.191</td>
<td>.079</td>
</tr>
<tr>
<td>Intercept</td>
<td>15.367</td>
<td>1</td>
<td>15.367</td>
<td>5.068</td>
<td>.028</td>
<td>.082</td>
</tr>
<tr>
<td>Age</td>
<td>11.045</td>
<td>1</td>
<td>11.045</td>
<td>3.642</td>
<td>.061</td>
<td>.060</td>
</tr>
<tr>
<td>Prededuction</td>
<td>4.969</td>
<td>1</td>
<td>4.969</td>
<td>1.639</td>
<td>.206</td>
<td>.028</td>
</tr>
<tr>
<td>Group</td>
<td>.013</td>
<td>1</td>
<td>.013</td>
<td>.004</td>
<td>.948</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>172.844</td>
<td>57</td>
<td>3.032</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>3707.827</td>
<td>61</td>
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<td></td>
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<tr>
<td>Corrected total</td>
<td>187.719</td>
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</tr>
</tbody>
</table>

a $R^2 = .079$ (adjusted $R^2 = .031$).

Table 13

Univariate Tests—Dependent Variable: Deduction

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast</td>
<td>.013</td>
<td>1</td>
<td>.013</td>
<td>.004</td>
<td>.948</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>172.844</td>
<td>57</td>
<td>3.032</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The fourth analysis focused on critical thinking—analysis. A preliminary analysis evaluating the homogeneity of slopes assumption was conducted with the covariates for age, pretest score, and time. For this variable, all assumptions (age, time on test, and pretest score) were satisfied. A subsequent analysis of the homogeneity of slopes assumption indicated that the relationships between the covariates for total time on test: $F = 3.535$, $MSE = 3.645$, $p = .065$, partial $n^2 = .059$, age: $F = .013$, $MSE = .014$, $p = .909$, partial $n^2 = .000$, and pretest score, $F = 4.629$, $MSE = 4.772$, $p = .036$, partial $n^2 = .076$ on the dependent variable (deduction) did not differ significantly as a function of the
independent variable (group). The ANCOVA for critical thinking—analysis was not significant, $F(1, 56) = .039, MSE = .040, p = .844$ (see Tables 14 and 15).

Table 14

**Tests of Between-Subjects Effects Postanalysis**

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>$df$</th>
<th>Mean square</th>
<th>$F$</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected model</td>
<td>8.507$^a$</td>
<td>4</td>
<td>2.127</td>
<td>2.063</td>
<td>.098</td>
<td>.128</td>
</tr>
<tr>
<td>Intercept</td>
<td>3.816</td>
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<td>3.816</td>
<td>3.701</td>
<td>.059</td>
<td>.062</td>
</tr>
<tr>
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<td>.014</td>
<td>1</td>
<td>.014</td>
<td>.013</td>
<td>.909</td>
<td>.000</td>
</tr>
<tr>
<td>Total time</td>
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<td>1</td>
<td>3.645</td>
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<td>.059</td>
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<td>4.772</td>
<td>4.629</td>
<td>.036</td>
<td>.076</td>
</tr>
<tr>
<td>Group</td>
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<td>1</td>
<td>.040</td>
<td>.039</td>
<td>.844</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>57.738</td>
<td>56</td>
<td>1.031</td>
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<tr>
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<tr>
<td>Corrected total</td>
<td>66.246</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^a R^2 = .128$ (adjusted $R^2 = .066$).

Table 15

**Univariate Tests—Dependent Variable: Postanalysis**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of squares</th>
<th>$df$</th>
<th>Mean square</th>
<th>$F$</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast</td>
<td>.040</td>
<td>1</td>
<td>.040</td>
<td>.039</td>
<td>.844</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>57.738</td>
<td>56</td>
<td>1.031</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The fifth analysis focused on critical thinking— inference. A preliminary analysis evaluating the homogeneity of slopes assumption was conducted with the covariates for age, pretest score, and time. The variable for time on test (pre and post) did not satisfy this assumption. As a result, this variable was excluded from the model. A subsequent analysis of the homogeneity of slopes assumption indicated that the relationships between
the covariates for age: $F = 3.767$, $MSE = 6.169$, $p = .057$, partial $n^2 = .062$, and pretest score: $F = .208$, $MSE = .340$, $p = .650$, partial $n^2 = .004$ on the dependent variable (inference) did not differ significantly as a function of the independent variable (group).

The ANCOVA for critical thinking—inference was not significant, $F(1, 57) = .082$, $MSE = .134$, $p = .776$ (see Tables 16 and 17).

Table 16

**Tests of Between-Subjects Effects Postinference**

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>$F$</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected model</td>
<td>6.702$^4$</td>
<td>3</td>
<td>2.234</td>
<td>1.364</td>
<td>.263</td>
<td>.067</td>
</tr>
<tr>
<td>Intercept</td>
<td>5.366</td>
<td>1</td>
<td>5.366</td>
<td>3.277</td>
<td>.076</td>
<td>.054</td>
</tr>
<tr>
<td>Age</td>
<td>6.169</td>
<td>1</td>
<td>6.169</td>
<td>3.767</td>
<td>.057</td>
<td>.062</td>
</tr>
<tr>
<td>Preinference</td>
<td>.340</td>
<td>1</td>
<td>.340</td>
<td>.208</td>
<td>.650</td>
<td>.004</td>
</tr>
<tr>
<td>Group</td>
<td>.134</td>
<td>1</td>
<td>.134</td>
<td>.082</td>
<td>.776</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>93.333</td>
<td>57</td>
<td>1.637</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1190.506</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>100.035</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^4R^2 = .067$ (adjusted $R^2 = .018$).

Table 17

**Univariate Tests—Dependent Variable: Postinference**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>$F$</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast</td>
<td>.134</td>
<td>1</td>
<td>.134</td>
<td>.082</td>
<td>.776</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>93.333</td>
<td>57</td>
<td>1.637</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The sixth and final analysis focused on critical thinking—evaluation. A preliminary analysis evaluating the homogeneity of slopes assumption was conducted with the covariates for age, pretest score, and time. For this variable, all assumptions
(age, time on test, and pretest score) were satisfied. A subsequent analysis of the homogeneity of slopes assumption indicated that the relationships between the covariates for time on test: $F = .507, MSE = .505, p = .479$, partial $n^2 = .009$, age: $F = 1.404, MSE = 1.399, p = .241$, partial $n^2 = .024$, and pretest score: $F = 1.721, MSE = 1.716, p = .195$, partial $n^2 = .030$ on the dependent variable (evaluation) did not differ significantly as a function of the independent variable (group). The ANCOVA for critical thinking—evaluation was not significant, $F(1, 56) = .029, MSE = .029, p = .864$ (see Tables 18 and 19).

Table 18

*Tests of Between-Subjects Effects Postevaluation*

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>$df$</th>
<th>Mean square</th>
<th>$F$</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected model</td>
<td>5.054</td>
<td>4</td>
<td>1.263</td>
<td>1.267</td>
<td>.294</td>
<td>.083</td>
</tr>
<tr>
<td>Intercept</td>
<td>5.417</td>
<td>1</td>
<td>5.417</td>
<td>5.434</td>
<td>.023</td>
<td>.088</td>
</tr>
<tr>
<td>Age</td>
<td>1.399</td>
<td>1</td>
<td>1.399</td>
<td>1.404</td>
<td>.241</td>
<td>.024</td>
</tr>
<tr>
<td>Preevaluation</td>
<td>1.716</td>
<td>1</td>
<td>1.716</td>
<td>1.721</td>
<td>.195</td>
<td>.030</td>
</tr>
<tr>
<td>Total time</td>
<td>.505</td>
<td>1</td>
<td>.505</td>
<td>.507</td>
<td>.479</td>
<td>.009</td>
</tr>
<tr>
<td>Group</td>
<td>.029</td>
<td>1</td>
<td>.029</td>
<td>.029</td>
<td>.864</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>55.824</td>
<td>56</td>
<td>.997</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1672.693</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>60.877</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^{a}R^2 = .083$ (adjusted $R^2 = .018$).

**Findings—Quantitative**

In reviewing the initial question to be answered by the quantitative data, this study was a comparison of critical thinking scores between groups that participated in
traditional level I experiences only, as compared to students who combined traditional level I experiences with a simulated clinical experience. The research question was:

- Are there differences in critical thinking scores, as measured by the Health Sciences Reasoning Test, between students who have a series of traditional level I experiences as compared to students who have an alternative level I experience composed of traditional level I experiences mixed with scenario-based simulation fieldwork participation?

The null hypothesis was that there will be no difference ($p < .05$) in scores between the alternative level I experience group and the traditional level I group. The research hypothesis for this study was that critical thinking scores as measured by the Health Sciences Reasoning Test (HSRT) will be achieved at a greater rate for students who participate in the alternative level I experience as for students who participate in traditional level I fieldwork experiences.

Analysis of the descriptive data showed large variance in the areas of age of students and in the time that they spent taking the test. These variances demonstrated a need to perform an ANCOVA procedure, controlling for these variables. Results of the exploratory data based on the paired $t$-tests determined that students gained critical thinking skills in the area of inference with a medium effect size. In examining the

Table 19

*Univariate Tests—Dependent Variable: Postevaluation*

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of squares</th>
<th>$df$</th>
<th>Mean square</th>
<th>$F$</th>
<th>Sig.</th>
<th>Partial Eta squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast</td>
<td>.029</td>
<td>1</td>
<td>.029</td>
<td>.029</td>
<td>.864</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>55.824</td>
<td>56</td>
<td>.997</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


exploratory data, students did gain critical thinking skills, as compared to the general population although the results were not significant. Exploratory data also showed that students, regardless of being placed in the control or intervention group, made gains in their critical thinking skills in their overall score and in the areas of induction and deduction. Students had slight decreases in scores in the area of analysis and evaluation. Analysis of covariance demonstrated that there were no significant differences in critical thinking skill score changes in any area between students who participated in the simulation experience combined with the traditional level I as compared to students who participated in only the traditional level I experience. There was some variance across groups, with the control for time on test not satisfying the assumptions for the overall score, the deduction score, and the analysis score. Therefore, this variable was excluded from the model for these score analyses.

**Qualitative Data Analysis Results**

The questions used to gather the qualitative data were originally developed and piloted prior to the true data collection phase of this study. Originally, there were 13 questions asked of the students. Six questions were chosen as representative of student learning in the scenario based experience. All students participating in the scenario-based experience returned answers after each simulation weekend, resulting in 72 separate document responses, with each student responding once after their experience as a patient and once after their experience as the therapist. This survey was given to students in an attempt to gain an understanding of their perceptions of the simulation experience. The six questions specifically chosen for qualitative analysis and interpretation were selected because they gave a broad picture of the students’ experiences within the simulation.
These questions were numbers, 1, 2, 8, 9, 12, and 13. Questions chosen for analysis were:

1. Please list at least 5 things that you hope to get out of this fieldwork experience. (This question was filled out prior to the beginning of the weekend to gain a sense of student expectations for learning).
2. Name 3 new things you learned this weekend
8. What did you feel most prepared for this weekend?
9. What did you feel least prepared for this weekend?
12. Is there anything else that you would like to let me know about this weekend that would help make it better or a stronger experience next time? Did you find this a valuable experience?
13. How do you feel this compares to a traditional level I experience?

These survey questions were chosen because they gave the greatest scope of information to address the research questions.

The questions were answered by students who participated in the simulation experience within 1 week after the completion of the simulation weekend. Students emailed their completed answers to the clinical education associate at the university. The clinical education associate removed the student name from the form and compiled all surveys into a document folder. Once all responses had been correlated, data from the chosen research questions were compiled into data sets by question. All data were entered into Saturate online data software for analysis.
Data Analysis and Interpretation

Data were initially analyzed by the primary researcher and then by an independent assessor, a faculty member familiar with the profession and the research, for validity and appropriate triangulation of the data. More than 100 natural codes evolved over the process of the analysis. Analysis was completed through combination of similar codes into four major themes. The emerging themes were: (a) *I want to learn/I learned . . .*; (b) *Anxiety, pressure, and pride*; (c) *Be prepared for the unexpected*; and (d) *Trying what we learned in a safe environment*. These themes are described in detail with supporting data.

**Theme 1: I want to learn/I learned . . .** The first major theme that emerged from the data revolved around the students’ perceptions of what they need to learn during clinical experiences and what they did learn. This theme is operationally defined as an examination of what the students delineated as their learning objectives, what the students felt they learned from the simulation experience, and the progression of becoming a professional from the students’ perspective. This includes an examination of: students’ expectations for learning within the simulation environment; what they feel they gained educationally from participating in the simulation; and what value they placed on their simulation experience. All of these pieces appear to have a significant effect on how the students frame their learning objectives for their clinical experiences, for their education, and for their future as clinicians. This relates back to the concept of developing the skills for professional competence, proposed and defined by Epstein and Hundert (2002). Prior to their simulation experience, students were asked to identify their learning goals. These learning goals tended to fall into two subthemes prior to the simulation: concrete
responses, and vague abstractions. Postparticipation, the students’ description of the learning changes, which is described under the subtheme: understanding of the therapeutic process.

**Subtheme: Concrete responses.** One of these subthemes involves concrete processes. Concrete processes are procedural in nature and involve methods that have been directly taught in prior coursework. These processes typically have strict protocols to follow and involve some type of memorization of the process. Students tended to identify these processes as cut and dried procedures that would have a set answer or action. Their responses classified these activities as things that could potentially be assigned a quality as doing it “right” or doing it “wrong” instead of understanding the bigger picture of their actions across a continuum. As students engage, they are expected to apply the concrete process to the specific situation for their patient. This appears to be something that was unexpected and that students did not feel prepared for. “Although I have been exposed to them, I did not feel prepared to interpret results of assessments and come up with goals and interventions with my team. Also, I did not feel fully prepared for documentation.” “I felt least prepared to complete treatments. I have not learned about my patients’ specific diagnosis before, so I was not sure exactly how to interact with them or what kind of treatment was appropriate to do with them.” These classifications are an indicator that students prior to the simulation do not identify that there could be a continuum of responses, that there could only be black and white answers rather than shades of gray, with their responses depending on the feedback that they gain from the patient. In looking at what students stated that they wanted to gain from the simulation, they gave the same type of responses, “To learn how to write
effective SOAP notes,” or “To practice more transfer techniques.” These goals are indicators that the students are still focusing on the end result rather than on the process for learning.

**Subtheme: Vague abstractions.** The other category of responses is vague abstractions that demonstrate that the student is unable to see the bigger picture. These responses again tend to involve processes that require application for learning as with the concrete processes, but that do not have real meaning in the lexicon of student engagement as a therapist. Students expressed their goals as: “Learning what it feels like to be the patient”; “Becoming more assertive when necessary”; or “Learning what it’s like to be a therapist,” rather than looking at the larger process of therapeutic intervention. These vague abstractions, while the opposite of concrete processes, still are an indicator of a lack of understanding. The students are struggling to put together what they are learning in the classroom with what they are seeing outside in the clinical community. It is apparent that the students are looking at the simulation and trying to fit their didactic experience into the hands-on learning situation. They do not have a good understanding of what they are supposed to be learning based on previous learning experiences.

**Subtheme: Understanding the therapeutic process.** There is a significant change in the students’ responses after their participation in the simulated clinical experience. Where previous expectations were vague or did not take into account the application of previous knowledge, responses after the experience demonstrated a greater understanding of the larger therapeutic process and clarified that students were beginning to understand what they did not know going into the treatment sessions. The tone and clarity of the responses changed, leaning more toward looking at problem solving in the moment and at
critical thinking for task and patient analysis. “Most importantly, I gained faith in my problem solving skills. I feel like I was able to provide good ‘in-the-moment’ critical thinking.” “I learned to incorporate items that may not be intrinsic to an activity (ex. Standing a patient when playing cards).” “I learned that you can gain a lot of information about a patient’s level of improvement or ability by observing the many steps that make up one functional activity, such as donning socks.” These responses are indicators for change in how students are thinking about their learning. There is considerably more sense of application of their learning. Students also appear to be looking at their performance in a different way. Responses indicate a much greater identification as a therapist, taking on the responsibilities for applying the knowledge of the therapist rather than looking for a single answer. As one student stated:

I learned how to react quickly and think on my toes when the plan I had for the patient initially will no longer work based on my observations of how the patient is reacting to his/her environment and responding to that environment.

Responses on the value of the experience clearly identified that the students felt the simulation gave them a bigger picture of the requirements of providing occupational therapy (OT) intervention. In examining the environment, students stated that they felt that the safe space of the simulation clinic gave them the ability to try new techniques in a safe space. They were less afraid of making mistakes because they knew that they were not going to actually injure their patients if something went wrong in the treatment session.

This experience was extremely valuable to me. I know I made several mistakes throughout the weekend, but it was nice to always have someone nearby to offer
advice on how to do it better next time. I’ve been lucky and have had some great level I experiences; however, there’s no way I could have ever learned even half of what I learned in this one weekend.

Despite this, many students still attempted to return to the bulimic model, and there was a distinct increase in anxiety as students began to realize that there was not always going to be a specific answer that they could know all of the time. It is this grey area that requires the constant analysis, evaluation, and planning that come from highly developed critical thinking skills. Student responses like the following are a good indicator of how this looks: “I did find this to be a valuable experience because I could mess up in a safe environment. I also found it to be very stressful, and I am more nervous about my actual fieldwork.” Statements like this one indicate that ownership of learning is something that is elicited by the simulation experience. Students can no longer be passive in their learning, which is true of many of their classroom experiences and of their traditional level I experiences. Instead, students find that their anxiety changes because there is a greater understanding of the expectations of being a therapist.

Theme 2: Anxiety, pressure, and pride. The second theme that emerged from the data encompassed the students’ emotions surrounding the simulation experience and their progression towards professionalism throughout the process. This theme is operationally defined as an examination of students’ emotional responses as reactions during their engagement in the simulation experience. The data fell into two subthemes: Anxiety and Confidence. These subthemes describe both the initial emotional responses from the students and the progression over their experiences in the simulation that lead to building professional competence.
**Subtheme: Anxiety.** During the simulation experiences, students initially expressed anxiety in their performance, although this anxiety was expressed subtly within their expectations for learning. There were multiple passive statements that students wanted to “experience” or that they wanted to see what something “feels like” rather than stating that they wanted to engage with their patients and into the role of becoming the therapist. Engaging in the simulation experience changed that anxiety into a realization of what would be expected as the students engaged in clinical practice. As with examining their knowledge and value for simulation, their emotions emerged as increased anxiety about what to expect for future fieldwork experiences. “Overall, I feel as though I came out of the experience more confused about and unsure of myself as an OT than I did going into the fieldwork weekend.” This level of confusion and anxiety can be viewed as a positive aspect, as these emotions are a part of the natural evolution into becoming a competent practitioner. In looking at student performance, the students who reflected on their realization that there was a bigger picture was in stark contrast to students who just wanted to have a concrete answer. In this setting there were several students who reflected that they were worried about inconsistent feedback and, rather than understanding that there are multiple therapeutic perspectives to be addressed in any setting, students appeared to still want the concrete answer.

I definitely think fieldwork weekend is a valuable experience in gaining more experience and experiencing what it would be like to assess and come up with interventions in an acute setting. I think that it would be helpful to go over what is expected from SOAP notes starting in term one at USA. All the people [teaching faculty] there helping graded and commented differently on each note.
Though it was nice getting different feedback, which is helpful, [it] would be nice if everyone was on the same page in terms of what was expected. It would make the note writing experience a little less stressful.

In this example, the student wanted a concrete answer to what to put in the treatment note, rather than acknowledging that there are multiple perspectives on how to write a treatment note, and each note will contain different information based on what happened during the assessment or treatment session. This appears to be the struggle for students attempting to break away from the memorization cycle and engage in more active learning. It is a struggle, and many students are not prepared for the uncertainty that they encounter in these circumstances.

Students also become anxious with conflicting feedback.

I felt the fieldwork weekend was a valuable experience, because I learned more about what I would need to do in a hospital setting, what I would need to watch out for, what precautions I need to take, how to adapt to different situations that may arise, and how to complete a full evaluation with a discharge. I felt there was so much information to take in, so I was really overwhelmed, but overall I gained experience from it. I did feel more frustrated on the second day of the weekend because I was getting contradictory feedback, which left me feeling more confused about what I was doing as a therapist. I felt less confident in my abilities to treat my patient and I felt a little discouraged.

Within clinical practice, there are many instances of students getting different feedback from professionals involved with each patient. In many instances, each patient, therapist, doctor, nurse, and family member has their own opinions about what needs to be
accomplished. Discriminating between the different types of feedback, communicating the unique view of the profession, and developing a patient-centered treatment plan is a large part of being a medical professional. Although students participating in the simulation experience may not be at a level in their critical thinking where they could be prepared for this feedback, it is important to understand that these issues will continuously arise over the course of clinical practice.

Comments like this indicate an important development in student skills. After this type of experience a review of student feedback allows the faculty the opportunity to return to the student to help facilitate the learning. In this feedback, the student acknowledges that she learned many techniques, and it is evident that she is gaining a better overall picture of what it takes to be a therapist. She will need facilitation to take the next step in realizing that the confidence and discouragement are places where she can begin to take control of her learning.

**Subtheme: Confidence.** Changing the learning model from observation in a traditional clinical level I site to a simulation experience also changes how the student sees himself or herself within the learning framework. Students are naturally very cautious in working with patients who are injured and potentially in pain. It would be a poor indicator of performance if a student were not cautious in that type of situation. So in looking at how they view the simulation experience, changing the educational model changes the confidence. By removing the grade from the experience and the potential danger to patients, the students respond very differently.

I feel that this is very comparable to, if not more beneficial, than a traditional level I experience. I think that it definitely depends on the site where you go, as far as
how much involvement you have with the patients. At my first level I placement, they were willing to have me as an active part of treatments and assessments and often encouraged me to do so. Where the very important difference lies is in the confidence level. When I was at my site, I did not feel confident or comfortable performing tests, assessments, and treatments that I had only practiced in class. What this experience provides is the opportunity for us to try what we have learned in a safe environment that is simulating the clinical setting. It is still taken very seriously as if it was a real situation, but we don’t have to worry about causing harm if we make a mistake.

This confidence is a common thread to student discussion over the simulation experience. Another common thread is the concept of trying things out in a safe environment. The concept of a safe or low-risk environment for practice was frequently repeated in the student responses.

I liked all of my one-day observance experiences, but having a reduced-pressure situation being able to practice on healthy, low-risk classmates rather than actually fragile real adults gives us a chance to really jump into treatment whereas, in a more real situation, we would be more apt to sit back and just observe for fear of doing something wrong or hurting someone unintentionally.

It is this safe environment for learning that also assists students in coming to terms with the transition from student to therapist. Looking at the students’ anxiety with this transition, it makes sense that they would need a space where they feel safe to explore these ideas. This is a significant contributing factor to how the students change within the simulated environment.
**Theme 3: Be prepared for the unexpected.** The third theme that emerged from the data is the students’ perspective change across all experiences. This theme is operationally defined as an examination of how the students changed the way they saw themselves as both students and as therapists over the course of their simulation experiences. One of the biggest changes that students reported experiencing in the simulated environment is the transition between being the patient and being the therapist. Students affirmed that the patient experience was one that changed their view and approach as the therapist. One student stated, “I was not sure what to expect, but in the real world any patient who receives therapy is not sure what they are going to experience.” This is stated as a realization from the student perspective and is a possible indicator that she might approach the patient differently, possible with increased clarity because of the realization that the patient does not know what the therapeutic experience will hold. The same student had an even clearer response after her experience as a therapist: “I learned that you cannot expect your treatment plan to go the way you want it to, because you are not in the patient’s shoes/world at that moment.” These responses indicate a process of learning that is vital to becoming a therapist and reinforce the previous research that playing the patient role changes how the student interacts with the therapist (Boerjan et al., 2008; Cleland et al., 2009; May et al., 2009; Nestel et al., 2010; Wallace, 1997).

Students also reported a perspective change that affected the way they approached their patients as therapists, not just in explaining what the patient will be experiencing but in the physical way that they worked with their patients.
I believe that it is important to be in the shoes of the patient to understand how tired, frustrating, and difficult it can be to work with a therapist. I definitely gained a huge understanding of what it’s like to be a patient in a hospital and the little details that go into that, from the little things to the big things. For example, it was a really weird feeling whenever my therapist made my bed flat. Something so simple totally changed the way my back felt, and I had to take a few seconds to adjust to it.

Students consistently reported that, when they returned to the experience as therapists, their approach to their patients changed because their patient experience was at the front of their minds. Details like making sure that their patient was physically comfortable for a transfer were mentioned because the patient experience had been awkward. This increased the students’ awareness as therapists for the patient experience.

An important concept that is discussed in the OT practice framework is therapeutic use of self. This is the concept of using oneself as a therapeutic tool and incorporates the concepts of client relationship, client-centered intervention, empathy, and clinical reasoning (AOTA, 2014). It is a concept that students are taught in their first term in the program, but it is also a term that they have difficulty applying. Students participating in the simulation experience consistently reported a change in how they viewed the concept of therapeutic use of self. “I learned that therapeutic use of self is critical, and must be adapted depending on the situation and behavior of the client.” This is a change in their understanding and again demonstrated a clearer perspective on how the students’ approach to being OT professionals changes after engagement in the simulation experience.
Theme 4: Trying what we learned in a safe environment. The final theme that emerged from the data was the students’ discernment of what they gained during the simulation and how it compared to their learning outside of the experience. This theme is operationally defined as an examination of the students’ perceptions of their learning experiences both in the clinic and in the simulation and the value that they place on each type of learning. In examining how the students perceive the two different types of clinical experience, it is evident that they recognize that each experience is different and valuable for their learning.

The problem with traditional level 1 experiences is that they are so variable. There are some OTs who only allowed me to observe, while others allowed me to lead a treatment session with their guidance. In some regards, I believe that the fieldwork weekend was more worthwhile because it was more hands on and problem solving than being at a traditional fieldwork setting. However, I also enjoy traditional fieldwork because it gives me the opportunity to observe different settings and actual patient-therapist interactions, treatments, and evaluations.

While the students discuss that they have such variable experiences on their clinic-based level I experiences, they also state that those clinical experiences allow them to examine the broad scope of the profession. One student stated:

I think a traditional level I experience is also a great way to get exposure to a variety of settings. I wish there was a way we could make fieldwork weekend an entire class and then continue to keep traditional level I fieldwork.
There is a sense that students, especially as they are engaged in their practice area intervention coursework, need to see the different settings. This creates a complex picture of how the students perceive traditional versus simulated OT experiences.

In examining simulation, the students like the feeling of being the therapist in a safe situation. They report that the simulation increases their confidence, clinical reasoning, and self-esteem.

I really like the idea of being able to be in charge of a patient instead of observing someone else do it. You have to be able to use your own clinical reasoning skills and creativity to treat a patient versus someone telling you what they are going to do. Although it is a simulation you feel more responsibility, pressure and pride than just observing.

Furthermore, students feel that they were required to engage at a greater level in the simulation experience because they were not allowed to just sit back and observe. The responsibility for a positive experience from both the patient and therapist perspective was squarely on their shoulders.

Compared to a traditional experience I would say I learned 3 times as much.

Being in charge and having to assess the patient and come up with treatment plans based off my observations and perspective is completely different than having the CI giving you hints as to what to look for. I had to use quite a bit more brain power and critical thinking than I did in my other experiencing. Because I was in charge and participated in the treatment from beginning to end, I will also remember the experience much better than just observing and participating in
someone else’s treatment session. This experience also helped me to refine and improve my skills as an OT.

It is this engagement with the therapeutic environment that accelerates their learning. The students report feeling exhausted at the end of the simulation experience in ways that they were not at the end of their clinical observation experiences. But in the end, the consensus is that both types of experiences are valuable for student learning.

Components of both the clinical and simulated environment give the OT student important skills on their journey to become a clinician, specifically because their education has such a tremendous apprenticeship component in their level II fieldwork with the expectation that they have a growing skill-set prior to beginning their long-term placements. In the end, what the students appear to really want is both sets of experiences.

I feel like this [the simulation] is beneficial in that you are able to actually be an Occupational Therapist and gain confidence but I also think the traditional level 1 experience is beneficial to allow for exposure of multiple settings and multiple expert opinions about assessments, treatments, and interventions.

The overall opinion is that the clinical experience helps them relate to the simulation and vice-versa. Students tie in pieces of both experiences and use parts of both the clinical experience and the simulation experience to create their identity as an occupational therapist.

**Summary of the Qualitative Data**

In examining how the students perceive their experience in the simulation, the analysis of the qualitative data will assist in triangulating student expectations for
learning in the simulation experience, and student perceptions of similarities and differences at traditional level I sites, as compared to the alternative scenario-based experience. In examining the student responses to the questions asked after their participation in the simulation, a complex picture emerges of how the students learn clinical skills and how they view both the clinical level I and simulated level I experiences.

For the first part, student responses indicate that their expectations for learning transition from basic skills to the more complex processes of becoming a therapist as they progress through the simulation experience. Their emotional responses change, as well as they begin to understand that there is a body of knowledge that they were not aware of prior to engaging as a patient or therapist in the simulated setting. This includes the difference between observing a therapist engaging in technical practice and the act of being the student/therapist. These changes have a positive effect on the students in that they feel that they increase their confidence, on-the-spot problem solving, and self-esteem. Interestingly, when the simulation experiences are compared to the traditional clinical experiences, students see the value in both. In examining their participation, they acknowledge the variances between the two but are not willing to give up either experience. Further, the simulation experience helped the students better understand their experience in the clinical setting and enabled them to more clearly define what they wanted to learn.

Summary of the Chapter

In this chapter, there was a presentation of the data from both the quantitative and qualitative student responses. Quantitative data were gathered from the Health Sciences
Reasoning Test (HSRT) and analyzed using SPSS (2014) version 22 software.

Exploratory data was analyzed using paired t-tests. An ANCOVA procedure was completed on all subtests of the HSRT controlling for age and time on test. Qualitative data were gathered from student responses to questions asked after their participation in the simulation experiences and were analyzed using Saturate online analysis software. Themes emerged from the student responses that helped triangulate the quantitative data and assisted in explaining the students learning within the simulation experience. In the next chapter, there will be a discussion of these data, including the key findings, and a projection of thoughts for future research in this area.
CHAPTER 5—DISCUSSION

Introduction

The final chapter discusses the findings for this research study as they relate to the literature and to current occupational therapy (OT) practice. A discussion of the implications for future research in this area is offered, both in the practice of simulation and in the field of OT. In reviewing the literature, it is important to remember that there are no uniform or prescribed methods for delivering teaching through simulation. In fact, there are multiple types of simulation delivered in different environments. Each profession uses simulation differently depending on the needs of the profession (Epstein & Hundert, 2002; Galal et al., 2012; Gilliland et al., 2012; Kane-Gill & Smithburger, 2011; Miller et al., 2008; Shoemaker et al., 2011; Vyas et al., 2011; Vyas et al., 2012; Wu & Shea, 2009). With this in mind, this chapter begins with a review of the purpose, significance, and research questions to assist in explaining the parameters of simulation used for this study.

Purpose and Significance

The purpose of this experiment was to compare the experiences of OT students who are involved in different types of level I fieldwork, contrasting a traditional model with a clinical/simulation-combined model. Critical thinking skills were analyzed by the HSRT to determine if there was a change in scores between groups. Additionally, there was an examination of what specific activities and events occur during scenario-based simulation that students feel further support their learning, as compared to traditional level I experiences. It was the intent of this researcher to increase information on the use of simulation as a safe, effective, and hands-on alternative or supplement for level I
fieldwork. This research was designed to explore alternative ways for students to gain level I experiences that build critical thinking skills and facilitate clinical reasoning.

**Key Findings**

In looking at both the quantitative and qualitative data, there are some definite conclusions. These conclusions are that, while the students made general progress in their critical thinking skills overall, there were no statistically significant differences between the students in the intervention group and the control group in their scores on the HSRT. In looking at the student perceptions of their experience in the simulation clinical, there is strong evidence that there was solid growth and a good understanding of what it means to become an occupational therapist that the students had not gained participating in the traditional clinical level I experiences. In the students’ statements, they reported that both experiences significantly contributed to their growth and education as a therapist, and they felt that both the traditional level I fieldwork and the simulation experience were valuable to them. The individual research questions will be addressed below.

**Research Question 1**

Question: What are the differences in critical thinking abilities, as measured by the Health Sciences Reasoning Test, between students who have a traditional level I experience as compared to students who have an alternative level I experience of traditional level I combined with a scenario based simulation fieldwork experience?

While the statistical data did not yield significant differences between the groups in the areas of critical thinking skills, it is important to note that there was an increase in percentile score of 4.702 percentage points. While this was not a statistically significant
result, as compared to the general population, students are demonstrating gains in their
critical thinking skills overall. In looking at starting and ending points for student critical
thinking scores as compared to the HSRT recommended performance assessment,
students’ pretest scores indicated high moderate or strong critical thinking skills across all
areas. Students were able to maintain these strong scores, again scoring at the upper limit
of the moderate scores or in the strong category for the subtests and in the strong category
for overall scores. In the one subtest where students did make significant gains,
induction, the pretest score was the lowest average score of all of the subtests and the
score difference between pre- and posttest brought their score into line with scores in all
of the other subtest areas. This is demonstrated in Tables 20 and 21.

Table 20

**HSRT Overall Score—Recommended Performance Assessment With Comparison**

<table>
<thead>
<tr>
<th>HSRT overall score</th>
<th>Not manifested</th>
<th>Weak</th>
<th>Moderate</th>
<th>Strong</th>
<th>Superior</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 point forms</td>
<td>0-14</td>
<td>NA</td>
<td>15-20</td>
<td>21-25</td>
<td>26 or higher</td>
</tr>
<tr>
<td>Pre and post</td>
<td>22.46, 23.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


These results indicate that this study began with a population of students who
entered their second term with relatively strong critical thinking skills. This is a possible
explanation for why the changes in these areas were not significant. Students were
already performing in the higher ranges and did not necessarily have the room for
significant growth that students starting with lower critical thinking skills may have had.
Additionally, while the HSRT is considered to be a good measure of critical thinking
Table 21

HSRT Scale Scores (33-Point Assessment) With Comparison

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Not manifested</th>
<th>Moderate</th>
<th>Strong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>0-2</td>
<td>3-4</td>
<td>5 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre and post 4.56, 4.491</td>
<td></td>
</tr>
<tr>
<td>Inference</td>
<td>0-2</td>
<td>3-4</td>
<td>5 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre and post 3.72, 4.22</td>
<td></td>
</tr>
<tr>
<td>Evaluation</td>
<td>0-2</td>
<td>3-4</td>
<td>5 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre and post 5.23, 5.14</td>
<td></td>
</tr>
<tr>
<td>Induction</td>
<td>0-4</td>
<td>5-7</td>
<td>8 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre and post 7.89, 7.895</td>
<td></td>
</tr>
<tr>
<td>Deduction</td>
<td>0-4</td>
<td>5-7</td>
<td>8 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre and post 7.13, 7.596</td>
<td></td>
</tr>
</tbody>
</table>


skills for healthcare students in occupational therapy, and studies have shown that the HSRT could discriminate between novice and experienced practitioners, it is possible that it is not a sensitive enough measure to demonstrate skill growth for students performing in the higher ranges (Insight Assessment, 2014; Thomas, 2011). Finally, in looking at the data for time on test, students spent less time in taking the posttest than the pretest. There are many factors that could be affecting these data, but if students did not spend as much time considering the questions in the posttest, then it is likely that they devoted less effort into this test. While this was controlled for in several of the ANCOVA results, it is possibly one factor that affected score gains between the pre- and posttest.
Lack of statistically significant differences between the intervention and control group in the ANCOVA results is a positive indicator that students who have a simulation component replacing a clinical experience have similar skill growth to students participating in traditional clinical level I experiences. These results allow for cautious optimism in looking at the use of simulation for level I fieldwork. While simulation combined with traditional level I fieldwork does not show stronger gains in scores than traditional level I fieldwork, the skill gain was similar, indicating that simulation is an option that allows students to gain clinical skills, while also allowing schools to reduce the load on their clinical sites. If the goal for the profession is to find alternate ways to deliver clinical experiences or to have the ability to continue to train students when there is a deficit of fieldwork sites, these initial data support the use of simulation as a valid alternative to clinical placement (Bethea et al., 2014).

**Research Question 2**

Question: How do students perceive the experience of the scenario-based simulation experiences as compared to traditional level I fieldwork?

The qualitative data findings show that students have considerable anxiety when entering their clinical rotations. That anxiety and the feeling that they do not know anything valuable causes students to focus on concrete or extremely abstract components of the therapeutic process, rather than focusing on the overall skillset needed to be an occupational therapist. Once engaged in the simulation experience, the students’ responses changed and, while there does not appear to be a decrease in emotional response, the anxiety changed into a much more focused emotion. The students show a greater understanding of the larger picture of being a therapist including: understanding
therapeutic use of self; increasing on-the-spot problem solving; and engaging in all aspects of evaluation and treatment. This understanding is communicated both through how the students express their understanding of the process and through the value the students placed on the experience itself. Students reported that they felt that the simulation significantly linked what they had learned in the classroom with what they were seeing in the clinic. Furthermore, the students reported that, because there were such tremendous variances in what they were experiencing on traditional level I fieldworks, they liked the structure of the simulation experience as a way to engage in hands-on learning.

Student expectations for a simulation experience do not always link together with the expected learning outcomes listed in the syllabus. This relates back to a basic problem of didactic learning. The students do not know what they do not know, they have been caught in the memorization cycle of learning for too long, which leaves them feeling like they do not know anything (Zorek et al., 2010). Students entering the simulation experience tend to want the instructor to give them the answer, a succinct and easily memorized answer, rather than engaging in critical thinking to problem solve in the moment. In answering what they expect to learn from the simulation experience, students base their expectations on memorized concepts they have encountered previously and on vague notions, rather than on the larger concepts of critical thinking in the moment. Students express a distinct discomfort with the reality that there are multiple options or choices that could be made in being the patient or in working with the patient, and that any of these options could be correct at any moment in time based on the needs of the patient and the situational or environmental demands. In analyzing the student responses,
the students are not looking at the role of being the patient or the therapist as a holistic experience. Instead, responses prior to participating in the simulation experience indicate that students have no concept of the larger picture and, in fact, do not understand that the larger picture exists at all despite having participated in traditional clinical level I fieldwork.

In examining the changing roles of the students within the simulation, the students stated that their approach to being a therapist was changed by their participation in the simulation as the patient. Students reported that the process of being the patient changed their approach as the therapist, and this process enhanced their patient interactions once they changed roles. Having the experience of lying in the bed, pretending to be weak and sick, helped the students build their empathy toward their future patients, as well as preparing them for the role of the professional. Finally, while the students state that they really like the simulation, reporting enjoying it more than their traditional clinical experiences, they also do not want to give up those traditional clinical experiences. Overall, students feel that each type of experience supplements the other, that their clinical experiences helped them better understand what they needed to do in the simulation and that the simulation helped them integrate and humanize what they had seen in the clinic. Because of this, many students advocated for a blended or integrated model that would use aspects of both the traditional clinical experiences combined with simulation in multiple practice areas. In considering the results of this study, the evidence supports a combination of both of these approaches as strong ways to build the students’ professional competence.
Discussion

Based on the literature on simulation and critical thinking, it is important to examine the needs of occupational therapy students in comparison to students from other health professions. Upon examination of simulation as a structured teaching tool, there was no consensus as to what simulation looked like in practice. There were variations in the environments used, the type of simulation, and in the way it was used as a teaching tool. There are many reasons why this study was set up the way it was (i.e., a 2-day learning experience using a bed lab with students playing simulated patients). This study was attempting to simulate the environment that occupational therapy students might encounter if they were working in a skilled nursing facility, in-patient rehabilitation center, or acute care hospital. In future iterations, there should be a consideration of how the simulation is set up, considering the multiple practice environments for occupational therapists, the patient types needed, and the process that should be followed for a successful simulation experience.

Simulation: Environments for OT Students

The simulation experience for this study was held in a multi-bed nursing simulation lab at a community college. It most closely resembled student experiences in a hospital or skilled nursing facility. In addition to the hospitals or nursing facilities, occupational therapists are qualified to work in many arenas including: in the community, outpatient clinics for adults, public and private schools, pediatric sensory integration clinics, home health, primary care, alternative practice, and ergonomics (AOTA, 2014; Bethea et al., 2014). With the need to gain instruction in all of these environments, it is important to consider what the environment is going to look like for each area of practice.
In this study, the simulation addressed a small portion of the didactic curriculum, albeit one that many students would experience in both level I and level II fieldwork.

Creating the simulated environment requires both a focus on the skills students are expected to acquire and the goals of the simulation itself. This begs the question: Is it reasonable to expect that students will generalize the knowledge they acquired in the simulation back to the original clinical setting and into other areas of practice? If this is an expectation for students, then the simulation experience, whatever the environment, must have a reflection piece that integrates new learning with both the didactic learning and the simulation. The best learning model for this is Kolb’s (1984) Experiential Learning Theory. Each environment must be designed for students to both engage in simulation and to have space for teaching, reflection, and debriefing so that the students can incorporate their learning objectives into their understanding of the experience (Issenberg & Scalese, 2008; Silberman, Panzarella, & Melzer, 2013; Wu & Shea, 2009). The environment should also be reflective of the area of practice that it is approximating, with medical clinical skills learned in a simulated medical environment, community skills learned in a functional or natural environment, and clinical practice skills learned in a simulated clinical environment (Copley et al., 2010; Gordon et al., 2001; Rothgeb, 2008; Wu & Shea, 2009). Considerations for occupational therapy programs should include the cost to build the environment, as well as space concerns. All planned simulations should include an analysis of the environment to see if it can be used as both teaching space and simulation space or if the environment needs to be single use. Additional considerations should encompass the type of observation/hands-on-experience that the students are exposed to within the environment. This can include simulated patients, video learning,
or tele-teaching in order for the students to gain greater exposure to different practice environments.

**Simulation: Patient Types**

In the literature on simulation, there is a significant amount of discussion on who should play the patient (Bray & Hammer, 2011; Galal et al., 2012; Vyas et al., 2011; Vyas et al., 2012; Wu & Shea, 2009). This study used simulated patients, role-played by students in their second term. There were several benefits from this experience. Students reported that playing the simulated patient helped them realize how to approach their patients once they became therapists. Being the patient changed the focus and understanding on how to plan future interventions and increased student understanding of therapeutic use of self. By having the experience of being the patient, the students had a better understanding of how they wanted to be treated and could transfer that into their new role as the therapist. The literature discusses that this understanding of therapeutic use of self, the use of oneself as a therapeutic tool, is fundamental to building professional competence (Epstein & Hundert, 2002; Taylor et al., 2009). There are further benefits to having students play their patients, as the reported experience of students in this study links strongly with the literature in that students reported that they gained a better understanding of what it meant to be an occupational therapist (Boerjan et al., 2008; Herge et al., 2013; Velde, Lane, & Clay, 2009).

There are some difficulties with having the students play simulated patients. In the simulation, the interaction between therapist and patient is dependent on how well the patient is role-playing their conditions. This can be complicated when students have no real-life experience with the diagnosis, although the research into the diagnosis is also
valuable. It is also very difficult for students to simulate certain medical conditions, such as spinal cord injuries with associated paralysis, spasticity in motor movements, and amputations (Giles et al., 2014). Further, students find it very difficult to take the patient role seriously when being asked to play the role of young children or the mentally ill. Alternative ways to gain the patient experience without the use of students as simulated patients, despite the stated value to the students as an experience, become necessary. For educational programs contemplating simulation, an exploration of patient alternatives that maintains the focus of the simulation on the student-as-therapist is important to ensure that the students gain the strongest experience. This can be accomplished through the use of: typical children as pediatric patients; healed patients with prior injuries such as spinal cord injuries or amputations to play themselves as newly injured patients; or of practitioners knowledgeable of mental health conditions to play the simulated patients (Giles et al., 2014; Herge et al., 2013). It is important to find a balance between patient fidelity and the other important concept of ensuring that the students are practicing the skills they are learning in the simulation in a safe environment (Gordon et al., 2001; Kneebone et al., 2007). It may also be beneficial to begin investigation on the use of technology, such as video learning as an alternative where no possible simulated patient can be found to ensure that multiple options exist for programs contemplating simulation as a clinical alternative.

**Simulation: Process**

In this study, there was a single model used for all simulated experiences that adhered to a set curriculum. This curriculum was designed to meet the objectives of the level I fieldwork course, with a strictly followed 2-day curriculum. Student comments on
feedback forms stated that they would have liked to see a variety of patients and that they felt that the 2-day weekend format was very tiring. These are possible future modifications to the simulation experience for students with a greater level of clinical exposure, but in this situation these changes would have weakened the structured nature of the simulation and would not have enabled the students to meet their objectives.

Future simulated experiences, specifically if they are in combination with or in substitution for level I fieldwork, must consider the timelines, number, or variety of patients seen by the students, and what objectives need to be met in order for the students to be fully engaged (McGaghie et al., 2011; Swinehart & Meyers, 1993). Furthermore, there should always be time built into any simulation in order for students to reflect on their experience and to debrief in order to help answer any questions they may have and to reduce their discomfort or anxiety stemming from the process of simulation, allowing students to leave the experience feeling of accomplishment (Admi, 1997; Elfrink et al., 2009).

**Critical Thinking**

Critical thinking as a measure of student learning on level I fieldwork is linked to clinical reasoning. Both of these skill sets are linked to overall professional competence. For the purposes of this study, professional competence was defined as “the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and the community being served” (Epstein & Hundert, 2002, p. 226). Critical thinking was considered to be a foundational skill for overall professional competence (Coker, 2010; Ennis, 2001; Lederer, 2007; Schell & Cervero, 1993; Thomas, 2011). Within this study,
students started with strong critical thinking skills. It is not known if this is typical for occupational therapy students, and this was not a part of this study. With students initially scoring so strongly, it raises the question of what is being strengthened during the simulated experience or during level I fieldwork. While the initial thought was that critical thinking was the skill being built during this time, the HSRT results require a reconsideration of the linkages between critical thinking skill, clinical reasoning, and professional competence. The use of professional competence as the true measure is reinforced by the qualitative data. Students reported that the skills they gained during the simulation included professional competence measures such as: communication, knowledge, technical skills, clinical reasoning, values, and reflection. The students themselves reported this growth, which is documented under the themes I want to learn/I learned and Trying what we learned in a safe environment. While the HSRT was a strong measure of the students’ critical thinking abilities, it is felt that their overall professional competence would have been a more precise and meaningful measure.

**Emergent Theory**

The emergent theory for the use of simulation for occupational therapy students is a confirmation of Kolb’s (1984) Experiential Learning Theory. Student learning followed a process from the concrete experience of patient interaction, then transitioned through reflection on what had happened, problem solving through linking their concrete experiences to the didactic coursework, and applying them to the new situation. This cycle occurred repeatedly during the course of the simulation and is a strong proposed model for future simulation experiences. The theory is illustrated in Figure 3. Use of this theory can assist the students in building their critical thinking skills, clinical reasoning,

and professional competence through generalization of learning. In approaching clinical learning through this theory, students will be able to approach their patients with greater confidence in their own knowledge and a greater understanding of the profession (Clapper, 2010b; Kolb, 1984). Use of this type of a model also breaks the cycle of bulimic learning that is so common in healthcare educational programs (Bensley & Ellsworth, 1994; Zorek et al., 2010).
Implications for Future Research

This pilot study examined the critical thinking skills across a combined simulation/traditional environment, as compared to traditional level I clinical practice. Within the field of occupational therapy, the definition of level II fieldwork leaves no opportunity to suggest the use of simulation-based learning as an opportunity for practice except within the context of the larger work environment as apprenticeship (ACOTE, 2011). In looking at the results of this study, the fact that there was no difference in critical thinking skills between groups provided some evidence that students could experience the same type of learning in their critical thinking regardless of whether simulation was used as an experiential component of the level I fieldwork. There are multiple areas of research that could assist in developing simulation or scenario based learning as a valid alternative to or combination with level I fieldwork. The following are recommendations for future research in the area of simulation, professional competence, and how students learn clinical skills.

Quantitative research should be done to determine both the expectations for students’ learning during their level I fieldwork and on the differences between learning using simulation experiences and traditional clinical fieldwork. Further research should be completed on using scenario-based experiences in conjunction with level I fieldwork to determine if simulation is a solution to the shortage of clinical level I sites. This research could use this same curriculum based in a hospital setting, or could be adapted to include other settings including mental health, pediatrics, and outpatient clinics. Research in the area of simulation should also include components that help define simulated clinical experiences for the profession.
As professionals educating students to become future practitioners, expectations for short-term experiences are not well defined. Student participation varies widely during traditional level I experiences, and there is still no set curriculum to define student learning within the clinical therapy community for level I fieldworks. This is an area of curriculum development that is urgently needed as the profession moves forward, due to the fact that occupational therapy programs rely heavily on outside clinics to educate their students in performance of practical skills. With students expected to have greater skill bases as they enter their level II fieldworks, level I fieldwork becomes more important as a part of that preparation. Students report feeling that the engagement of simulation helps solidify their skills as a contrast to the passive role that they report taking in traditional level I fieldwork as demonstrated in their responses documented in the theme Trying What We Learned in a Safe Environment. Without a level of hands-on engagement, students continue to feel that there should be a specific answer for each patient condition, rather than a continuum of possible answers that requires engagement of continued clinical reasoning.

Additional research into simulation as an alternative or supplement to traditional level I experiences should examine different ways to determine what students learn during clinical experiences. For this study, it was thought that critical thinking skills would be an effective measure of learning. Given the evidence of high initial scores on the HSRT, further research is warranted to explore other indicators of learning that could be used to measure student progress. These include measures of professional competence and clinical reasoning. Smaller skill subsets could be measured to document clinical skill development, such as patient approach, basic skills (transfers, range of motion, manual
Research into how students gain these skills through participation in level I fieldwork would give the profession stronger indicators of what should be done to ensure the strongest possible student learning experience possible.

Finally, more research should be done to examine how students learn critical thinking skills, clinical reasoning, and overall professional competence. The HSRT, while a validated measure for looking at critical thinking skills for health sciences does not appear to be a measure that is able to discriminate progress at the student level, especially for students who score strongly in entering their program. There are not any other measures published that measure the skills for professional competence, which is unfortunate as a more sensitive measure or a measure that examined overall clinical competence would be valuable in evaluating student readiness for practice. It would be beneficial for the healthcare professions to develop measures that would examine these skills.

**Recommendations for Occupational Therapy Educational Practice**

Based on this study, the current research on scenario-based learning and simulation in other healthcare professions, and the lack of research on simulation in occupational therapy, it is time for this profession to gather more evidence as to the benefits of simulation as a model for building clinical competence. The profession and the Accreditation Council for Occupational Therapy Education (ACOTE) assume that level I experiences lead the students to develop clinical skills that will be used for level II experiences which will, in turn, lead to a competent practitioner in the field (ACOTE, 2009, 2011; AOTA, 2007). There is little research to indicate the effectiveness of these
level I experiences. Moreover, level I experiences are defined so ambiguously that each program may be exposing their students to different occurrences with no uniform learning to ensure the quality and preparedness of future practitioners (Hanson, 2012a). There is considerable room in the field of occupational therapy for study of scenario-based learning experiences, with a concentration in role-play and simulation as an alternative or supplement for level I experiences. A defined set of expectations for level I fieldwork would benefit the students, the educational community, and the clinical community due to increased understanding of what should happen during this clinical exposure. There is also a great need for students to engage in the see-do-apply framework that allows them to observe, then kinesthetically work through the situation using a simulation model, followed by a return to apply their learning in the clinical setting.

The use of this model for teaching occupational therapy students applies equally for occupational therapy assistant programs. In the profession of occupational therapy, the occupational therapy assistant is expected to complete a significant amount of patient treatment under the supervision of the occupational therapist (AOTA, 2014). The occupational therapist is expected to assess the patient and plan the course of treatment, while the occupational therapy assistant follows through with the patient interaction. This partnership in treatment also creates opportunities for partnership in education. By incorporating both the occupational therapist and the occupational therapy assistant in the simulation experience, the potential for building future clinical bonds increases. Students are able to problem solve as teams and can use the opportunity of the simulation to learn how to develop professional working relationships with each other. Simulation would also be a valuable part of the educational process for the occupational therapy assistant, as
they have a need to practice clinical skills in the natural environment, as well. It may be easier for the occupational therapy assistant to engage in simulated experiences, as many assistant programs operate through the community colleges in conjunction with nursing programs and simulation environments are readily available within these programs without great cost.

This study suggests a direction for clinical experiences that would redefine level I fieldwork for the profession. In combining student clinical experiences with simulation, it is possible to imagine a level I experience that meets the accreditation standards, enhances student learning needs, and that reduces the demand on the clinical community for level I fieldwork. Combining a shorter amount of traditional clinical fieldwork with simulation experiences that allow the students to practice clinical skills in a safe environment would meet the needs of the profession and the clinical community. The student impressions of their simulation experience shows that they are looking for an educational program that allows them to have both experiences, simulation combined with clinical experience. This could be envisioned through several different models, some of which are recommended within this chapter. Three examples of these models are the combined model, the integrated model, and the clinical site model.

**The Combined Model**

One model proposed is a combined experience with a few days of clinical exposure, a few days of simulation, and then a brief return to the clinical setting to apply what they have learned. This set of experiences fits within Kolb’s (1984) Experiential Learning Theory as a see/do-reflect-integrate-apply model. A combined model would follow the schedule of a traditional level I, following the time typically set aside for this
course but reducing the time commitment from the clinical sites. By seeing how the occupational therapist operates in the clinic, then performing the duties of the therapist in the simulation setting, and then returning to the clinic for application of the new knowledge, students would be able to gain a greater understanding of the therapeutic process. Specific skills would be taught using hands-on experience through the use of a simulation that mimics the practice setting. The simulation would include the specific skills observed, and would necessarily encompass the professional skills needed to become a therapist within that setting. Once the student has completed the simulation and has had an opportunity to truly reflect on their experience, they return to the clinic for another day, this time with the expectation that they would perform a skill that they had been observing and practicing in the simulated environment. This would allow the student to both observe and enact the role of the occupational therapist. Students would be able to practice skills required within each practice area while still adhering to a traditional model of education.

The combined model is illustrated in Figure 4.

Figure 4. A combined model of level I fieldwork.
The Integrated Model

Another potential model that would incorporate the principles of clinical learning combined with simulation is an integrated model. This model looks very different from the traditional model used now. While it has some similarities to the combined model, the integrated model infuses fieldwork education into the entirety of the occupational therapy educational program. Instead of having level I fieldwork as a separate course, an integrated model would include the level I clinical experiences into the core coursework of the program. Clinical and simulated experiences would be built into the curriculum of each practice area course, ensuring that the didactic coursework was completely intertwined with the fieldwork component. Building an occupational therapy program with the level I fieldwork infused into coursework for all intervention areas, as well as courses in background skills, could increase the variety of both clinical and simulated experiences and could be a significant factor in strengthening student professional competence. This type of a model could be considered as a gold standard for level I fieldwork, as it appears to truly embody the intent of the accreditation standards. By integrating coursework, simulation, and fieldwork, the students would have greater opportunities to engage in active learning, which could have a significant effect on their preparation for clinical practice (Krathwohl, 2002). This model would be a step in the right direction, both to address the issue of lack of clinical sites and to improve student learning in their occupational therapy program.

The integrated model is illustrated in Figure 5.
The Clinical Site Model

In defining a clinical site model, it is important to examine the partnerships that exist between the educational institution and the clinical community. The clinical site model is the most difficult model to define because it directly depends on how the institution works with its clinical partners to educate students. This type of model would require a change in expectations within the clinical sites for students engaging in level I fieldwork. If the simulated experience is to be carried out with actual patients, it is also important to define the boundaries for safety and liability for the sites prior to the beginning of the experience. The recommendations for this experience could be a significant improvement to level I fieldwork experiences for students. A clinical model would require observation and simulation to occur at the same site. This might involve having a group of students observe a treatment in the occupational therapy gym, having students practice skills on each other through structured simulation, followed by allowing students to practice on the patient. Including the clinical sites in all phases of the fieldwork brings in a component of learning that is often missed in lab simulation. It is
possible that, by having the students engage in the simulation at the actual clinical site, there will be a greater connection of the learning to the treatment of the patients. Assignments for this type of clinical experience can be directly linked back to the curriculum for the program, with students returning to campus for their reflection and debriefing. In spirit, this may be seen as less of a full simulation model and more of a model allowing the students to engage in safe practice. With this model, there will need to be an intensive training regimen for the clinicians in how to teach students within their setting and an intensive collaboration between the school and the site. In practice, this collaboration may only be a benefit, in that more clinicians will come out of that experience with the knowledge of how to teach occupational therapy students.

The clinical site model is illustrated in Figure 6.

**Summary**

Within these proposed models, there are some common threads that run through each experience. One of these threads is the idea that occupational therapy programs need to improve their links with the clinics in terms of how they are teaching their students clinical skills. Through the use of simulation, programs can easily develop those links and by doing so may actually improve the students’ experiences within the clinics for level I fieldwork. Each potential model listed integrates specific skill demonstration within the clinical environment. By having the students practice these skills through the simulation experience, the clinical sites can be assured that the students are prepared to demonstrate the skills safely and within the boundaries of site liability and practice standards. The other common thread in the proposed models is the theoretical link to Kolb’s (1984) Experiential Learning Theory. Understanding the importance of the
Figure 6. A clinical site model of level I fieldwork.

see/do, reflect, integrate, apply learning loop is vital to developing educational programs that teach clinical skills effectively within both the classroom and the clinic.

**Implications for Accreditation**

The scores on the HSRT during this study validated that students entering the occupational therapy program at this university had strong critical thinking skills. Despite these high scores, students were still struggling to apply their skills in the clinical and simulated environments. There is a need to develop a measure that can examine students’ professional competence both in the classroom and in the clinical environment. This measure would need to encompass skills that have been defined in this study, including “communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and the community being served” (Epstein & Hundert, 2002, p. 226). While current measures, such as the HSRT, are good indicators of students’ critical thinking skills, they are not sensitive
enough to be good measures of student performance. Use of a measure of professional competence also has implications for accreditation, both from the occupational therapy accrediting body (ACOTE) and from regional accreditors. With the focus for accreditation centering on evidence based practice, it is increasingly important to use assessments that establish how students are acquiring their clinical skills. By tying professional competence into the learning outcomes, programs would be able to demonstrate both skill acquisition and clinical readiness. As the focus of accreditation is on meeting these learning outcomes, a measure of professional competence would allow programs to give stronger evidence that they are truly preparing students for clinical practice.

**Conclusion**

This study demonstrated a novel approach to clinical learning for occupational therapy students. It provides a contribution to the national conversation on how to deliver clinical experiences while decreasing impact on clinical sites. The use of scenario-based teaching, specifically through simulation is a valid alternative to traditional clinical experience. In looking at the students’ responses to their participation in the simulation, it is proposed that a combination of the two approaches creates a learning situation that allows students the opportunity to solidify the skills they see in their clinical observations. This study has answered both of the original research questions. There is no difference in critical thinking skill development between students participating in traditional level I fieldwork and students participating in a combined traditional/simulation model. Additionally, students’ qualitative responses to the questions asked after their participation in the simulation experience provide a viewpoint on how students learn
through engaging with hands-on experiences as a part of their occupational therapy education. Engaging in the simulation changes how the student view their own professional competence. Students report an understanding of the value of simulation, of both playing the patient and the therapist, and of applying that simulation experience back to the clinical setting. These results hold many implications for occupational therapy education. By engaging in simulation, students have a much greater understanding of the role of the occupational therapist. All of these skills combined create a strong practitioner in the field who understands their role and their value, thus creating an effective occupational therapy professional whose patients benefit greatly from their care.
REFERENCES


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doi:10.0000/j.1547-5069.2011.01405.x


doi:10.1300/J002v38n04_01

doi:10.1016/j.ecns.2009.07.003


doi:10.1080/01421590903002821


APPENDIX A

Two-Day Curriculum

2-Day Fieldwork Alternative Experience—Pilot Program
Acute/Geriatric experience

Dates and Times:
Sat/Sun
8:00 - 5:00

COURSE OBJECTIVES
During and/or upon completion of this course, the student will be able to:

1. Develop skills in finding pertinent information within a client’s record and transforming that information into a succinct occupational therapy note [1.1,1.2,4.1,4.7].

2. Identify and discuss the various types and formats of documentation [1.1, 4.10].

3. Write appropriate client documentation in the SOAP format, including proper location of all note components [1.1, 1.2, 2.7, 4.10, 5.28].

4. Identify pertinent client-related information transform that information into a succinct occupational therapy note in SOAP format [1.1, 1.2, 2.7,4.10].

5. Assist in client-centered assessments as assigned by the fieldwork supervisor with supervision [4.3].

6. Identify a problem list and develop at least 1 long term and 2 short term goals in the assigned format from the problem list based on information contained in the subjective and objective portion of the note [1.1, 1.2, 2.7, 4.10].

7. Identify and write a plan based on information contained in S, O, A and P. [1.1,1.2, 2.7].

8. Identify and explore the role of OT and OTA in a variety of settings [6.1, 6.2, 6.5, 7.1].

9. Begin to assist in the implementation of the OT treatment plans for individuals currently or not currently receiving OT services as appropriate to the assigned setting [5.5, 5.18].

10. Utilize universal precautions, adhere to safety precautions during the OT process, and maintain client confidentiality [2.8, 5.13].
11. Participate in the supervisory relationship with the Fieldwork Supervisor [7.10].

12. Describe and implement the requirements of HIPAA. [9.1]

13. Compare and contrast the role of the OT and COTA in the screening and evaluation process along with importance and rationale for supervision and collaborative work between the OT and COTA in that process [B.4.5].

14. Develop effective communication strategies for interprofessional collaboration. [B 2.8, B 5.7, 5.21].

Participants:
8 OCT 5802 students (IA)
8 OCT 5803 students (IB)
8 2nd year OTA students

Dress Code and Student Requirements:
All MOT students will be required to bring a laptop.

OCT 5802 (IA students) will wear snug fitting clothing (leggings, tanks, etc) that will allow them to be covered but will allow them to put looser clothing over to allow for ADL dressing. Students will be wearing hospital gowns for at least part of the day over snug fitting clothing. All IA students will be required to bring:
- Baggier clothing for ADL dressing (sweat pants, t-shirt, socks, slip on or tie shoes)
- Hair Brush and Tooth Brush
- Any additional materials that would allow them to stay in character for all treatment sessions.

OCT 5803 (IB students) and OTA students will be dressed professionally in treatment gear. This may include scrub pants or khakis. Shirts should be professional (polo) or t-shirt that allows the student to move and treat while appearing professional. This is considered clinical dress. Students should also bring a ‘bag of tricks’. This should include any materials that might be used during an OT assessment or treatment session. This should be creative and bring occupation into the treatment session. Each of these bag ‘treatment kits’ will look a little different but should include materials for treatment in:
- Fine motor, Visual Motor, Sensory Motor, ADL, IADL, Cognitive, etc.

Roles:
IA students - Will be patients for the entire scenario. Will also collaborate with IB/OTA teams after initial assessment and treatment sessions to share out and collaborate.
IB students - Will be treating therapists (primary therapists) for the entire scenario. Will be responsible for treatment plan, collaborating with treatment groups, will take primary role on goal writing and writing assessment report with collaboration from IA and OTA.
OTA students - Will be collaborative partner with IB students. Will be responsible for collaborating with IB on assessment, treatment plan, and goals. Will take primary role in 2 or 3 treatment sessions.

**Materials:**
- Jan Davis curriculum - videos and books
- 8 hospital beds (sim lab)
- 8 wheelchairs
- 8 walkers/canes/crutches (gait training devices)
- Adapted grooming and hygiene equipment
  - Hip kits, oral stim, adapted equipment, etc.

**Assessments:**
- COPM
- Assessment Report Format
- Complete patient charts (Grossmont supplied)
- Small classroom workspaces for problem solving
- Large classroom space for whole group
- Coffee, drinks and snacks will be provided for mid morning and mid afternoon
- Lunch will be provided both days (pizza, sandwiches, etc.)

**Tentative Schedule:**

**Saturday:**
8:00 - 8:30
Group meet together in large classroom
  - Introductions
  - Brief tour of treatment spaces and materials
  - Pair groups up into groups of 3 with:
    - 1 OTA
    - 1 IA
    - 1 IB
  - Introduce groups and review roles

8:30 - 9:30
Review principles of safe transfers and practice transfers in the sim lab.

9:30 - 9:45 - BREAK

9:45 - 10:45
Jan Davis Series
  - Functional Treatment Ideas and Strategies - Disc 1
    - Evaluation
      - Evaluation Introduction
    - Clinical reasoning
      - Clinical Reasoning introduction
Discussion of first steps for assessment
   - Review assessment report format
   - Review roles of OT and OTA in assessment

10:45 - 11:15
Begin Assessment Session

IB and OTA students to review chart for their patient.

IA students to go to sim lab and prepare for assessment session.

11:15 - 12:15
Assessment session begins
   IB and OTA students will begin with:
   - Clinical Observations
   - Basic Mobility
   - Patient Interview

12:15 - 1:00
Lunch and discussion of initial observation in groups.

1:00 - 1:15
IB students to choose formal evaluation to complete with their patient.

1:15 - 2:45
Formal assessment completion

2:45 - 3:00 - BREAK

3:00 - 5:00
Write up of full assessment - all team members work together to complete assessment, goals, and treatment plan. Begin problem solving for treatment sessions the next day.

**Sunday:**

8:00 - 9:30
Regathering
Group share out from yesterday's assessment session
Review Assessment report
Review treatment plan
Review Goals
Begin strategizing for treatment sessions for the day

Jan Davis discs 2 and 3 - Preparing for function and functional activities
9:30 - 9:45
Groups prepare for first treatment session lasting 45 minutes

9:45 - 10:30
First treatment session (IB and OTA treating as team - OTA in lead)

10:30 - 10:45 Break

10:45 - 11:30
Group Review, SOAP note writing, and problem solving discussion
Plan next treatment session
Revise STG

11:30 - 12:30
Lunch and group discussion about first treatment session

12:30 - 1:00
Groups prepare for second treatment session - 45 minute session

1:00 - 1:45
Second treatment session (IB and OTA treating as team - IB in lead)

1:45 - 2:30
Group Review, SOAP note writing, and problem solving discussion
Plan next treatment session
Revise STG

2:30 - 2:45 - BREAK

2:45 - 3:00
Groups prepare for third treatment session - 30 minute session

3:00 - 3:30
Third treatment session (IB and OTA treating as team - OTA in lead)

3:30 - 4:00
SOAP note writing and discussion
Discuss discharge planning

4:00 - 5:00
Group comes back to discuss weekend learning. Will review learning and value of particular parts of weekend group sessions.
Instructor Notes:

1 - 2 weeks in advance of weekend experience.

- Meet with IA students to give them copy of patient chart. They will be given a diagnosis, patient history, any pertinent medical records, etc. They will also be given instructions to research their patient condition. This will include watching youtube videos of patients with similar conditions. It will be made clear that the IA students will be responsible for simulating a realistic patient for the assessment/treatment experiences. Students will also be instructed to wear snug fitting clothing and to bring baggier changes of clothing for ADL work.

- Meet with IB students to review assessments and to go over role. These students will be responsible for bringing laptops to write up assessment and treatment plan. The IB students are responsible for bringing a ‘bag of tricks’. This will include any treatment activities and occupational activities that they think they might need to engage in assessment or treatment sessions.
APPENDIX B

IRB Approval Form From University of St. Augustine

July 13, 2012

Holly Reed
Academic Fieldwork Coordinator
University of St. Augustine
700 Windy Point Drive
San Marcos, CA 92069

RE: Number “UR-0218-001 – Scenario Based Level I Experience”

Dear Holly:

The Institutional Review Board (IRB), responsible for the review of research involving human subjects, has reviewed your original proposal. Approval for the project will be for one year, starting February 27, 2013. If a University of St. Augustine For Health Sciences faculty member or student leaves the University prior to completion of a USAHS IRB-approved study, the study may be continued until expiration of that IRB approval. However, use of any University resources will be at the discretion of University administration. The IRB Committee cannot, nor will not, grant approval of University resources. The IRB approval will expire on February 27, 2013.

This approval is granted with the understanding that no changes may be made in the procedures to be followed, nor in the consent form(s) to be used, until after such modifications have been submitted to the IRB for review and approval. Researchers must retain a copy of the signed consent form in their files for three years following completion of the project and must provide a copy of the consent form to the subject(s).

Any unanticipated problems involving risks to human subjects or serious adverse effects must be promptly reported to the IRB.

Two months prior to the expiration of this approval, you will receive notification of the need for updated information to be used for the project’s continuing review.

Sincerely,

Marilyn E. Miller, PhD, PT, GCS
Chair, IRB California Campus

cc: J. Olson

MM/ct
January 28, 2014

Holly Reed
University of St. Augustine for Health Sciences
700 Windy Point Drive
San Marcos, CA 92069

RE: UR-0218-001

Dear Holly,

Thank you for submitting the information for extension of your research proposal entitled “Scenario Based Level 1 Experience”. Your research proposal is approved until February 28, 2015.

We wish you continued success with your project.

Sincerely,

Marilyn E. Miller, PhD, PT, GCS
Chair, IRB California Campus

CC: Judith Olson

MEM/ct
APPENDIX D

Informed Consent Packet

IRB
University of St. Augustine for Health Sciences
Local: (760) 591-3012

IRB Informed Consent Form, IRB #___________

Title: Scenario Based Level 1 Experience

Investigator(s):

Principle Investigator: Holly Reed, MA OTR/L
Address/phone/email: University of St. Augustine, CA Campus
700 Windy Point Drive
San Marcos, CA 92069
(760) 591-3012
hreed@usa.edu

Secondary Investigator: Judith Olson, Ph.D., OTR/L
Address/phone/email: University of St. Augustine, CA Campus
700 Windy Point Drive
San Marcos, CA 92069
(760) 591-3012
jolson@usa.edu

Funding Source: N/A

Description of This Research Study:

You are being asked to participate in this research study because you are in a Level I Fieldwork course (either OCT 5802 Fieldwork IA or OCT 5803 Fieldwork IB) and we would like to investigate the learning in a scenario based Level I fieldwork experience versus the learning in a traditional Level I fieldwork experience. This research is being conducted to determine if there are alternative ways for students to learn critical thinking skills essential for clinical competence.

If you agree to take part in this research study, you will be randomized to one of the following groups. The procedures and visits you can expect will include the following:
IRB
University of St. Augustine for Health Sciences
Local: (760) 591-3012

IRB Informed Consent Form, IRB #___________

Group A
1. Participation in two traditional level I fieldwork experiences in the local clinical community, excluding travel time, of 24 hours each or a total of 48 hours.
2. Filling out and returning all paperwork associated with the fieldwork experience, including: supervisor evaluation of the student, and the student evaluation of the fieldwork experience for both level I experiences.
3. Pre- and Post testing using the Health Sciences Reasoning Test (HSRT) portion of the California Critical Skills Test (CCST)

Group B
1. Participation in one traditional level I fieldwork experience in the local clinical community, excluding travel time of 24 hours.
2. Six hours of preparatory reading and study are expected before the Scenario Based Level I Experience Weekend.
3. Participation in the Scenario Based Level I Experience Weekend, excluding travel time, of 18 hours
4. Filing out and returning all paperwork associated with the fieldwork experience including: supervisor evaluation of the student, and the student evaluation of the fieldwork experience for both the traditional level I experience and the Scenario Based Level I Experience Weekend.
5. Pre- and Post testing using the Health Sciences Reasoning Test (HSRT) portion of the California Critical Skills Test (CCST)

Possible Side Effects and Risks of Participating
No risks beyond those of a routine Level I fieldwork are anticipated.

What are the Benefits of Participating in this Study?
Participating in this study may result in increased learning opportunities for those students in the intervention group.

If you have any concerns about your participation in the study, you should discuss them with the Principal Investigator, Holly Reed at 760-591-3012 x2473. If this individual is not able to address your concerns, you may contact the Chair of the IRB committee (Dr. Miller, PhD) at the University of St. Augustine for Health Sciences for the CA campus: 1-760-591-3012
IRB Informed Consent Form, IRB #___________

Cost and Payments to the Participant:
All students who participate in this study will incur travel expenses to and from the fieldwork facilities. Students in either randomized group should incur similar travel costs. No other costs are expected of the participants. The University of St. Augustine is not liable for any cost or compensations incurred as a result of participating in this study.

Confidentiality:
All information obtained in this study is strictly confidential unless disclosure is required by law. All students will be randomly assigned a number and all documents created by students will use that number for identification purposes. No names will be used. The principal investigator, Holly Reed, will have access to the student roster for the course OCT- 5802 and 5803.

All documents related to this project will be kept in a locked file cabinet in the office of secondary investigator, Judith Olson, until the conclusion of this project.

Participant’s Right to Withdraw from the Study:
- Your participation in this research is entirely voluntary. You may withdraw or refuse to participate from this study at any time. If you decide to enter the study and withdraw in the future, there will be no penalty and all data will be destroyed.
- The study investigators may decide to discontinue the study at any time, or withdraw you from the study at any time, if they feel that it is in your best interests.

Other Considerations:
In addition to receiving copy of this Informed Consent Form, you will also receive a copy of the California Medical Research Patients’ Bill of Rights.

Your total time commitment for this project if you are randomly assigned to the intervention group is approximately 48 hours. This does not include travel time. This time commitment is the same as that of a traditional Level I Fieldwork experience. Participants in either group will be expected to engage in level I fieldwork experiences for a total of two trimesters.

Voluntary Consent by Participation:
Participation in this research project is totally voluntary, and your consent is required before you can participate. See signature statement on the following page.
IRB
University of St. Augustine for Health Sciences
Local: (760) 591-3012

IRB Informed Consent Form, IRB #___________

Investigator’s Claim:

I have explained to ________________ the purpose of the research study, the procedures required, and the possible risks and benefits to the best of my ability.

Investigator’s signature: ___________________________ Date: ______________

Investigator’s printed name: ________________________

Participant’s Claim:

I have read this consent form (or it has been read to me) and I fully understand the contents of this document and voluntarily consent to participate. All of my questions concerning this research have been answered. If I have any questions in the future about this study, the investigator listed above or his/her staff will answer them. A copy of this form has been given to me.

______________________________  ____________________
Participant’s signature  Date

______________________________
Participant’s printed name

______________________________  ____________________
Witness’ signature  Date

______________________________
Witness’ printed name
IRB
University of St. Augustine for Health Sciences
Local: (760) 591-3012

IRB Informed Consent Form, IRB #___________

MEDICAL RESEARCH PATIENT’S BILL OF RIGHTS

California law requires that any person asked to take part as a subject in research involving a medical experiment, or any person asked to consent to such participation on behalf of another, is entitled to receive the following list of rights written in a language in which the person is fluent. This list includes the right to:

1. Be informed of the nature and purpose of the experiment.

2. Be given an explanation of the procedures to be followed in the medical experiment and any drug or device to be utilized.

3. Be given a description of any attendant discomforts and risks reasonably to be expected from the experiment.

4. Be given an explanation of any benefits to the subject reasonably to be expected from the experiment, if applicable.

5. Be given a disclosure of any appropriate alternative procedures, drugs, or devices that might be advantageous to the subject, and their relative risks and benefits.

6. Be informed of the avenues of medical treatment, if any, available to the subject after the experiment if complications should arise.

7. Be given an opportunity to ask any questions concerning the experiment or the procedures involved.

8. Be instructed that consent to participate in the medical experiment may be withdrawn at any time and the subject may discontinue participation in the medical experiment without prejudice.

9. Be given a copy of the signed and dated written consent form.

10. Be given the opportunity to decide to consent or not to consent to a medical experiment without the intervention of any element of force, fraud, deceit, duress, coercion, or undue influence on the subject’s decision.
APPENDIX E

IRB Approval From San Diego State University

Exempt Verification
Reg: 46.101(b)(4) – minimal risk

September 29, 2014

Student Researcher: Mrs. Helen Reed
Faculty Sponsor/Thesis Chair: Garen Sax
Department: Educational Leadership
IRB Number: 1838099

Re: An Examination of Critical Thinking Skills in Traditional and Simulated Environments for Occupational Therapy Students

Dear Mrs. Reed,

The above referenced research was reviewed and verified as exempt in accordance with SDSU’s Assurance and federal requirements pertaining to human subjects protections within the Code of Federal Regulations (45 CFR 46.101). This review applies to the conditions and procedures described in your protocol.

The determination of exemption is final and requests for continuing review (Progress Reports) are not required for this study. However, if any changes to your study are planned, you must submit a modification request and receive IRB verification that the modification is exempt (per 45 CFR 46.101). To submit a modification request, please follow the necessary steps below:

Modification steps:
• Access the protocol via the Webportal
  [https://sunspot.sdsu.edu/pls/webapp/web_menu.login/]
• Protocol main page click on “Modifications” to enter a report
• Once the report has been fill out completely, click “submit”
• Make sure to email the IRB (irb@mail.sdsu.edu) notifying them that a modification has been submitted.

Additionally, please notify the IRB office if your status as an SDSU-affiliate changes while conducting this research study (you are no longer an SDSU faculty member).

Sincerely,

Anne Dodge-Schwanz
Research Affairs Analyst/HRPP
Important information for ALL exempt studies:

To access IRB review application materials, SDSU's Assurance, the 45 CFR 46, the Belmont Report, and/or any other relevant policies and guidelines related to the involvement of human subjects in research, please visit the IRB web site at https://newscenter.sdsu.edu/researchaffairs/irbpp.aspx

a) If this research involves the use of existing or secondary data sources, information obtained must be recorded so that subjects cannot be identified, either directly or through identifiers linked to the subjects.

b) If information will be obtained from individual medical records, please check with the organization authorized to provide access to these records to determine whether regulations relating to the Health Insurance Portability and Accountability Act (HIPAA) pertain to your research. Likewise, if academic records are accessed, Federal Education Rights and Privacy Act (FERPA) requirements must be respected. Notify the SDSU IRB office if protocol revisions are necessary to comply with HIPAA regulations.

C) If recruitment will take place through an outside agency or organization, confirm with that institution that you have permission to conduct the study prior to initiation of any study activities. If this research involves the use of existing or secondary data sources, confirm with the data owner that you have permission to access the data.

d) Approval is contingent upon the completion of the SDSU human subjects tutorial (found at: http://www-rohan.sdsu.edu/~msa/login.php) by all members of the research team. This certification must be renewed every 2 years.
Student Name: ___________________________ Date: ____________

Clinical Site: __FIELDWORK PILOT WEEKEND _________________________

SATURDAY AM:
1. Please list at least 5 things that you hope to get out of this fieldwork weekend:
   a. 
   b. 
   c. 
   d. 
   e. 

TO BE COMPLETED AFTER THE EXPERIENCE
2. Name 3 new things you learned this weekend.
   a. 
   b. 
   c. 

3. What was your favorite part of the weekend?

4. What was your least favorite part of the weekend?
5. Was there anything that you felt you wanted more exposure to or time for?

6. Was there any part that you felt could be eliminated?

7. Was there anything that you felt should be added to make the weekend more complete?

8. What part of the weekend did you feel most prepared for?

9. What part of the weekend did you feel least prepared for?

10. Please tell us a little bit about what you did this weekend. Who your patient was and how you planned your assessment and treatment. For IA students, please write your patient’s backstory here. (You may use a separate page)

11. What did you learn about the roles of the COTA/OTR and how do you feel you were able to work within the therapy team? Did you feel that this was a productive relationship? Did you learn anything about your scope of practice and your role within the OT team?

12. Is there anything else that you would like to let me know about this weekend that would help make it better or a stronger experience next time? Did you find this a valuable experience?

13. How do you feel this compares to a traditional level I experience?