Residents’ Perceptions of Classroom Situated E-learning for Medical Education

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Abstract

Medical education helps ensure doctors acquire skills and knowledge needed to care for patients. However, resident duty hour restrictions have impacted time residents have for medical education, leaving resident educators searching for innovative options for effective medical education. Classroom situated e-learning, a blended learning delivery method, was created to find an effective option for medical education. Research has been conducted on the use of e-learning with residents. More limited research has been reported on the use of blended learning with residents. Research is needed regarding the use of classroom situated e-learning for resident education. Qualitative phenomenological research was used to understand residents’ perceptions of the effectiveness of, and interactions in, classroom situated e-learning and traditional lectures. In-depth interviews were used for data collection. Research participants were nine residents who had participated in classroom situated e-learning and lecture based learning. Analysis of the data revealed all participants found classroom situated e-learning effective because it was problem based, provided access to an expert, was interactive, and conducted in a small group. Six of the nine participants provided an example of an effective lecture, which they found effective due to the inclusion of practical or applicable content and an engaging educator. Residents were asked to describe their interactions with the content, the educator, and other learners for classroom situated e-learning and traditional lectures. Their responses were analyzed and themes identified. The themes identified for interaction in classroom situated e-learning were, through the computer for interaction with the content; providing real world content, asking questions of the educator, and feedback for interaction with the educator; and discussion for interaction with other learners. The theme identified for traditional
lectures was asking questions of the educator for interaction with the educator. The findings from this study demonstrated that participants’ perceived classroom situated e-learning to be effective, and had a preference for interaction that included discussion with the educator and other learners. Recommendations for future research include a replication of this study with residents in other residency programs, and quantitative research comparing the learning outcomes of classroom situated e-learning with traditional lecture based learning.
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Chapter 1: Introduction

Medical education is an integral component of the medical system, designed to ensure that doctors are capable of providing high-quality care for their patients (Miller et al., 2008). Licensed doctors participate in continuing medical education to keep pace with ongoing changes in the field of medicine (Guillemin, McDougall, & Gilan, 2009), and maintain their licenses and specialty certifications (Brandt & Shanedling, 2010). Residency programs include medical education (Accreditation Council for Graduate Medical Education, 2007), and medical schools provide the beginning medical education for students who want to be doctors (Macmillan Dictionary, 2011).

Despite the importance of medical education, required changes in residency programs have affected residents’ medical education. In 2003, representatives of the Accreditation Council for Graduate Medical Education (ACGME) instituted a mandatory reduction in resident duty hours (Accreditation Council for Graduate Medical Education, 2003). One reason for this change was to improve patient safety (Lin, Beck, & Garbutt, 2006). Quality patient care must be a priority, but resident education must also be a high priority (Wayne & Arora, 2009). However, resident hour reductions have had a negative effect on resident education (Tempelhof et al., 2009).

Residents have reported that restricted duty hours have left them with less time for education (Mathis, Diers, Hornung, Ho, & Rouan, 2006), and residents often miss medical education to attend to other responsibilities (Vidyarthi, Katz, Wall, Wachter, & Auerbach, 2006). Individuals designing resident programs have been forced to implement changes to incorporate work hour limitations while providing effective medical education (Lin et al., 2006). To accomplish this goal, innovative options for
medical education are needed (Tempelhof et al., 2009), as well as research regarding the use of e-learning (Westmoreland et al., 2010), and blended learning for medical education (Lewin, Singh, Bateman, & Glover, 2009). Lecture is still the common mode of delivery (Robertson, Yun, & Murray, 2009) even though cognitive researchers and theorists have suggested that medical educators should make use of more interactive options (Graffam, 2007). Blended learning can combine face-to-face interaction with e-learning. The potential benefits of blended learning for medical education have been shown (Bekkers et al., 2010) and include increased flexibility (Crouch, 2009), improved test scores (Lewin et al., 2009), and cost savings (Sung, Kwon, & Ryu, 2008). However, there are few formal applications of blended learning for medical education (Lewin et al., 2009).

Classroom situated e-learning is a type of blended learning that combines e-learning with simultaneous face-to-face facilitation. It was specifically created for use with medical residents in a pediatric hospital in Ohio. The content is projected onto a screen and is primarily made up of activities that mimic what residents experience when caring for patients. Guided by a facilitator, residents make decisions, answer questions, ask questions, and engage in discussion. To date, research has not been conducted on this specific form of blended learning, to determine if classroom situated e-learning is an effective option for meeting the needs of medical educators and residents.

This chapter includes background information related to medical education and residency followed by statements of the problem and purpose of this study. The theoretical framework is then presented along with the research questions and, the nature and significance of the study. Definitions of key terms are then provided to explain and describe the contents of this study.
Background

Medical education has always been an important component of the medical system. In the 1920’s the role of education in medicine became a priority as medical education shifted from an apprenticeship to formal education (Brandt & Shanedling, 2010). In the contemporary environment doctors must make a commitment to lifelong learning (Miller et al., 2008) to ensure they continually increase their skills and knowledge beyond what they learned in medical school (Guillemin et al., 2009). Residency is typically the stage that follows medical school. The patient care responsibility of residents is gradually increased over the course of the 3-year program, with the goal of ensuring that residents are capable of independently caring for patients upon graduation (Iglehart, 2008). Those responsible for resident programs are charged with maintaining the safety and well-being of both residents and the patients that residents treat (Accreditation Council for Graduate Medical Education, 2011).

In 2003, representatives of the ACGME began implementing restrictions in the amount of hours that residents could work, as a way to maintain patient and resident safety, and to improve medical education (Iglehart, 2008). However, researchers have found that reduced hours have not resulted in improved education (Mathis et al., 2006; Vidyarthi et al., 2006). There are over 8,000 residency programs, serving more than 100,000 residents (Iglehart, 2008), and representatives of those programs have searched for new and more effective options for providing medical education to their residents (Robertson, Yun, & Murray, 2009).

Statement of the Problem
Residents are doctors and adult learners (Das, Malick, & Khan, 2008) in graduate medical education programs, who must successfully complete accredited residencies to be eligible for board certification. Residency programs include medical education (Accreditation Council for Graduate Medical Education, 2007). However, restrictions on residency hours have affected the amount of time residents are able to participate in medical education (Accreditation Council for Graduate Medical Education, 2011). In addition, residents experience highly demanding workloads, creating full schedules with little free time. As a result, residents are further limited in their ability to obtain formal medical education (Baker et al., 2010).

The problem addressed in this study is that medical education for residents is hindered by the lack of effective delivery method options. Lecture-based training is the traditionally used format for medical education (Robertson et al., 2009) despite a need for innovative educational options that make the best use of residents’ limited time (Tempelhof et al., 2009), and address the needs of adult learners (Stratman, Vogel, Reck, & Mukesh, 2008). The use of e-learning for medical education takes advantage of technology (Gray & Tobin, 2010). However, e-learning lacks face-to-face discussion, considered critical for student thinking and reflection (Cook & McDonald, 2008). Many researchers (Carbonaro et al., 2008; Cook et al., 2010; Edginton & Holbrook, 2010; Westmoreland et al., 2010) have noted the need for continued research regarding e-learning for medical education. In addition, little is known about the use of blended learning for medical education (Gray & Tobin, 2010). There is a need to find and use innovative educational options that will meet the learning needs of residents and the educational goals of residency programs (Tempelhof et al., 2009). There is also a need to
understand residents’ perceptions of effective medical education and innovative learning methods to more fully comprehend the potential impact of these methods.

**Purpose of the Study**

The purpose of this qualitative study was to discover how medical residents, who are adult learners (Das et al., 2008), perceived the effectiveness and use of interactions in classroom situated e-learning, and traditional lectures for medical education. Given the value of education during residency (Charap, 2004), the high demand on residents’ time, and residents’ limited time for medical education (Baker et al., 2010) research is needed to understand residents’ perceptions of these modes of learning for medical education. The study was phenomenological in design. In-depth interviews were conducted with nine residents at a pediatric hospital in Ohio.

**Theoretical Framework**

Residency typically follows medical school, putting the usual age of first year residents in their mid-twenties. Therefore, residents are considered adults when using the common definitions for adulthood. The biological definition places adulthood at a person’s ability to reproduce. According to the legal definition, adulthood usually coincides with the ability to vote, marry, and obtain a driver’s license. The social definition of adulthood is when a person takes on adult roles and responsibilities (Knowles, Holton, & Swanson, 2005). A strong theoretical foundation needs to be at the heart of all learning (Herie, 2005), and creators of blended learning and e-learning need to have awareness of technology and an understanding of adult learning theory (Stewart & Waight, 2008). Adult learning theory acknowledges that adults learn differently from
children (Welty, 2010). Andragogy is a term used to mean adult learning. At its root, andragogy means leading or teaching adults (Knowles et al., 2005).

Malcolm Knowles is often considered the founder of andragogy, the first real attempt to distinguish adult learning from learning in childhood (Knowles et al., 2005). Although, the use of the word andragogy dates back to the 19th century where it also referred to the idea that adults learn differently than children (Forrest & Peterson, 2006). The origination of the word andragogy has been credited to a German teacher named Alexander Knapp who began using the word in 1883 (Jarvis, 2005). Today, the word andragogy is typically used, in the United States, to mean the work of Malcolm Knowles, while in Europe andragogy is considered the heading for all adult learning (Knowles et al., 2005). Given that residents are adults, research regarding resident education best fits under the framework of adult learning theory.

The use of adult learning theory for creating medical education has become a topic of interest and research. Medical educators are now acknowledging that residents and other post-graduate students in medicine are adult learners (Das et al., 2008), and adult learning theory should be incorporated into the creation of medical education (Grijpink-van den Biggelaar, Drop, & Schuwirth, 2010). In Canada, the use of adult learning theory is a requirement of resident education in the field of family medicine (Klein & Schipper, 2008). Research has shown the value of incorporating adult learning theory into medical education (Grijpink-van den Biggelaar et al., 2010), and medical educators are advocating the value of using adult learning theory (Allevi & Lane, 2010; Das et al., 2008).
Yet, there is still controversy about the use of adult learning theory for medical education. Some educators believe that residents enter residency programs with comfort and experience in pedagogy, but need support moving toward achieving comfort with andragogy based learning experiences (Klein & Schipper, 2008). Becoming a resident requires successful completion of many years of schooling, and that typically means succeeding in pedagogy based education, leaving a question as to whether residents would prefer andragogy based learning (Stratman et al., 2008). Research was conducted, using a learning styles inventory, to assess the learning style preferences of dermatology residents across North America. The results showed that the residents preferred andragogy based learning styles, leaving the researchers to recommend that medical educators use adult learning theory in creating resident education (Stratman et al., 2008).

**Research Questions**

The research questions for this study addressed the need to explore blended learning, in the form of classroom situated e-learning, as an alternative to the traditional lecture-based learning typically used for resident education. Residents were asked to describe their perceptions of the effectiveness and interactions of classroom situated e-learning and traditional lecture-based learning. For the purpose of this research, the definition of effectiveness was based on the six core competencies representatives of the ACGME require residents to master prior to graduation (Allevi & Lane, 2010). The competencies are: “patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice” (Antiel et al., 2011, p. 185). For this research, effective was defined as education that increased residents’ knowledge in at least one of the ACGME’s six core
competencies. Interaction, for this research, was defined using Moore’s (1989) seminal work on the three types of interaction in education: interaction between the student and the content, interaction between the student and the instructor or facilitator, and interaction between the student and other students. Effectiveness and interaction were measured through the residents’ responses to questions asked during the in-depth interviews.

**Q1.** How do residents perceive the effectiveness of classroom situated e-learning and traditional lecture based learning?

**Q2.** How do residents perceive the interaction (between the student and the content, the facilitator or instructor, and other students) in classroom situated e-learning and traditional lectured based learning?

**Nature of the Study**

The study was conducted using qualitative methods and a phenomenological perspective. Phenomenology was used because it matched the intended purpose of the research, to gain a deep understanding of the lived experiences of the participants (Moustakas, 1994). For this research, the lived experiences were the residents’ perceptions of the effectiveness of a specific type of blended learning, classroom situated e-learning.

Participants consisted of nine residents at a pediatric hospital, who had completed at least one classroom situated e-learning session, and at least one lecture based conference. In-depth interviews were used for data collection. A question guide (see Appendix A) ensured that major themes and topics were covered, but flexibility was maintained to allow the participants to accurately report their own lived experiences.
(Bogdan & Biklen, 2007). The first step in data analysis was horizontalization, followed by reduction and elimination. The remaining data was clustered based on emerging themes, and then validated. Finally, individual textural and structural descriptions were created, followed by the creation of a composite description and synthesis (Moustakas, 1994).

Significance of the Study

The study provides qualitative information about the participants’ perceptions of the effectiveness of classroom situated e-learning for educating pediatric residents. The study could benefit residents by generating information that could lead to more effective medical education. Ultimately, patients would benefit from receiving care from doctors who have experienced effective education during their residency.

Residency has been called the most important learning opportunity in a doctor’s career (Charap, 2004). Lecture-based learning (Graffam, 2007), e-learning (Cook & McDonald, 2008), and blended learning (Crouch, 2009) have been used for medical education. However, classroom situated e-learning was created for use with residents in a pediatric hospital in Ohio, and to date no research has been published on this specific form of resident education. Because of the importance of residency, research is needed regarding innovative educational options that could improve the effectiveness of resident medical education (Tempelhof et al., 2009). Classroom situated e-learning is one possible innovative educational option.

Definition of Key Terms

Blended Learning. Blended learning is an educational format that uses multiple teaching methods, often including face-to-face and online learning (Bliuc, Goodyear, &
Ellis, 2007). For the purpose of this research, blended learning is defined as a synchronous combination of face-to-face learning and e-learning.

**Classroom situated e-learning.** For the purpose of this research, classroom situated e-learning is defined as a form of blended learning. In this synchronous learning format the learning is facilitator led, and the learners and facilitator are in the same conference room. An e-learning module is projected on a screen at the front of the room. The module consists primarily of a patient’s case and asks residents to determine the differential diagnosis, tests and labs to be ordered, next step for the patient, and diagnosis. The module also includes resources residents can choose to view, and feedback based on the choices residents make as they progress through the module. The facilitator runs the computer, moving the residents through the module. The facilitator can also ask questions, answers questions, and provide additional information about the content based on the interests, wants, and experiences of the residents participating in the session. The facilitator enables the educational experience to be tailored to the specific needs and interests of the participating residents. Classroom situated e-learning is a term defined for this study (see Appendix E).

**Continuing Medical Education.** Continuing medical education is a learning activity designed for doctors to build knowledge, skills, and abilities related to the care of patients, society in general, or the medical profession (Accreditation Council for Continuing Medical Education, 2007).

**Distance learning.** Distance learning is an educational format in which the learner and educator are physically separated (Hannum & McCombs, 2008), and interact
through a medium such as an electronic device. Historically, distance learning was conducted through postal mail (Bruder, 1989).

**Effective.** For the purpose of this research, effective is defined as education that increases residents’ knowledge in at least one of the ACGME’s six core competencies. The term was defined for this study.

**E-learning.** E-Learning is instruction delivered through some type of electronic media such as the internet, a CD-ROM, or satellite broadcast (Govindasamy, 2002), with no specified form, or means of student access (Cook & McDonald, 2008).

**Instructional Method.** An instructional method is one of the various activities that teachers use to support learners in gaining, using, and maintaining new knowledge or content (Cook & McDonald, 2008).

**Interaction.** Interaction in education is comprised of interaction between the student and the content, the student and the instructor or facilitator, and between the student and other students (Moore, 1989).

**Medical Education.** Medical education is an activity used to give learners the information and reasoning skills they need to be competent doctors (Stern, 2008).

**Online learning.** Online learning is an educational format that occurs either in part, or entirely, through the use of the internet (Means, Yoyama, Murphy, Bakia, & Jones, 2009).

**Residency.** Residency is a medical education program that meets the requirements of the ACGME. The program provides a formal and structured learning experience, and fulfills the specific standards of the designated medical specialty (Accreditation Council for Graduate Medical Education, 2007).
**Resident.** A resident is a physician who has a degree from an accredited graduate medical program and is enrolled in an accredited residency program (Accreditation Council for Graduate Medical Education, 2007).

**Solitary e-learning.** For the purpose of this research, solitary e-learning is learning delivered through a computer, to learners participating in the learning activity individually, from a location of their choice. The term was defined for this study.

**Summary**

This chapter included an introduction and background into medical education in general and resident education in particular. It also included a brief explanation of recent changes to residency program requirements and how those changes have impacted resident medical education. The purpose and problem statements, theoretical framework, and the research questions established the need for innovative and effective resident education, which makes the most efficient use of the residents’ limited time, and prepares residents for their work as independent doctors. The research addressed the ability of classroom situated e-learning to meet those needs, using qualitative phenomenology, with nine participants who were residents at a pediatric hospital.
Chapter 2: Literature Review

Resident education is a mandatory component of an accredited residency program (Accreditation Council for Graduate Medical Education, 2010). Yet, mandated changes in residency work hours (Accreditation Council for Graduate Medical Education, 2011), and residents’ continuing full and demanding schedules and responsibilities (Baker et al., 2010), make it challenging for residents to find time to participate in medical education (Tempelhof et al., 2009). Residents’ limited time means that leaders of residency programs must find ways to effectively provide education within the residents’ restricted hours (Holmboe et al., 2005).

Lecture based education is a traditional form of teaching used in medical education (Graffam, 2007; Robertson et al., 2009; Statler, 2010), despite findings of researchers showing the effectiveness of other forms of education, such as e-learning (Bove, 2008). Blended learning has the ability to combine a traditional face-to-face classroom with e-learning, but little research has been conducted on this form of learning for medical education (Lewin et al., 2009). Classroom situated e-learning is a form of synchronous blended learning, specifically created for use by residents at a pediatric hospital in Ohio, in response to the residents request for more education on pediatric rheumatology.

Classroom situated e-learning combines a classroom experience with learning led by a facilitator, and the content delivered through e-learning and projected on a screen at the front of the room. The e-learning module contains the content, moving students through a patient’s case and the related decisions required in caring for the patient. Residents can choose to use the multiple types of resources built into the module as they
make decisions, and the module provides feedback based on their decisions. The module could be individually completed by residents but the experience is designed as facilitated, synchronous learning, to allow residents to benefit from interactions with other residents, and a facilitator, who is either a pediatric rheumatologist or a fellow studying to be a pediatric rheumatologist.

Qualitative phenomenology was used to understand residents’ perceptions of the effectiveness and interactions of traditional lecture experiences, and the effectiveness and interactions of classroom situated e-learning. Data collection consisted of in-depth interviews. The sample size consisted of nine residents, at a pediatric hospital in Cincinnati, Ohio, who had participated in classroom situated e-learning and traditional lectures.

The literature review begins with an understanding of the overarching area of medical education, and then moves to a description of residency. The description includes both what residency is and the role of medical education in a residency program. The section also includes the problems currently encountered in providing effective medical education for residents, given the mandated changes in allowed residency work hours. The literature review then covers three forms of learning used for medical education, beginning with a broad explanation of each, and then specifics regarding the use of each form in medical education. E-learning is considered first, followed by lecture based learning, which is still a hallmark of medical education (Statler, 2010). Finally, the use of blended learning is described in general, and then as a form of medical education. The literature review concludes with a summary of the information provided.
Documentation

The literature search was conducted using both medical sources and educational sources, to provide information from both perspectives, and to find where and how the two topics overlap. The primary education search engines used to conduct the literature review were ProQuest, for peer reviewed scholarly education journals, and ERIC, for a vast array of educational literature. Medical sources were mainly found using Medline, for its wide scope of medical related journals. Additional medical sources were found through The Journal of the American Medical Association. The literature searches in the various databases revealed relevant articles, and the reference lists in those articles were used as additional sources for locating pertinent articles. The combination of medical and educational journals resulted in articles representing a wide range of research on the same topics, such as; e-learning, blended-learning, lecture based learning, workplace learning, and medical education. There was also an overlap regarding the need for continued research, and a concern for finding an effective form of education that benefits the learner, the educator, and the institution providing the education.

Medical Education

Medical education has always been a recognized part of a doctor’s life (Davis, Davis, & Bloch, 2008). It fulfills the ethical mandate for doctors to be competent physicians (Stern, 2008). Medical schools, residency programs, fellowship programs, and continuing medical education are all elements of medical education, and quality medical education is needed to maintain and improve healthcare for all patients (Mazmanian, 2010). Yet, limited time and a continual increase in, and changing of, content in the field of medicine make medical education more challenging than ever
before (Stern, 2008). In addition, it is anticipated that there will be an ever increasing shortage of doctors (Bower, English, Choi, Cedfeldt, & Girard, 2010). The results of such a shortage magnify the critical need for well-educated doctors, and educational options that make the most efficient use of doctors’ limited time. Residents are doctors who are embarking on the next stage of their medical education program (Accreditation Council for Graduate Medical Education, 2007).

Medical education is needed to give doctors the skills and knowledge required to provide quality care for their patients (Stern, 2008). Ongoing education ensures that doctors are capable of providing quality health care throughout their careers (Miller et al., 2008). Life-long learning has become an accepted goal for all health care professionals, due to the ever-changing and complex nature of the field of medicine, and because doctors do not graduate from medical school knowing all there is to know about their profession (Guillemin et al., 2009). Medical education is valuable for both patients and doctors. Medical educators are charged with providing education that gives doctors the knowledge and skills they need to care for patients, within a continually changing health care system (Rushton et al., 2010). Residents have graduated from medical school, but require additional medical education and training before they can begin to independently treat patients (Accreditation Council for Graduate Medical Education, 2010).

Prior to the 20th century doctors were trained exclusively through an apprenticeship mode of learning. This meant that doctors in training spent all of their time working with, and learning from, real patients, under the guidance of practicing doctors (Smith, Cookson, McKendree, & Harden, 2007). However, it also meant that their training was limited to the ailments of the patients they were able to see during their
apprenticeships (Smith et al., 2007). In the 1920s, it was determined that the apprenticeship model left large gaps in doctors’ training and resulting medical skills and knowledge. Formal medical education was created to address those gaps (Brandt & Shanedling, 2010).

Residents are required to participate in medical education during their residency, but they must also commit to lifelong medical education to remain in the field of medicine (Guillemin et al., 2009). Ongoing education is required for doctors to maintain certification and credentials. Leaders of the American Board of Medical Specialties (ABMS) now demand that physicians prove they are participating in continuing education in order to maintain their certification. In addition, the ABMS regulations require that physicians are able to demonstrate that the professional development they are participating in results in both improvements in their medical practices, as well as improvements in patient outcomes (Miller et al., 2008).

**Residency**

Residents are doctors, who have successfully completed medical school, and are participating in graduate medical education programs (Accreditation Council for Graduate Medical Education, 2007). The programs must be sponsored by teaching hospitals, or other medical academic centers (Accreditation Council for Graduate Medical Education, 2007). Residents must complete their residency with an accredited program in order to be eligible to take the board certification examination and practice medicine independently (Accreditation Council for Graduate Medical Education, 2010). A successfully completed residency is also required for doctors to practice medicine in the United States (Kesselheim & Austad, 2011). Residency typically includes caring for
patients, as well as participating in research and medical education, and is usually a three year experience (Accreditation Council for Graduate Medical Education, 2007). The educational component of a residency program must include didactic lectures, although, the amount and frequency of those lectures are not specified (Accreditation Council for Graduate Medical Education, 2011).

ACGME officials, in an attempt to better explain the wide range of knowledge and skills needed by practicing physicians, established six core competencies for residents (Antiel et al., 2011). The core competencies were created to provide a description of what residents are expected to know upon completion of a residency program (Allevi & Lane, 2010). They are: “patient care, medical knowledge, interpersonal and communication skills, professionalism, practice-based learning and improvement, and systems based practice (Accreditation Council for Graduate Medical Education, 2011, section 4).

Residency program directors must ensure that their programs offer “effective educational experiences for residents that lead to measurable achievement of educational outcomes in the ACGME competencies” (Accreditation Council for Graduate Medical Education, 2007, p. 8). To meet these requirements residency program officials and educators must create educational strategies and curriculum to support the achievement of the ACGME core competencies (Stratman et al., 2008). However, a survey of resident program directors revealed that more than half of the respondents believed duty hour restrictions will negatively impact residents’ achievement of five of the six ACGME core competencies (Antiel et al., 2011).
Residents can have varying titles throughout their residency program. Residents whose goal is to complete a three year residency program are referred to as categorical residents. Residents in their first year are often called interns, although that term is no longer an official term used by the ACGME (Accreditation Council for Graduate Medical Education, 2010). While residents are receiving an education they are also part of the residency programs’ work forces. As such they have work related responsibilities that they are obligated to fulfill, in addition to achieving their educational requirements (Kesselheim & Austad, 2011).

“The goal of residency is to provide competent, professional, humane physicians,” (Lin et al., 2006, p. 66). Some argue that doctors’ time in residency constitutes the most important period of learning within their medical training and careers (Charap, 2004). Residency has come to be known as a time of; hard work, demanding responsibilities, long hours with little free-time, and sleep deprivation (Duran-Nelson, Van Camp, & Ling, 2010). Nevertheless, changes limiting the number of hours residents can be on the job have impacted residents’ lives, along with residents’ medical education opportunities (Lin et al., 2006).

In 2003, residency work hours, which include education, were limited by representatives of the ACGME to a maximum of 80 hours a week, and a maximum of 24 consecutive hours (Accreditation Council for Graduate Medical Education, 2003). The duty hour restrictions were put into effect, in part, as a result of the public’s concern regarding health care safety. There was apprehension about the well-being of patients being cared for by doctors working excessively long hours (Duran-Nelson, Van Camp, & Ling, 2010). The duty hour changes are possibly the biggest effort the ACGME
representatives have made to increase patient safety in teaching hospitals (Volpp et al., 2007).

Beginning in July of 2011, the ACGME officials added a further restriction for first year residents. The new allowable maximum number of consecutive hours for interns, or first years, was decreased from 24 to 16. Although, the maximum number of consecutive hours allowed for senior residents remained at 24. The maximum number of total weekly hours remained 80 for all residents (Accreditation Council for Graduate Medical Education, 2011). Officials of the ACGME made the decision to restrict resident work hours to allow residents to focus on their education (Kesselheim & Austad, 2011). However, the results of the latest change have yet to be discovered, and research regarding the newest restrictions has not yet been reported.

One of the main goals for the original reduction in resident work hours was to improve patient care in medical institutions that have residency programs, as well as improve the lives of the residents (Skeff, Ezejl-Okoye, Pompel, & Rockson, 2004). Residency programs are charged with maintaining the safety of patients treated by the residents, as well as the residents’ well-being (Accreditation Council for Graduate Medical Education, 2011). In the state of New York, the death of a patient was blamed, in part, on an over worked and fatigued resident. Resident supervision was also considered a major factor in the patient’s death. However, the resident’s long hours were highly publicized, and gained the attention and the outrage of the public (Charap, 2004). The allowable amount of consecutive work hours have long been regulated for truck drivers, pilots, and other professionals. The public began voicing the opinion that the same consideration seemed appropriate, and necessary, for residents charged with caring
for human lives (Duran-Nelson et al., 2010). These types of incidents created concern for 
patient safety and resident duty hours, making resident education a topic of both debate 
and controversy (Rushton et al., 2010).

Reduction in hours in residency was meant to increase patient safety, while still 
providing residents with the education and training they need (Kesselheim & Austad, 2011; Skeff et al., 2004). Yet, there is uncertainty as to whether those goals are actually 
being met (Tempelhof et al., 2009). Residents have reported that the duty hour 
restrictions have had a positive effect on their personal lives, but the cost has been a 
decrease in time available to care for patients, and the quality of their education (Lin et 
al., 2006). Researchers who conducted a study of residency program directors learned 
that the program directors did not believe the reduction in resident duty hours would 
lessen residents’ level of fatigue (Antiel, 2011). Researchers conducting research with 
pediatric residents learned that since the 2008 duty hour restrictions, the interns who 
participated in the study increased their sleep by only .20 hours in a 24 hour period 
(Auger, Sipelinga, Simmons, & Gonzalez del Rey, 2010). In addition, researchers 
conducting a two year study found no significant difference when comparing the 
mortality rate of Medicare patients treated in teaching hospitals before and after the 
resident duty hour restrictions (Volpp et al., 2007). Residency program educators have 
reported that the time they spend keeping track of, and organizing, residents’ work hours 
takes away from time they should be spending on resident education (Duran-Nelson et 
al., 2010).

The ACGME mandated changes in residency work hours have brought dramatic 
changes to medical education. Residency program personnel have had to make major
modifications in how education is provided to residents (Holmboe et al., 2005). Program leaders had to determine how to effectively deliver education to residents within the limitations of the restricted hours, and within the context of their own programs (Holmboe et al., 2005). The new duty hour restrictions that went into effect in July 2011 required residency program staff to once again consider how to meet the ACGME requirements, while providing residents with a high level education (Duran-Nelson et al., 2010).

**Adult Learning Theory**

Pedagogy is a term that dates back to the ancient Greeks and refers to educational principles for teaching children. Pedagogy views the student as empty of content and in need of the educator to provide knowledge (Forrest & Peterson, 2006). Adult learning theory recognizes that adults and children learn differently (Welty, 2010). The word andragogy means adult learning. At its root andragogy means leading or teaching adults, and an adult has been described as someone who performs what society considers to be adult roles, such as financially supporting yourself, or defending your country. Andragogy, in contrast to pedagogy, defines learning as a student centered activity, and values the adult’s past knowledge and experience (Forrest & Peterson, 2006).

Malcolm Knowles is often considered the father of andragogy, which is a theory of adult learning. Andragogy makes a distinction between how adults learn and how children learn (Knowles et al., 2005). However, the use of the word andragogy predates Malcolm Knowles. Its origin has been credited to a German teacher named Alexander Knapp who began using the word in 1883 (Jarvis, 2005). Today, the word andragogy is typically used in the United States to mean the work of Malcolm Knowles, while in
Europe andragogy is considered the heading for all adult learning (Knowles, Holton, & Swanson, 2005).

Knowles wrote over 200 articles as well as a number of books on the subject of andragogy (Saxon, 1997). His use of the word andragogy began in 1968 but gained popularity in 1970 with his first published book on the subject (Forrest & Peterson, 2006). Some consider Knowles explanation of andragogy to be a philosophy rather than a strategy, and all teaching strategies have the potential to fit within andragogy (Forrest & Peterson, 2006). “Some have viewed andragogy as an adult learning theory, whereas others view it as an approach, a set of principles, a set of assumptions, or a guideline for educational practice” (Chan, 2010, p. 32). Malcolm Knowles came to describe andragogy as a theory that can be adapted to any adult learning need or situation rather than a specific set of rules that need to be followed (Knowles et al., 2005).

Knowles writing on andragogy included his six assumptions, or an understanding of who the adult learner is and what the adult learner desires in an educational experience (Knowles et al., 2005). Knowles six assumptions are; “the learner’s need to know, the learner’s self-concept, the role of the learner’s experience, a student’s readiness to learn, the student’s orientation to learning, and the student’s motivation to learn” (as cited in Knowles et al., 2005, pp. 64-68). Andragogy provides teachers with information that allows them to create educational experiences that meet the needs of adult learners (Knowles et al., 2005).

Awareness of the idea of adult learning theory increased during the 20th century, in part due to changes in the workplace and the skills and knowledge needed of workers. In the past workers came to a job knowing most of the information they needed to do
their job for their entire careers. In the 20th century workers, and their employers, realized that successful employees required ongoing training throughout their working life (Welty, 2010). In order for companies to remain competitive they must employ workers who are knowledgeable and remain knowledgeable. Ongoing training is required to achieve this goal (Chan, 2010). Yet, all too frequently those responsible for creating and delivering training know the content but do not know the best way to teach it to adults (Galbraith & Fouch, 2007). Creators of education for adults need to have an understanding of how adults learn (Stewart & Waight, 2008).

Various studies have been conducted which show the positive impact of using andragogy to create adult learning. Qualitative research was conducted with police officers to determine their preference for learning. Much of law enforcement education, and professional development uses a traditional lecture based approach. However, interviews and focus groups with police officers revealed their preference for learning experiences that are based on adult learning theory. The officers wanted professional development that was guided by adult learning theory, and they placed a high priority on learning that is practical, based on their jobs, and can be applied on the job (Oliva & Compton, 2010). Another study used a pre and post-test to determine the effectiveness of a re-designed training for a specific group of new employees. The training was based on Malcolm Knowles theory of andragogy. The research showed that the new andragogy based training increased training effectiveness for the company’s newly hired customer service representatives (Woodard, 2007).

Andragogy has also been tested in adult learning for health care professionals. One author found that the use of adult learning in professional development for nurses
created a learning experience that allowed nurses to thrive. The author emphasized the effectiveness of small group learning sessions that offer interaction and an opportunity for discussion (Riggs, 2010). Family physicians participated in qualitative research regarding the use of patient case review as a form of education. Data collected, through in-depth interviews, showed that the physicians appreciated the opportunity to reflect on past cases. They also valued an educational experience that was patient based and built on real world experiences (Anderson, Hansen, Sondergaard & Bro, 2008).

Adult learning theory has also been tested with medical residents. One hospital revamped its journal club, a common educational component of most residency programs, to include adult learning theory. An evaluation survey was sent to participating residents which showed that all of the residents preferred the new journal club format, and journal club moved from being the least attended to the second most attended professional development offering (Hartzell, Veerappan, Posley, Shumway, & Durning, 2009). Research conducted with dermatology residents regarding their preferred style of learning, revealed the resident’s preference for adult learning (Stratman et al., 2008).

**E-learning**

E-learning is a form of distance education, and distance education began over one hundred years ago (Means et al., 2009). At that time, students engaged in learning through correspondence courses, and used the mail as a way to engage in two-way communication with their instructors (Means et al., 2009). Correspondence courses are often cited as the original distance learning. However, the creation and availability of printed text, as a way of disseminating and teaching content, began in medieval times
(Moore, 1989). This has also been labeled the beginning of distance education. With content accessible through print, learners could access information in a way that did not require human face-to-face interaction (Moore, 1989).

Today, distance learning has broadened into a wider variety of options, including e-learning, which has become the quickest growing type of learning in education (Mahle, 2007). E-learning began its rise in popularity as an educational tool in corporate training in the 1990s (Duhaney, 2004). E-learning is one of many phrases used to describe a learning experience that employs some type of computer based technology to deliver education or professional development to learners (Remtulla, 2007). One commonly used description for e-learning is instruction delivered through a form of electronic media, such as the internet, a CD-ROM, or satellite broadcast (Govindasamy, 2002).

E-learning can be used in a variety of ways, by a variety of learners, and for a variety of reasons. E-learning can be used for synchronous learning, requiring the learners and educators to participate in learning experiences at the same time, even though they are in different locations (Means et al., 2009). E-learning can also be used for asynchronous learning, allowing learners and educators to access course content, and provide responses, at different times (Means et al., 2009). The use of technology for learning can provide access to content through text, video, or audio (Khirwadkar, 2009). Technology can engage learners in meaningful dialogue around a topic, can provide problem-based learning, or can be used to solve, or work on, real life problems (Khirwadkar, 2009). Learners can experience e-learning that attempts to mimic the traditional classroom experience, like a lecture based class (Means et al., 2009). E-learning can also be used to create an experience that is completely different from the
traditional classroom encounter, like an electronic learning game, a simulation, problem-based learning, or a multi-faceted group project (Means et al., 2009).

E-learning has been used for learners of all ages, ranging from elementary school students, to college students, and for adult students of varying ages (Dobrovolny, 2006). Educators in the state of Pennsylvania have offered 11 cyber charter schools for students from kindergarten through high school. The cyber schools made it possible, for students in Pennsylvania, to receive a public education in home school settings (Stone, 2008). E-learning has been successfully used to teach algebra to students in areas with no experienced algebra teachers. Students physically located in one school were connected with, and taught by, algebra teachers in different locations (O'Dwyer, Carey, & Kleiman, 2007). E-learning has been used to allow a professor in the United States to teach a college course to students attending a Ukrainian university (Satya & Delia, 2007). There are many varied examples of e-learning for adults. They range from solitary online learning used by the military (Artino, 2007), to e-learning used for continued medical education (Curran, Lockyer, Sargeant, & Fleet, 2006), to the use of e-learning to provide self-paced support for adults learning English as a second language (Coryell & Chlup, 2007).

E-learning can be used for formal and informal education (Khirwadkar, 2009). Adults have reported using e-learning for a variety of reasons that include: gaining the skills needed to change careers, to achieve a college degree, to get a better job, or to gain new skills in an area of interest (Knightley, 2007). For older adults, e-learning has been used for gaining personally relevant skills and knowledge, and learning skills and information that could be useful in the work place (Githens, 2007). Older adults have
also participated in professional development offered or required by their employers (Githens, 2007).

Employers have experienced benefits from the addition of e-learning for professional development, and have found it to be “reliable, affordable, centralized and sustainable” (Magnussen, 2008, p. 85). Company leaders were quick to adopt the use of e-learning for educating their employees (Means et al., 2009). Business owners and managers have reaped many positive outcomes from the use of e-learning, including the ability to maintain a skilled workforce, able to meet the challenges and changes brought by a global economy (Dykman & Davis, 2008).

Employers have found that e-learning can provide a cost savings (Means et al., 2009). Organizations used to spend large sums of money, and time, on travel related to employee training (Stewart & Waight, 2008). Often there was travel costs involved for both trainers, and for staff being trained. E-learning has allowed organizational educators to eliminate those travel costs, and the time involved in travel (Stewart & Waight, 2008). Technology can be used to train large numbers of employees, taking advantage of economies of scale, and resulting in a decrease in the cost of delivering professional development (Dykman & Davis, 2008).

Improvements in technology have provided benefits for corporations wanting to provide e-learning for their employees. Employers have found that updated technology has resulted in less time needed to create e-learning (Stewart & Waight, 2008), and that an organization’s training staff can create e-learning on their own, without a need for additional technical resources (Alcock, 2008). Training staff no longer need to hire technology experts to create their designs. This allows the training professionals to
maintain control of the final products, instead of having to rely on outside support to create portions of their educational products (Alcock, 2008).

Technology improvements have also increased the options that can be included in e-learning. Training designers can now easily add video, graphics, audio, and pictures to professional development (Bove, 2008). Electronic learning management systems also support the use of e-learning. The systems allow organizational educators and managers to provide e-learning to employees, and also have the ability to track who has taken training, and their success in completing the professional development (Stewart & Waight, 2008).

Employees appreciate the ability to access learning at a time, and from a location, that is convenient for them (Remtulla, 2007). E-learning allows employees to eliminate the extra time necessary to travel from one location to another in order to participate in professional development (Abate, 2008). Employee learning can even occur through the use of a smart phone (Khirkwadker, 2009). This just in time learning means that employees can get the support they need, exactly when they need it (Metcalf, 2006). Employers can now create, and offer to employees, a wide range of professional development options. This gives employees the ability to not only control when and where they learn, but also to choose the content they need, or want to learn (Remtulla, 2007).

Yet, while e-learning can provide multiple advantages for employers and employees, there are also potential problems that need to be considered. Technology can be both a benefit and a barrier for employees. For those learners who are not experienced with using a computer, and who may struggle with learning through technology, e-
learning can pose a challenge (Milligan & Buckenmeyer, 2008). E-learning can also be problematic for learners with low literacy skills, because literacy skills are usually a requirement for participating in e-learning for professional development (Milligan & Buckenmeyer, 2008). These challenges can be more common for employees who come from low-socio economic backgrounds, and could result in a lack of access to professional development for employees who are most in need (Stine, 2010).

Despite the potential problems, e-learning has successfully been used with adults who have low computer technology skills, and low-literacy skills (Gatta, 2008). Options for supporting employees with limited computer skills include self-paced learning, that allows the learners to move through the professional development experience at a pace that meets their needs, and building optional training on basic computer skills into professional development (Coryell & Chlup, 2007). Low literacy skills have also been addressed through a variety of successful e-learning programs (Gatta, 2008). One example is agricultural workers with low-literacy skills, who participated in research using e-learning to teach safety information, resulting in improved learner skills and knowledge (Anger et al., 2006).

Although technology improvements have made it easier for training staff to create e-learning, there can still be hurdles to overcome. The ability to use technology is not the only skill needed to create successful e-learning. Education and training staff also need an understanding of pedagogy for the e-learning experience (Herie, 2005). Designers of e-learning need to understand, for example, that with solitary e-learning employees can usually move through training as they choose, resulting in the possibility of learners skipping, or missing, key information (Dobrovolny, 2006). One solution to this problem
is the use of classroom situated e-learning, because the facilitator moves the learners through the experience. This ensures that key content is not missed. In addition the residents have the option to access the learning modules on their own, after the facilitated experiences, and can then customize the learning, or content review, to their own needs.

Unfortunately, education staff without experience in creating e-learning, are often expected to create technology based professional development. In addition, they are frequently asked to do this without being given any training, or additional time to experiment with, and learn how to, design this type of learning experience (Callahan & Sandlin, 2007). Also, an organization’s training staff may not see the value of e-learning, and prefer to continue using traditional face-to-face professional development (Coryell & Chlup, 2007).

Although there can be barriers to the creation of successful e-learning for professional development, there are also potential solutions. Company leaders can prevent potential problems related to e-learning by taking the time to identify possible barriers, and then determining the appropriate solutions for their organizations (Stewart & Waight, 2008). Companies, could support their staff who create training, by providing them with opportunities to attend outside training, or courses that will allow them to increase their knowledge and skills in the area of e-learning (Coryell & Chlup, 2007), and by creating some type of option for ongoing technical support (Khirwadkar, 2009).

Companies can promote a positive opinion of e-learning among training staff, by including them in research and decisions about the type of electronic management systems and software the companies will use (Coryell & Chlup, 2007) Employers can also offer training staff the ability to come to supervisors, and company leaders, to
discuss questions and concerns about e-learning (Coryell & Chlup, 2007). Organizational leaders can understand that e-learning, and the staff that create and implement e-learning, can have a positive impact for employers and employees, and value the training staff for the potential benefits they can bring to a company (Stewart & Waight, 2008).

**E-learning in Medical Education**

Medical education, whether for continuing medical education, training for medical students, or for residents, has been delivered in multiple ways, with multiple and sometimes contradictory results. While medicine continues to evolve, medical education still primarily relies on passive lecture-based experiences (Graffam, 2007; Shortt, 2010). Although, the use of web based learning for medical education can be traced back to 1992 (Westmoreland, Counsell, Tu, Wu, & Litzelman, 2010), and there is continued growth in the use of e-learning for medical education (Cook & McDonald, 2008).

Numerous authors support the potential benefits of using technology to provide medical education. Technology allows for easy access, storage, and retrieval of information, and allows students to see images and hear sounds related to medical care that previously required using costly and hard to access medical equipment (Bove, 2008). E-learning for medical education can be used in many ways, resulting in a variety of possible advantages including; easy access to case based learning, self-paced learning, connecting learning in the clinic with learning outside of the clinic (Stern, 2008), flexibility, adaptability of content for different learners or groups, and easily updatable content (Webber, 2007).
Technology allows for easier creation of, and access to, patient-based learning, which is considered a hallmark of medical education (Smith et al., 2007). Additionally, e-learning in medical education can remove barriers related to location and time. Residents assigned to rotations in off-site locations may not be able to attend lectures at their learning institutions, or hospitals (Gray & Tobin, 2010). Residents, who are attending to the needs of patients, or other clinical responsibilities, might miss, or be tardy for medical education that occurs at specific times. E-learning can also provide the ability to teach a greater number of students without increasing the time needed to teach (Gray & Tobin, 2010). E-learning provides a broad variety of ways to present content and innovative options for delivering education (Bove, 2008). It makes it easier to incorporate an assortment of teaching strategies, and medium, into the learning experience (Cook & McDonald, 2008). Furthermore, researchers have found that residents are comfortable using e-learning as a form of education (Westmoreland et al., 2010).

Technology has been used in different ways to deliver medical education. Content in medical education is usually delivered in the form of text, images, or sound. All three of these formats can be incorporated into e-learning (Bove, 2008). Text information, like journal articles, research findings, and medical reports, can be easily stored, retrieved, and located using the internet, and personal computer storage options (Bove, 2008). A wide variety of medical images, such as x-rays, images from magnetic resonance imaging, echocardiograms, and other types of test results, can now be converted into images that can be seen on a computer. This also eliminates the need to access expensive machines to view certain test results (Bove, 2008). Sounds, like those
heard through a stethoscope, or a ventricular assist device, can be turned into audio files, and made available to students through computers (Bove, 2008). The varying uses of e-learning for medical education have included: tutorials like those used to help residents study for board exams, online discussions, conferences, virtual patients, and instruction that adjusts based on the responses or actions of the students (Cook, Garside, Levinson, Dupras, & Montori, 2010).

Simulation has been used for resident education. Through the use of simulation, e-learning offers a way for learners to try new skills in safe environments (Takayesu, Nadel, Bhatia, & Walls, 2010). Although, this type of learning is expensive, and requires careful planning to ensure that the money, time, and effort that go into creating simulation based learning are being well used (Takayesu et al., 2010). Technology makes it possible for medical education, or information, to be available as medical professionals are caring for patients. Content available on smart phones, or through computers located in common areas near patient rooms, can provide valuable just-in-time tools when caring for patients (Bove, 2008).

Yet, while e-learning can have benefits for medical education, it can also be problematic. Value has been placed on discussion in medical education, over solitary e-learning. Solitary e-learning can be an isolating experience for learners, and discussion supports students’ critical thinking and reflection (Cook & McDonald, 2008). Potential disadvantages of e-learning can include “social isolation, de-individualized instruction, high development costs, technical problems, and poor instructional design,” (Cook, 2006, p. 596).
Another concern over the use of e-learning is a lack of a common definition, or agreed upon meaning, for the term. The phrases e-learning, web-based-learning, and online learning are often used interchangeably in medical education. It is also possible to find each one of the previously mentioned phrases used to describe differing modes for delivering medical education. There is a great variance in what is labeled web-based learning (Cook et al., 2010). E-learning is often considered to be synonymous with online learning, although it is also considered to be the heading for learning that takes place through the use of technology, and learning that takes place at a distance through the internet (Ruiz et al., 2006). This makes it hard to use research to determine any conclusions about e-learning for medical education (Cook, 2006).

However, there is a variety of research available on the use of e-learning for medical education. A group of authors conducted a search on web based learning research and found over 250 articles on the topic (Cook et al., 2010). Although, the majority of the research they found involved a single method of learning, rather than a comparison of two different types of educational interventions (Cook et al., 2010). Even with the number of studies that have been conducted, the results of current research does not provide a decisive recommendation for the use of e-learning in medical education. Researchers conducted a meta-analysis of research articles regarding the effectiveness of e-learning (Cook et al., 2008). Their analysis revealed that, of the studies that had no comparison form of education, all of the e-learning experiences had positive results. However, the authors also showed that in the research where there was a comparison of e-learning with another form of education, there were no consistent positive or negative effects of e-learning for medical education. The comparison forms of education included
traditional face-to-face classes, paper based modules, and electronic options such as satellite based conferences, and video based lessons (Cook et al., 2008).

In one study, researchers conducted quantitative research using a pre and post-test, and two surveys (Baker et al., 2010). The researchers looked at the effectiveness of online learning modules, to teach primary topics, to pediatric residents. In this study there was no comparison with another form of education. The researchers found that the online learning modules were effective in improving knowledge, and they were well received by the residents. Although, residents use of the modules, delivered over the course of a year, decreased as the year progressed. The researchers theorized that the decrease in module use was based, in large part, on the busy and demanding schedules of the residents (Baker et al., 2010).

Researchers conducted qualitative research with nine experienced medical educators, and found two main categories of challenges for creating and implementing e-learning (Lockyer, Sargeant, Curran, & Fleet, 2006). The challenges the educators reported were the acquisition of new technical skills, and their understanding of how to facilitate learning and interaction in an e-learning environment. The medical educators reported that one of the positive aspects of the experience included extra time to think about how to respond to students. This is an option that is not available with the immediacy of face-to-face learning. They also appreciated the opportunity to work with new people, from locations across the country, when creating the e-learning modules (Lockyer et al, 2006).

Researchers conducted quantitative research with residents in a revolving one month ambulatory rotation (Westmoreland et al., 2010). The researchers compared the
effectiveness of e-learning modules with paper based modules. A pre and post-test, along with a review of resident and patient encounters, and a review of chart completions, were used for data collection. The researchers found that there was a gain in knowledge by the e-learning group, as shown by comparing the pre and post-tests for the e-learning residents, and the residents using the paper based learning. However, there was no difference between the residents’ skill level during patient encounters, and their ability to do chart completions. The researchers reported that the study results revealed that e-learning had a positive effect on knowledge gain over the traditional paper based learning, but there was no difference in clinical behavior between the two forms of learning options (Westmoreland et al., 2010).

Yet, despite the amount of existing research, there is still a need for more research regarding the use of e-learning for medical education. An increase in the use of e-learning for medical education has resulted in a growing concern over the effectiveness of this form of education (Cook et al., 2008). The increased use of e-learning in medical education has also led to a need for more research on how to effectively use this form of education (Baker et al., 2010; Cook et al., 2010). Making a change from traditional lecture based learning to e-learning requires current medical educators to gain an understanding of how to teach using this new format (Lockyear et al., 2006), and research is one way to provide that additional understanding.

**Lectures**

The lecture is another form used for delivering education. According to one author, the use of the lecture for education dates back to the beginning of man, when the oral sharing of information, such as where to find food, or how to avoid danger, was
needed for survival (Jones, 2007). However, Plato’s use of oration for teaching has also
been labeled as the origin of lecturing in education (Bland, Saunders, & Kreps-Frisch,
2007). The invention of the printing press in 1440 changed how information could be
shared (Jones, 2007). For the first time information could be disseminated. As a result,
oral communication was no longer the only option for sharing knowledge. However, the
printing press did not have a huge impact on the use of the lecture as a form of education
(Jones, 2007). Despite the ability to gain knowledge through the printed word, and
eventually through electronic formats, lecturing has remained one of the most often used
methods for teaching on college campuses (Letassy, Fugate, Medina, Stroup, & Britton,
2008), with more than 80% of college teachers still choosing to use the lecture (Saville,
Lambert, & Robertson, 2011).

The underlying principle behind lecturing is that the teacher holds the knowledge
that needs to be imparted, or provided, to the student. This makes lecturing a passive
activity in which the student is receiving the content that the teacher is giving (Brew,
1999). Through the lecture, those who have information are able to share it with those
who need it, or want it (Jones, 2007). However, the lecture can involve the use of
different methods to deliver the information (Hart, Waugh, & Waugh, 2000). The
lecturer has the ability to use a variety of vocal and visual techniques to impart content to
the students, although the students do not typically vocally engage with the lecturer (Hart
et al., 2000). Nevertheless, in a traditional lecture experience the students do provide the
educator with ongoing feedback. Through their actions, such as eye contact, facial
expressions, or other physical movements, students give valuable information that can be
interpreted by the teacher. This feedback can be used by the lecturer to make ongoing
changes and adjustments to maintain students’ interest and attention. This response from students can also make the lecture a two way experience as the flow of information, either verbal or non-verbal, moves back and forth between the teacher and the students (Hart et al., 2000).

Yet, although lectures may be the common choice in college classrooms there are a number of problems associated with this form of education (Saville et al., 2011). The passive nature of lectures, with the student perceived as an empty vessel receiving information, is often listed as one of the concerns with this type of educational experience (Bland et al., 2007). Passive lecture based learning does not engage students in critical thinking about the content being taught (Bland et al., 2007). Lecture based learning is also considered to lack the ability to support students in learning problem-solving skills and the ability to engage in life-long learning. In addition, lecture based learning results in decreased content retention as compared with other types of education (Letassy et al., 2008). Lecture based learning lacks the ability to place the content within the context where it will be used, making it less effective for teaching information that needs to be transferable to real life settings (Yadav, Subedi, Lundeberg, & Bunting, 2011). Students often report lectures are boring, and complain that lectures provide information that can be just as easily found in print, or through technology, and lectures focus on the needs of the group, rather than the needs of the individual (Hart et al, 2000).

However, despite the many drawbacks that are associated with lecture based learning, there are also benefits associated with this type of learning experience. Lectures provide a level of comfort for both students and educators (Saville et al., 2011). College students often prefer lecturing as a form of education, because by the time they have
reached college it is a form of learning they are familiar and comfortable with, and they know what to expect. Students may also feel that by the time they go to college they have gained the experience and tools they need to be successful in lecture based classrooms (Saville et al., 2011). Teachers often choose to use lecturing because it is what they experienced as students (Bland et al., 2007), because it is a familiar and highly used form of education (Brew, 1999), and because it is the form of education they are used to using (Saville et al., 2011).

The familiarity and common use of lectures is often cited as a reason for its continued use as a form of education. Some of the explanations for why lecture based education is so common is the high level of convenience in using lectures, and the relative inexpensive nature of lecturing (Brew, 1999). In addition, lectures may create a more comfortable learning experience for students from cultures where it is considered inappropriate and disrespectful to question authority (Folley, 2010).

Lectures also have the ability to create a common experience for the learners who are in attendance, in the same way that a live music concert, or live theatre, creates an experience that is different from listening to pre-recorded music or watching a television show or movie (Jones, 2007). Through the immediacy of live experiences, facial expressions, enthusiasm, and other emotions can be conveyed to the learners. Those cues can be lost or non-existent when the same information is learned through print or electronic media (Hart et al., 2000). An example of this difference is commonly found when words in print are misinterpreted because they lack the vocal intonation, facial expression, and physical gestures that can be seen when words are delivered orally and in person (Hart et al., 2000).
While lectures have been called boring they have also been found to be moving (Brew, 1999), and inspirational (Jones, 2007). It has been argued that when a lecture is boring it is a problem that should be associated with the educator, rather than with the form of education (Hart et al., 2000). Lectures have been shown to deliver information in a way that generates student interest in the content (Brew, 1999). They can serve as a form of modeling for how the content can be intellectually understood, processed, or conceived (Brew, 1999).

Researchers conducted a quantitative study, with undergraduate engineering students, and reported that the students felt they learned new concepts better in traditional lecture based classes than in problem-based learning classes. In addition, the students reported they were more comfortable with lecture based learning and preferred this type of learning experience (Yadav et al., 2011). However, the same researchers also found that the students’ performance was at least 50% higher following problem-based learning classes than lecture-based learning classes. Specifically, the increase was found in the students’ ability to solve problems, and to apply course content in new situations (Yadav et al., 2011).

Researchers gathered data by surveying students at a large United Kingdom university (Folley, 2010). They learned that the students in the survey all valued lectures, but their reliance on lectures decreased as they advanced through their college years. The authors theorized that this might have been due to an increase in the students’ ability to engage in self-directed learning as they advanced through their college experiences. However, both students and teachers reported believing that there is value in the lecture as a form of education (Folley, 2010).
A researcher, using quantitative research, found that students with high verbal communication skills scored higher on a post-test, for classes taught using lectures, than classes taught using a case-based format (Carter, 2002). The researcher discovered the opposite results occurred with students who had high general reasoning skills. The author concluded that matching cognitive ability with the form of teaching can increase a student’s learning outcomes (Carter, 2002).

Research results may be inconclusive regarding the value of lecture based learning over other forms of learning, but lecture based learning continues to be a highly used form of education in college classrooms (Saville et al., 2011). Perhaps the inconclusive results support the idea that lecture based learning should be just one part of a student’s learning experience. Other learning options, such as reading, note taking, discussions with other students, and conducting research, are all options that can complement lecture based learning (Hart et al., 2000). Lecturing, just like any other form of education, is not right for every educational need, situation, and student (Hart et al., 2000).

**Lectures in Medical Education**

Lecture based learning is also commonly found in medical education. Post graduate education in the field of medicine is typically conducted using the traditional lecture (Kulier et al., 2009). Lecture based learning is also the most common form of education offered for continuing medical education, even though there is little to no research to support the effectiveness of this form of learning (Statler, 2010). In addition, there is ongoing debate about the effectiveness of lectures for medical education (Brandt & Shanedling, 2010).
Given the busy and hectic schedules of residents, it can be challenging for them to attend lecture based learning, because it occurs in specific locations and at specific times (Baker et al., 2010). The traditional lecture format is also conducted at one pace, and does not allow for the individualization that other forms of education can provide (Davis et al., 2008). Although, lecture based learning, and its face-to-face format, brings physicians together, allowing them to network, communicate, and bond with their colleagues. There is little ability to engage in these activities in e-learning based medical education (Davis et al., 2008). The same concern exists for medical students, regarding the effects of social isolation and lack of interaction with other students, when learning is not delivered in a face-to-face form, like lectures (Cook & McDonald, 2008).

Researchers have found mixed results regarding the use of lectures in medical education. An author, conducting a review of literature on the effectiveness of a variety of educational interventions for improving physicians’ misuse of antibiotics, found that lecture based education options were not effective (Dachs, 2008). The same researcher learned that more active forms of education had better results (Dachs, 2008). Researchers comparing the use of computer based training with lecture based training, for recently graduated doctors, found no difference in learning between the two forms of education. Both groups significantly improved their knowledge of the content taught, when compared to their knowledge prior to the learning interventions (Davis et al., 2007).

Researchers conducted a study with medical post graduate students, comparing the results of pre and post-test scores for e-learning with traditional lecture based learning. The researchers found no statistically significant difference in knowledge gain between the
two groups, although, there was a slightly higher average knowledge gain for the e-learning group (Kulier et al., 2009).

Researchers studied the effectiveness of lecture based learning for medical professionals (Dolcourt, 2000). The medical professionals attended three days of lectures, and then made commitments to change their behavior at work based on what they learned during the lectures. The researchers conducted a follow up survey, and found that one month after the lectures, more than half of the commitments had been achieved, with participants planning to continue working toward meeting the remaining commitments. In addition, a survey using a Likert scale was given to the participants, for the purpose of rating how well the lectures achieved the pre-determined outcomes. All of the participants entered a score of either a four or a five, showing participants felt the lectures were successful in meeting the learning objectives. However, the researchers believed that pairing the commitment component with the lectures increased the lectures effectiveness in achieving change in the workplace (Dolcourt, 2000).

**Blended Learning**

Blended learning is an educational option that can refer to the combining of learning styles, methods, and techniques. For example, blended learning could be the use of both e-learning and the more traditional face-to-face classroom learning to create a learning experience (Sloman, 2007). However, this is just one of many varying descriptions that can be found for blended learning. One definition emphasized a mix of pedagogy and learning strategies, but did not include a requirement for the use of technology (Verkroost, Linsten, & Veen, 2008). Another description of blended learning referred to a blend of formal and informal learning (Baldwin-Evans, 2006), although yet
another definition found was a blend of methodologies (Sloman, 2007). Perhaps the most common description of blended learning, located in the literature, is a combination of face-to-face learning and online learning (Bliuc, Goodyear, & Ellis, 2007; Means et al., 2009), and the online component can be synchronous or asynchronous (Duahney, 2004). Other authors defined blended learning as merging face-to-face teaching with the use of technology, to educate learners (Wall & Ahmed, 2008; Stubbs, Martin, & Lewis, 2006). According to two authors, blended learning needs to be a true blending of methods, with each method having equal importance to the educational experience (Garrison & Kanuka, 2004). In other examples of blended learning one of the instructional methods is meant to be used as an addition, or support, to the main method for providing education. An example is the use of podcasts to supplement the information taught through face-to-face classroom lectures (Lau et al., 2010).

Classroom situated e-learning, created for use with residents at an Ohio hospital, fits within some of the above definitions, but does not correspond with all of the definitions for blended learning. This is one of the difficulties with defining a learning program as blended learning. The varying descriptions make it a challenge to know what is meant when a program is labeled blended learning (Kim, Bonk, & Oh, 2008). One author used the word “fuzziness” (p. 476) to describe existing definitions of blended learning (Yoon & Lim, 2007). The findings of one group of researchers, conducted with human resource staff, revealed that confusion regarding an understanding, or definition, for blended learning is one of the major hindrances to using it. This confusion can make it challenging to plan for and create blended learning (Kim et al., 2008). There is a clear need to create a common definition for blended learning that allows both educators, and
those conducting educational research, to have a common understanding or meaning for the phrase (Bliuc et al., 2007).

There is even disagreement as to when the phrase blended learning began to appear in published articles regarding education. According to one author, prior to 2000, the phrase was very uncommon in educational literature, but since 2000, hundreds of articles containing the phrase blended learning could be found (Bliuc et al., 2007). Although Sloman (2007) reported that the use of the phrase blended learning first appeared in 2001, and was created as a solution for improving the success of e-learning, by allowing for the addition of a face-to-face component.

Yet, even though there is a lack of a common understanding about what blended learning is, or when and why it came into existence, blended learning can be found in many different educational settings. Blended learning has been used by two charter schools in the state of Pennsylvania as an alternative option to traditional brick and mortar schools (Stone, 2008). Graduate students enrolled in an MBA program experienced blended learning as a combination of online learning, paired with face-to-face classes (Mitchell & Honore, 2007). Blended learning has also successfully been used for corporate training (Baldwin-Evans, 2006), where despite the challenges regarding a common definition, it has increased in popularity (Duhaney, 2004). The expectation is for a continued increase in the use of blended learning for educating employees (Kim et al., 2008).

A wide variety of settings have been the host to blended learning research for training employees. The use of blended learning for professional development, for social workers throughout the state of Texas, revealed the value of using adult learning theory,
and the need to consider both the learners and the topics when designing blended learning experiences (Abate, 2008). Blended learning was used to teach English to adult workers in India, and researchers who studied the program discovered the importance of centering the learning on the needs of the students (Sloman, 2007). IBM used blended learning to provide management training, offering four different levels of the training that progressively moved from solitary online learning, to cooperative online learning, to face-to-face learning (Lewis & Orton, 2006). Cisco provided education for engineers, through a blended learning model that used a combination of upfront online learning with basic content information, followed by more in-depth training in a face-to-face setting (Dennis et al., 2006).

Training for bookstore sales staff is the closest educational program, found to date, to classroom situated e-learning. The training was labeled simulation based e-learning, and offered employees a learning experience that combined e-learning to simulate the sales experience, with facilitation by a live coach (Slotte & Herbert, 2008). Employees met in small groups, where the coach led them through the training experience. The coach was able to individualize the experience to the needs of each small group. Employees also had the ability to access the e-learning after the live session. This allowed them to review any of the material on their own (Slotte & Herbert, 2008).

In the case of the bookstore employee training, the authors described the use of simulation as creating an e-learning experience that mimicked what sales people encounter. This use of simulation differs from the highly sophisticated simulations that might be used for learning to fly an airplane, drive a car, or do open heart surgery (Slotte
Herbert, 2008). This blended learning experience is very similar to classroom situated e-learning, where a facilitator leads a small group of pediatric residents through an e-learning event, designed to simulate the choices residents would have, and the decisions residents would make, when encountering patients. The facilitator is also able to tailor the learning experience to the needs of the small groups of residents that are participating.

The book store sales employees benefitted from participating in a learning experience that allowed them to gain knowledge through discussion with each other, in addition to what they learned through the simulation based e-learning (Slotte & Herbert, 2008). The researchers showed that participating in this type of simulation based e-learning, with a small group of colleagues, increased the learners’ enthusiasm for the training. In addition, the coach was able to personalize the learning to each small group of employees, helping them to see the relevance to their own work, and add additional content related information based on learners needs and interests (Slotte & Herbert, 2008). Conducting research on the use of classroom situated e-learning, for pediatric residents, will provide information regarding the learners’ perceptions of the learning process. Given the similarity between classroom situated e-learning, and the simulation based learning described in the above study, it will be interesting to learn if any of the same positive benefits are reported by the pediatric residents.

The increased popularity of blended learning may be due to the many advantages it can provide. Blended learning offers options that can support the differing learning styles of students (Duhaney, 2004), creating the possibility to design courses or training options that are learner centered (Sloman, 2007). Blended learning allows educators to combine the strengths of a wide variety of options (Garrison & Kanuka, 2004) resulting
in the potential for a level of flexibility that could not be found in a single learning option (Harris, Connolly, & Feeney, 2009). The varied choices provide the ability for learning to be customized to the specific needs of organizations, and the needs of the learners (Stone, 2008). Effective learning has been described as consisting of the following three elements “teaching presence, social presence, cognitive presence” (Garrison & Kanuka, 2004, p. 98), and blended learning allows the educator to use a combination of face-to-face learning and e-learning to provide all three elements in one educational experience (Garrison & Kanuka, 2004).

Yet, although blended learning has advantages it also has possible disadvantages, which necessitate careful research and consideration, to determine if it is the right choice for the desired application and outcomes (Harris et al., 2009). Blended learning also requires the use of three different types of resources (Garrison & Kanuka, 2004). Financial resources are needed to pay for costs, which can include initial and ongoing development and delivery, and any needed hardware and software for the organization creating the learning. Sometimes resources are needed for the purchase of additional technology for the students who will be participating in the learning. Human resources are needed to provide the skills and abilities to design, develop, and deliver the education. Technical resources are needed to create a learning experience that allows the educators and learners to concentrate on the learning, rather than the technology (Garrison & Kanuka, 2004).

Blended learning can offer a wide variety of options, but the ability for such a wide assortment of combinations makes blended learning a highly complex choice (Garrison & Kanuka, 2004), and the continued changes in technology can add to that
complexity (Kim et al., 2008). Technology can create a problem for creators and users of blended learning, and so the ability to access and use technology needs to be a consideration in the choice and creation of blended learning programs (Harris et al., 2009). The goal in using technology should be to allow the technology to serve as a vehicle for learning, rather than an obstacle (Harris et al., 2009). One way to overcome this potential problem is to make technology training and support available to those who are responsible for creating blended learning (Kim et al., 2008), as well as the learners who will be using it (Harris et al., 2009). Another option is to have educators or designers familiar with the creation of blended learning work with classroom teachers. The classroom teachers serve as the content experts, while the experienced blended learning educators take responsibility for the other aspects related to creating blended learning. This removes the technical concerns from the teachers, allowing the teachers to remain focused on teaching, and on the students, rather than how to create blended learning (Stone, 2008).

Although the use of technology can be one obstacle to creating successful blended learning there are other areas that require consideration. In the past, designers of blended learning focused on the way technology, and face-to-face instruction, could be combined. However, successful learning designers also need to consider and determine the appropriate pedagogy for the learning experiences they are creating (Duahney, 2004), choosing the blend that best meets the students’ needs (Verkroost et al., 2008). Learning and teaching should take precedence over technology (Harris et al., 2009).

Creating successful learning requires understanding and consideration of the learners, the learning goals for the educational experiences, and the learning
environments for the educational experiences (Wall & Ahmed, 2008). Blended learning should be based on a blending of methodologies and teaching methods to support the varying learning styles of the learners. Designers need to consider elements such as structured versus unstructured learning, individual versus group experiences, face-to-face versus distance learning, and student directed versus teacher directed education (Sloman, 2007).

Evaluation and assessment are also important considerations for blended learning. When blended learning is used by an organization it should be thoroughly evaluated to determine its success, and to learn information regarding any changes that need to be made to increase positive outcomes (Harris et al., 2009). In addition, the evaluation should include all of the parties involved, which could be instructors, organizational management staff, and the end users (Harris et al., 2009).

Evaluating the outcomes of blended learning is important for those involved in creating, implementing, and participating in the learning experiences, because research on blended learning does not currently provide all of the information needed to make informed decisions (Bliuc et al., 2007). A great amount of research on blended learning concerns educational experiences where technology is an addition, or support, for traditional face-to-face classroom learning, rather than a true blended experience (Bliuc et al., 2007). Blended learning is usually very specific to the context in which it is being used, making it difficult to generalize findings from blended learning research to other organizations (Harris et al., 2009). In addition, researchers conducting a meta-analysis of online learning, which included comparisons between online learning and blended learning, and between blended learning and face-to-face learning, pointed out the
importance of ensuring that the options being compared differ in delivery only, while the instruction and content remain the same (Means et al., 2009).

**Blended Learning in Medical Education**

The use of blended learning for medical education has similar variations in the definition and usage of the term. One example of blended learning included a combination of face-to-face lectures and e-learning modules, to teach doctoral students in pharmacology (Crouch, 2009). Another blended learning project combined online modules, face-to-face discussions, and video presentations, to teach general practitioners (Bekkers et al., 2010). A third type of blended learning, for new nurses, was made up of face-to-face classroom sessions followed by a series of e-mailed questions, delivered over time, to the learners. The nurses e-mailed their responses to the questions they received. Then the nurses were sent instructional feedback on their responses (Sung et al., 2008).

The need for additional research, regarding the use of blended learning for medical education, is also apparent after reviewing the literature. There was very little literature regarding the use of blended learning to teach pharmacology (Crouch, 2009). There was little written regarding the effect of blended learning on student and educator engagement with the learning experience in clinical education, and there were even fewer published articles about the outcomes of blended learning for clinical education (Gray & Tobin, 2010). In addition, researchers, conducting a study on the use of blended learning for teaching medical students, reported finding many instances of web-based e-learning for medical education, when conducting a meta-analysis of existing literature. However, they found there was almost no research on the use of blended learning, combining e-learning with a face-to-face clinical education, for that purpose (Lewin et al., 2009).
However, despite the lack of research regarding the use of blended learning for medical education, there were studies that pointed to using blended learning successfully, with different groups in the health care profession. Blended learning was a successful alternative for a course on cardiology pharmacotherapy for doctoral students in pharmacology. The students in the blended learning program had higher test scores than the students in the traditional face-to-face course (Crouch, 2009).

Medical students in a blended learning program had better exam scores than their peers, who took the same course in a face-to-face lecture format. The blended learning course combined the use of e-learning modules, online communication, and weekly communication with a preceptor (Lewin et al., 2009). General practitioners who participated in a blended learning program on antibiotic resistance reported increased awareness and confidence when making decisions about prescribing antibiotics for patients. They also reported a decrease in the amount of antibiotics they prescribed after the blended learning program (Bekkers et al., 2010).

Organizational staffs have realized benefits from offering blended learning as a medical education option. The initial cost for creating the e-learning component of blended learning can be high, but can ultimately result in a cost savings over face-to-face classes. This is because blended learning allows for continued use of electronic learning components that once created, can be used repeatedly (Sung et al., 2008). Blended learning has been reported to be less demanding on faculty time, because educators are not required to be the sole disseminator of the course content (Crouch, 2009).

Learners in medical education have also reported benefits from blended learning, beyond their gain in knowledge. Learners enjoyed the flexibility that blended learning
could offer (Crouch, 2009). Doctors, in a blended learning program for continuing education in clinical care, appreciated the blended learning approach (Shaw, Long, Chopra, & Kerfoot, 2011). Medical students, in a blended learning program, enjoyed the learning experience, and reported that the information they learned was material they were able to apply directly to the clinical setting (Lewin et al., 2009). Doctors, participating in a blended learning program on antibiotic resistance, felt the program was beneficial, and suggested broadening its use with other groups of health care professionals (Bekkers et al., 2010).

The form of blended learning to be studied in the proposed research, classroom situated e-learning, is a form created specifically for use with residents at a pediatric hospital in Ohio. To date, there has been no published research on this form of medical education. This mode of synchronous learning puts a small group of residents and a facilitator in the same room. The content is contained in the e-learning module, which is displayed on a screen located at the front of the room. The facilitator leads the residents through the e-learning module, where residents are encouraged to solve problems, share ideas, and ask questions, as they move through the case and the tasks being presented. The module is also designed to simulate the decisions, test results, and order of decisions that residents must make when seeing patients. The research mentioned previously, regarding blending learning used with bookstore sales staff, is the closest found to date to classroom situated e-learning (Slotte & Herbert, 2008). The training for the bookstore staff was labeled simulation based e-learning, and combined e-learning that simulated the sales experience with face-to-face facilitation by a live coach. The researchers showed
this form of blended learning increased the learners’ enthusiasm for the training (Slotte & Herbert, 2008).

New innovations in medical education are needed to produce excellent doctors, and residency programs are in search of innovative options for delivering effective medical education (Robertson, Yun, & Murray, 2009). Classroom situated e-learning has the potential to meet those needs. However, research must be conducted to determine if the learners believe it is an effective form of medical education.

Summary

Medical education gives students, residents, fellows, and physicians the opportunity to gain the skills and knowledge they need to treat and serve their patients, the public, and their field (Accreditation Council for Continuing Medical Education, 2007; Lin et al., 2006). It also ensures that patients have access to doctors who have the ability to provide them with safe and effective health care (Mazmanian, 2010; Miller et al., 2008). Medical education is meant to serve both the learners and the patients that they care for (Farley et al., 2008).

Residency is a time when doctors continue to participate in medical education, while they take on the professional responsibilities of caring for patients (Lin et al, 2006). It is considered to be the most important educational period in a doctor’s career (Charap, 2004). However, restrictions in resident work hours, mandated by representatives of the ACGME (Accreditation Council for Graduate Medical Education, 2003; Accreditation Council for Graduate Medical Education, 2011), have had an impact on the amount of time that residents have for medical education (Jagsi, 2006).
Modes for delivering medical education include traditional lecture based learning, e-learning, and blended learning. In medical education, e-learning has been associated with advantages and disadvantages (Baker et al., 2010; Ruiz et al., 2006; Stern, 2008). Although there is existing research on the use of e-learning for medical education, the results are not conclusive (Cook et al., 2010), and the lack of a clear definition for the term e-learning makes research even more unclear (Ruiz et al., 2006; Cook et al., 2010). A lack of conclusive research and continued increase in the use of e-learning in medical education (Cook et al., 2008) have resulted in concerns about the effectiveness of this form of learning (Baker et al., 2010; Cook et al., 2010). It has also resulted in the awareness of a need for new research on the use of e-learning for medical education (Baker et al., 2010; Lockyear et al., 2006).

Lecture based learning, as a general form of education, relies on knowledgeable educators to provide students with the needed content (Brew, 1999; Jones, 2007). The lecture is the most common form of medical education (Kuliet et al., 2009; Statler, 2010). Yet the debate continues regarding the effectiveness of lecturing for medical professionals (Brandt & Shanedling, 2010). Just as with the use of lectures in general education, there are pros and cons associated with lecturing in medical education. The pros include a chance for medical professionals to gather, converse, and create a social network (Davis et al., 2008), and the chance for medical students to bond and create a cohesive and supportive group (Cook & McDonald, 2008). The cons associated with lecture based learning include: a lack of interaction (Davis et al., 2008), difficulty in attending education delivered at a specific time (Baker et al., 2010), and education delivered with the group rather than the individual as the priority (Davis et al., 2008).
Blended learning, as a general option for education, is challenging, due to the lack of a common definition (Kim et al., 2008; Yoon & Lim, 2007). There is little research regarding the use of blended learning for medical education (Crouch, 2009; Gray & Tobin, 2010; Lewin et al., 2009), and there is a call to expand that research (Cook et al., 2010). Although, of the research that does exist, positive outcomes have been achieved for both learners (Crouch, 2009; Lewin et al., 2009; Bekkers et al., 2010) and for organizations (Sung et al., 2008; Crouch, 2009).

There is also a need to conduct research on innovative options for medical education (Robertson et al., 2009), given that there is no proven method for the most effective way to educate residents in light of the restrictions in resident work hours (Lin et al., 2006). Classroom situated e-learning is an innovative blended learning approach to medical education, created for use with pediatric residents at an Ohio hospital, that combines e-learning and face-to-face classroom learning, offering a new option for medical education of residents.
Chapter 3: Research Method

The problem this study addressed is the need to find an effective mode of medical education that will make the most efficient use of medical residents’ limited time. Restrictions in residency hours have impacted the time residents have for medical education (Accreditation Council for Graduate Medical Education, 2011). Residents also experience a highly demanding workload. Both factors limit the time residents have for participating in medical education (Baker et al, 2010). Residency program educators must now find a way to effectively educate residents within the restricted hours (Holmboe et al., 2005). In addition, there is a need to find and use innovative educational options that will meet the learning goals of residents and residency program educators (Tempelhof et al., 2009).

The purpose of this qualitative study was to learn residents’ perceptions of the effectiveness of blended learning and the effectiveness of traditional face-to-face lectures. In-depth interviews were used for collecting data. The sample size was nine pediatric residents at a pediatric hospital. Given the value of education during residency (Charap, 2004), the high demand on residents’ time, and their limited time for education (Baker et al., 2010), research is needed for this mode of learning for medical education (Edginton & Holbrook, 2010; Carbonaro et al., 2008). Blended learning has the ability to combine face-to-face interaction with e-learning. However, although the potential of blended learning for medical education has been shown (Bekkers et al., 2010), a search of the literature revealed a limited number of formal applications of this mode of learning for this purpose (Lewin et al., 2009).

The study was guided by the following research questions:
Q1. How do residents perceive the effectiveness of classroom situated e-learning and traditional lecture based learning?

Q2. How do residents perceive the interaction (between the student and the content, the facilitator or instructor, and other students) in classroom situated e-learning and traditional lectured based learning?

The remainder of this chapter describes the research methods and design, including a description of the participants, and the process for creating the question guide for the in-depth interviews. The data collection and analysis process is explained, and the chapter concludes with a discussion of the methodological assumptions of the study, along with limitations and delimitations, and ethical considerations.

**Research Methods and Design**

A qualitative research method was used for this study because it provided the ability to gain a deeper understanding of the phenomenon from the perspective of the participants (Moustakas, 1994), which was the intended goal of the research. This is an interpretive approach, used to understand how something works, as opposed to trying to fix something that does not work (Schram, 2006). The interpretive approach fit with the intention of the research, to understand the effectiveness of classroom situated e-learning for medical education with residents from the learners’ perspectives. In addition, the use of qualitative research has gained respect and legitimacy, especially in the area of education (Taylor, 2009).

A phenomenological perspective is used to understand how someone, or a group of people, makes meaning of an experience or phenomenon (Patton, 2002). Phenomenology provides an understanding of a phenomenon from the individual’s
perspective and interpretation (Shank, 2006). The aim of phenomenology is to understand what an experience means for those who have lived it (Moustakas, 1994). Phenomenology, with a focus on understanding a phenomenon from the participant’s viewpoint, was the best fit for the proposed research, and the desire to understand classroom situated e-learning from the learner’s perspective.

The research participants were pediatric residents who had participated in classroom situated e-learning. Each month, residents from a pediatric hospital in Cincinnati, Ohio participate in classroom situated e-learning as a part of their rheumatology rotation. Six residents, comprised of four first year residents and two senior residents, make up the monthly group who are assigned to the rheumatology rotation. The senior residents are in their second or third year of residency.

As part of their training, each group of six residents rotates through, or is assigned to a different specialty each month. During their rheumatology rotation, the residents are provided with two classroom situated e-learning sessions on rheumatology topics. Residents are highly encouraged by their supervisor, the chief resident, to participate in these sessions. However, due to patient needs, resident schedules, and a mandated number of hours residents may work consecutively, some of the residents are not able to attend the classroom situated e-learning sessions. Typically, four of the six residents in the monthly rotation are able to attend. On average, a total of 48 residents participate in the classroom situated e-learning each year.

In-depth interviews are one of the traditional methods associated with phenomenology (Schram, 2006). “Evidence from phenomenological research is derived from first-person reports of life experiences,” (Moustakas, 1994, p. 84). This type of data
is also generated data, meaning it is a re-creation, or re-telling of the phenomenon being studied. It highlights each individual’s perspective, and therefore captures an individual’s beliefs and reflections about a phenomenon (Ritchie & Lewis, 2003). The process of conducting an interview includes gaining insight into the lived experience of the interviewee, and then seeking out the meaningful themes within that lived experience (Shank, 2006). In-depth interviews provided the appropriate avenue for pursuing an understanding of the lived experiences of classroom situated e-learning from the participants’ perspectives.

**Population**

The population was residents at a pediatric hospital in Cincinnati, Ohio who had completed at least one classroom situated e-learning session and participated in one traditional face-to-face lecture. This population was chosen to ensure potential participants were familiar with the two forms of resident education to be studied in the proposed research. There are approximately 200 residents enrolled in the pediatric residency program at any one time and all of them participate in traditional face-to-face lectures on a regular basis. Of those residents about 75 are given the opportunity to attend classroom situated e-learning each year. On average, a total of 48 residents participate in the classroom situated e-learning in a given year.

**Sample**

Nine residents were included in this research study. A small sample size is typical of qualitative research (Rudestam & Newton, 2007) and is based on the specific goals of qualitative research, in comparison to the larger sample sizes needed for
quantitative research. Qualitative research usually relies on gathering in-depth data from small samples (Patton, 2002).

Examples of small sample sizes in qualitative phenomenological research include a sample size of four military officers in a study regarding the use of simulation in military training. The researchers determined that a sample size of four was enough to reach saturation, or redundancy, in the data (Cane, McCarthy, & Halawi, 2010). Data was collected from six participants in a research study regarding the impact of a fall on patients with multiple sclerosis (Peterson, Kielhofner, Tham, & von Koch, 2010). Four participants made up the sample in a phenomenological study regarding the lived experiences of working life following a stroke (Eriksson & Tham, 2010).

Quantitative research relies on statistical representation for determining a sample size that is large enough to apply statistical analysis (Ritchie & Lewis, 2003), with a goal of generalizing the research results to a larger population (Patton, 2002). Therefore, quantitative research requires large numbers of participants to obtain meaningful results. Qualitative research requires only the number of individuals needed to show a pattern, or theme, in the phenomenon being researched (Dobrovonly & Fuentes, 2008). An appropriate sample size in qualitative research can be as small as one (Cresswell, 2009).

Qualitative data is made up of rich and detailed information, and each piece of relevant data is given equal weight or consideration, which can quickly lead to redundancy. The use of a small sample size allows qualitative research to focus on developing an in-depth understanding of the phenomenon being studied. In addition, qualitative research results in large amounts of data that can be best analyzed when kept to a small purposeful sample size (Ritchie & Lewis, 2002). “The validity,
meaningfulness, and insights generated from qualitative inquiry have more to do with the information richness of the cases selected and the observational/analytical capabilities of the researcher than with sample size” (Patton, 2002, p. 245).

The sample for the proposed research were residents at a pediatric hospital, in Cincinnati, Ohio, who participated in classroom situated e-learning as part of their rheumatology rotation, and who participated in at least one face-to-face traditional lecture as part of their residency. Additional criteria were used to determine the specific sample, and ensure that the purposeful sample had the ability to accurately represent the phenomenon being studied. However, given the somewhat homogeneous nature of the group, the participants were all pediatric residents, employed by the same hospital, with the same training participation requirements, the same minimum level of previous academic experience, and were living in the same general geographic area; there were a small number of criteria.

A minimum of one senior resident and one first year resident was included in the sample. Residents from three different monthly rotation groups were included in the sample and at least one male and one female was included. All residents who had participated in an entire classroom situated e-learning session, in the month prior to, or during the months when data was collected, were asked to participate in the research. Residents who did not attend the classroom situated e-learning, or arrived after the session started, left before it ended, or where called away during the session, were not asked to participate.

Each month, the chief resident responsible for the team that rotates through rheumatology sent the rheumatology education specialist a list of those residents that
would be in the following month’s rotation. That list was used to track which residents met the attendance requirement. All residents who met the attendance requirement were sent an e-mail containing a letter that described the research project and asked if they would be willing to participate. The letter told residents they could respond to the request by e-mail or phone. Residents who did not respond two days after receiving the request received a follow-up e-mail. Another e-mail was sent three days after the follow-up e-mail to anyone who had not responded at that point. A final reminder e-mail was sent two days later. A log was maintained of the participant criteria to determine when the criteria had been met.

Ten interviews were conducted for this research. The first interview was a pilot interview, which was transcribed and shared with the dissertation chair for feedback and additional guidance prior to moving forward with data collection. Following the pilot interview nine interviews were conducted, and the data collected from those interviews was used for this research. All qualifying residents who attended classroom situated e-learning in May, June, and July of 2012 were invited to participate. Each of the residents was e-mailed an invitation, and up to two follow-up requests, when responses were not received (see Appendix F). A total of 16 residents participated in at least one classroom situated e-learning session during the three months. Of those 16 residents ten agreed to participate. All of the residents had participated in multiple traditional lectures as residents. Residents are expected to attend Grand Rounds, which are offered once a week. Grand Round lectures are traditional lectures. Residents are also expected to attend noon conferences, which occur five days a week. The format for noon conferences
is determined by the educator, and so only a portion of the noon conferences are traditional lectures.

All of the participants completed the entire interview, and were willing to answer all of the interview questions. Not every resident, however, had an answer for every question. An acceptable time and date for the interview was arranged with the residents. One interview was conducted in a conference room in a local hospital where the resident was completing a family medicine rotation. All other interviews were conducted in a private office in the Children’s Hospital that houses the residency program. Residents were interviewed within six weeks following their participation in a classroom situated e-learning session. Eight of the nine residents participated in the interview four or fewer weeks following their participation in classroom situated e-learning. The interviews ranged in length from 33 minutes to one hour and 5 minutes. The average length of the interviews was 43 minutes. During the interviews residents were provided with a document that listed the definitions for effective education and for interaction being used for this research (see Appendix G).

**Materials/Instruments**

In-depth interviews were the source of data for the research. When conducting phenomenological research the researcher must attempt to put aside any opinions and beliefs regarding the phenomenon, and be completely open to allowing the participants to describe their experience. This practice requires the researcher to acknowledge that the participant is the expert regarding the phenomenon, and must be given the freedom to determine the relevant topics, and guide the interview (Moustakas, 1994).
Although in-depth interviews are individualized for each participant, it is common in phenomenological research for the researcher to create a guide to ensure that basic themes or topics related to the phenomenon are addressed. However, the use of a guide is to provide a general sense of the topics to be covered. The interviewer may need to alter, remove, or add questions based on the direction the participant wishes to go (Moustakas, 1994). A guide was developed for this research based on the research questions.

The first draft of the guide was reviewed, and feedback for improvement and changes was provided by three individuals. One reviewer was a facilitator for classroom situated e-learning, and a rheumatology fellow. She also participated in classroom situated e-learning two years ago, during her residency. The second reviewer was also a facilitator for classroom situated e-learning, as well as a pediatric rheumatologist. The third reviewer was a medical anthropologist who specializes in qualitative research and is a professor at the University of Cincinnati. Each reviewer provided valuable input that resulted in changes to the guide. The three reviewers were also sent an updated second draft of the guide, and each provided additional feedback on that version. Their reviews also provided face validity for the guide (see Appendix A). The guide was then pre-tested with one resident who had participated in classroom situated e-learning. The pre-testing was used to further assess the usefulness of the guide in gaining and understanding the participants’ perceptions of the phenomenon being studied. In addition, the dissertation chair was provided with a transcript of the first in-depth interview to determine if the guide supported the research goals.
However, flexibility was maintained in the questions asked to allow the participants to maintain control over their own stories (Bogdan & Biklen, 2007), and support further probing to gain a fuller description of the participants’ experiences with the phenomenon being studied (Ritchie & Lewis, 2003). Validity in in-depth interviews requires gaining each participant’s specific and unique description of their reality regarding the phenomenon being researched (Cho & Trent, 2006). Flexibility in the questions asked during the interview supported validity.

A protocol was used to conduct the in-depth interviews (see Appendix B). The protocol ensured consistency among interviews, while still allowing for the flexibility called for in phenomenological research (Moustakas, 1994). The goal was to continue to develop an understanding and familiarity with conducting interviews, and to allow the focus of the interviews to be on the participants and the content of the interviews rather than the principles of interviewing (Kvale & Brinkman, 2009).

The interviews began with an explanation of the research and the purpose of the interview, to set a tone for the interview, establishing it as something different from a casual conversation (Gubrium & Holstein, 2001). The interview moved to a few questions designed as an ice-breaker. These types of questions are designed to build a rapport between researchers and participants (Bogdan & Biklen, 2007). The interview then moved into questions designed to illicit information about the phenomenon being studied. The questions were open-ended, and the interview guide included broad questions to be asked of each participant. However, the follow-up questions were adjusted based on the individual participants’ answers (Gubrium & Holstein, 2001). The follow-up questions were used to gain further “penetration, exploration, and explanation”
(Ritchie & Lewis, 2003, p. 203) of the phenomenon. During the interviews residents were provided with a document that listed the definitions for effective education and for interaction being used for this research (see Appendix G). Residents were not provided with a definition for traditional lecture.

Each in-depth interview lasted between 33 and 65 minutes. The in-depth interviews were recorded using two digital audio recorders. The condition of the devices was checked prior to each use, and an extra set of batteries was readily available (Ritchie & Lewis, 2003). Having two devices provided a back-up recording in the event that one of the recorders malfunctioned. Qualitative research can amass a large amount of data (Lin, 2009). This data is priceless and irreplaceable (Patton, 2002), and therefore requires a well thought out plan for storage, to ensure both access to, and safety of all data (Richards, 2009). Data was transferred from the digital recorder to a computer as soon as was feasibly possible, which was within one hour of recording the interview. This allowed the data to be maintained in an accessible fashion, in a timely manner, and created a back-up to prevent potential loss or damage of the data (Richards, 2009). In addition to maintaining all data on a computer’s hard drive the data was stored on an external hard drive. The data stored on the external hard drive was considered a master copy, to ensure safety of the data (Patton, 2002). All data was backed-up on the external hard drive on a daily basis.

**Data Collection, Processing, and Analysis**

The research was conducted with nine residents at a pediatric hospital in Cincinnati, Ohio who had participated in classroom situated e-learning and lecture based learning. In-depth interviews were set up at a time and location convenient for the
participants. Given the demanding schedules of the residents, this was important in acquiring the needed number of participants. All in-depth interviews but one were conducted on the grounds of the pediatric hospital, with the specific locations based on what was convenient for the residents. One interview was conducted at an adult hospital where the resident was participating in a family medicine rotation.

The interviews were conducted within six weeks of the classroom situated e-learning sessions. The process for conducting the interviews included gaining insight into the lived experiences of the interviewees and then seeking out the meaningful themes within those lived experiences (Shank, 2006). Quantitative interviews rely on large numbers of responses to the same questions, and the use of statistics to analyze the responses. In contrast, qualitative research relies on in-depth interviews that are personalized to the individual participant (Patton, 2002), allowing the researcher to respond to each individual’s specific lived experience (Ritchie & Lewis, 2003).

Interviews were conducted with residents from three monthly rotation groups. The data collection took 12 weeks.

Analysis in qualitative research occurs as both a stage of research as well as a consideration throughout the entire research process, from the idea forming through to writing the results (Ritchie & Lewis, 2003). The analysis stage should typically begin about halfway through the data collection, as patterns in the data start to emerge, and should be noted by the researcher (Patton, 2002). For this research, the process of data analysis was based on the framework of phenomenology and the data collection method of in-depth interviewing.
Simultaneously to the analyzing process a log was maintained to document each step. This log was maintained to provide a way to follow the interpretive process used in the research (Ritchie & Lewis, 2003). The data organizing or managing included the researcher doing the transcribing, to allow for continued immersion in the data, as well as an opportunity for analysis (Patton, 2002). This was followed by the organizing steps of phenomenological analysis, which began with horizontalization and then moved to reduction and elimination (Moustakas, 1994).

During horizontalization, the first step in data organization, all data is considered equal in value (Patton, 2002) and divided into expressions that are relevant to the phenomenon being studied (Moustakas, 1994). In the case of this research, each transcribed interview was horizontalized into expressions that were relevant to the participants’ experiences with the effectiveness of classroom situated e-learning, and lecture based learning. Next was the process of reduction and elimination, a key component of qualitative research, given that qualitative research usually results in massive amounts of data (Ritchie & Lewis, 2003). During reduction and elimination expressions were reviewed and those that were repetitive, overlapped, or were irrelevant were removed (Moustakas, 1994).

It is at this point that the analyzing steps began. However, analyzing research does not always proceed in a linear fashion, and a researcher may need to move back and forth between the steps (Ritchie & Lewis, 2003). In this research, the analyzing steps followed those suggested by Moustakas (1994). This included clustering and then validating the remaining expressions, followed by creating an individual textual and structural description for each research participant.
During reduction and elimination each expression was reviewed to determine relevancy based on the definitions of effective and interaction being used for this study. In the case of effective, the expressions that described participant’s perceptions about how the two educational formats increased their knowledge, in at least one of the ACGME’s six core competencies, was maintained. Any expressions that were based on other definitions of effective were eliminated. The same process was used with expressions regarding interaction. Those expressions about participants’ perceptions of interaction between the participant and the content, facilitator or instructor, and other students, during the course of the educational activity, were maintained. Expressions that were based on other definitions, or pertained to interaction before or after the educational format, either lecture or classroom situated e-learning, were eliminated.

Initially, the remaining expressions in the proposed research were reviewed, yet again, and clustered based on the themes that emerged. The expressions were then validated, by finding each expression within the original transcript and confirming that within this context, each expression still accurately represented the theme, while also representing the intent of the participant as expressed during the interview. Those expressions that did not meet those criteria were removed (Moustakas, 1994). Using the remaining expressions, a textual and structural description was written for each individual that explained the phenomenon from their experience, and explained the underlying meaning of the experience for each participant (Moustakas, 1994; Patton, 2002). Each participant was provided with a copy of their resulting textural and structural descriptions to review and validate accuracy.
The remaining steps in the process cover the interpretation of the data, a requirement for qualitative research (Ritchie & Lewis, 2003). This part of the process involved creating composite descriptions, and then synthesis (Moustakas, 1994). A composite description was written, using the textual and structural descriptions, which were a depiction of the groups experience (Moustakas, 1994); these descriptions were then used to create a synthesis of the phenomenon, which provided the meaning, and the essence of the phenomenon (Patton, 2002).

**Assumptions**

This study was based on the assumptions that: the participants gave honest and truthful answers to the interview questions, participants were representative of the population being studied, and a minimum of eight residents would agree to participate in the study. Given the nature of the study, and the assurance of anonymity, it was assumed that the participants would be willing to provide their true thoughts regarding each question, or choose to not answer a question or questions. It was anticipated that given the relative homogenous nature of the residents at the pediatric hospital, and the additional criteria being used, the sample was representative of the hospital’s resident population. It was also assumed that the residents would be motivated to participate in this research effort because even though they had busy and demanding schedules they were also working in a teaching hospital, where research and education are highly valued.

**Limitations**

The limitations for the study were mainly related to the choice of qualitative research, and phenomenology. Phenomenology is used to understand a lived experience from the perspective of the participant (Moustakas, 1994), and makes use of a small
sample size. However, this choice limits the ability to generalize the research findings to other populations. In addition, although all residents who completed the classroom situated e-learning, in three monthly rotations, were asked to participate, not all actually chose to participate. There is a possibility that the residents who chose to participate had a reason or characteristic which was not possessed by those who choose not to participate, which could also have impacted the research results.

**Delimitations**

Delimitations in a study refer to a purposeful narrowing of the scope of the research (Cresswell, 2009). The delimitations of this study included a small sample size, a pool of residents from three monthly rotations in rheumatology who completed at least one classroom situated e-learning session, and 12 weeks for data collection. An additional delimitation was the interpretation of the data by the researcher.

**Ethical Assurances**

Ethical considerations were used for planning the research. The main ethical guidelines in qualitative research are “do no harm” (p. 118), “be open” (p. 119), “be honest” (p. 119), and “be careful” (p. 119) (Shank, 2006). Do no harm, or protection from harm, includes access or entrance into the setting to be studied, and how the data is collected (Shank, 2006). Entrance to the proposed research setting was through the chief resident who oversaw the residents, and was fully informed about the proposed research. Residents were offered the option to participate in the research, and their choice was kept anonymous and not reported to the chief resident or anyone else at the hospital. The data collection process occurred through in-depth interviews. It is possible that any in-depth interview can cause emotional distress or discomfort for the participant (Patton, 2002).
Although, given the nature of the research and the questions asked it was not anticipated that answering the questions would cause any emotional distress for the participants. However, participants were informed that they did not have to answer any of the questions, and that they could end the interview at any time.

The idea of being open is related to informing participants of the purpose of the research (Shank, 2006). Participants were informed that they were being interviewed for the purpose of research regarding their experiences with classroom situated e-learning and lecture based learning. There was never a time when participants were asked research-related questions without their knowledge. In addition, the participants were given the opportunity to withdraw from participation at any time during the research. Participants were provided with a written document that described the research, and they were asked to sign an informed consent form. The form (see Appendix D) included the purpose of the research, how the information would be used, the general content to be covered in the questions, confidentiality, and any potential risks and benefits to the participant (Patton, 2002). The form confirmed that the participants understood the purpose of the research being conducted, their role in the research, and their ability to discontinue or withdraw their participation at any time.

Honesty in qualitative research refers both to interactions with participants and analysis of the data (Shank, 2006). For the proposed research, participants needed to sign an informed consent form before their participation. In addition, their participation in the research was described verbally prior to their participation, and the informed consent form was verbally reviewed.
The final guideline is be careful. This guideline emphasized the need to maintain accurate and detailed research records (Shank, 2006). Thorough and accurate records were maintained throughout the research process in order to allow the information to be used by others to confirm any claims made. Detailed records will also allow others to have a clear understanding of how the research was conducted.

Participants in research have a right to privacy (Patton, 2002). The residents were asked to participate in the research through private e-mail. This allowed their responses to remain private as well. Residents’ decisions to participate, or not, remained completely private, and was not shared with anyone. This was stated in the informed consent, so residents were fully aware of this. A document was maintained that gave each participating resident a number. This number was used for transcribing, and for data coding and analyzing. The document will remain separate from all other data. This will ensure that readers of the completed dissertation or any of the transcriptions, who might be familiar with the pediatric hospital where the participants are residents, will not be able to identify residents by name. Approval from Northcentral University’s Internal Review Board and the Internal Review Board at the residents’ hospital was obtained prior to any data collection.

Summary

The research was conducted using phenomenology, a qualitative research method, regarding the effectiveness of classroom situated e-learning from the perspective of the participants (Moustakas, 1994). Nine residents, from at least two different monthly rotations of pediatric residents in a children’s hospital, were the participants. A guide was used for the interviews, which contained a list of open-ended questions and further
probes. The data was stored in a laptop computer with a master copy, used for security purposes, stored in an alternate location.

Data collection occurred through in-depth interviews, and a log was kept to document the research process and any changes that occurred during the process. Data analysis occurred throughout the research process, with the actual analysis stage beginning about halfway through the data collection (Ritchie & Lewis, 2003). Data analysis reflected the research framework of phenomenology, and consisted of horizontalization, or data being broken into relevant expressions, reduction and elimination, clustering, and validating (Moustakas, 1994). The data was used to create an individual textural and structural description for each participant, which was then used to create a composite description and synthesis of the group’s experience (Moustakas, 1994). Assumptions, limitations, and delimitations were closely tied to the choice of qualitative phenomenological research. Ethical considerations were centered on the need for the study to “do no harm” (Shank, 2006, p. 118), “be open” (p. 119), “be honest” (p. 119), and “be careful” (p. 119).
Chapter 4: Findings

The purpose of this qualitative study was to discover how medical residents, who are adult learners (Das et al., 2008), perceived the effectiveness and use of interactions in classroom situated e-learning and traditional lectures for medical education. A qualitative phenomenological approach was used to conduct the research. This chapter provides a description of the results of the data gathered and the analysis conducted, following the seven steps for analyzing phenomenological data (Moustakas, 1994).

The chapter begins with a description of the participants, followed by a presentation of the results. Findings are organized by the research questions. Each question is divided into two elements. Within each research question results are organized according to themes. A main theme is defined as a theme discovered in the responses of at least four participants.

The perceptions of the participants, regarding the effectiveness of classroom situated e-learning are discussed, followed by their perceptions of the effectiveness of traditional lectures. Effectiveness was defined as an increase in the participants’ knowledge in at least one of the six core competencies, as delineated by representatives of the ACGME: “patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice” (Antiel et al., 2011, p. 185). Next, the perceptions of the participants, regarding interactions in classroom situated e-learning are presented, followed by their perceptions of interactions in traditional lectures. Interaction was defined using Moore’s (1989) description of three types of interaction: between the learner and the content,
between the learner and the educator, and between the learner and other learners. The chapter ends with a summary of the information presented.

Results

Results were collected between May and July 2012. There were a total of nine participants. Four participants were interviewed in May, one in June, and four in July. Six participants were first year residents, two were second year residents, and one was a third year resident. Participants included six males and three females. All of the participants completed the entire interview and were willing to answer all of the interview questions, although not every resident had an answer for every question asked. Each participant was assigned a number from 1 to 9 to maintain anonymity and confidentiality.

Research Question 1. How do residents perceive the effectiveness of classroom situated e-learning and traditional lecture based learning? This question had two elements (a) participants’ perceptions of the effectiveness of classroom situated e-learning, and (b) participants’ perceptions of the effectiveness of traditional lectures.

Analysis of the questions resulted in a total of six themes, which are delineated based on the two elements. A combination of direct quotes and paraphrased statements are used to support each theme. The themes are summarized in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Question elements</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Participants’ perceptions of the effectiveness of classroom situated e-learning</td>
<td>Theme 1. Problem-based or case-based learning</td>
</tr>
<tr>
<td></td>
<td>Theme 2. Access to an expert</td>
</tr>
<tr>
<td></td>
<td>Theme 3. Interactive or active learning</td>
</tr>
<tr>
<td></td>
<td>Theme 4. Small-group learning</td>
</tr>
</tbody>
</table>
Element a: Participants’ perceptions of the effectiveness of classroom situated e-learning. All participants reported that their experiences with classroom situated e-learning were effective, and it increased their knowledge in at least two core competencies. One participant named increased knowledge in three core competencies, one named increased knowledge in five core competencies, and one participant reported increased knowledge in all six core competencies. In addition, all participants reported that classroom situated e-learning was a positive learning experience. Participants described classroom situated e-learning using phrases such as “it’s actually quite effective,” “it was beneficial,” “they were great,” and “good way to present the material.”

However, despite the participants overall positive perception of classroom situated e-learning six participants commented on ways the experience could be improved. There were several comments related to the design of the computer module. Participant 1 wanted to have control of the computer module, instead of the facilitator: “There were times when I felt like I wanted to drive … I wanted to be the one clicking and looking, and exploring it a little bit more on my own.” Participant 7 commented on the use of the module as a group experience: “The format kind of threw me, because it was … like a lot of learning modules that we do independently.” There was criticism related to the structure of the experience. Participant 3 would have liked the ability to provide responses privately rather than in front of the whole group. Participant 6 suggested the content be introduced in a different format, and the group format be used as
a follow-up learning experience. Participant 1 said the facilitation could be improved, stating that the educator was “giving away too much too early on.”

Theme 1 was problem-based or case-based learning. Six participants commented on the benefits of the use of problem-based or case-based learning in classroom situated e-learning. However, the participants had differing reasons as to why they found this effective. Some participants provided a broad statement saying that case-based learning is how they prefer to learn. Participants reported that case-based education helped make the content more memorable and useful. Participant 2 said, “Show me a patient, tell me why their symptoms … should be perking up my ears towards a rheumatologic diagnosis … then I feel like it’s very, very useful and I can take something away.” Participant 7 found the problem-based learning beneficial because it put the content into a real world context: “Seeing and hearing how it would be described clinically is helpful because that’s how you’re going to see it when you’re in practice and how you’re going to see it in the notes from other providers.” Participant 8 said that the case-based learning required her to think through her decisions: “When you are told the answer, you think, that makes sense to me, but if you have to explain why it makes sense, I think it’s much more effective, so I liked the cases for that reason.”

Theme 2 was access to an expert. Five participants shared their belief that having access to an expert was a positive aspect of classroom situated e-learning. Each session was facilitated by a rheumatology doctor or a rheumatology fellow. In addition, the e-learning modules included electronic feedback from a doctor, provided after participants made decisions about the case. The participants appreciated the additional information the experts were able to provide, and their willingness to answer questions. Participant 4
said, “I think it was really nice to have the specialist, the person who knows everything about JA [juvenile arthritis] there, that can answer the questions.” Participant 3 appreciated the unique combination of access to a live doctor or fellow and feedback from an onscreen doctor.

Theme 3 was interactive or active learning. Four participants reported the use of interactive or active learning as a positive component of classroom situated e-learning. The participants provided different reasons for why they found it effective. Participants said the interactive nature of the learning experience maintained their interest and attention. Participant 5 found that the active learning supported connections between the content being presented and other aspects of medical care. Participant 9 reported that the discussions were effective because they were “actively engaging.” Participant 4 said the active learning was effective because it made her “apply the knowledge.”

Theme 4 was small-group learning. Four of the residents found the small-group setting of classroom situated e-learning to be beneficial. The typical classroom situated e-learning session was made-up of four residents, a rheumatology doctor or fellow, and the rheumatology education specialist. The participants reported that the small-group experience allowed everyone to take part in the discussion. Participant 2 said:

I think that the strength was the small-group, and having a facilitator and four or five residents discussing whereas if you had a large group and maybe one or two faculty it might get diluted out a little bit, because everyone would have their opinion, or the seniors would dominate, and the med students would be quiet. Participant 7 said the small-group setting gave her the opportunity to learn from her peers. Participant 9 appreciated the unique opportunity of learning in a small-group
setting: “I liked it … I think part of the reason is because it was a smaller group … which we don’t get a lot of in residency, and so I enjoyed that aspect of it.”

In addition to the four themes, nine other effective elements were named by three or fewer participants. Three participants spoke positively of the opportunity to make decisions during the learning experience. According to Participant 8, “Making and explaining decisions increases your learning because you commit to a decision, making sure that you have the information you really want to make that decision, which then makes you more accountable and responsible for the decision.” Providing new information, providing immediate feedback, and mimicking real life, were effective elements of classroom situated e-learning each named by two participants. Participant 9 said:

When you threw out a test you would say, well I think we should get CBC [complete blood count] because this could be a sign of infection, sort of the way we actually work on the ward when we’re considering doing tests … we want to have a reason behind it.

Pictures and graphics, a safe environment, applicable content, organization of content, and adapting to learner needs were each named by one participant as an effective element of classroom situated e-learning. Participant 5 said, “If there were certain things that the group seemed to get as a whole we could kind of gloss over things then focus on our knowledge gaps and things that we needed help with.”

**Element b: Participants’ perceptions of the effectiveness of traditional lectures.**

The participants named six different lectures when asked to provide an example of an effective lecture in their residency program. Two participants chose a lecture that
occurred during Grand Rounds, which happened in a formal setting in a large auditorium, and were open to all hospital employees and visitors. Grand Rounds were offered once a week. Four residents chose a lecture that occurred during noon conferences. Noon conferences occurred in a setting that allowed the lecturers more flexibility in how the content was presented, were held in a smaller less formal space, and during the residents’ lunch time. Noon conferences were offered to residents and medical students. Three participants were unable to name an effective lecture. Table 2 shows the participants’ choice for an effective traditional lecture.

Table 2

Participant Named Effective Lectures

<table>
<thead>
<tr>
<th>Participant</th>
<th>Year of residency</th>
<th>Type of effective lecture</th>
<th>Increased core competency</th>
<th>Lecture topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>Could not name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>Could not name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Grand rounds</td>
<td>2, 5</td>
<td>Kawasaki’s disease</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Noon conference</td>
<td>2</td>
<td>ICU management</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Could not name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Noon conference</td>
<td>1, 3</td>
<td>Outpatient clinics</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Noon conference</td>
<td>1, 2</td>
<td>Constipation</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Grand rounds</td>
<td>1, 2, 4</td>
<td>Pneumonia</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>Noon conference</td>
<td>1, 2, 6</td>
<td>Antibiotics</td>
</tr>
</tbody>
</table>

Note. Core Competencies are the following: 1-patient care, 2-medical knowledge, 3-interpersonal and communication skills, 4-professionalism, 5-practice based learning, 6-systems based practice.
When describing their overall perceptions of traditional lectures two insights emerged from the participants’ responses: lectures have the potential to be beneficial and lectures are not the best way for me to learn. Six participants stated that lectures have the potential to be beneficial. Participant 3 said, “Sometimes … you don’t know anything about the subject, you need some lectures just to get a baseline fund of knowledge.” However, four participants said lectures were not the best way for them to learn. Participants sited reasons that included an inability to pay attention for an hour-long lecture, and an inability to remember content taught through a lecture. Participant 5 stated, “I would rather not sit through them … I would rather be doing something.”

Theme five was practical or applicable content. Eight participants found traditional lectures to be effective when the content was practical or applicable. Participants had differing reasons for why they believed this was important. Some participants reported that practical content was useful and relevant to their daily work as doctors. Participants said that applicable content increased their motivation to pay attention and their ability to focus on the content. Participant 7 made this point through an example of an ineffective lecture: “It was just information that I knew I wasn’t going to apply to my practice, so I had no real motivation to actively listen.” Participant 4 said applicable content was more memorable. Participant 6 said it was “easier to follow.” Participant 9 said practical content made the experience more engaging and was a better use of residents’ limited time.

Theme six was an engaging educator. Five participants found traditional lectures to be effective when presented by an educator with an engaging personality. The participants said that lecturers with an engaging personality were able to hold their
interest and attention. Participant 9 said, “She was quite humorous so it interspersed humor within it which kind of kept people interested.” Many of the comments were related to an ineffective lecture, and an educator that was not engaging. Participant 2 described an ineffective lecturer:

The one where … it’s a power point or something that’s completely read from top to bottom … at that point I should just have the books open and I could probably read faster than they could read it to me, so those are the ones I don’t like.

In addition to the two themes, seven other effective elements were named by three or fewer participants, and did not constitute a theme. New or interesting content, problem or case-based learning, and pictures, graphs or algorithms were each named by three participants as an effective element of traditional lectures. Participant 2 said, “I think that’s what we’re there for, is to treat patients, so I think the lecture should have patient’s involved.” Appropriate length, and content at the learner’s level, were each named by two participants as effective elements of traditional lectures. Participant 1 said, “I have a hard time sitting through any one hour lecture, even if it is practical, I start to zone out … 30 minutes is pretty much my max.” Concise and well organized content, an educator with expertise on the topic, and content that generates ongoing conversation after the lecture were each mentioned by one participant as being effective elements of traditional lectures.

**Research Question 2.** How do residents perceive the interaction (between the student and the content, the facilitator or instructor, and other students) in classroom situated e-learning and traditional lectured based learning? This question has two elements (a) participants’ perceptions of the interactions in classroom situated e-learning,
and (b) participants’ perceptions of the interactions in traditional lectures. In addition, each element was divided into the three types of interaction, between the learner and the content, the learner and the educator, and the learner and other learners. Analysis of the residents responses to this question resulted in a total of seven themes, which are delineated based on the two elements of the question, and the three types of interaction. A combination of direct quotes and paraphrased statements are used to support each theme. The themes are summarized in Table 3.

Table 3:

*Thematic Results of Research Question 2*

<table>
<thead>
<tr>
<th>Type of Interaction</th>
<th>Element (a)</th>
<th>Element (b)</th>
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<tbody>
<tr>
<td></td>
<td>Participants’ perceptions of the interaction in classroom situated e-learning</td>
<td>Participant’s perceptions of the interactions in traditional lectures</td>
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<thead>
<tr>
<th>Type 1</th>
<th>Content Interaction</th>
<th>Theme 1. Discussion</th>
<th>Theme 2. Through the computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2</td>
<td>Educator Interaction</td>
<td>Theme 3. Providing practical or real world content</td>
<td>Theme 4. Asking questions of the educator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Theme 5. Feedback from the educator</td>
<td>Theme 7. Asking questions of the educator</td>
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<table>
<thead>
<tr>
<th>Type 3</th>
<th>Learner Interaction</th>
<th>Theme 6. Discussion</th>
</tr>
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**Element a: Participants’ perceptions of the interactions in classroom situated e-learning.**

*Interaction Type 1: Interaction between the learner and the content.* All participants stated at least one way they interacted with the content during classroom
situated e-learning. Most of the residents described their interactions with the content in a neutral way. Three residents described their interaction with the content as being positive, and there were no negative descriptions of interaction with the content. Participant 2 gave a sample expression of a positive interaction: “I benefitted from seeing the content … with the presentation and hearing it, also getting to discuss it, and have a facilitator there to help say well why would you want this, and hear something that you didn’t think about.”

Theme 1 was discussion. The first theme regarding interaction with the content, and noted by six participants, was discussion. Participants said discussion occurred among the residents, and with the residents and the facilitating doctor or fellow. Participants also said discussion was used to make a decision, or answer a question regarding the content. Participant 6 said, “A question would come up, it was usually what would we do next, or how would you go with your differential [diagnosis possibilities] … and we would talk and sort of discuss … why we thought a certain thing would fit.”

Theme 2 was through the computer. The second theme for interaction with the content was through the computer, or the information that was presented on the screen. Classroom situated e-learning combined face-to-face learning with content presented via a computer based module, projected onto a screen at the front of the room. Four participants named this type of interaction. Participants said they interacted with the content through the case that was presented in the computer module. Participant 9 stated, “Sort of the layout of the cases themselves … how they would give you the opportunity to pick certain tests, or not pick certain tests.” Participant 5 said interaction with the
content occurred through the participant’s ability to access additional information available within the computer module.

Participants also noted an additional eight ways they interacted with the content, although they were mentioned by three or fewer participants, and did not constitute a theme. Three participants said through an expert. According to Participant 1, “I think he was able to provide us with some facts, and some basic practical information I don’t think we would have otherwise known.” Feedback, reading, listening, summarizing of the content, and answering questions asked by the educator or expert, were each named by two participants. One participant named interacting with the content through images, and one participant said interaction occurred through a case-based experience.

*Interaction Type 2: Interaction between the learner and the educator.* Eight of the nine participants named at least one form of interaction with the educator during classroom situated e-learning. Six participants described their interaction with the educator as being positive. There were no negative statements, and two participants described their interactions in a neutral way. Participant 7 provided a sample expression of a positive comment: “I think it increased my satisfaction because she gave perspective on what actually occurs in a clinical setting.”

Theme 3 was *providing practical or real world content.* This theme was for interaction between the learner and the educator and was found in the responses of five participants. The participants appreciated the doctor or fellow’s overall experience and knowledge regarding the content. They also noted the benefit of hearing what occurs in a rheumatology clinic setting, and what type of information the rheumatologist would want from a referring pediatrician. Participant 5 said, “I think she was able to bring her [the
educator/doctor] knowledge and her own personal experience, her own clinical decision-making.” Participant 7 said, “It was nice that she [the educator/doctor] was there to say yes this is actually what we do in our clinic, and this is what we would actually expect the primary care provider to do.”

Theme 4 was asking questions of the educator. This theme for interaction between the learner and the educator was found in the responses of five participants regarding classroom situated e-learning. They appreciated the doctor or fellow’s willingness to attend a resident training and to answer any questions posed by the residents. Participant 6 believed that asking questions improved learning: “If she hadn’t been able to answer those questions immediately, we would have either forgotten about them or had to go try to look them up later, so it was easier.” Participant 6 also noted the ability to individualize the learning by asking questions of the educator: “I know I had some questions that came up that weren’t necessarily kind of prompted by the slides but were related and so she was also available for those questions.”

Theme 5 was feedback from the educator. This theme is for interaction between the learner and the educator. Four participants said receiving feedback from the educator was a form of interaction that occurred during classroom situated e-learning. The participants appreciated that the doctor or fellow allowed them to have a discussion, and make a decision, before providing feedback. Participant 2 said, “They would kind of hold their opinion back until we got the answer and they would talk about … what they might do … or the art of medicine in rheumatology.” Participants commented that the feedback the facilitator provided was about the participant’s decision-making process, not just their final decision. Participant 7 described the interaction by saying, “She gave us
feedback on our train of thought and our clinical decision-making, which was good because that’s what we actually need.”

The participants also named an additional three ways they interacted with the educator in classroom situated e-learning, although they were mentioned by three or fewer participants and did not constitute a theme. Two participants named facilitating, or guiding the conversation, as a form of interaction. One participant named being asked questions by the educator, and one participant called the educator’s ability to put the residents at ease, so he felt comfortable participating, a form of interacting with the educator.

**Interaction Type 3: Interaction between the learner and other learners.** Seven of the nine participants described a form of interaction with other learners, in classroom situated e-learning. All seven participants made at least one positive remark regarding their interaction with other learners, and none of the participants had a negative statement. Participant 9 provided a sample expression of a positive perspective by stating, “I thought the stops during it that allowed you to sort of reassess where you are and engage in conversation with your peers was effective.”

Theme 6 was **discussion.** Discussion was the theme for interaction with other learners in classroom situated e-learning, found in the responses of six participants. The participants said they found sharing ideas with other learners to be beneficial. Participant 9 said, “Instead of just throwing out get this test, this test, this test … if you’re concerned with JIA [juvenile idiopathic arthritis], we actually had to talk about … why would you get that , and so I thought that was effective.” Participant 4 said discussion with other learners increased memorability of the content. Participants said discussion with their
peers increased their learning. According to Participant 6, “It always helps me to … say well what were you seeing that I wasn’t seeing.” Participant 7 enjoyed having the opportunity to hear other residents’ opinions and perspectives.

The participants also named an additional two ways they interacted with other learners, although they were mentioned by three or fewer participants and did not constitute a theme. One resident mentioned problem solving as a form of interaction. One resident said the good-natured attitude of the other learners was a form of interaction.

**Element b: Participants’ perceptions of the interactions in traditional lectures.**

Participants were also asked to describe the interactions they experienced during the traditional lectures they described as effective, and those they named as ineffective.

*Interaction Type 1: Interaction between the learner and the content.* Eight of the nine participants provided at least one form of interaction with the content. However, there was no theme for this type of interaction in traditional lectures. Although the participants shared five different types of interaction, each was stated by three or fewer participants. The majority of the statements, regarding interaction with the content, were neutral, with two positive comments, and one negative comment. Participant 7’s positive comment was, “He did incorporate some images and x-rays and things like that, which was nice, to kind of break up the words and give us a real example of … what things look like.” Participant 1 had a negative comment regarding interaction with the content in an ineffective lecture. “It’s usually him just talking and that’s probably part of it, that he doesn’t really use power point or seem to have any organized or coherent lesson that he’s trying to get through.”
Three residents named interacting with the content through pictures, graphics, or a visual presentation as an effective component of traditional lectures. Three residents described actively engaging with the content as a form of interaction. Participant 2 described his thoughts on lectures that lack engagement with the content: “There’s no reason for me to pay attention if I am not being … interacted with.” Two residents shared asking questions of the educator as a form of interaction with the content. One participant named answering questions asked by the educator, and one participant named discussion as a form of interaction with the content, in an effective traditional lecture.

Interaction Type 2: Interaction between the learner and the educator. All nine participants named at least one form of interaction with the educator in traditional lectures. Five participants shared a positive comment regarding their interaction with the educator, one resident had a negative comment, and three residents stated neutral comments. Participant 9 shared a positive comment, “She created a very safe learning environment, made what a lot of people would consider a dull topic, made interesting and fun.” One participant had a negative comment. Participant 5 described his interaction with the educator in an ineffective traditional lecture:

There are [questions] at the end but by that time you’re already thinking I’ve got to get to rounds … don’t want to prolong this anymore, you forgot because it was like 30 minutes ago when you thought of the questions … it made it very unsatisfactory.

Theme 7 was asking questions of the educator. Analysis of the data revealed one theme for interacting with the educator in a traditional lecture. Participants said they appreciated an educator’s willingness to take time to answer their questions. Participant
4 described it by stating, “I think the fact that she was willing to explain things if we didn’t understand them perfectly, explain them again, or give us a better answer for what we should have done, I think that all helps.” This form of interaction was also considered a way to increase participant knowledge, and one participant shared that a question asked by one resident is usually a question that others have as well. Participant 8 said:

We actually talked about this today because at the end of morning report a lot of people missed the question portion of the lecture and today we talked about how a lot of times, some of the questions that come up are actually questions everyone had.

The participants also shared an additional four forms of interaction with the educator in traditional lectures, each of which was stated by three or fewer participants, thereby not constituting a theme. Three residents described being asked questions by the educator as a form of interaction. Participant 2, said, “It’s easier to pay attention when they’re asking questions and asking you to participate.” Two participants said an educator with an engaging personality was a form of interaction. Facilitating a discussion was mentioned by one participant, and creating a safe learning environment was shared by one participant.

*Interaction Type 3: Interaction between the learner and other learners.* One of the nine participants described a form of interaction with other learners in traditional lectures. This did not constitute a theme because it was stated by fewer than three participants. The comment was neutral in tone. Participant 4 named discussion as a form of interaction. He said, “I think if I didn’t think of something they could explain it to me, why they thought that, or what they would have done.”
Evaluation of Findings

The purpose of this qualitative study was to discover medical residents’ perceptions of the effectiveness and use of interactions in classroom situated e-learning, and traditional lectures for medical education. The two research questions, each divided into two sub-elements, provided the guiding structure for the interview questions. The participants’ responses were analyzed using the phenomenological approach, and the framework of adult learning theory. Analysis of the data revealed 13 themes. The literature review showed a gap in information regarding the use of blended learning for resident education (Gray & Tobin, 2010; Lewin et al., 2009). This study helped to fill that void by capturing participants’ first hand perspectives of a blended learning program, in addition to their perceptions of the traditional lectures typically used for resident education (Robertson et al., 2009). This study serves as a contribution to the literature by identifying participants’ preferences for learning and the type of learning they find effective. This information could be used to inform resident educators searching for more effective ways to educate residents (Robertson et al., 2009).

Residents are considered adults, when using the biological, social, and legal definitions for adulthood (Knowles et al., 2005). Some medical educators acknowledge the potential value of using adult learning theory for medical education (Allevi & Lane, 2010; Das et al., 2008). Other medical educators believe residents familiarity and comfort with pedagogy supports the continued use of this type of learning experience for medical education (Klein & Schipper, 2008, Stratman et al., 2008).

Research Question 1. How do residents perceive the effectiveness of (a) classroom situated e-learning and (b) traditional lecture based learning? Classroom
situated e-learning, according to the instructional designer who created it, was based on adult learning theory. Traditional lectures are based on pedagogy (Stratman et al., 2008). The definition used for effective, for this research, was education that increased residents’ knowledge in at least one of the six ACGME core competencies. This definition was chosen because residency program directors are charged with ensuring their programs provide residents with learning experiences that result in achievement of each of the core competencies (Accreditation Council for Graduate Medical Education, 2007). All nine participants in this research stated they experienced increased knowledge in at least two of the core competencies, as a result of participating in classroom situated e-learning. Six participants provided an example of an effective traditional lecture. Those six participants stated they experienced increased knowledge in at least one core competency as a result of participation in the traditional lecture.

Lectures are the traditional format used for medical education (Robertson et al., 2009), and are typically based on pedagogical principles (Stratman et al., 2008). However, traditional lectures may not be the most effective choice. An increase in the six core competencies can only be accomplished if residents attend and participate in the education being offered to them. Resident satisfaction with a learning experience has been shown to increase the likelihood that the residents will participate and learn from the experience (Hartzell, Veerappan, Posley, Shumway, Durning, 2009). The participants in this research were asked their opinion regarding the effectiveness of classroom situated e-learning and traditional lectures. All nine participants stated they found classroom situated e-learning, an experience based on adult learning theory, to be a positive learning experience. Six participants reported their belief that traditional lectures, based on
pedagogy (Stratman et al., 2008), can be beneficial. Four participants noted that lectures are not the best way for them to learn. In addition, all nine participants shared how they prefer to learn, and one participant named a traditional lecture.

Comfort and familiarity is one of the reasons given for residents’ presumed preference for lecture based learning (Klein & Schipper, 2008). However, only three of the participants in this research made mention of lectures as a form of education with which they have comfort and experience. According to Participant 7, “I think they’re fine …it’s what I’m used to so … I learn well with them obviously or else I probably would not have gotten this far.” None of those participants, however, said it was their preferred way of learning, and two of the participants mentioned their belief that there were better ways for them to learn. Participant 5 described a level of comfort with traditional lectures: “Definitely I think in medical school it was more lecture format, and I think that’s just the way my brain worked at that time, so I was used to it.” However, Participant 5 went on to describe a change in how he currently prefers to learn: “Now it’s more on the fly, I think it’s more time, and plus I won’t be listening … if it’s not applying directly to my care and my scope of practice.”

Residents’ preference for education based on adult learning theory is supported by other research as well. Dermatology residents, from 40 different programs, completed a learning style inventory which included 12 passive pedagogical learning styles and 23 active adult learning styles. The survey received a 68% response rate. The results revealed that the residents had a significantly higher preference for the active, adult learning activities. The three activities that received the highest overall rating were:
hands-on and direct experience, addressing patient problems, and teaching/explaining to others (Stratman et al., 2008).

Educators in a residency program noted the need to evaluate all of their educational programming’s ability to meet learning goals, in light of resident work hour restrictions (Hartzell et al., 2009). They revamped their journal club, one component of their resident education, using the principles of adult learning theory. Residents were asked to complete a survey regarding the new format. There was an 87% response rate to the survey, and all of the residents who responded reported preferring the new format (Hartzell et al., 2009).

**Element a: Participants’ perceptions of the effectiveness of classroom situated e-learning.** Analysis of the data resulted in four themes, for element a, of the first research question. The four themes addressed participants’ thoughts on what made classroom situated e-learning effective. The themes were: (1) problem based or case based learning, (2) access to an expert, (3) interactive or active learning, and (4) small group learning. Three of the themes correlated with at least one of the assumptions of the andragogical model, Knowles’ model of adult learning theory (Knowles et al., 2005).

Theme 1 was *problem-based or case-based learning.* Problem-based learning correlated with the andragogical assumption “orientation to learning” (as cited in Knowles et al., 2005, p. 67), which was described as the adults desire to learn in ways that match how they will use the information in real-life, with adults preferring problem-based, or case-based learning experiences (Knowles et al., 2005). Participant 6 described the benefit by stating, “Now if I ever get a case… I can at least think back to that hypothetical case and sort of run through … the presentation … the treatment … that was
helpful to me.” Participants reported that they valued this type of learning because it was how they prefer to learn, made the content more memorable and useful, and put the content into a real world context. The participants’ preference for learning content that can be applied in a real world context correlated with the andragogical assumption “readiness to learn” (as cited in Knowles et al., 2005, p. 67), which is described as the adult students desire to learn information that they can apply in their real lives (Knowles et al., 2005).

Educators, in a surgery program for residents, also found success with the use of problem based learning in small groups (Nguyen et al., 2006). Following participation in the program, residents were asked to complete a survey comparing the new problem based format with traditional large group experiences. Of the residents who responded, 64% chose the option agree or agree strongly when asked if the small group, problem-based format was preferable. In addition, the residents’ scores on the American Board of Surgeons In-Training Examination increased by 10% following the implementation of the new format (Nguyen et al., 2006).

Theme 3 was interactive or active learning. The participants said they found interactive or active learning in classroom situated e-learning to be beneficial because it maintained their interest and attention, was actively engaging, and allowed them to apply their knowledge. They also reported that it allowed them to connect the new content they were learning with their current medical knowledge. The connection to other medical knowledge correlated with the andragogical assumption “the need to know” (as cited in Knowles et al, 2005, p. 64), which is described as the adult learners desire to know why they should learn new content, and supporting the learner in seeing how the new content
fills a gap in their current knowledge (Knowles et al., 2005). Participant 5 said active learning, “Helps me put things together, makes connections.”

Theme 4 was small-group learning. Participants said learning in a small group in classroom situated e-learning was beneficial because it allowed all of the residents to take an active role in the experience, and it allowed the participants to learn from their peers. This correlates with the andragogical assumption “the role of the learners’ experiences (as cited in Knowles et al., 2005, p. 65), which refers to an understanding that adults, unlike children, come to a class with a wide array of previous experiences and knowledge, which should be valued by the educator, and incorporated into the learning experience (Knowles et al., 2005). Participant 7 described it by saying, “You did have the feedback from the other learners and you could say … I had never thought of that.”

Element b: Participants’ perceptions of the effectiveness of traditional lectures. Analysis of the data resulted in two themes, for element b, of the first research question. The two themes addressed participants’ thoughts on what made traditional lectures effective. The themes were: (5) practical or applicable content and (6) an engaging educator. One of the themes correlated with one of the assumptions of the andragogical model, Knowles’ model of adult learning theory (Knowles et al., 2005).

Theme 5 was practical or applicable content. The participants said this was effective, when used in traditional lectures, because it: was relevant to their daily work, increased their motivation to pay attention, made the content more memorable, made the lecture easier to follow, and made the lecture more engaging. The participants’ preference for practical or applicable content correlated with the andragogical assumption “readiness to learn” (as cited in Knowles et al., 2005, p. 67), or the adult learners need for
content that they can apply in their real lives (Knowles et al., 2005). Resident 7 cited practical content when she described why a lecture on constipation was effective. “The content, the applicability to my patients, the frequency that we see that too, it seems like every kid is constipated.”

The participants showed an overall preference for classroom situated e-learning, based on adult learning theory. In addition, the themes that resulted from analysis of the participants’ responses further supported their predilection for education that is based on adult learning theory. Participants’ responses to the first research question resulted in six themes, and of those themes, four correlated with at least one of Knowles’ andragogical assumptions (Knowles et al., 2005). Some of the participants agreed that the traditional lecture is familiar, and they have had success with the learning format. However, all of the participants stated that classroom situated e-learning was a positive learning experience. The participants showed particular interest in education that incorporates their previous knowledge and experience, focuses on content that can be used in daily work, and uses a format that mimics how the content will be used in real life. The findings emphasize the potential importance of using adult learning in creating effective resident education. This information could inform educators in other residency programs, searching for how to best educate their residents (Nguyen et al., 2006; Robertson et al., 2009), within the shortened amount of work hours required by officials of the ACGME (Accreditation Council for Graduate Medical Education, 2003).

**Research Question 2.** How do residents perceive the interaction (between the student and the content, the facilitator or instructor, and other students in (a) classroom situated e-learning and (b) traditional lectured based learning? The definition of
interaction, for the purpose of this study, was defined by Moore (1989). Analysis of this research question was divided by the two elements within the question, and each element was divided by the three types of interaction. Analysis of the data revealed seven themes. Six themes were regarding classroom situated e-learning, one theme was regarding traditional lectures.

Interaction Type 1: Interaction between the learner and the content. Interaction between the learner and the content is considered to be the core of learning. This critical interaction must take place for learning to occur (Moore, 1989). The participants in this study concurred, placing a high value on interaction with the content. The participants were asked to share the importance of the three types of interaction for their learning. Eight of the nine participants shared their perceptions. Six participants said interaction with the content was most important. According to Participant 6, “I think right now interacting directly with the content … the resident/content has been definitely where… I’ve learned the most since I’ve gotten here.” Participant 7 concurred and shared, “When you’re learning the most important interaction is between you and what you’re trying to learn.”

When asked to share how they interacted with the content, nine residents named at least one type of interaction for classroom situated e-learning. Eight residents named at least one type of interaction with the content for traditional lectures. Data analysis revealed two themes for interaction with the content during classroom situated e-learning. Those themes were (1) discussion and (2) through the computer. Data analysis resulted in no themes for interaction with the content in traditional lectures.
Researchers have shown discussion as an important option for interaction with the content. A simulation training for surgical residents revealed that the experience resulted in an increase in resident knowledge and residents’ perceived ability to care for their patients. The residents also reported that the most helpful aspect of the simulation was the group discussion among the educator and fellow residents (Popp et al., 2012).

*Interaction Type 2: Interaction between the learner and the educator.* Although not as critical to the learning process as interaction with the content, interaction with the educator is typically of high importance to educators, and is often a desired form of interaction by learners (Moore, 1989). This form of interaction was named as most important by two of the participants. Eight of the participants shared at least one way they interacted with the educator in classroom situated e-learning. All nine of the participants shared at least one form of interaction with the educator that they either experienced in effective traditional lectures, or that was missing from an ineffective lecture.

Data analysis revealed three themes for interaction with the educator during classroom situated e-learning. Those themes were (3) providing practical or real world content, (4) asking questions of the educator, and (5) feedback from the educator. Data analysis resulted in one theme for interaction with the content in traditional lectures, (7) asking questions of the educator. This is the one form of interaction where there was an identical theme in both classroom situated e-learning and traditional lectures. In addition, this is the one form of interaction where a theme emerged for traditional lectures.

Other research supports the idea that while residents value interaction with the educator they have differing opinions on their preference for how the interaction should
occur. Focus groups were conducted with residents to determine their perceptions of effective teaching. All of the residents noted the value of the relationship between the learner and the educator during education. The senior residents reported a preference for their interaction with the educator to be conversational and discussion focused, rather than presentation driven. The junior residents shared a desire for positive interactions with the educator (Kisiel, Bundrick, & Beckman, 2010).

Theme 5 was feedback from the educator. Feedback from the educator was a theme, named by four participants, as a form of interaction experienced in classroom situated e-learning. This form of interaction coincides with the value that Moore (1989) placed on feedback from the educator, noting the educator has the ability to assess students in a way that students are unable to do on their own. Participant 9 shared:

I think it just provided a nice context … because if we were totally off base on something, or if something we picked seemed really right to us but didn’t pan out… they would be able to provide some background information about why, or what we might be thinking.

Surgery residents concurred, placing value on feedback from the educator. The residents, who participated in a surgery simulation experience, named feedback after the simulated training as one of the most valuable components of the educational experience (Popp et al., 2012).

Interaction Type 3: Interaction between the learner and other learners. The third type of interaction is between the learner and other learners. Although this type of interaction is often considered less important than the other two it can be a valuable asset to learners. The value of learner and learner interaction is often related to the content, the
age, and autonomy of the learner, and the forms of interaction that occur between learners (Moore, 1989). Two of the participants named this form of interaction as most important to their learning, with one of those residents saying interaction with the educator and interaction with other learners were of equal importance.

Other researchers have found value in the interaction between learners in educational activities (Edginton & Holbrook, 2010). A blended learning course on pharmacokinetics for pharmacy students consisted of online modules and face-to-face tutorial sessions. Through a post course questionnaire students reported that they found interaction with their fellow students, as well as the educator, to be either a moderate or a great amount of help with their learning. In addition, the students’ most common response regarding the least effective aspect of the course was the lack of face-to-face interaction with other students and the educator (Edginton & Holbrook, 2010). In the previously mentioned research, concerning the effectiveness of small-group sessions using problem-based learning, learner interaction was an unanticipated positive outcome. Of the participating residents, 82% agreed or strongly agreed that the small-group experience improved interactions with other learners (Nguyen et al. 2006).

Interaction between learners had the most agreement among the participants, but had the fewest number of responses. Seven participants named at least one form of interaction between learners in classroom situated e-learning, one participant provided an interaction with other learners in traditional lectures. Data analysis revealed one theme for interaction with other learners during classroom situated e-learning. The theme was (6) discussion. One participant named a form of interaction with other learners during traditional lectures, and that form was discussion.
Other research showed residents preference for learning through discussion. In the earlier mentioned resident simulation training the residents noted that discussion with other learners, during the debriefing, was one of the most helpful features of the experience (Popp et al., 2012). Research was conducted to test the effectiveness of the resident’s use of IPods to access recorded noon conferences (Tempelhof et al., 2009). Given residents’ hectic schedules and pages that interrupt noon conferences, it was anticipated that access to a recorded version of the noon conferences would be beneficial. The control group attended five live conferences while members of the intervention group accessed the conferences through an IPod. Quiz results on the content taught in each lecture revealed no significant difference in knowledge learned between groups. However, depending on the lecture, between 40% and 75% of the residents believed there were secondary gains from attending the live conference, which were interaction with the lecturer and with colleagues (Tempelhof et al., 2009).

These findings show the value the participants placed on interaction with the content, which matches Moore’s (1989) description. However, the findings of this research also show an emphasis on interaction through some type of discussion, which was a theme found for all three forms of interaction. Discussion was specifically named as a theme for interaction with the content and with other learners. Discussion could also be implied in one theme for interaction with the educator; asking questions of the educator. Understanding the perceptions of the participants, and their preference for discussion as a form of interaction, may allow resident educators to better meet the learning needs of residents in other residency programs.
Summary

This purpose of this research was to explore participants’ perceptions of their lived experiences in classroom situated e-learning and traditional lectures. The research specifically looked at their perceptions of the effectiveness of the two forms of education, and the interactions they experienced in both forms of education. All of the participants had experienced both traditional lectures and classroom situated e-learning prior to participating in the research. The research was conducted using a qualitative, phenomenological approach.

Effectiveness was defined as an increase in knowledge in at least one of the ACGME six core competencies. The competencies are: “patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice” (Antiel et al., 2011, p. 185). Resident achievement of all six competencies is a requirement for resident education programs (Accreditation Council for Graduate Medical Education, 2007).

The first research question was used to understand participants’ perceptions of the effectiveness of classroom situated e-learning and traditional lectures. All nine participants reported increased knowledge in at least two core competencies as a result of participating in classroom situated e-learning. Six participants reported an increase in knowledge in at least one core competency, as a result of participating in an effective traditional lecture.

The first research question was divided into (a) effectiveness of classroom situated e-learning and (b) effectiveness of traditional lectures. Analysis of the data revealed four themes regarding effective aspects of classroom situated e-learning: (1)
problem-based or case-based learning, (2) access to an expert, (3) interactive or active learning, and (4) small-group learning. Data analysis revealed two themes concerning participants perceived effective aspects of traditional lectures: (5) practical or applicable content, (6) and an engaging lecturer. Participants self-reported positive outcomes, and preference for classroom situated e-learning, adds a new dimension to the possible effective educational options available for use and for research in resident education. These findings support the need for research that explores new ways to provide resident education (Tempelhof et al., 2009), and the use of blended learning for resident education (Lewin et al., 2009).

The second question was used to learn participants’ perceptions about their interactions in classroom situated e-learning and traditional lectures. Interaction in education was based on Moore’s (1989) description of three types of interaction; with the content, with the educator, and with other learners. The second research question was divided into (a) classroom situated e-learning, and (b) traditional lectures, which were each further divided by the three types of interaction. When describing classroom situated e-learning, the two themes revealed by data analysis, for interaction type 1 (interaction with the content) were (1) discussion and (2) through the computer. The three themes named for interaction type 2 (interaction with the educator) were: (3) providing practical or real world information, (4) asking questions of the educator, and (5) feedback from the educator. The one theme named for interaction type 3 (interaction with other learners) was (6) discussion. There was no theme for interaction type 1 (interaction with the content) during traditional lectures. The one theme for interaction
type 2 (interaction with the educator) was (7) asking questions of the educator, and there was no theme named for interaction type 3 (interaction with other learners).

Evaluation of the findings revealed the participants preference for education that is based on adult learning theory. All nine participants found classroom situated e-learning, based on adult learning theory, to be effective. Six of the nine participants were able to name an effective traditional lecture, which are based on pedagogy (Stratman et al., 2008). Four of the six themes addressing residents’ perception of the effectiveness of classroom situated e-learning and traditional lectures can be correlated with at least one assumption of the andragogical model, Knowles’ model of adult learning theory (Knowles et al., 2005).

When asked the most important form of interaction, for their own learning, six participants chose interaction with the content, two chose interaction with the educator, and one chose interaction with other learners. This matches Moore’s (1989) description of the importance of the three types of interaction. The data analysis revealed seven themes for interaction in classroom situated e-learning and traditional lectures. However, when looking across the three types of interaction and the two types of learning formats, discussion stood out as a preferred form of interaction.
Chapter 5: Implications, Recommendations, and Conclusions

Restrictions in resident hours (Accreditation Council for Graduate Medical Education, 2011), and a highly demanding schedule, have limited the time residents have available to participate in medical education (Baker et al., 2010). Innovative educational options are needed to enable residency program educators to meet the educational needs of residents within the hours they have available for educational activities (Tempelhof et al., 2009). In addition, research regarding the use of blended learning in medical education is needed, to see if it can be an effective option (Gray & Tobin, 2010). Also, insight into residents’ perceptions about educational options is essential for gaining a fuller understanding of their potential benefits for resident education.

The purpose of this qualitative research was to understand how residents perceived the effectiveness and use of interactions, in classroom situated e-learning and traditional lectures. For this research, effective education was defined as education that increased the residents’ knowledge in at least one of the ACGME six core competencies. The competencies are: “patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice” (Antiel et al., 2011, p. 185). Perceptions of interactions were based on Moore’s (1989) description of three types of interaction; with the content, the educator, and other learners.

Phenomenological design was used, and data was gathered through interviews consisting of open-ended questions. A total of ten participants, enrolled in a residency program at a pediatric hospital, were interviewed. One interview served as a pilot, the
remaining interviews provided the data. Analysis was conducted using the phenomenological approach (Moustakas, 1994).

The limitations for this research were largely based on the use of a qualitative phenomenological design, resulting in a small sample size, which reduced the ability to generalize the findings to other populations. In addition, residents from only three monthly rotations were asked to participate. Of those residents, only those residents who volunteered participated in the research. This self-selection by the residents may have meant that the residents who chose to participate had perceptions, regarding medical education, which differed from those residents who chose not to participate.

Prior to data collection approval for the research was obtained from the Internal Review Board of both Northcentral University, and the hospital housing the resident program in which the participating residents were enrolled. Participation in the research was voluntary. All residents eligible to participate in the research were recruited through a series of e-mails that described the research and the anticipated time commitment for participants. Each participant signed an informed consent form prior to their participation. There was no use of deception in the research and every attempt was made to maintain participant’s anonymity.

The remainder of this chapter provides implications regarding data analysis in relationship to the research purpose and existing literature. Limitations of the study are noted. Finally, recommendations are given for practical applications of the information gained from the research.
Implications

The first research question was used to investigate participants’ perceptions of the effectiveness of (a) classroom situated e-learning and (b) traditional lectures. Effectiveness was defined as education that increased the residents’ knowledge in at least one of the ACGME six core competencies: “patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice” (Antiel et al., 2011, p. 185). All nine participants found classroom situated e-learning to be an effective form of education. They all reported increased knowledge in at least two of the ACGME core competencies. In addition, they all found classroom situated e-learning to be a positive learning experience. Some of the words the residents used to describe the experience included “effective,” “beneficial,” “helpful,” and “great.” This is of particular importance because residency program directors must ensure that their programs provide residents with educational experiences that will lead to their achievement of all core competencies (Accreditation Council for Graduate Medical Education, 2007).

Three participants were unable to name an effective traditional lecture they had experienced, while six participants reported attending an effective lecture that increased their knowledge in at least one ACGME core competency. Six participants said traditional lectures could be an effective way to learn, and four participants stated traditional lectures are not the best way for them to learn. The residents did not all agree that lectures were effective, or a preferred learning method, but they also did not show an overwhelming dislike of lectures. However, some researchers have found lecture
based medical education to be ineffective (Dachs, 2008), or no better than an e-learning option (Kulier et al., 2009).

The participants in this research found blended learning, in the form of classroom situated e-learning, to be effective. However, there is little existing research regarding the use of blended learning for clinical education (Gray & Tobin, 2010). The current research serves as a way to begin to fill the gap in exploring innovative educational options for medical education (Robertson, Yun, & Murray, 2009).

The participants’ descriptions of effective learning also points to their learning style preferences. Classroom situated e-learning was designed using principles of adult learning theory; traditional lectures are pedagogy based (Stratman et al., 2008). Four themes emerged from participants’ descriptions of how classroom situated e-learning was effective, and two themes from participants’ descriptions of how traditional lectures were effective (see Table 1). Of those six themes, four correlated with at least one of Knowles (2005) assumptions of the andragogical model for adult learning. There is debate over the appropriateness of resident education based on adult learning theory (Klein & Schipper, 2008, Stratman et al., 2008). However, the results of this research add to the knowledge base regarding residents learning preferences. Data analysis revealed that the participants in this research preferred learning experiences based on adult learning theory.

The second research question was used to look at participants’ perceptions of interactions in (a) classroom situated e-learning and (b) traditional lectures. Interactions were based on Moore’s (1989) description of three types of interaction; with the content, the educator, and other learners. The majority of participants, six out of nine, said
interactions with the content were most important for their learning; this corresponds with Moore’s (1989) interpretation.

Analysis of the data revealed seven themes regarding the three types of interaction. Six of those themes were for classroom situated e-learning, one was for traditional lectures (see Table 3). There was little overall agreement regarding the interactions the residents experienced, and almost no agreement for interactions in traditional lectures. The type of interaction that had the most agreement was interaction with other learners. Discussion was a theme for classroom situated e-learning, and was the only type of interaction with other learners named for traditional lectures. While the participants placed a high level of importance on interaction with the content, interaction with other learners was described, by seven participants, as having a positive effect on their learning.

The value of interaction with other learners has been noted by other researchers (Cook & McDonald, 2008; Popp et al., 2012). In addition, the lack of interaction with other learners has been found to be a missing component in traditional lectures (Davis et al., 2008). A lack of learner interaction in traditional lectures was also found in this research. Out of nine participants, one was able to provide information regarding interaction with other learners in an effective traditional lecture.

Of the seven themes for interaction found in this research, four involved either conversation or asking questions. One of the themes for interaction with the content, in classroom situated e-learning, was discussion. Asking questions of the educator was a theme for interaction with the educator in both classroom situated e-learning and traditional lectures. Discussion was the only theme for interaction with other learners in
classroom situated e-learning. This information adds to the knowledge in the field by providing participants’ perceptions of the value they placed on conversation, either in the form of discussion or asking questions, in all three forms of interaction.

A limitation of these results was the volunteer process used to obtain participants. In addition, residents asked to participate in the study were the residents who were assigned to classroom situated e-learning during May, June, and July, the last two months of the resident academic year, and the first month of the academic year. The interviews were conducted following those rotations. It is possible that the residents who volunteered for the research had a different perception of medical education, and the effectiveness of classroom situated e-learning and traditional lectures, than those residents who chose not to volunteer. It is also possible that residents’ perceptions of educational experiences are different at the end of the academic year, and following the first month of the academic year, than they are at the middle of the academic year.

**Recommendations**

This qualitative phenomenological research studied residents’ perceptions of the effectiveness and interactions in classroom situated e-learning and traditional lectures, supporting the need for exploring innovative options for medical education (Tempelhof et al., 2009), and additional research regarding medical education (Edginton & Holbrook, 2010). The results of this research have added to the field of knowledge by providing information that can be used to inform resident program directors and educators in creating and designing effective learning experiences for residents, and by providing information that could guide future research in the area of resident education.
The study revealed participants perceptions of blended learning, in the form of classroom situated e-learning, as an effective form of medical education. Participants also had a positive perception of this type of learning experience. This research adds to the small body of knowledge on the use of blended learning for medical education (Gray & Tobin, 2010). It also points to the need for future research in this area, both with classroom situated e-learning, as well as other forms of blended learning. Additional research would allow for testing of blending learning with different groups of residents, beyond the scope of this study, in varied resident programs, and geographical areas, and covering different content. Recommendations for future research include a replication of this study with residents in other residency programs, and quantitative research comparing the learning outcomes of classroom situated e-learning with traditional lecture based learning.

Traditional lectures are the mainstay of medical education (Kulier et al., 2009), and are pedagogy based (Stratman et al., 2008). Yet there is debate over the effectiveness of this form of education (Brandt & Shanedling, 2010), and the potential value of adult learning theory in medical education (Klein & Schipper, 2008, Stratman et al., 2008). The participants in this research found traditional lectures to be less effective than other forms of education. Three participants were unable to name an effective traditional lecture, even though the participants typically attend traditional lectures multiple times each week. All of the participants provided a positive description of classroom situated e-learning and found it to be an effective way to learn. This information can support resident program educators who wish to investigate and use new and innovative forms of education. Additional research can be conducted to better understand why residents find...
lecture based learning to be ineffective, and how lectures can be updated to meet the learning needs of residents. In addition, research can be conducted on the outcomes and learner perceptions associated with the use of adult learning methods.

The participants in this research had varying opinions regarding interaction in education. However, a majority of participants reported that they believed interaction with the content to be the most important form of interaction for their learning. The participants had the most agreement regarding interaction between the learner and other learners, stating the positive effect of discussion between other learners, something that has also been found in other research (Popp et al., 2012). The participants also appreciated conversation and question asking in all three types of interaction. This information can be used to inform resident educators of the value of the role of discussion among residents in educational experiences, and the value of conversation, and the ability to ask questions. It also can be used to guide future research regarding the use of discussion in resident education, including the type of discussions used, as well as the timing of discussion within the educational experience.

Conclusions

This research used qualitative, phenomenological design, to answer two research questions. The questions addressed residents’ perceptions of the effectiveness and interaction in classroom situated e-learning and traditional lectures. Analysis of the data collected from this research revealed 11 themes regarding participants’ perceptions of the educational experiences.

Participants found blended learning, in the form of classroom situated e-learning, to be effective and a positive learning experience. Participants reported that traditional
lectures have the possibility to be effective, but four participants reported they are not the best way for them to learn, and three participants were unable to provide an example of an effective lecture. They reported that interaction with the content was the most important form of interaction for their learning. However, they had the most agreement regarding interaction with other learners, and said discussion with other learners had a positive effect on their medical education. They also valued conversation and question asking in all three types of interaction.

There were limitations to this research. The first being the use of qualitative research design, which resulted in a small sample size. In addition, participation in the research was voluntary, and those who chose not to participate could have differing perceptions than the residents who chose to participate. Also, the timing of the interviews, at the end and beginning of the academic year, could have affected the participants’ perceptions of the educational experiences.

Resident program directors and educators could use the data from this research to further inform their decisions regarding the educational opportunities they provide their residents, and the creation of new educational experiences. There are practical applications that could be considered for residency programs based on the results of this research. The applications for consideration are the value of incorporating blended learning into resident education; the value of incorporating opportunities for resident discussion and conversation, and asking of questions; and the desire to lessen the use of traditional lectures as a form of medical education in residency.

This research added new information to the existing body of knowledge regarding options for effective resident education. However, it also supports continued research in
this area. Quantitative and qualitative research in the use of blended learning, in the form of classroom situated e-learning, and other blended learning options, is needed to increase the understanding of the potential benefit of blended learning for medical education. Additional research could also address the potential benefits of interaction between learners, in the form of discussion, and conversation and question asking in medical education.
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Appendixes
Appendix A: Interview Guide

Research Questions

Q1. How do residents perceive the effectiveness of classroom situated e-learning and traditional lecture based learning?

Q2. How do residents perceive the interaction (between the student and the content, the facilitator or instructor, and other students) in classroom situated e-learning and traditional lectured based learning?

Definitions

We are defining effective medical education as education that increases residents’ knowledge in at least one of the ACGME’s six core competencies. (Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism, Practice Based Learning, Systems Based Practice)

We are defining interaction in medical education as interaction between the resident and the content, the resident and the facilitator or educator, and between the resident and other residents or learners

Questions

1) Describe a learning experience you have had as a resident that has been effective for you, and increased your knowledge in at least one of the ACGME’s six core competencies.

   a) What made the experience effective?
   
   b) Was there a feeling or “aha moment” that you had during the learning experience and if so describe it?
   
   c) When did you know it was effective (during or after the experience)?
   
   d) In which ACGME core competencies was your knowledge increased through the experience?

2) Describe the interactions you had with the content during that experience and any role those interactions played in the effectiveness of the learning experience.

   a) Thinking about the content
b) Processing the content
c) Applying the content

3) Describe the interactions you had with the educator during that experience and any role those interactions played in the effectiveness of the learning experience.
   a) How the content was organized and presented
   b) Discussion you had with the educator
   c) Evaluation or feedback provided by the educator
   d) Motivation and interest in the topic you gained from the educator

4) Describe interactions you had with the other learners during the experience and any role those interactions played in the effectiveness of the learning experience.
   a) Discussion with other learners
   b) Presentation or sharing of information by other learners
   c) Motivation or support provided by other learners

5) Thinking about all of your experiences as a learner, what kinds of learning activities work best for you and why?
   a) Describe specific examples of those learning activities and why/how they worked
   b) What made those experiences effective?
   c) How did you know they worked for you?
   d) What was the setting for the experience and did that have an impact?
   e) What was the content of the experience and did that have an impact?
f) What types of interactions were in those experiences and how did they impact your learning (between you and the content, educator, other learners)?

6) Describe a lecture you have attended as a resident that was effective, and increased your knowledge in at least one of the ACGME’s six core competencies.

   a) What was the core competency/s and how was your knowledge increased?
   b) What made the lecture effective (lecturer, content, presentation method…)?
   c) Was there a feeling or “aha moment” you had during the lecture and if so describe it

7) What interactions did you experience with the content during the lecture?

   a) Describe the interactions
   b) How did the interactions impact your learning?
   c) How did they impact your satisfaction with the lecture?

8) What interactions did you experience with the instructor during the lecture?

   a) Describe the interactions
   b) How did the interactions impact your learning?
   c) How did they impact your satisfaction with the lecture?

9) What interactions did you experience with other learners during the lecture?

   a) Describe the interactions
   b) How did the interactions impact your learning?
   c) How did they impact your satisfaction with the lecture?

10) Describe a lecture that was ineffective and did not increase your knowledge in at least one of the ACGME’s six core competencies.
a) What made it ineffective (lecturer, content, presentation method, distractions)?

b) What did you do to deal with the situation (walk out, do something else, muscle through it)?

c) What could have made it better?

11) What interactions did you experience with the content during the lecture?
   d) Describe the interactions
   e) How did the interactions impact your learning?
   f) How did they impact your satisfaction with the lecture?

12) What interactions did you experience with the instructor during the lecture?
   d) Describe the interactions
   e) How did the interactions impact your learning?
   f) How did they impact your satisfaction with the lecture?

13) What interactions did you experience with other learners during the lecture?
   d) Describe the interactions
   e) How did the interactions impact your learning?
   f) How did they impact your satisfaction with the lecture?

Now we are going to talk about the rheumatology noon conferences on JIA and JDM, which we are calling classroom situated e-learning.

14) Did the rheumatology noon conferences have any components that were effective or increased your knowledge in at least one of the ACGME’s six core competencies? (If yes)
   a) What was the core competency/s and how was your knowledge increased?
   b) What made it effective (facilitator, content, format, interactivity)?
c) Was there a feeling or “aha moment” and if so describe it

15) Were there moments during the rheumatology classroom situated e-learning sessions that were ineffective and if so what could be done to increase the effectiveness for you?
   a) What made it ineffective?
   b) How did you deal with the situation (what did you do during those times)?
   c) What would make it more effective?

16) What interactions did you experience with the content during the rheumatology noon conferences?
   a) Describe the interactions
   b) How did the interactions impact your learning?
   c) How did they impact your satisfaction with the conference?

17) What interactions did you experience with the instructor during the rheumatology noon conferences?
   a) Describe the interactions
   b) How did the interactions impact your learning?
   c) How did they impact your satisfaction with the conference?

18) What interactions did you experience with other learners during the rheumatology noon conferences?
   a) Describe the interactions
   b) How did the interactions impact your learning?
   c) How did they impact your satisfaction with the conference?

19) How do you feel overall about lectures as an effective form of education?
20) How do you feel overall about classroom situated e-learning (the rheumatology noon conferences) as an effective form of education?

21) How do you feel overall about the importance of the three types of interaction for your learning?
Appendix B: Interview Protocol

1. Orally review consent form and purpose for the research and the interview

2. Answer any questions the participant has regarding the consent or research

3. Remind residents that they are the experts, that the researcher has not participated in medical education, and that the researcher has no personal knowledge or opinion about either forms of medical education that will be covered during the interview

4. Acquire a signed consent form from participant (if a signed consent is not acquired the interview is ended)

5. Obtain permission to record the interview (if permission is not granted the interview is ended), if permission is granted start the recorder

6. Engage the participant in introductory, warm-up questions, to create a rapport and help make the participant more comfortable

7. Using the guide ask the broad research questions

8. Follow-up probes are asked, as needed, for “penetration, exploration, and explanation” (Ritchie & Lewis, 2003, p. 141)

9. Ask the participant if there is any other information they would like to share regarding the phenomenon

10. Stop the recording device

11. Thank the participant, and answer any additional question there may be regarding the research
Appendix C: Permission to Use Premise

Jill Segerman
4466 Cheswick Drive
Cincinnati, Ohio 45242

Jill Segerman

I give you permission to contact residents at Cincinnati Children's Hospital Medical Center, who have participated in the rheumatology classroom situated e-learning, for the purpose of participating in your research. I understand that resident participation will be voluntary and will remain confidential.

Sincerely,

Javier Gonzales-Del-Rey, MD
Professor of Clinical Pediatrics
University of Cincinnati College of Medicine
Director, Pediatric Residency Training Program
Associate Director, Emergency Medicine Cincinnati Children’s
Appendix D: Informed Consent

Northcentral University

Informed Consent Form

Residents’ Perceptions of Classroom Situated E-learning for Medical Education

Purpose. You are invited to participate in a research study being conducted for a dissertation at Northcentral University in Prescott, Arizona. The purpose of this study is to discover how medical residents perceive the effectiveness of classroom situated e-learning, and traditional face-to-face lectures. There is no deception in this study. We are interested in your opinions and reflections about the topic being studied. It is anticipated that a minimum of 8 people will participate in the study. Your participation in the study would be complete voluntary and your decision to participate, or not participate, will be confidential and will not result in any penalty or loss in benefits.

Participation requirements. You will be asked to participate in one face-to-face interview. The session will last approximately one hour.

Research Personnel. The following persons are involved in this research project and may be contacted at any time: Jill Segerman, 513-636-6266, jill.segerman@cchmc.org and Dr. Tim Delicath, 314-562-8370, tdelicath@my.ncu.edu

Potential Risk/ Discomfort. Although there are no known risks in this study, you will be asked about your personal experiences and opinion, and it is possible that you may find this to be uncomfortable. However, you may withdraw at any time and you may choose not to answer any question that you feel uncomfortable in answering.

Potential Benefit. Direct benefits to you for participating in this research include the potential for changes or improvements to your residency program. The Director of the Pediatric Residency Training Program has agreed to review the findings from the research and to make programmatic changes if warranted and feasible. In addition, residents who participate in the study will receive a $10 gift card to the hospital gift shop as a small token of appreciation.

Anonymity/ Confidentiality. The data collected in this study are confidential. All data are coded such that your name is not associated with them. In addition, the coded data are made available only to the researcher associated with this project.

Right to Withdraw. You have the right to withdraw from the study at any time without penalty. In addition, you may omit any questions you do not want to answer.

I would be happy to answer any question that may arise about the study. Please direct your questions or comments to: Jill Segerman, 513-636-6266, jill.segerman@cchmc.org or Dr. Tim Delicath, 314-562-8370, tdelicath@my.ncu.edu.

Signatures

I have read the above description of the Residents’ Perceptions of Classroom Situated E-learning for Medical Education study and understand the conditions of my participation. My signature indicates that I agree to participate in the research study.

Participant's Name: ______________________   Researcher's Name: _______________
Participant's Signature: ____________________  Researcher's Signature: _______________
Date:_____________      Date:_____________
Appendix E: Description of a Classroom Situated E-Learning Module

Juvenile Idiopathic Arthritis: Oligoarticular Type

Page 1: Basic description of Oligoarticular Type JIA - informational

Page 2: Explanation of classification system for the disease – informational

Page 3: Picture of two patients with their age and chief complaint – informational

Page 4: Patient one case, results of conversation with child’s parent and physical exam findings – informational

Page 5: Additional patient history information – informational

Page 6: Determine Anna’s differential diagnosis, using the list provided determine the differential diagnosis, hovering over the information button provides information about each possible diagnosis listed – active participation

Page 7: Thought’s from the Attending physician regarding the differential diagnosis choices – feedback based on resident choices

Page 8: Determine labs to order for patient, using the list of provided labs, hovering over the information button provides information about each lab – active participation

Page 9: Based on the information known to this point what should the patient do, options include make a follow-up appointment, wait for lab results before deciding, refer to a pediatric rheumatologist, make an appointment for a joint injection, refer to an ophthalmologist – active participation

Page 10: Feedback of decisions from previous page – feedback based on resident choices

Page 11: Test results, including feedback about what should and should not have been ordered – feedback based on resident choices

Page 12: Determine the diagnosis – active participation

Page 13: Patient’s diagnosis and what was used to make the decision – informational

Page 14: Patient prognosis – informational

Page 15: Key learning points from the case – informational

Page 16: Self-Assessment which is made up of a series of multiple choice questions followed by the answers designed to reinforce key ideas from the case – self-assessment
The left hand side of the page provides a tabs for resources residents can access or the facilitator can use based on needs and interests of the residents (module instructions, types of JIA, diagnosis criteria, epidemiology, genetics, differential diagnosis, lab tests, clinical manifestations, treatment, physical therapy, uveitis, other resources)

Residents have access to modules through the hospital’s electronic learning management system allowing them to review information or complete the other case(s) on their own.
Appendix F: Letters E-Mailed to Residents Inviting Participation in the Research

**Letter 1**

Dear (the Resident’s name inserted here),

I am a doctoral student in education, as well as an educational specialist at Cincinnati Children’s Hospital Medical Center. I am conducting qualitative research to understand residents’ perceptions of the effectiveness of traditional lectures, and the blended learning used for the rheumatology noon conferences.

As a resident who has participated in both types of education I am asking if I can interview you about your experiences with resident education. The interview should take about an hour and I would be happy to schedule the interview at a time and location that is convenient for you. Dr. Gonzalez-del-Rey is aware of this research and has agreed to read the results, and use that information to improve resident education, if feasible and warranted. In addition, you will receive a $10 gift card to the hospital gift shop as a small token of appreciation for your participation. Your decision to participate, and any information you provide will remain confidential.

If you are willing to be interviewed please contact me, by e-mail or phone, to set up a time and location convenient for you. Also, please feel free to contact me if you have any questions regarding the research. Your participation would be greatly appreciated.

Sincerely,

Jill Segerman

Jill Segerman, MEd
Education Specialist, Cincinnati Children’s Hospital Medical Center
513-636-6266
Jill.segerman@cchmc.org

**Letter 2**

Dear (the Resident’s name inserted here),

This letter is a follow-up to a letter you received a few days ago asking you to participate in qualitative research regarding resident education. I value your insights and would greatly appreciate the ability to learn about your experiences and thoughts on the effectiveness of resident education.
If you are willing to be interviewed please contact me, by e-mail or phone, to set up a time and location convenient for you. Also, please feel free to contact me if you have any questions regarding the research. Your participation would be greatly appreciated.

Sincerely,

Jill Segerman

Jill Segerman, MEd
Education Specialist, Cincinnati Children’s Hospital Medical Center
513-636-6266
Jill.segerman@cchmc.org

Letter 3

Dear (the Resident’s name inserted hear),

I know how busy you are, but I just wanted to check in to see if you would be willing to participate in research I am conducting regarding the effectiveness of resident education. I would be happy to work with you to find a time and location that best meets your demanding schedule.

If you are willing to be interviewed please contact me, by e-mail or phone, to set up a time and location convenient for you. Also, please feel free to contact me if you have any questions regarding the research. Your participation would be greatly appreciated.

Sincerely,

Jill Segerman

Jill Segerman, MEd
Education Specialist, Cincinnati Children’s Hospital Medical Center
513-636-6266
Jill.segerman@cchmc.org

Letter 4

Dear (the Resident’s name inserted hear),

I know how busy you are, but I just wanted to check back in to see if you would be willing to participate in the research I am conducting regarding the effectiveness of resident education. I would be happy to work with you to find a time and location that best meets your demanding schedule. Your participation would be greatly appreciated and your experiences highly valued.
If you are willing to be interviewed please contact me, by e-mail or phone, to set up a
time and location convenient for you. Also, please feel free to contact me if you have
any questions regarding the research. Your participation would be greatly appreciated. If
you are not able to participate please let me know that as well.

Sincerely,

*Jill Segerman*
Appendix G: Definitions Provided to Residents During Interviews

Definitions

We are defining **effective medical education** as education that increases residents’ knowledge in at least one of the ACGME’s six core competencies.

- Patient Care
- Medical Knowledge
- Interpersonal and Communication Skills
- Professionalism
- Practice Based Learning
- Systems Based Practice

We are defining **interaction in medical education** as interaction between

- the resident and the content
- the resident and the facilitator or educator
- the resident and other residents or learners