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EXPLORING THE USE OF TECHNOLOGY IN MENTORING

A Dissertation Submitted in Partial Fulfillment of the
Requirements for the Degree
Doctor of Education
in
Organizational Leadership

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ABSTRACT

Exploring the Use of Technology in Mentoring

By Denise Wilcox, EdD

Purpose. The purpose of this qualitative case study was to explore how using technology tools during mentoring impacts the desired outcomes, as defined by the mentor-mentee contract, of the mentoring relationships of technology workers at a private graduate university with the main campus in Southern California.

Methodology. This was a single qualitative case study designed to investigate skill transfer in mentoring relationships using technology. The sample was selected from information technology workers who participated in a pilot mentoring program at the identified university. Open-ended and semistructured questions were asked in face-to-face individual interviews with the mentors and mentees. Subsequently, the supervisors of the mentees were also individually interviewed using semistructured face-to-face interviews for an independent assessment.

Findings. Participants reported that technology enabled them to transfer both technical and soft skills during mentoring. The data also showed that technology enabled learning and promoted the development of technical skills, such as 3D programming skills, web application development, and project management skills, and the development of soft skills: communication skills, interpersonal skills, and time management. Mentors and mentees were comfortable with technology and therefore used technology during mentoring. The perceived quality of the mentoring relationship was enhanced through the use of technology.

Conclusions. Mentors and mentees who have an acceptance of the usage of technology can help improve the quality of their relationship by using technology to expedite communication and enhance the transfer of skills. For information technology workers, the type of technology used should be relevant to the technical skills the mentee seeks to develop. Soft skill development regarding communication skills can be successfully developed during mentoring when technology designed for communication is utilized.

Recommendations. The researcher recommends three categories of future studies: (a) exploring user acceptance of technology and its impact on mentoring success (including populations of technology workers and others in fields outside of technology in hybrid and e-mentoring relationships); (b) exploring gender influence on mentoring needs for technology workers (with specific focus on women, keeping their technical skills current, and advancing in male-dominated profession); and (c) quantifying newly explored themes and patterns in user acceptance of technology, and gender influences, as related to mentoring success.

CONTENTS

FIGURES

TABLES

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Thank you is not enough to say to my parents, my family, and friends for all their love and support through my educational process, not just during my doctoral program but also in my undergraduate and master's programs. I am grateful to my parents, Dennis and Darlene, for instilling in me the belief that I can achieve anything I set my mind to. For my loving, supportive, and understanding husband, Mike, and wonderful boys, Matthew and Samuel, who enabled me to focus on my studies. To my best friend, Michelle, who has been there through thick and thin with me since we met in the 8th grade. Thank you also to my wonderful in-laws, Dean and Peggy, who have loved and supported me like their own daughter. In loving memory of my grandparents, who, like my parents, served as great role models for working with honesty and integrity.

CHAPTER I

INTRODUCTION

There is a growing need in today's global economy to have skilled and enculturated members of the workforce in order for companies to function well and stay competitive. Baby boomers are retiring in large numbers, so there will be fewer highly trained people in the workforce (Reinsch, 2008). By 2030, all of the more than 40 million U.S. baby boomers, currently the largest living generation, will be at or over the typical retirement age of 65 (Sightings, 2014). A lack of technical skills and interpersonal skills, also referred to as soft skills, can limit technology workers' ability to perform their jobs successfully. Those preparing to enter the workforce are not learning to be technology workers, as only 5.6% of college students were studying computers, statistics, and mathematics in 2013 (Center on Education and the Workforce, 2016). With the retirement of many existing workers and the deficiency of incoming skilled technology workers, existing workers need to enhance their skills. Technical and soft skills are both valuable for technology workers.

Multiple studies worldwide have shown that mentoring is an effective means of improving workers' job and/or soft skills, but there are a limited number of available mentors to provide the necessary technical guidance (Allen, Eby, Poteet, Lentz, & Lima, 2004; Baugh & Scandura, 1999; DiRenzo, Linnehan, Shao, & Rosenberg, 2010). Studies

on mentoring have shown that mentors who build trust with their mentees can help the individual mentees by educating them on important workplace abilities (Colky & Young, 2006; Walabe, 2013). More than 43% of United Kingdom technology businesses surveyed reported that mentoring is an important means of skill development; it was in the top three skill-development methods (Tech City UK, 2016). Skilled technology workers who mentor others can help less experienced workers develop their technical skills (Bello & Mansor, 2013). Mentoring studies are available in the current literature, but they do not address specifically the use of technology to facilitate the mentoring process. Very few studies have focused on technology workers specifically and the need to increase knowledge and skills in technology and interpersonal areas.

Mentoring has also been proven to be an effective means of developing soft skills such as time management, communication skills, or leadership skills (Bello & Mansor, 2013). This study explored the effectiveness of improving soft skills by mentoring with technology in either a hybrid or e-mentoring relationship. Gibson and Sodeman (2014) stated that "recent graduates, while technologically adept, are deficient in soft skills" (p. 63). Technology workers in general could benefit from enhancing their soft skills to enhance their overall efficacy, and mentoring can be an effective means of building those skills.

Due to the limited number of skilled technology workers, mentors available for other technology workers may not be in the same geographic vicinity. Prior studies on e-mentoring have focused on ways to build trust, but few have focused on the effectiveness of augmenting traditional mentoring through the use of technology (hybrid mentoring) to

achieve the desired mentoring outcomes (Colky & Young, 2006). There are many studies available in the current literature, but few specifically assess the use of technology to facilitate the mentoring process. The existing studies do not focus on technology workers specifically and the need to increase knowledge and skills in technology and interpersonal areas.

The potential beneficiaries of this research are professionals looking to promote knowledge and skill transfer through mentoring, particularly individuals looking to promote skills through the use of e-mentoring or hybrid mentoring. Organizations implementing mentoring programs can use the results of this study to determine if e-mentoring or hybrid mentoring could benefit their own organization. Even organizations that already have traditional face-to-face mentoring programs can leverage information from this study to determine if hybrid or e-mentoring can help with mentor proximity challenges and still meet the desired outcomes of the mentoring relationship. E-mentoring may also assist organizations in promoting diversity by utilizing technology to mentor. Studies have shown that e-mentoring reduces mentors' tendency to mentor individuals who are similar to themselves (de Janasz, Ensher, & Heun, 2008; Rowland, 2011).

Mentoring

There are many types and styles of mentoring, including formal versus informal; career, academic, or psychosocial mentoring; traditional face-to-face mentoring, a combination of face-to-face and e-mentoring (hybrid mentoring), or e-mentoring;

experienced higher position mentor to less experienced mentee; lower position mentee mentoring higher position individual (reverse mentoring); and peer mentoring, all of which can be used to develop a mentee in some way (Ensher & Murphy, 2007). The various types of mentoring serve different roles in the development of the individual being mentored. Psychosocial mentoring helps the mentee to recognize his or her own self-worth (Baugh & Scandura, 1999). Each of the mentoring types offers advantages and disadvantages compared to the other types of mentoring.

The primary objective of career mentoring is to improve the mentee's potential for career growth, development, achievement, and balance (Mundia & Iravo, 2014). Mentoring is traditionally thought of as an older, more experienced person guiding a younger, less experienced individual (Kram, 1985). Today there is also peer-to-peer mentoring where both individuals are at the same level of the organization, but the mentor has more work experience than the mentee (Bryant, 2005). Reverse mentoring utilizes the skills of the younger worker to mentor an older, more experienced worker, often in technology (Biss & DuFrene, 2006). Each of these methods and modes of mentoring has advantages and disadvantages. The literature review for this study explored multiple methods of mentoring as a means of transferring skills.

Mentoring has been documented as a means of knowledge transfer since the times of the ancient Greeks in the 8th century BC (Hamilton, 1942, as cited in Khan, 2010). The term *mentor* represents a wise person and/or a trusted advisor (Picchietti, 2016). Mentoring is still alive and going strong more than 10 centuries later because it works as a means of transferring soft skills and knowledge (Allen et al., 2004; Kram, 1985;

Mundia & Iravo, 2014). Some of the seminal works that are frequently cited to define mentoring and its benefits are the studies by Kram (1985) for traditional mentoring and Bierema and Merriam (2002) for what is now most commonly referred to as e-mentoring. The literature review for this study included terms to identify studies that identified if e-mentoring or hybrid mentoring can provide the same type of skill transfer as traditional face-to-face mentoring.

Leadership skills have been shown to be advanced through the use of mentoring. Leaders need to help develop people in the organization, according to Kouzes and Posner (2012): "The most significant contribution leaders make is not simply to today's bottom line; it is to the long-term development of people and institutions so they can adapt, change, prosper, and grow" (p. 21). A study by Russo (2013) concluded that "mentors are critical to leadership development" (p. 54). Leadership skills can be developed through mentoring; existing leaders can demonstrate how to perform procedures and behave ethically and professionally as leaders (Ridout, 2006). Leadership skills are among the many potential skills that can be fostered in a mentoring relationship.

Skilled Workforce

Technology workers must keep technical skills up to date as technology changes. When they are working full time, it may be difficult to make time to advance or expand their technical skills. A lack of skill development can be very detrimental to the technology workforce in general and career limiting to the individual. In addition to skill development, another challenge is retaining skilled individuals in the field; the IT

industry averages 25% to 30% turnover globally in the workforce (Acharya & Mahanty, 2007). Without skilled technology workers, U.S. institutions will not remain competitive in a global market, and technology work will be outsourced if the U.S. workforce does not have the capacity to do the jobs (*America's Workforce Needs*, 1999). Technology workers can use mentors to advance their skills.

Given the generally hectic lifestyle many people lead today, there is limited time to devote to things like skill development. Technology can be used as a means of augmenting a mentor-mentee pair's skill-building process and can lessen the time commitment needed from the mentor (Shpigelman, Weiss, & Reiter, 2009). Changes in technology occur regularly, and technical workers need to keep learning in order to maintain their ability to perform at peak levels. The use of e-mentoring or hybrid mentoring (part face-to-face mentoring and part e-mentoring) can help technology workers by providing them with the option of receiving some mentoring without needing to be in the same geographic location or needing to travel in order to meet their mentor. E-mentoring can also reduce the time demands on the mentor by minimizing travel time and may also enable multiple individuals to be mentored simultaneously in multiple locations (Shpigelman et al., 2009).

Background of the Problem

Today's organizations rely on technology to accomplish many strategic planning objectives as well as to maintain day-to-day activities. This, coupled with the increasing number of technology devices organizations use, such as workstations, laptops, tablets,

and smartphones, creates a large need for workers with technical skills. U.S. organizations are having a difficult time filling available technology positions with skilled workers; therefore, they want the government to increase the number of visas for technology workers from other countries (Atkinson, 2015). The current pool of skilled technology workers is not growing fast enough to meet the demands in the United States and globally in other developed countries (Major, Morganson, & Bolen, 2013). The United States is importing workers with technical skills to help meet some of the demand (*America's Workforce Needs*, 1999).

Existing technology workers in science, technology, engineering, and mathematics (STEM) must also keep technical skills up to date as technology changes. When they are working full time, it may be difficult to make time to advance or expand their technical skills. However, a lack of skills and lack of time to develop skills can be very detrimental to the workforce in general. Only 5.6% of college students in the United States in 2013 majored in computers, statistics, or mathematics (Center on Education and the Workforce, 2016). Without skilled technology workers, U.S. institutions will not remain competitive in a global market.

Mentoring has been shown to help build skills (DiRenzo et al., 2010; Kram, 1985). Hybrid mentoring and e-mentoring offer a more convenient, less time-intensive means of serving as a mentor, since these types of mentoring minimize the need to travel and to find synchronous time availability between the mentor and mentee (Rowland, 2011). The mentor-mentee pair can exchange information and ideas through email, texting, and/or learning management systems, which do not require both parties to

participate at the same time. If the mentor-mentee pair do want to have real-time communication, they can use video conferencing, phone, or instant messaging to chat back and forth without having to meet at a common location. Studies on mentoring have also shown that a single mentor can provide support to multiple mentees in an e-mentoring format without a major increase in effort beyond what is required to support a single mentee (Fong, Mansor, Zakaria, Sharif, & Nordin, 2012).

There are many studies that have researched the value of e-mentoring compared and contrasted to traditional face-to-face mentoring (Godwin, 2011; Philippart, 2014; Rowland, 2011; Wilbanks, 2014). Despite there being many studies on e-mentoring, there are few studies that show if or how supplementing traditional face-to-face mentoring with an online component impacts the mentoring outcomes. Technology workers are good candidates for leveraging e-mentoring since they are generally comfortable with the use of technology. Even with the obvious connection to technology, there are not many studies that have evaluated how technology workers can successfully utilize mentors through hybrid or e-mentoring.

The Statement of the Problem

A lack of technical skills and interpersonal skills can limit technology workers' ability to perform their jobs successfully. Multiple studies worldwide have shown that mentoring is an effective means of improving workers' skills, but there are a limited number of available mentors to provide the necessary technical guidance (Allen et al., 2004; Baugh & Scandura, 1999). Available mentors for technology workers may not be

in the same geographic vicinity. Virtual mentoring, also referred to as e-mentoring, can assist with time and geographic constraints associated with traditional face-to-face mentoring. Prior studies on e-mentoring have focused on ways to build trust, but few have focused on the effectiveness of augmenting traditional mentoring through the use of technology (hybrid mentoring) to achieve the desired mentoring outcomes (Colky & Young, 2006).

There have been many studies on the benefits of traditional face-to-face mentoring, but there are fewer studies on electronic mentoring, also known as e-mentoring. Those prior studies that focused on e-mentoring concentrated on ways to pair mentors and mentees, and some studied how to establish trust between the mentor and mentee, but few have evaluated the effectiveness of augmenting face-to-face mentoring with technology (Soto-Acosta, Casado-Lumbreras, & Cabezas-Isla, 2010). Limited research has examined the effectiveness of achieving the desired outcomes of the mentoring relationship by incorporating technology into mentoring, in a hybrid of e-mentoring and traditional face-to-face mentoring. Only a few studies have assessed how well mentoring will work at transferring technical skills in technology workers.

The information technology team at the site selected for this study implemented a mentoring program based on needs of technology workers that were brought forth at a retreat. During a brainstorming session on ways to enhance their team, the technology workers recommended having a mentoring program. The mentoring program was designed to help build skills. The executive director of information technology was not a mentor or mentee in the program but was responsible for promoting and supporting the

technology workers in their technical skills. As the leader of the information technology department, it was important that the executive director of information technology help develop the employees, as technical-skill growth is an essential part of improving and retaining a strong team. This formal program was created to help the team members gain new technical skills. This study helped identify if the mentoring program enables the transferring of technical skills and soft skills using technology, which is the desired outcome.

Significance of the Problem

The United States does not currently have enough skilled technology workers to meet the demand. Nearly all organizations, regardless of their primary business, need skilled technology workers. According to the U.S. Department of State (2016), H1B visas, visas for foreign-born workers to come fill positions that require technical skills in the United States, increased by at least 5% every year between 2010 and 2015. The United States needs to train more technically skilled workers in this country, and mentoring presents a proven method of providing training.

The United States is not educating enough students in the STEM fields to fill positions throughout the country. Between 2004 and 2007, there was a 27% decrease in the number of computer science degrees awarded (Kaplan, 2010). Although more students graduated in 2012 with computer science degrees, numbers are still less than 88% of the rates in 2005 (National Science Foundation, National Center for Science and Engineering Statistics, 2015). According to Kaplan (2010), “Out of 4 million students

who entered high school in 2001, fewer than 200,000 will graduate with a STEM degree" (p. 25). This lack of people coming into the technology workforce means it is even more important that existing workers are able to continually develop their skills.

To compound the problem that the current numbers of skilled technology workers are not sufficient to meet the demand and the United States is not educating enough to fill current or future demand, workers are retiring. Limits of existing skilled workers and the retirement of a large generation of workers, the baby boomers, will deplete the pool of skilled technical workers even more.

Utilizing technology to enhance the traditional mentorship may allow the limited pool of mentors to take on more mentees at a given time (An & Lipscomb, 2010). The use of technology to augment traditional face-to-face mentoring can also help provide mentoring to technical workers who may not be in close geographic proximity to other, more experienced technical workers. This research contributes to the body of knowledge regarding the transfer of skills using technology in a mentoring relationship, which is currently limited. The next section provides an overview of the lack of existing information on the topic of how to best transfer skills via e-mentoring or hybrid mentoring.

Deficiency of Knowledge

There is a knowledge gap about the use of e-mentoring/cybermentoring to augment traditional face-to-face mentoring. Furthermore, there are not many studies that have examined how technology workers can successfully utilize mentors. Past research

found the need for more studies to verify the effectiveness of mentoring programs, especially the conditions that help mentees develop (Allen et al., 2004). This study focused on mentoring programs using technology. Further research was useful to help identify if mentoring relationships can be fostered by utilizing technology. Technology may help limit one of the potential drawbacks of traditional mentoring, which tends to pair individuals with similar backgrounds, thus limiting advancement and training opportunities for people without the same gender and ethnic background as those individuals already in more advanced positions.

Audiences

This research was broadly intended to benefit organizations that have the need to train workers in particular skills, enabling organizations to make educated decisions on how technology may affect mentoring and the successful transferring of skills. The broad concept of the use of technology in mentoring is applicable to organizations of any nature that are using mentoring programs to enhance their workforce. Human resource personnel and organizational leaders can also use this study to implement effective e-mentoring/hybrid mentoring methods.

A more specific targeted audience is leaders of technical workers, as this study examined e-mentoring and hybrid mentoring as means to help transfer technical skills and soft skills in technology workers. Technology workers who want to develop additional skills can use the results of this study in the same way as the leaders. This study also benefits other individuals who want to be mentored in the future by helping

them understand if it is effective to use technology during mentoring. Potential mentees in any field can use this study to decide if hybrid mentoring or e-mentoring can help them advance their skill set.

Purpose of the Study

The purpose of this qualitative case study was to explore how using technology tools during mentoring impacts the desired outcomes, as defined by the mentor-mentee contract, of the mentoring relationships of technology workers at a private graduate university with the main campus in Southern California.

According to Stake (1995), single case studies are used to understand an activity with circumstances that are important to the understanding of the topic. A single case study research design was selected to discover and understand the way the technology tools affected the mentoring outcomes. Using the everyday experiences of technology workers helped to identify the best technology to use to foster successful hybrid mentoring relationships. The results can be useful to individuals who would like to increase their skill set but lack mentors with synchronous time or a common geographic location by expanding mentor options through the use of hybrid or e-mentoring. This study can help technical workers know which type of technology would be best suited for their mentoring relationship. The results of this study will additionally directly benefit the team that was studied by providing them with information to enhance the mentoring program.

There are many types of mentor relationships; this research was focused on formal hybrid mentoring for career development regardless of whether the mentors are peer mentors or traditional older, more experienced mentors. The mentors and mentees were paired through the organization based on mentor experience and the skill the mentees desired to develop. The mentors were more experienced in technical skills but were not necessarily more senior in the organization. Due to the lack of seniority, these were peer-to-peer mentoring relationships. The study was designed to review transferring skills, technical in particular, between mentors and mentees using technology. This not only can help individuals but will also help organizations.

The results can also help organizations that want to establish formal e-mentoring or hybrid mentoring programs to know which technology to invest in or which existing technology to incorporate into the mentoring program. Organizations can benefit by reviewing this study to understand the technologies that enable skill transfer during mentoring.

Conceptual Framework

The conceptual framework explains the primary ideas that will be studied and the expected relationships anticipated to be found associating the ideas (Miles & Huberman, 1994). It was also described by Roberts (2010) as the "lens through which the research problem is viewed" (p. 129). For this study, the conceptual framework was based on the unified theory of the acceptance and use of technology (UTAUT; Venkatesh, Morris, Davis, & Davis, 2003). The UTAUT was used to understand how individuals'

acceptance of technology affected the outcomes of hybrid or e-mentoring relationships by using the best-suited technology for the mentoring pair. The UTAUT influenced this research by promoting the understanding that the comfort level of mentors or mentees can impact the usage of technology in e-mentoring. The framework (Figure 1) influenced the open-ended question regarding acceptance of technology in both the mentor and the mentee interviews (see Appendix A).

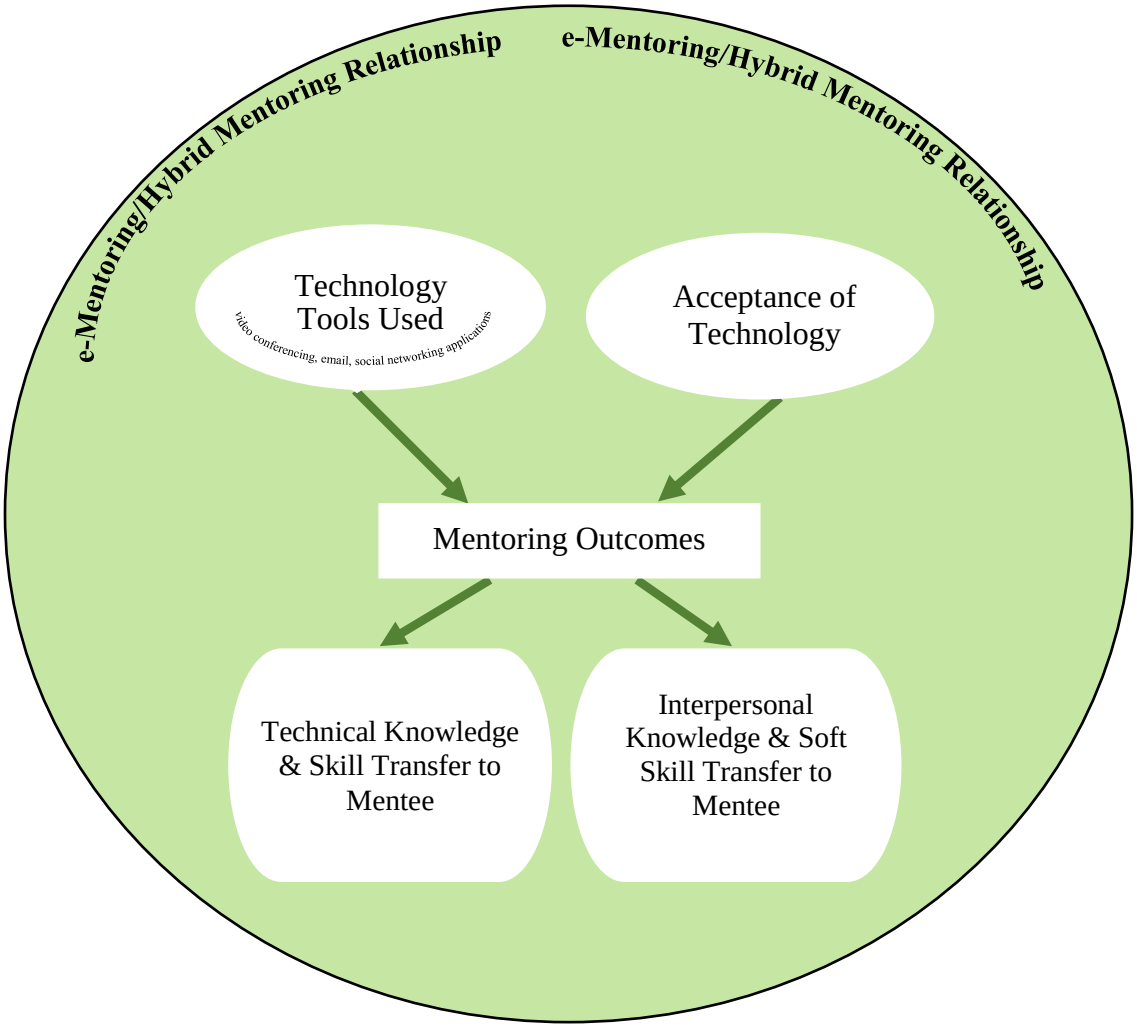

Figure 1. Conceptual framework.

Research Questions

The central research question for this study was, "How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the desired outcomes, as defined by the mentor-mentee contract?" The desired outcomes of the mentor-mentee contract may include technical knowledge and skills and soft skills. Technical knowledge and skills may include programming language knowledge, network security techniques, or interface design interpersonal knowledge, and soft skills may include enhancing speaking, listening, or collaboration skills.

The subquestions that helped assess the central question were as follows:

1. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of technical knowledge from mentor to mentee?
2. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of technical skills by the mentee?
3. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of knowledge of soft skills from mentor to mentee?
4. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of soft skills by the mentee?

5. How does the mentee's acceptance of technology affect the use of technology tools in a mentoring relationship?
6. How does the use of technology affect the mentor's/mentee's perceived quality of the mentoring relationship?

Significance of the Study

There is a shortage of skilled technology workers due to several factors including the fact that baby boomers are leaving the workforce in larger numbers than new entrants are joining the workforce (Houck, 2011). Another factor contributing to the increased demand for skilled technology workers is the fact that there are more technology devices per person than ever before and that people are becoming increasingly dependent on technology. The combination of these factors is creating an increased demand for qualified technology workers to meet technical support needs. Organizations in all industries, not just technology organizations, depend on technology workers to keep their systems and organizations functioning; in one example, Nationwide Insurance found that its largest category of employees was information technology workers, not insurance sales or support workers (Kaplan, 2010). An additional challenge contributing to the limited supply of skilled technology workers is the inadequate quantity of students studying in fields related to technology (National Science Foundation, National Center for Science and Engineering Statistics, 2015).

This research will inform both organizations and potential mentors regarding whether using technology tools during mentoring can build technical and/or soft skills.

This study will help organizations identify potential mentors and mentees to determine if they are a good fit for inclusion in a hybrid or e-mentoring program based on the individuals' acceptance of technology. Using an e-mentor can eliminate one of the barriers of traditional face-to-face mentoring: mentors' tendency to select mentees whom they perceive to be like themselves (de Janasz et al., 2008; Rowland, 2011). This can aid minorities in gaining mentors in organizations that have a limited supply of mentors or a more homogeneous pool of available mentors. E-mentoring can aid in reducing gender gaps or diversity limitations by increasing the pool of potential mentors by limiting bias in mentee selection.

Individuals can self-evaluate the study results to determine if hybrid or e-mentoring options would be viable. People considering the use of mentoring for their own skill development can base their decision on whether the study participants saw positive results. Another factor that potential mentees can access is if their own comfort level with technology will enhance the likelihood that e-mentoring would be beneficial. Potential mentors can also evaluate if they are good candidates for becoming e-mentors based on their own acceptance of technology.

Delimitations

This study was purposefully limited to four pairs of mentors and mentees participating in a mentoring program for technology workers at a private graduate university with the primary campus in Southern California in order to study an important issue for the information technology industry.

Assumptions

At the time of the study, the researcher was in the same organization and department as study participants, so honest experiential reporting was encouraged by reminding interviewees that it would benefit the mentoring program. It was assumed that study participants wanted the mentoring program to succeed. The researcher presumed that the study participants all responded to the interview questions openly, honestly, and without withholding their opinions. Participation in the study was voluntary, and participants had the opportunity to opt out of the study if they felt uncomfortable at any time answering questions related to the study with someone in the researcher's chain of command.

Definitions of Terms

E-mentoring. "Mutually beneficial relationship between a mentor and a mentee, which provides new learning as well as career and emotional support, primarily through e-mail and other electronic means (e.g., instant messaging, chat rooms, social networking spaces, etc.)" (Ensher & Murphy, 2007, p. 300). This may also be referred to as cybermentoring or virtual mentoring, and in some studies, this was historically referred to as telementoring (Guy, 2002).

Face-to-face mentoring. For the purposes of this study, face-to-face mentoring represents traditional in-person mentoring where the mentor and mentee meet in the same physical location at the same time.

Hybrid mentoring. A combination of traditional face-to-face mentoring and online mentoring (Childre & Van Rie, 2015).

Mentoring. Knowledge sharing or training combined with counseling from an experienced individual to a less experienced individual, traditionally done on a face-to-face basis. Khan (2010) defined mentoring as a positive influence of an experienced individual on a less experienced individual who willingly accepts guidance from the experienced mentor.

Peer mentoring. "An intentional one-on-one relationship between employees at the same or similar lateral level in the firm that involves a more experienced worker teaching new knowledge and skills and providing encouragement to a less experienced worker (Eby, 1997)" (Bryant, 2005, p. 321).

Reverse mentoring. When a younger person serves as a mentor to an older person (Biss & DuFrene, 2006).

Social networking application. A software application used for interacting with other individuals, usually those who share a common interest. This study included applications such as LinkedIn, Google+, and Facebook.

Telementoring. An electronic or online version of mentoring that is facilitated via technology (Guy, 2002).

Virtual mentoring (web/online/e-mentoring). The development of a relationship using online technology between two people to develop career skills or psychosocial development (Jolly, 2011).

Summary

There is a workforce deficit of skilled technology workers necessary to support today's organizations, many of which depend on technology to perform business. The limited supply of skilled technology workers is exacerbated by the high demand for technology support and a lack of people studying technology. Employees already working in technology have limited time to advance their skill set as technology rapidly changes. Mentoring—face-to-face, hybrid, and e-mentoring—has been shown to be an effective means of transferring knowledge. This qualitative study explored whether hybrid mentoring helped technology workers gain technical skills and/or soft skills. Having more skilled workers will assist in increasing the availability of qualified technology workers able to meet the growing demand.

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this qualitative case study was to explore how using technology tools during mentoring impacts the desired outcomes, as defined by the mentor-mentee contract, of the mentoring relationships of technology workers at a private graduate university with the main campus in Southern California. In formal mentoring programs, there are typically outcome goals established as part of the mentorship. Understanding how the technology tools used in hybrid or e-mentoring relationships affect the transfer of skills can help organizations determine if utilizing hybrid or e-mentoring programs will help or hinder the mentors/mentees. This literature review focused on mentoring and mentoring with technology to access what has previously been studied. Gay, Mills, and Airasian (2011) described a review of the relevant research as thoroughly identifying and analyzing sources that are related to the research problem.

Since mentoring has been utilized and studied for so long, there were thousands of results on the topic. Per Gay et al. (2011), the literature identified was restricted to sources from scholarly peer-reviewed journals, by authors with their credentials listed, and limited by date. The resulting set of articles reviewed was restricted to the last 10 years, with the exception of classic articles that served as key reference works for many of the more recent studies. After obtaining a significant number of results, the researcher

reviewed the abstracts of the journal articles for relevancy to this study. Studies referenced in this chapter met the above criteria and are cited for the relationship to this research.

This chapter defines the major themes identified in the literature on mentoring. The major categories were the result of the literature search on the term **mentor**, which was refined to include the term *tech**. Business, science, and education databases were searched for peer-reviewed journal articles on mentoring, which were then reduced to focus on mentoring with technology. The results of the literature search produced the categories of enablers/barriers, outcomes, and technology tools. Although the literature review results do not help define the variables in qualitative research as they do in quantitative research, the value of a literature review for a qualitative study is that it helps solidify the topic of the study (Roberts, 2010).

Research was selected on the basis of a subject keyword search of databases containing scholarly peer-reviewed journals. The search term *mentor* can return results including terms like *e-mentor*, *virtual mentor**, *online mentor**, *telementor**, or *cybermentor**. The asterisks are wildcards that represent any number of characters, so a search of *mentor* could return results that include terms such as *mentor*, *mentors*, *mentoring*, *ementor*, *e-mentor*, *ementors*, *telementor*, and so forth. After reviewing the results of the *mentor* search, the results were limited by adding *technology* as a subject keyword. An additional search using the term *computer-mediated communication* returned no additional references. Current workforce trends were researched using the keyword terms *skill*, *technology*, and *workers*.

After reviewing the research, the relevant studies were grouped by major themes and associated subthemes, as recommended by Creswell (2012). To provide a visual representation of the articles within each theme, preliminary search results were represented in a circular design literature map (Figure 2), as described by Creswell. Those research studies that addressed multiple themes were represented in an overlap of the theme circles, like a Venn diagram. This process helped the researcher identify the major themes of existing studies on mentoring by grouping the articles visually.

Technology Skills Needed

To stay competitive in the current global economy, U.S.-based organizations need skilled technology workers who understand the company needs and function well together. A study by Martin (2013) showed that over 40% of organizational knowledge is in an employee's brain. The United States is not educating enough people to fill needed technology positions. Students are not studying in the areas of science, technology, engineering, and mathematics (STEM). In 2013, only 5.6% of college students were majoring in computers, statistics, and mathematics, which means that likely less than 5% of students (Figure 3) were studying computers (Center on Education and the Workforce, 2016).

Baby boomers are leaving the workforce in large numbers, reducing the pool of skilled workers. Reinsch (2008) stated, "As the first wave of the 70 million Americans classified as Baby Boomers gets ready to retire, some experts are predicting a potential

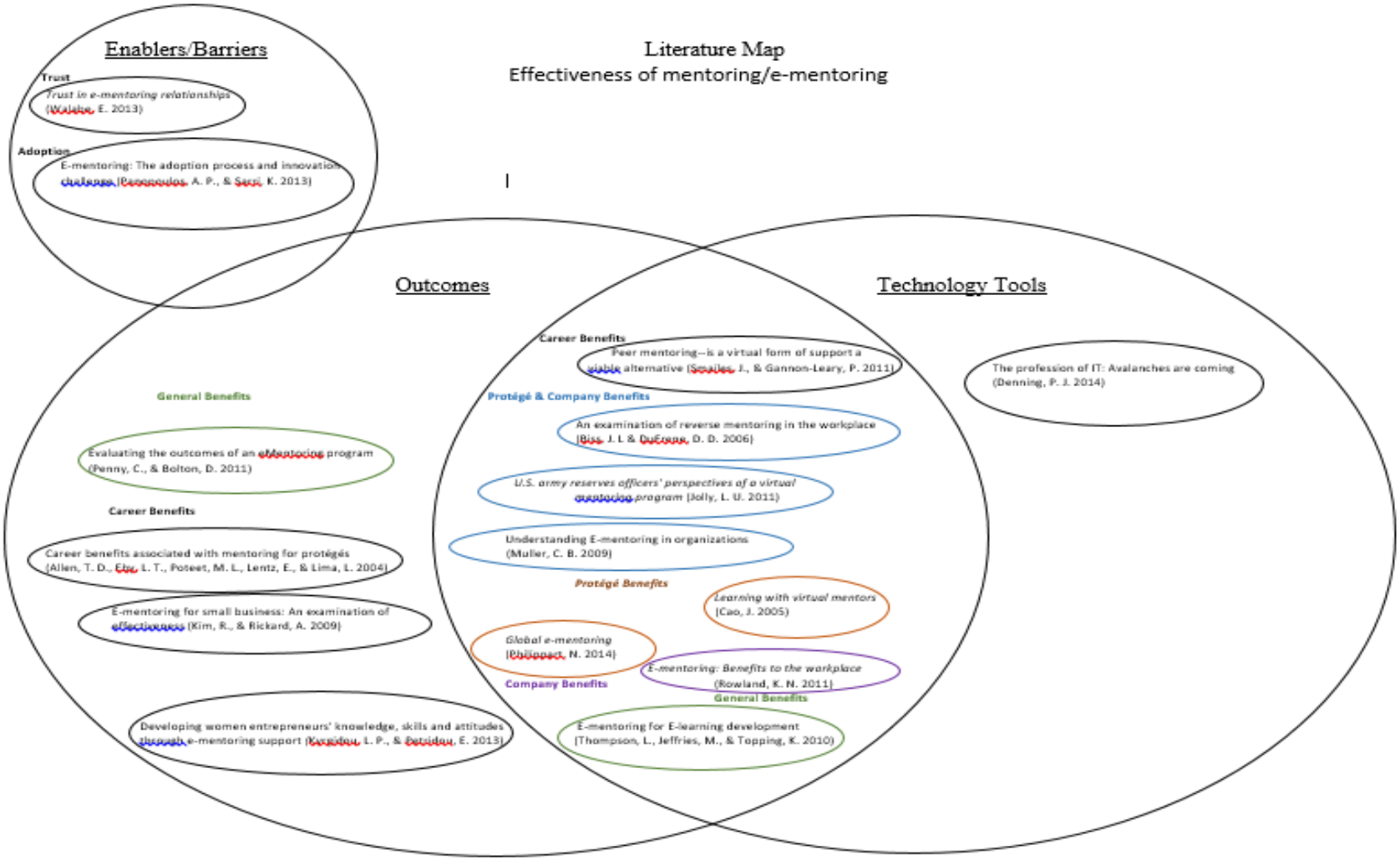

Figure 2. Literature map.

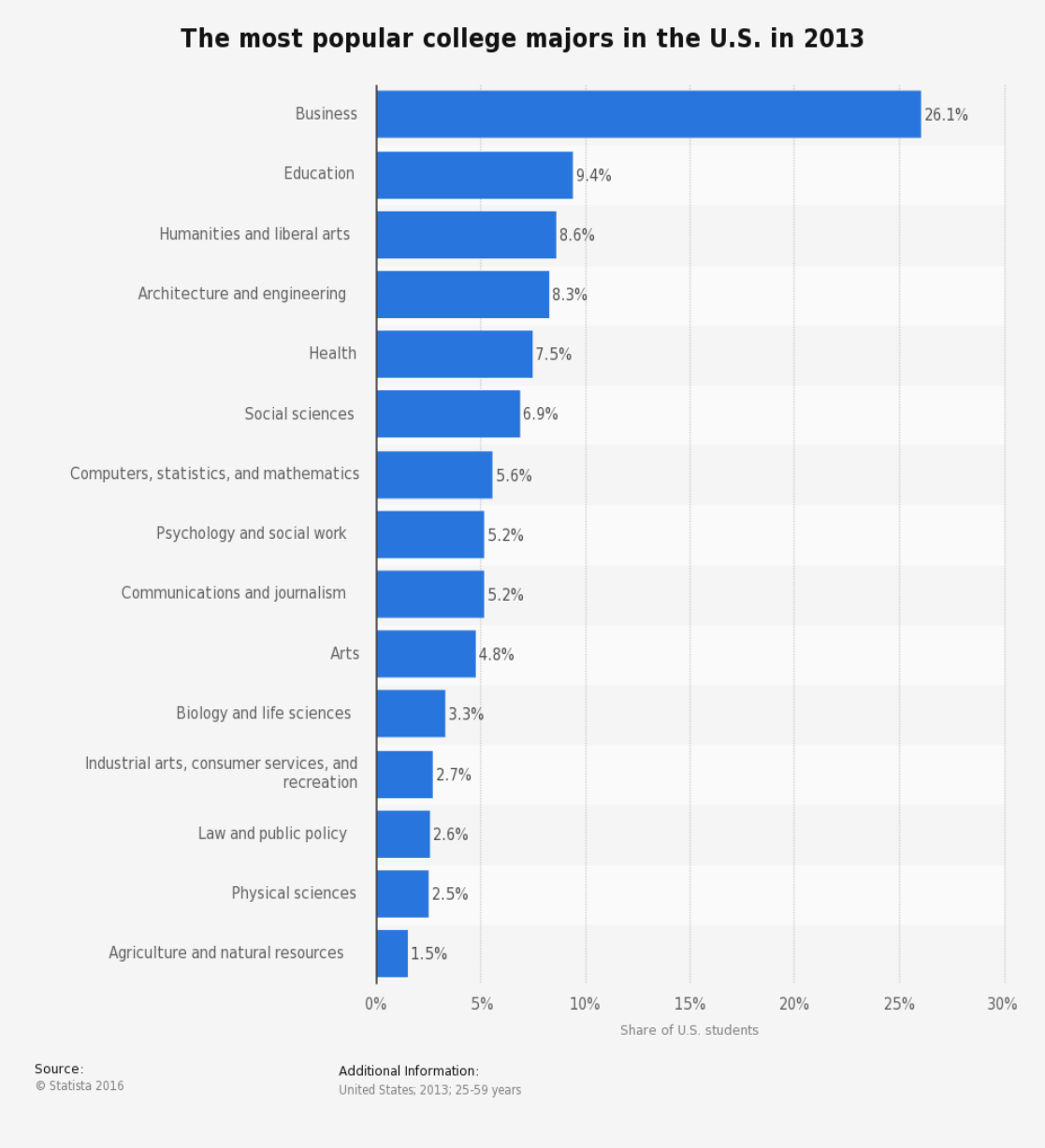

Figure 3. U.S. most popular college majors. From "The Most Popular College Majors in the U.S. in 2013," by Center on Education and the Workforce, 2016, in *Statista—The Statistics Portal*, retrieved from http://www.statista.com/statistics/225634/most-popular-college-majors-in-the-united-states/.

emergency" (p. 35). Over the past 10 years, the top six most valuable public organizations have gone from including one technology company to being almost

exclusively technology organizations (see Figure 4), illustrating an increased demand for technology and technology workers. According to Reinsch, "More job openings are not a good thing if the second tier isn't properly prepared to lead the company into its next phase, says Eric Herzog, Ph.D., organizational expert and author of Future Leaders" (p. 35).

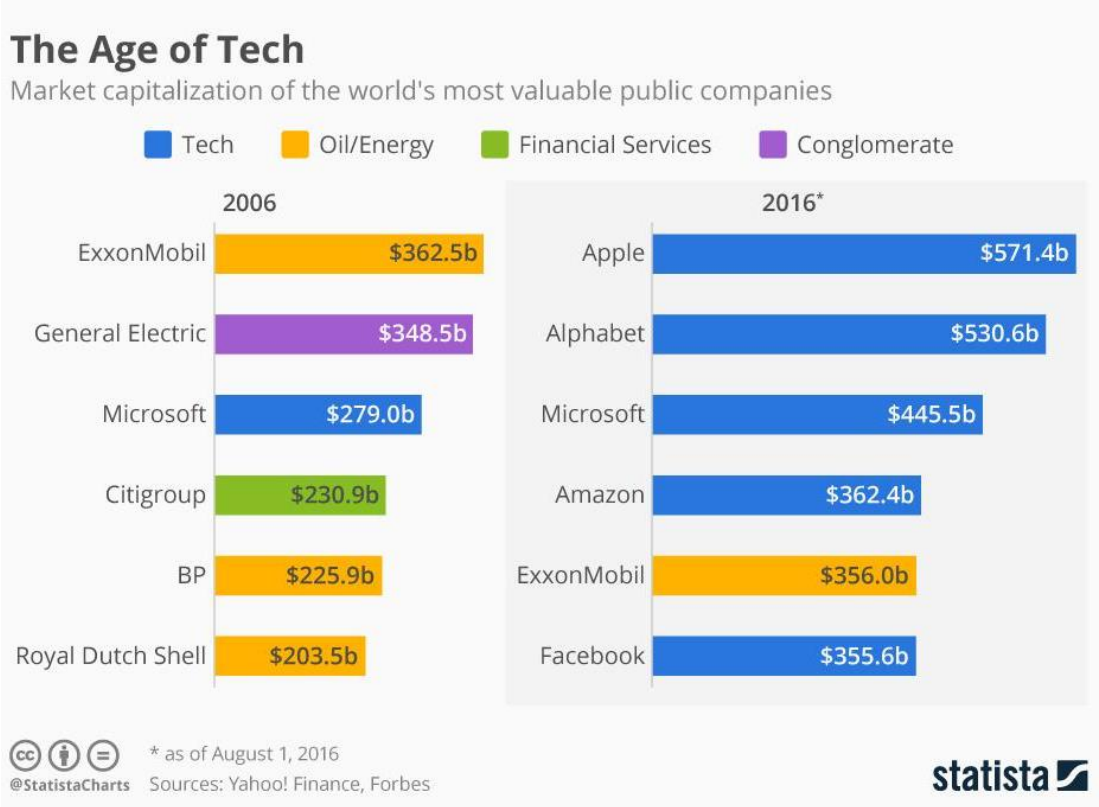

Figure 4. Top valued organizations. From "The Age of Tech," by F. Richter, 2016, retrieved from https://www.statista.com/chart/5403/most-valuable-companies-2006-vs-2016/.

It can be challenging for technology workers to keep up with the workload demands and carve out time to participate in a mentoring relationship. To better

understand the historical research on mentoring with the use of technology, a literature review was performed. The results included sources predominantly ranging in date from 2005-2016. Sources that were included that predated this date range were selected from the references in sources found during the search and seminal works on the study of mentoring.

Mentoring is an established and important means of transferring knowledge and skills from one individual to another (Bello & Mansor, 2013; Rowland, 2011). The mentor is frequently defined as a more experienced person who guides another individual in development. Much has been written about mentoring; studies were done to evaluate its effectiveness, the best ways to go about mentoring, how to successfully match mentors and mentees, and how to evaluate the outcomes of the relationship.

This chapter describes each of the three major themes and the subcategories and their relevancy to this study. The first major theme identified is the factors that can help enable successful outcomes in mentoring relationships or cause impediments/barriers in the mentoring relationships. The second major theme identified in the literature is outcomes, which covers studies on the results of the mentoring relationships from the mentor perspective, the mentee viewpoint, and the company perception. The final major theme identified relevant to this study is the technology tools used in e-mentoring or hybrid mentoring relationships.

Enablers/Barriers of Successful Mentoring

A review of the factors that contribute to the success of a mentor-mentee relationship helps to provide an understanding of what can be done to promote the use of the enablers. Studying what impedes the mentoring relationship can help eliminate the barriers in a mentoring relationship by raising awareness in organizations and among the mentors. The major enablers, as identified through the literature review, include trust between the mentor and mentee and a formal mentoring structure. The major factors that research indicates can hinder successful mentoring outcomes include a lack of trust by the mentee of the mentor; poor implementation of the mentoring program; a lack of self-confidence with technology, which will limit adoption of e-mentoring; and virtual distance.

Trust: Potential Enabler/Barrier

Mentoring is a recognized means of knowledge transfer, but it only happens when the mentee trusts his or her mentor. Trust was found to be one of the most important aspects of a mentoring relationship in a study by Eberle (2008). Walabe (2013) found that the factors identified as most closely correlated with trustworthiness during the formation of an e-mentoring relationship are perceived benevolence, integrity, and the extent to which the e-mentor shares his or her professional and personal background via his or her electronic profile. Daloz (1999) stated that a good way for a mentor to establish trust is to be a good listener. Mentors and mentees can also build trust through effective communication (DiRenzo et al., 2010). Respect for the mentees is another way

mentors can establish trust in their relationships (Eller, Lev, & Feurer, 2014; Mott, 2002). Once the trust is established, the mentor must share the commitment to the goals of the mentee to maintain trust (Daloz, 1999). In telementoring, response time delays via email can be a cause for questioning whether the mentor cares about the mentee, which can damage trust (Guy, 2002). Trust can either enhance or decrease the likelihood of successfully transferring skills via traditional face-to-face, hybrid, or e-mentoring.

Adoption: Potential Enabler/Barrier

Despite the pervasiveness of Internet access and usage, e-mentoring has not been adopted as quickly nor put to as effective use as traditional face-to-face mentoring. E-mentoring can help with the implementation of mentoring programs despite geographic distance, time constraints, and different perceptions between mentor and mentee (Philippart, 2014). E-mentoring/telementoring could help ease the burden on organizations with experienced technology workers who are preparing for retirement but do not have enough time to mentor the new workers one-on-one in a traditional face-to-face mentoring relationship. According to Panopoulos and Sarri (2013), the mentees' prior experience with technology can be either an enabler or a barrier to adopting e-mentoring, depending on the individuals' perceived self-efficacy. Individuals preparing to participate in an e-mentoring relationship should complete a self-efficacy questionnaire. The results of the questionnaire can help determine if either the mentor or the mentee needs training in the technology prior to embarking on the relationship, to minimize potential communication issues due to a lack of comfort with technology

(Panopoulos & Sarri, 2013). A phenomenological study found that mentor study participants, particularly baby-boomer generation mentors, think that it would be best to support an online mentoring relationship by having some face-to-face interactions (Eberle, 2008).

Higher personal innovativeness and self-efficacy will act as an enabler to mentees and increase the adoption rates of e-mentoring (DiRenzo et al., 2010). Conversely, lower ratings in these measures will be a barrier to e-mentoring adoption. Mentors' perception of potential obstacles will limit the adoption rate. Mentees' perception of pressure will positively impact the rate of e-mentoring adoption (Panopoulos & Sarri, 2013). Jolly (2011) also found that the mentors' comfort level with technology contributes to their adopting the use of technology in the mentoring relationship.

Overall Enablers/Barriers

There are many reasons a mentoring relationship can be successful or encounter barriers that limit the chances for success. E-mentoring and hybrid mentoring can face additional challenges that are not present in traditional face-to-face mentoring. Virtual distance—defined as a "psychological separation" caused when people interact virtually from separate physical locations, different operational areas, diverse cultural situations, and social distance—can act as a barrier for mentoring relationships, according to Philippart (2014). Studies have had varying results on whether time zones are a barrier or not. Rowland (2011) found that time zone differences can be a barrier to the utilization

of e-mentoring. Meister and Willyerd (2010) reported that a benefit of e-mentoring is that time zone differences do not matter.

There are many factors that can enhance or detract from communication between a mentor and a mentee. Cross-cultural awareness is important in global e-mentoring; it can be a barrier or an enabler depending on the mentors' cultural awareness (Philippart, 2014). If the mentor and mentee are from different cultures, it is important to raise cultural awareness to promote good communication. Agreement on the goals between mentor and mentee plus clarity of goals increase the chances of producing successful outcomes through e-mentoring (Philippart, 2014). Establishing a common understanding of primary objectives for the mentoring relationship is another means of minimizing communication issues for the mentoring pair. One of the barriers identified by Jolly (2011) was infrequent communication by the mentor. Communication, when done well, can enable successful mentoring outcomes, but when it is not done well, it can impede or prevent the desired outcomes from being achieved.

Organizations can take steps to improve the potential for positive outcomes in a mentoring program. Organized mentoring programs act as an enabler for knowledge transfer during mentoring, as reported by Martin (2013); however, formal mentoring programs can be limiting if they are too cumbersome or not well implemented. The structure of a formal organizational mentoring program impacts the effectiveness; the program is more of an enabler when it allows for individual learning pathways (Rickard & Rickard, 2009). In addition to establishing a mentoring program that offers flexibility and sets communication expectations, organizations can enhance the mentoring program

by providing technology training for e-mentors. In a study by Russo (2013), the level of technology experience of mentors was shown as an enabler to e-mentoring when the mentors were experienced in the use of technology. Another study reported that generational differences in perceptions of technology usage and bandwidth limitations can represent barriers to e-mentoring (Rowland, 2011). Training and education on the use of technology may enable individuals, regardless of age, to be prepared to be e-mentors.

Meeting virtually can also be an enabler by reducing stereotyping bias in mentee-mentor pairing (de Janasz et al., 2008). Individuals mentored via the Internet can overcome stereotyping since they will be more likely to connect on an internal level rather than focusing on the external features (Ensher & Murphy, 2007).

Outcomes

Mentoring relationships can produce a variety of outcomes. The literature review produced results that were grouped into general outcomes when they were not specific to mentees or mentors. Multiple outcomes were found to benefit mentees. Several studies identified ways in which either the mentors or the mentees experienced career benefits as a result of participating in a mentoring relationship. Within the theme of mentor benefits, there were subthemes of general benefits and career benefits. Additionally, there were outcomes that demonstrated that mentoring is also beneficial for organizations, which is further discussed in the Company Benefits section. The final theme covered in this

chapter relates to the critical element for e-mentoring or hybrid mentoring: the technology tools used during mentoring.

General Outcomes

There are many general benefits to the individuals involved in mentoring, regardless of whether the mentoring relationship is formal or informal, for career, academic, or psychosocial purposes. Studies have documented that general cognitive development and learning are benefits for individuals who receive mentoring. They also can develop friendships with their mentors (McGill, Adler-Baeder, Sollie, & Kerpelman, 2015; Mott, 2002). One study identified local economic improvement when women entrepreneurs have a mentor, especially in the early phase of their business (Kyrgidou & Petridou, 2013).

A qualitative study by Biss and DuFrene (2006) investigated reverse mentoring to determine if it is valuable. The study found that a majority of Fortune 500 companies use mentoring for their employees. Many Fortune 500 companies have also adopted the use of reverse mentoring, where a younger worker trains an older worker frequently on the use of technology. Study participants identified communication skills, organization skills, research techniques, diversity support, etiquette, company profitability, productivity, cooperation, and efficiency as benefits of reverse mentoring (Biss & DuFrene, 2006). Organizations that used reverse mentoring also indicated that it provided older workers with a more youthful perspective and allowed younger employees

access to more senior members of the organization (Biss & DuFrene, 2006; Meister & Willyerd, 2010).

Additional general outcomes include the fact that in e-mentoring, groups of individuals may be mentored concurrently and mentors may be obtained from other organizations (Rowland, 2011). Another benefit cited for e-mentoring is that mentees are more likely to be treated impartially despite biographical differences (de Janasz et al., 2008; Rowland, 2011). This benefit can be used to help mentor minorities in fields with limited ethnic diversity. E-mentoring has been determined to help the mentor and the mentee by boosting their self-confidence (Kyrgidou & Petridou, 2013). Not all research has shown positive outcomes from mentoring; a mentoring experience may have bad outcomes for mentees if they do not have a mentor with whom they bond. In these cases, mentees may experience work depression or withdrawal (Eby, Butts, Durley, & Ragins, 2010).

Mentee Benefits

Mentees can benefit from utilizing mentors by learning skills that will benefit their career. Another advantage is getting support from a senior individual in a company who helps promote the mentee to the company. Mentees' view of their own general self-efficacy and career efficacy improves after having a mentor (DiRenzo et al., 2010; Schunk & Mullen, 2013). They also display improved task-specific skills (DiRenzo et al., 2010; Mammadov & Topçu, 2014). Similarly, one study found that mentees can benefit by gaining wisdom and organizational knowledge, learning from the experienced

perspective of their mentor, gaining networking contacts, developing personality attributes, and improving job-specific skills (Starr, 2014). Individual mentees can benefit by receiving objective feedback and gaining important insights (Muller, 2009).

There are a multitude of career benefits that mentoring can provide. People who receive mentoring see increases in pay, have more career mobility, and are likely to be promoted more quickly than counterparts who do not have mentors (Ensher & Murphy, 2011; Schunk & Mullen, 2013). The mentor relationship provides a safe environment to ask questions and practice skills (Godwin, 2011). The mentees also are challenged to build new skills and have been shown to increase professional development as a result of being mentored (Fong et al., 2012; Thompson, Jeffries, & Topping, 2010). In addition to many of the benefits already mentioned, Underhill (2006) found that job satisfaction and self-esteem increase for people who have had a mentor. Schunk and Mullen (2013) also found increased job satisfaction in mentees and a reduction of work-family conflict. Another study that found increased mentee job satisfaction also found benefits that included job advancement, greater job commitment, and better skills (Rowland, 2011). There are a wide range of benefits to individuals who receive mentorship, including skill development, which was important to this study. Figure 5 shows that mentoring is one of the top three ways to develop skills in the technology business.

Mentoring can have a beneficial impact on the mentees, improving leadership skills, attitudes, health, and focus. Many organizations, including the U.S. Army Reserve, have added complexity to leadership development due to leaders being separated by distance and time as a result of globalization. Jolly (2011) found that e-

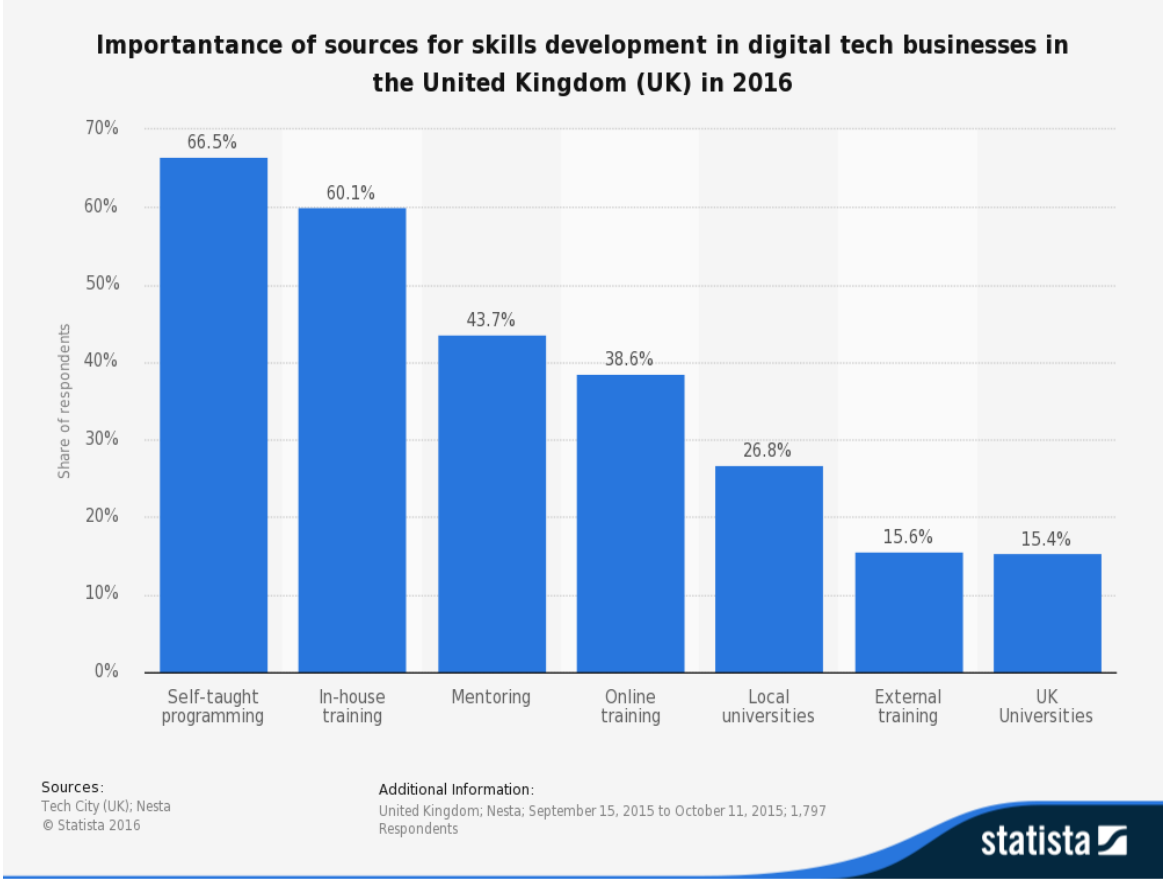

Figure 5. Sources of technical skill development. From "Importance of Sources for Skills Development in Digital Tech Businesses in the United Kingdom (UK) in 2016," by Tech City UK, 2016, in *Statista—The Statistics Portal*, retrieved from http://www.statista.com/statistics/519468/uk-important-skill-development-sources-for-digital-tech-survey/.

mentoring is beneficial and can offer leadership development to mentees in distant geographic locations. Results from a study comparing traditional, hybrid, and online mentors for teacher candidates showed that mentoring positively impacted the teachers-to-be across the three mentoring types (Penny & Bolton, 2011). E-mentoring was determined to have a positive influence on the mentored teachers' attitudes toward their jobs, teaching in inner-city schools in the study (Penny & Bolton, 2011). Effective

mentorships produce effective learning for the mentees and produce benefits like increased focus and better business acumen (Rickard & Rickard, 2009). Being mentored creates general outcomes that enhance the mentees' attitudes, provide health benefits by reducing stress, and improve employee behavior (Eby, Allen, Evans, Ng, & DuBois, 2008).

Career Benefits

Mentees can experience career benefits by having a mentor. As previously mentioned in the Mentee Benefits section, studies have shown evidence of greater career mobility, promotions, and pay increases (Baugh & Scandura, 1999). A Sun Microsystems 5-year study found that "both mentors and mentees were approximately 20% more likely to get a raise than people who did not participate in the mentoring program" (Quast, 2011, para. 5). Both career-related and psychosocial mentoring positively impact career outcomes for mentors and mentees (Allen et al., 2004).

Objective career-related outcomes were more strongly correlated with increased compensation and the number of promotions for mentored individuals than those who were not mentored, based on findings in the study by Allen et al. (2004). Individuals who received psychosocial mentoring reported higher career satisfaction rates than individuals who were not mentored. According to a study by Khan (2010), "Virtual mentoring is continually becoming an increasingly important factor in developing future leaders in multinational organizations and is playing an important role in an individual's career development as well as their career success and survival" (p. 98). There are many

potential career benefits for mentors and mentees, including developing leadership skills, improving job satisfaction, and increasing opportunities for promotion and pay increases.

Mentor Benefits

General benefits. Mentees are not the only individuals who benefit from the mentoring relationship; the mentors also see advantages from participating in mentoring relationships. Mentors can feel good and gain self-satisfaction about their contributions to the growth and development of others (Bryant, 2005; Fong et al., 2012; Schunk & Mullen, 2013). People can learn to appreciate their own experience level by serving as a mentor (Starr, 2014). Mentors also experience positive career outcomes (Allen et al., 2004). The advantages to the mentors for taking time to guide less experienced individuals may be used to entice potential mentors to become actual mentors.

Another type of general outcome of mentoring is knowledge transfer, which can be obtained through e-mentoring and traditional face-to-face mentoring. Mentoring is a means of professional development; however, there may be situations where traditional face-to-face mentoring is not feasible. E-mentoring can offer a way to overcome this problem if the mentors have the necessary skills in counseling, socioemotional support, and goal setting/problem solving. The participants in one study, which consisted of program leaders, all reported their e-mentoring program was successful at transferring knowledge (Thompson et al., 2010). E-mentoring was therefore determined to be an option to overcome barriers that may prevent traditional face-to-face mentoring.

Mentoring is most effective when done in conjunction with support from the organization and alignment with the organizational purpose.

Career benefits. Mentors can experience many of the same career benefits that mentees gain. Mentors often experience professional development and improved communication skills (Fong et al., 2012). Mentors also gain increased job satisfaction, according to a study by Ensher and Murphy (2011). In another study, e-mentoring was determined to be beneficial to female entrepreneur mentees because it improved their attitudes toward uncertainty and increased their flexibility and innovativeness, which are important skills in business, particularly for business owners (Kyrgidou & Petridou, 2013). Mentoring studies have shown that mentoring can produce many different career benefits such as professional development, enhanced communication skills, increased flexibility, and job satisfaction.

Company Benefits

Having a formal mentoring program can save a company money by reducing turnover among its employees (An & Lipscomb, 2010; Eby et al., 2008; Ensher & Murphy, 2011). Additionally, organizations see an improvement in the organization's culture by involving employees in a mentoring program (An & Lipscomb, 2010). Greater commitment to the organization and less ambiguity about the role the employees are to fill in the organization are beneficial outcomes (Baugh & Scandura, 1999). The reason organizations invest time and money in mentoring is because organizations see a variety of benefits, as do the individuals participating in the mentoring program.

Similar to the variety of benefits mentors and mentees can gain through the mentoring relationship, organizations can also see an assortment of benefits. Knowledge sharing, increased intellectual capital, increased team effectiveness, and improved socialization and enculturation of new employees are advantages to the organizations that have employees mentored (Bryant, 2005). Employees involved in mentoring typically also demonstrate an improvement in communication skills, which is beneficial to the company and the employees (Ensher & Murphy, 2011). Biss and DuFrene (2006) also found that mentees' job performance was improved through mentoring.

Face-to-face mentoring, hybrid mentoring, and e-mentoring offer organizations ways to save money. An organizational benefit of providing e-mentoring is that it is a cost-effective way to help employees learn. Rowland's (2011) study showed that e-mentoring demonstrated the advantages of flexibility in scheduling and speed of knowledge transfer due to the opportunity for asynchronous learning, providing access to the mentoring program to individuals who may not otherwise have had access. Organizations can also benefit from e-mentoring programs through increased productivity and increased revenue (Rowland, 2011).

E-mentoring can reduce company expenses by decreasing the travel time and travel costs involved in skill development. A study by Cao (2005) found that e-mentoring offers flexibility in the way people can be taught. This flexibility can benefit organizations by allowing them to meet the needs of multiple employees without modifying their mentoring programs, also saving money. The organizations benefit by developing leaders through mentoring and see increases in employee retention (Jolly,

2011). Increased employee retention reduces the cost of recruiting, hiring, and training new personnel, which helps organizations.

Organizations that have supported mentoring programs can gain value by building their employees in general and leaders in particular. Structured mentoring programs can be used successfully to diversify the leadership (Smailes & Gannon-Leary, 2011). Mentoring can help businesses maintain knowledge over time (Rowland, 2011). E-mentoring does enable successful knowledge transfer when trust and effective communication are present, and knowledge transfer benefits organizations, mentors, and mentees. Organizational benefits include increased creativity and innovation; knowledge transfer, which promotes organizational growth; employee commitment; productivity; and profitability (Rowland, 2011). This multitude of benefits represent many reasons organizations offer mentoring programs.

Technology Tools

With the proliferation of electronic communication methods, mentoring has expanded into using many of these methods of communication. For organizations to make wise investments in technology and for the technology to be used effectively in mentoring, the organizations need to know which technology has the greatest effect on the mentor-mentee relationship. Multiple studies have helped identify technology tools and the ways that they have been used in mentoring. Studies have varied in the level and quantity of technologies used during mentoring that were considered as an e-mentoring relationship. E-mentoring is a term used when the mentoring relationship, which can

offer learning, emotional support, or career support, takes place primarily through email and other electronic means (Ensher & Murphy, 2007).

In some studies, the e-mentoring pairs used a wide range of technology. The E-Mentoring Illinois mentoring program uses custom software to enable file transfers, chats, email, mailing lists, instant messaging, blogs, and discussion boards as tools to foster mentoring exchanges (An & Lipscomb, 2010). Social networking sites are a tool being used to help individuals match themselves up with a mentor (An & Lipscomb, 2010). In another study, the e-mentoring relationship was carried out through the use of email (Shpigelman et al., 2009). Technology tools like learning management systems, electronic bulletin boards, email, blogs, video conferencing systems, and social networking sites can be effectively used in e-mentoring as a means of communication.

Table 1 shows the broad range of studies on e-mentoring and the types of technology used in the mentoring situations studied.

Today, information technology resources offer many means for learning, but there is no "one size fits all." In a study by Cao (2005), technology, including systems like automatic question answering, was shown to provide effective learning using individualized instruction. Through the Learning with Virtual Mentors (LVM) system interactivity, Cao studied student mental models to determine the factors that impacted outcomes. The study showed that information technology was able to serve as a reasonable substitute for a real mentor by providing one-on-one interaction, videos with questions and answers, and lectures with hyperlinks. LVM was partially supported in

Table 1

Technology Used in e-Mentoring

	Technology used in e-mentoring										
Study	Blogs	Bulletin board/ forums	Email	Instant messaging/ texts	Intranet	Learning mgmt system	Social networking	Phone	Video conferencing	Virtual world	Web applications
An & Lipscomb, 2010	√	√	√	√					√		
Cao, 2005						√					
Cravens, 2003										√	
Fong et al., 2012		√									
Godwin, 2011			√		√		√				
Panopoulos & Sarri, 2013							√				√
Philippart, 2014			√					√	√		
Rowland, 2011	√	√				√	√			√	√

that some students preferred the self-paced learning and convenience based on their learning behavior and learning performance (Cao, 2005).

Several technology tools have been shown to be effective means of communication for e-mentoring relationships. Using email allows the mentor or mentee to ask questions at any time and get a quick reply (An & Lipscomb, 2010; Guy, 2002). A study by Rowland (2011) showed that blogs, electronic bulletin boards, learning management systems, web applications, social networking, and virtual worlds used in e-mentoring were effective. Many online mentoring programs use email, and some use video chat functionality or specialized websites; one program created a virtual world where the mentor and mentee engaged with each other via avatars (Cravens, 2003). The video chat functionality helps in communication between the mentor and mentee because it includes much of the nonverbal communication that can be missing in simple phone calls, emails, or text messaging. One main means of communication with the e-mentors in a study by Fong et al. (2012) was posting to an online forum that was published into an online newsletter. Like email, online forum postings allow individuals to submit questions or thoughts asynchronously, at any time, and get a quick response.

In Cao's (2005) study, mentee learning styles were found to impact the virtual mentorship effectiveness more so in the basic learning system functionality than in the more advanced learning functionality. This impact may also have been due to the mentees' level of acceptance of technology. Virtual mentorship was found to lessen barriers to asking questions during learning. Interestingly, students' self-reported perceptions of interactivity did not seem aligned with the data (Cao, 2005). Mentees

reported being more interactive in a session with a live mentor/instructor even though instructors reported that the mentees did not ask questions. Conversely, the mentees reported the perception of a lack of interaction with the virtual mentors even though the system data showed evidence of question-and-answer activity as well as other activity in the system (Cao, 2005). This study showed that some of the effectiveness of the technology tool is driven by the perceptions of the mentees.

The fact that the effectiveness of virtual mentorship was influenced by mentees' learning behavior, learning performance, perception of system usability, perception of system effectiveness, and e-learning preference (Cao, 2005) influenced this study by allowing the researcher to ask for mentee perceptions of system effectiveness and self-rating on acceptance of technology when evaluating the effectiveness of technology tools in a hybrid mentoring relationship. Additionally, findings from this literature review helped provide guidelines on which tools are most effective in e-mentoring or hybrid mentoring and for what purposes. The wide variety of technology tools that were found to be effective in the e-mentoring and hybrid mentoring studies also promotes the use of the tool the mentor and mentee are most comfortable using.

Telementoring or e-mentoring using technology tools such as discussion boards, email, and instant messaging allows the mentors to share information and coach mentees in an asynchronous fashion. Asynchronous technology allows for a more flexible schedule that meets the needs of both the mentor and the mentee without having to align their schedules (Guy, 2002). Multiple studies reported that virtual learning environments (VLEs) were beneficial to learning (Cao, 2005; Fong et al., 2012; Smailes & Gannon-

Leary, 2011). However, Smailes and Gannon-Leary (2011) found that if the instructor did not implement the VLE's utilization into the course, the tool was not viewed as effective. In those cases, the VLE was unappealing to students because it was primarily used as a course material repository (Smailes & Gannon-Leary, 2011).

Information and communication technology offer ways to augment traditional face-to-face mentoring in a hybrid mentoring relationship or to replace the face-to-face aspect altogether in an e-mentoring relationship. Technology tools can be enablers that help the mentoring relationship, or they can be barriers to an effective relationship. The literature review in Smailes and Gannon-Leary's (2011) study showed both positions, that the use of electronic means of mentoring can be both beneficial to mentees and a challenge to mentees. The ultimate results aligned with the positive effects outweighing the negative (Smailes & Gannon-Leary, 2011). Email communication between mentors and mentees can be seen as effective due to the focused nature, quick turnaround, and ability to review at a later time. Email communication also fits better into busy schedules. Difficulties with the e-mentoring format were expressed by participants in both effective and ineffective mentor relationships, so Rickard and Rickard (2009) recommended that e-mentoring not replace face-to-face mentorship but solely augment a traditional mentoring relationship.

Muller (2009) performed a literature review to gather information about the advantages and disadvantages of mentoring via electronic means. The study found that email was a technology tool used to get timely support when a face-to-face meeting could not occur. Technology tools used also included web-based programs designed to help

match mentees with mentors based on profile similarities or to match mentees with subject matter experts based on mentee skill-building needs. Online mentoring can help institutions foster knowledge transfer and improve knowledge of ways to perform work; this information can be distributed to multiple employees simultaneously using electronic communication (Muller, 2009).

Summary

There were three main themes that came out of a literature search for the term *mentor* and a narrowing search that added the term tech*. The themes were enablers/barriers of successful mentoring, outcomes of mentoring, and technology tools used in e-mentoring. The enablers/barriers theme also had subthemes of trust, adoption, and overall. Reviewing the enablers and barriers of mentoring programs helped identify what to do and not to do in a mentoring program to assist potential mentors and mentees in successfully adopting a partner, establishing trust with the partner, and providing the two with general information about ways to be successful in a mentoring relationship.

The second major theme of outcomes in mentoring in the existing literature had subthemes of general outcomes, mentee benefits, mentor benefits, career benefits, and company benefits. The importance of the literature on outcomes was in describing what value can be gained by the individuals participating in and organizations offering a mentoring program. It also lets potential participants know why they should participate in a mentoring relationship. The final major theme discovered in the literature review was technology tools. This information helped identify the advantages and disadvantages

of various technology tools that can be used to foster a successful e-mentoring relationship.

Although many studies recognized the benefits of e-mentoring, Rickard and Rickard (2009) identified what the difficulties were with the e-mentoring format in both effective and ineffective mentoring relationships. This contradiction presented an opportunity for further study to determine how the challenges can be overcome or mitigated to maximize the benefits of using technology tools in a mentoring relationship. Jolly (2011) recommended future research to gain comprehension on how technology is used to build and maintain mentoring relationships. This study also contributes to that understanding. Rowland (2011) recommended additional research to study trust, communication, and the effectiveness of e-mentoring in management for knowledge transfer. The literature identified in the review process helped identify common themes of enablers/barriers, outcomes, and technology tools in the e-mentoring research, as well as gaps in the research that could be opportunities for further study. The tools and measures defined in multiple studies to evaluate the effectiveness of e-mentoring were also valid for this current study.

With the increasing demand for technology and the decrease in the number of skilled technology workers in the United States, there is a need to help build technology skills in the current workforce (Major et al., 2013). This literature review can help organizations identify both the effective technology tools and those that have been found to be less than optimal to minimize investments of time and resources in those tools for mentoring purposes. Knowing the benefits of a mentoring relationship can entice

potential mentors and mentees as well as increase company support of a mentoring program. The ultimate goal is to promote mentoring programs that foster the transfer of knowledge to increase skills in workers in general and technology workers in particular.

CHAPTER III

METHODOLOGY

The purpose of this chapter is to inform the reader of the methods and processes used to conduct this qualitative case study and why the research design type was selected. The site of the study, the population, and the population sample are defined to provide an understanding of the parameters of this study. Additionally, important elements in the research study that identify the data collection process; data management; data analysis; the limitations of the study; and the validity/quality, rigor, and reliability/trustworthiness are described. Each of these components described in this chapter is an important element of a research study (Golafshani, 2003).

Purpose of the Study

The purpose of this qualitative case study was to explore how using technology tools during mentoring impacts the desired outcomes, as defined by the mentor-mentee contract, of the mentoring relationships of technology workers at a private graduate university with the main campus in Southern California.

Research Questions

The research questions were generated to help the researcher understand the phenomenon of how utilizing technology in a mentoring relationship can affect the

outcomes, particularly the outcome of knowledge transfer and secondarily the transfer of soft skills. In qualitative case studies, a central question is asked as the main question to be explored through the study (Creswell, 2012). The central research question for this study was, "How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the desired outcomes, as defined by the mentor-mentee contract?"

The subquestions that helped assess the central question were as follows:

1. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of technical knowledge from mentor to mentee?
2. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of technical skills by the mentee?
3. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of knowledge of soft skills from mentor to mentee?
4. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of soft skills by the mentee?
5. How does the mentee's acceptance of technology affect the use of technology tools in a mentoring relationship?

6. How does the use of technology affect the mentor's/mentee's perceived quality of the mentoring relationship?

Study Design

Qualitative studies are used to describe phenomena and explore and interpret situations in the natural world that are not well defined by previous research (Denzin & Lincoln, 2011; Strauss & Corbin, 1990). A case study supports the deconstruction and reconstruction of a phenomenon in order to develop theories about the occurrences, typically answering a question of how or why a contextual phenomenon occurs, without the researcher manipulating the study participants (Yin, 2003). This study was designed to explore the outcomes of hybrid mentoring relationships that used technology tools, through the use of interviews, not intervention, which is a case study, as defined by Yin (2003).

A qualitative single case research design was selected for this study. As described by Gay et al. (2011), this type of research methodology is utilized to describe a phenomenon of everyday practice that is bounded by time and location. The phenomenon under study was skill transfer in mentoring relationships using technology. Case studies are used to provide insights into the relationships of study participants to examine what, how, or why things in a bounded system work (Gay et al., 2011). A case study research design is valuable for studying complex social units, providing a holistic description of a situation in context, studying atypical cases, or describing processes

(Bogdan & Biklen, 2003). This case study was bounded by the 10 weeks of the mentoring program and the location of the university campus in Southern California.

The mentoring program selected for this case study was established to promote the transfer of technical skills among information technology workers at a university in Southern California. This study investigated if there was a primary benefit of transferring technical skills and/or a secondary benefit of the transfer of soft skills through the mentoring program. The prospective mentees looked through an electronic list of individuals who volunteered to be mentors. Potential mentees reviewed the list to find a person who reported having knowledge in a technology the mentees wanted to learn and submitted a request for the mentor. Both the supervisor of the potential mentor and the supervisor of the potential mentee had to approve of the mentoring pair prior to establishing the mentor-mentee relationship. After the mentors and mentees were paired, they established a set of desired outcomes, including which skill(s) would be developed and commitments, and set the meeting frequency (see Appendix B). Team members worked in multiple buildings on two campuses; therefore, it was not always easy for the mentor-mentee pairs to meet face-to-face.

As recommended by Bradley (2006), to help reduce the risk of a lack of trust and/or a lack of confidentiality becoming barriers in the mentoring relationships, a contract was used to establish common expectations between the mentors and the mentees. The mentor-mentee contract was developed at the university prior to piloting the mentoring program and prior to this study. The basis for the contract started with the "areas of commitment" section, which was created by another university. That

commitment section was modified, language regarding the responsibilities associated with the mentoring relationship and how to withdraw from the mentoring program was added, and the goals section was also added.

Population and Sample for the Study

A study population is defined as the entire group of individuals who are of interest to the study (Roberts, 2010). The target population of this study was all technology workers participating in a mentoring program using technology to facilitate the mentoring relationship and promote skill building. The sample consists of the representative members of the target population selected to participate in the study (Gay et al., 2011). Qualitative research uses purposeful sampling, which means deliberately selecting a group of individuals for the purpose of learning about a phenomenon (Creswell, 2012). The purposeful sample that was studied for this research was a small group of technology workers at a private graduate university, with a main campus in Southern California, who participated in a pilot mentoring program that took place at the university. The participants were 20 years of age and older. The sample population included information technology staff members, both male and female, of multiple ethnic backgrounds.

Miles and Huberman (1994) described the key components of sampling in a qualitative research study as purposive, nonrandom, "small samples of people nested in their context and studied in-depth" (p. 27). Creswell (2013) recommended a sample size for case study research of no more than five cases in a single study. For this study, the sample consisted of four cases; each case included a mentee, his or her mentor, and the

mentee's supervisor. The sample was a purposeful sample; the researcher had access to and input into the site's mentoring program and requested study participation from mentoring program participants. The sample helped the researcher promote the use of hybrid mentoring to encourage the transfer of technical skills in her own organization.

Potential study benefits for the population studied were insight into mentees' skill development and an enhanced team as a result of process improvements in the mentoring program. Improved networking with peers was another possible benefit for both mentors and mentees in the study. This research was also broadly intended to benefit organizations that have the need to train workers in particular skills, enabling organizations to make educated decisions on how technology may affect mentoring and the successful transferring of skills. The broad concept of the use of technology in mentoring is applicable to organizations of any nature that are using mentoring programs to enhance their workforce. Human resource personnel and organizational leaders can also use this study to implement effective mentoring methods. This study will also benefit other individuals who want to be mentored in the future by helping them understand if it is effective to use technology during mentoring.

Site of the Study

The study took place in the information technology department at a graduate university with the primary campus in Southern California. Since this was a single case study, only one site was selected to help the organization determine if its mentoring program was successful at transferring technical and/or soft skills to the mentees. The

successful transferring of the skills was the desired outcome benefit for the mentees in the program and for the organization, so this study identified if the mentoring program met its objectives. The study at this site also determined if the mentoring program that was being run in the information technology department at the university was using the appropriate technology tools based on the users' technology acceptance.

Data Gathering

Prior to gathering data, the researcher obtained permission from the institutional review boards (IRBs) at both the researcher's educational institution and the university where the study took place (see Appendix C). Upon approval from both IRBs, potential study participants who had completed the pilot mentoring program received an introduction letter that explained the purpose of the study (see Appendix D). The study introduction letter was designed to set the tone of the research, informing information technology staff members that the purpose of the study was to assess the mentoring program itself, not to evaluate the mentors or the mentees. The intent of the letter was to reassure participants that they were not being evaluated and therefore the study would not impact the evaluation of their job performance.

Following the study introduction letter, potential participants were sent an informed consent request to gain their permission for study participation (see Appendix E). After receiving the mentee participants' consent to participate in the study, the mentors and the mentees' supervisors were also provided with an informed consent form and requested to participate in the research study. The consent information was designed

to assure the participants that the study would be conducted within ethical and legal guidelines to ensure that the participants would not be negatively affected as a result of the study. Informed consent was necessary to help potential study participants understand and evaluate whether to participate in the study after reviewing the purpose of the study and the potential harm and benefits (Thomas, 2011). Researchers use informed consent to protect study participants and reduce the likelihood of ethical issues impacting the study participants (Gay et al., 2011).

Upon notification of interest from the potential participants, the informed consent form was provided to them either in person or via email. They were also informed that they could ask questions regarding the study or the informed consent form prior to signing the form. After participants consented to participate in the study, just prior to each interview, the researcher reviewed the informed consent and asked if the participant had any questions. The researcher also reiterated at the beginning of each oral interview that the interviewee could withdraw at any time without consequences of any kind.

In planning for the study, a case study protocol was developed that described the project objectives, the on-site procedures, the case study questions and data-gathering templates, and an outline of the planned report (Yin, 2003). The researcher prepared for proper data collection techniques by asking good, vetted questions relevant to the study (Yin, 2003). The open-ended initial interview questions were vetted by both information technology professionals and a mentoring expert. Interview questions were reviewed by two additional professionals for alignment with the central research question and

subquestions of this study. An expert in mentoring and a technology leader assessed the questions for content and limiting potential researcher bias or influence in the questions.

Prior to the interviews, the individual interviewees were apprised, through the informed consent form, of the purpose of the study and that participation in the study posed little to no risk. Participants were also informed of the potential benefits the study may offer and that there was not any compensation for participation in the study. The consent form stated that there was no physical or legal risk to the study participants. It also specified that there was little to no psychological or social risk. This set the tone for the interviews. During the interviews, the researcher listened intently and carefully to the interviewees' responses. The researcher allowed and planned for flexibility by asking open-ended questions and modifying questions based on the interviewees' responses (Yin, 2003). Based on the individuals' responses to the open-ended questions, the researcher asked additional follow-up questions. The literature review provided the researcher with a good understanding of mentoring, e-mentoring, and hybrid mentoring and the impacts on skill transferring without biasing the questions asked of the study participants.

The researcher reassured interviewees of the importance of honesty and reminded them that their answers would not adversely impact their existing position or chances for future growth, in order to limit any possible psychological discomfort. The informed consent form was provided to minimize the perceived risk of participation or nonparticipation in the study since the researcher was the executive director of the department at the time of the study. The consent form was also intended to reassure

participants that there was no conflict of interest as the researcher interviewed individuals in the reporting line of the executive director of information technology, since interviews all took place after the mentoring relationship ended. The interviews were for information gathering regarding the effectiveness of the mentoring program, not information about the individuals.

The potential study participants were informed that they could contact the researcher if they had any questions. The informed consent form let possible participants know that they could either refuse study involvement or drop out of the study, even after they agreed to participate. The researcher worked to ensure that the study was conducted in an ethical manner. According to Gay et al. (2011), "Respect and concern for your own integrity and for your participants' dignity and welfare are the bottom lines of ethical research" (p. 24).

Instrumentation

Data were gathered through a postmentoring semistructured interview with each of the mentees who agreed to be part of the study. The questions that guided the interviews were reviewed by information technology professionals and a mentoring expert before being used with the study participants. The review of questions was to verify that the questions were not biased and would solicit information that would help answer the central research question: "How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the desired outcomes, as defined by the mentor-mentee contract?"

Semistructured interviews were used to explore topics and allowed the ability to ask follow-up questions based on the interviewees' responses (Thomas, 2011). The mentee interviews were used to review the issue of using technology to transfer skills during mentoring. Since all study participants were local to the researcher, the interviews were conducted in person, one-on-one, after the completion of the 10 weeks of mentoring. Each individual was asked to provide his or her perspective on the experience in the mentoring program. According to Yin (2003), interviews are the best source of evidence in a case study, as the people involved in the situation being studied can provide the best insight into it.

To reduce the likelihood that the data collector performing the interviews would impact the results of the data collection procedures, the interviewees were reminded that the benefit for the team and future mentees could only be realized if they provided honest feedback about the mentoring program. The topics discovered through the semistructured interviews of the mentees were refined into focused interviews with open-ended questions for the mentors. A focused interview is a short-duration interview based on questions created from the case study protocol (Yin, 2003). After the mentees were interviewed, the mentors who participated in the mentoring program for the information technology workers at the university were also interviewed to gather an assessment of the mentees' changes in both technical and soft skills.

Individual participants were interviewed independently in 1- to 2-hour interviews. Since the mentees' interviews were open-ended semistructured and the mentors' interviews were open-ended, interviewee responses occasionally led to additional

questions. The total time of the interviews was based on the interviewees' responses. The interviewer remained neutral but asked respondents for details and concrete examples (Gay et al., 2011) to describe how the use of technology impacted the mentoring outcomes. Additionally, each mentee's supervisor was interviewed in a 1-hour semistructured interview. The supervisor interviews took place after the mentoring and the interviews of the mentees and mentors were completed. Interviewing the supervisors provided another perspective to ascertain an independent evaluation of any changes in the mentees' level of technical knowledge or skills.

All of the interviews were conducted in person at the university where the mentoring program was implemented, with an interviewer and a single interviewee at a time. An audio recording was made of each interview while the researcher was also taking notes. No cameras were turned on to video record. The documentation of the interviews also noted nonverbal communication, as recommended by Miles and Huberman (1994), so as not to miss important components of the information conveyed. The interviews were transcribed from the audio recordings to an electronic document and verified with the interviewees prior to coding.

Data Management

Gay et al. (2011) states that it is important to indicate in the research how the data will be managed and secured. Any information obtained in connection with this study that identified individual participants remained confidential and was disclosed only with individual participant permission or as required by law. Qualitative research evolves as

the study progresses and may change after the IRB review, so it was important that the researcher had training in the ethics of research and kept it in mind during the study (Gay et al., 2011). The researcher passed the National Institutes of Health (NIH) web-based training course Protecting Human Research Participants. Confidentiality was maintained by storing participants' names and interview identification numbers separate from the interview data. Data with personally identifiable information were stored in an encrypted, password-protected file.

Only the researcher had access to the raw data. Audio recordings of the interviews were stored in a locked cabinet and were made available to the individual interviewees for their review until they approved the transcripts. The audio recordings of the interviews and the original notes from the interviews were destroyed upon publication of the dissertation. The password-protected file and the transcription files will be maintained for 3 years.

Data Analysis

Data were analyzed through a coding process based on a constructivist paradigm that described the results through that perspective, which indicates that reality is a social construct derived from the perceptions of individuals (Yin, 2003). Data were inductively analyzed to identify the major groupings. Thomas (2011) described the interview coding process as a constant comparative process whereby the data are compared to other data to identify categories/themes. In this study, each interview was compared against all the other interviews to identify commonalities in the responses that became the themes.

Grbich (2007) stated that thematic analysis can be done by using existing research or by reviewing the cases for words and phrases that are used frequently.

Interviewee response data were coded into categories and reduced down until the number of themes could not be reduced further without losing intent and content. The interview data were deemed fully coded when the categories were saturated as determined by the fact that common terms were recurring regularly (Miles & Huberman, 1994). After the major themes were noted, they were reviewed to map connections between the themes (Thomas, 2011). Themes were also compared against the major themes identified in the literature review to determine if there was consistency or any obvious absences of major themes. Miles and Huberman (1994) described coding as identifying the larger connotations and their constitutive characteristics from the independent units of information.

Limitations to the Study

According to Yin (2003), "Survey research relies on statistical generalizations, whereas case studies (as with experiments) rely on analytical generalization. In analytical generalization, the investigator is striving to generalize a particular set of results to some broader theory" (p. 37). Although case studies seek to generalize against a theory, this case study had the following limitations that may impact its generalizability to other sites:

1. The small sample size may reduce the likelihood that this sample represented technology workers at large.

2. Educational organizational cultures tend to promote learning, and all the mentees in the sample worked in higher education; this may limit the transferability of results to other industries.
3. Since the mentors and mentees were all technology workers, their self-rating of user acceptance of technology may be viewed differently than that of workers from other industries.
4. There was potential for researcher bias.

Delimitations

Delimitations explain the boundaries of the study by stating what the researcher has included and excluded from the study (Roberts, 2010). This study was intentionally restricted to a single case consisting of four mentees, their four mentors, and the supervisors of the mentees who participated in a mentoring program for technology workers at a private graduate university with a campus in Southern California. The mentoring relationships occurred from October 2016 through December 2016. The interviews took place from December 2016 through January 2017. This study was purposefully designed in order to study the case of this mentoring program, which represented an important issue for the researcher's organization, the information technology industry, and information technology workers.

Validity/Quality and Reliability/Trustworthiness

Interview questions for qualitative data do not need to be validated in a qualitative study (Creswell, 2012). They are designed to help promote the conversation; the

questions are semistructured, and the researcher understands that the questions are prompts and that further questions can be asked beyond what was originally planned, depending on interviewees' responses. Despite the fact that the questions did not need to be validated, the open-ended questions were reviewed by other information technology professionals and a mentoring expert. Member checking was performed to allow participants to validate the transcriptions of the interviews to review what was stated and intended in the interviews (Ely, Anzul, Friedman, Garner, & Steinmetz, 1991). Each participant read over the transcript of his or her individual interview and provided corrections and final approval of the interview transcript. This process was employed to allow each interviewee to check what was said and make sure not only that the transcription reflected the words she or he said but also that those words captured what the individual intended to say. Transcription reviews were performed electronically by the interviewees and electronically approved.

This study was evaluated for validity/quality and reliability/trustworthiness (used interchangeably) based on Golafshani's (2003) definitions of each pair in a qualitative study. The survey results regarding the users' acceptance of technology were interpreted and compared against the conceptual framework expectations to review for consistency and verify the validity of the data, as recommended by Creswell (2012). To check for validity of the responses regarding effectiveness of the technology tools at promoting successful mentoring outcomes to increase the mentees' technical skills, each mentee's supervisor was interviewed. The supervisor was asked if there was a perceived change in the mentee's technical skills after the mentoring was completed.

Since this sample was from a site where the researcher had ongoing access after the interviews were completed, validity was also sought by monitoring for any evidence of advancement or improvement in technical skills demonstrated by the technology worker mentees. Data from all of the interviews about a single mentee (i.e., the mentee interview, the mentor interview, and the supervisor interview) were triangulated to improve the trustworthiness of the study. The accuracy and credibility of qualitative research are improved through triangulation of data from various sources, multiple individuals, various means of collecting data, or a variety of data types (Creswell, 2012). A case study is best performed by viewing the subject from multiple directions to get a more well-rounded and thorough representation of the subject of the study (Thomas, 2011).

Summary

This chapter provided an overview of the methodology that was used in this research. The research methodology and questions were detailed. The site of the study was specified, and the rationale as to why the site and population sample were selected was described. The methods that were used to collect valid data and ensure the ethical interaction with the participants and the data were described. This chapter also discussed how the data were managed and coded. Finally, the researcher defined how validity, also termed quality in a qualitative study, and reliability, or trustworthiness, were achieved in this study. Each of these steps was taken to make the research effective at exploring how the use of technology tools impacts the transfer of skills during mentoring relationships.

CHAPTER IV

RESULTS

This chapter delivers a brief review of the purpose of the study and the research questions this case study explored. Additionally, an overview of the study participants and the research study design is provided. The findings regarding this research on mentoring are presented based on relevancy to each of the research subquestions, supported by excerpts from study participant interviews. Themes that emerged out of the study are also provided, followed by a summary of the key findings.

Purpose of the Study

The purpose of this qualitative case study was to explore how using technology tools during mentoring impacts the desired outcomes, as defined by the mentor-mentee contract, of the mentoring relationships of technology workers at a private graduate university with the main campus in Southern California.

Research Questions

Data were collected via individual interviews of the study participants to answer the central research question: "How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring

relationship affect the desired outcomes, as defined by the mentor-mentee contract?" The subquestions that helped assess the central question were as follows:

1. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of technical knowledge from mentor to mentee?
2. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of technical skills by the mentee?
3. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of knowledge of soft skills from mentor to mentee?
4. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of soft skills by the mentee?
5. How does the mentee's acceptance of technology affect the use of technology tools in a mentoring relationship?
6. How does the use of technology affect the mentor's/mentee's perceived quality of the mentoring relationship?

For this case study, there were a total of 12 interviews conducted. Interviewees consisted of eight participants in a pilot mentoring program for information technology professionals at a private graduate university and four supervisors of the individual mentees. All interviews took place individually, face-to-face in a private office at the

university. The mentor and mentee semistructured interviews were scheduled for up to 2 hours to allow sufficient time for the individuals to fully communicate their experience. The time allocated also permitted time for follow-up clarifying questions or to solicit additional information from the interviewees about their experience. The supervisors of the mentees were interviewed to obtain independent opinions of how the technology tools used during mentoring impacted the outcomes of the relationships. One hour was allotted for each of these semistructured interviews. All of the interviews took place over a 3-week period.

Study Sample

The purposeful sample that was studied for this research was a small group of technology workers at a private graduate university, with a main campus in Southern California, who participated in a pilot mentoring program for an information technology department. Each of the individuals who participated in the pilot mentoring program was sent a study introduction letter via email (see Appendix D). All of the pilot program mentor-mentee pairs agreed to participate in this study. Interestingly, all the people who were mentees in the pilot program were female (see Table 2 for participant summary).

Data Coding Procedures

The coding process for each interview was performed by reviewing the entire transcript for the general ideas, both before and after it was approved by the individual interviewee. According to Creswell (2012), “The coding process is to make sense out of text data” through “an inductive process of narrowing data into a few themes” (p. 243).

Table 2

Summary of Participants

Mentor triad	Participant #	Gender	Role
1	1a	Female	Mentee
1	1b	Female	Mentor
1	1c	Female	Supervisor
2	2a	Female	Mentee
2	2b	Male	Mentor
2	2c	Male	Supervisor
3	3a	Female	Mentee
3	3b	Female	Mentor
3	3c	Male	Supervisor
4	4a	Female	Mentee
4	4b	Male	Mentor
4	4c	Male	Supervisor

Note. All participants identified with the letter *a* were mentees, all participants identified with the letter *b* were mentors, and all participants identified with the letter *c* were mentees' supervisors.

Next, following Creswell's (2012) recommendation, the researcher started coding the general themes based on the interviewees' perspectives of the mentoring program. The recurring terms were color-coded in the electronic document. The researcher then searched for synonyms of each of the color-coded terms to combine with the key terms and included them in the themes. Finally, an independent reviewer went through the deidentified transcripts to identify themes. The themes generated through the coding by the two reviewers were compared for commonalities and differences. The themes that matched were used in the results of the study since they had interrater reliability (Boyatzis, 1998). Additionally, the themes were layered with the major themes as the

overarching ideas and the subthemes that signified derivatives of the major themes (Creswell, 2012).

Findings

Completion of the data coding process revealed a number of findings. These findings were guided by the central research question and six research subquestions. The six subquestions were designed to help answer the central research question: "How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the desired outcomes, as defined by the mentor-mentee contract?"

Research Subquestion 1

How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of technical knowledge from mentor to mentee?

The findings from the interview questions that were applicable to Research Subquestion 1 resulted in the major theme that technology helped/was an enabler. The subtheme was that it specifically enabled the transfer of technical knowledge. All mentors and mentees reported that technology enabled the transfer of technical knowledge to the mentees. Supervisors were not asked questions related to the transfer of technical or soft skills because they did not witness the mentoring interaction but only observed the outcomes after the mentoring was completed. The excerpts that follow from

Participant 1a's (personal communication, January 19, 2017) interview provide evidence of this finding:

> [MS Word/PDF] was an enabler. If I did not have that, I would not have been able to proceed without the technology. . . . I placed the documentation on iBook, and then I was able to read the material while I was sitting up. I would not have been able to read a book due to surgery if I had not had that technology. I would not have been able to turn the pages. I reviewed Word documents.
>
> [Email] was helping me with leadership skills, with documentation skills, and with team involvement.

Participant 1b (personal communication, January 17, 2017) agreed with her mentee; she stated that "she [the mentee] was hospitalized, so I emailed her for a fast recovery and sent her documentation." Participant 1b also stated that email enabled the two to carry on the mentoring despite being in separate locations.

Participant 2a (personal communication, January 17, 2017) also stated that technology enabled her to receive the technical skills she was seeking in the mentoring relationship:

> Unity 3D was an enabler; the mentor was very prepared for the mentoring sessions. He had a syllabus of what to do. The mentor and I worked on a project using Unity 3D software. Unity 3D provided practice knowledge; the mentor showed me where to get scripts and how to use it.
>
> Hands on and mentor's instructions helped me gain a better understanding of the software. The mentor compared and contrasted use of Maya vs. Unity, which type [of] objects are better to design in which software, for example, snow.

The mentor, Participant 2b (personal communication, January 30, 2017), agreed with his mentee:

> The software itself wasn't impeding my abilities to mentor; it was my own challenge finding ways you would go about doing it the long way when you are starting out. I had to go back to that mindset.

Participant 2b then answered negatively that technology was an impediment and affirmatively to clarifying questions as to whether the technology was a barrier or an enabler.

Email and MS Word were described by both Participant 3b (mentor) and Participant 3a (mentee). Participant 3a (personal communication, January 17, 2017) stated the following:

> Email, we used it as a file transfer. It provided an additional means of transferring information that was discussed in the face-to-face meetings. . . . That was helpful.
>
> [MS Word] was okay; instead of writing it down, documented electronically. It was easy to save and retrieve documentation. It was easy for us to document what was discussed. . . . My mentor was taking the notes. The mentor captured my questions and answered them in a Word document.

According to Participant 3b (personal communication, January 30, 2017), email was used to transfer the technical skill information that was discussed in her face-to-face meetings with her mentee:

> After we met, I would follow up with a summary through email of what we discussed and send her links to project intake form[s] and links to some training that my staff [was] doing.

In response to the question of whether technology enabled the transfer of technical skills, Participant 4a indicated it was useful by stating that "hands-on is always better for me." Participant 4b reported that HTML, JavaScript, and CSS enabled the transfer of technical skills. The interview excerpt below provides insight into how HTML and CSS aided in the transfer of technical skills from the mentor to the mentee:

> [HTML] actually enhanced it a lot. There were two options that we could go with, one to write native code, which was just only for Apple. But we tried [to] go the other way, to write with HTML code, which we thought would improve it

> so we could also deploy it on Android. That was the direction she [the mentee] was looking forward for. So, it really helped because she already knew HTML [rather] than trying to start with a new programming language. HTML and CSS, they really helped to see final product demo at a faster pace. (Participant 4b, personal communication, January 31, 2017)

Participant 4b was the only member of the pilot mentoring program to describe any of the technology as a barrier, but he qualified this by saying it was not really the fault of the technology. He explained, "I would say [Unity] was a barrier" (Participant 4b, personal communication, January 31, 2017). When asked in what way this technology was a barrier, he responded with the following:

> Well, I guess this might be more of my own lack of 100% knowledge in Unity rather than the program itself. . . . Well, I don't know. It is almost like you are teaching another language. It is not the fault of the language. It is just translating that to someone who has never spoken the language before. (Participant 4b, personal communication, January 31, 2017)

Each mentor-mentee pair reported through independent interviews that technology served as an enabler in the transfer of technical skills from the mentor to the mentee. The mentees all reported that the use of various types of technology, both hardware and software, helped them receive technical skill training from their mentors (see Table 3). The type of technology varied, but results were consistent: All of the mentors reported that technology helped them transfer their technical knowledge to their mentees. Not all technology enabled the transfer of technical skills, but each of the mentees also stated that technology promoted the transfer of technology knowledge.

Table 3

Technology Used in the Mentoring Relationships

Technology	Purpose
AchieveIt	Learning technical skill
Ellucian PM	Learning technical skill
Google Drive/File Server Drive	Documentation sharing
HTML5	Learning technical skill
iBook	Learning technical skill
iPad/MacBook	Learning technical skill
JavaScript	Learning technical skill
Maya—Computer Animation & Modeling	Learning technical skill
MS Outlook	Communication, logistics, soft skill development
MS Word, PDFs	Documentation, learning technical skills, soft skill development
PluralSight	Learning technical skill
Skype	Communication
Unity 3D	Learning technical skill
Virtual reality glasses	Learning technical skill
Xcode	Learning technical skill

Research Subquestion 2

How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of technical skills by the mentee?

Data analysis of the interview responses confirmed that technical skills were developed using technology during the mentoring relationship. All four of the mentees reported that they developed at least one technical skill. Validity of these responses was added by confirmation from each of the supervisors that the mentee had developed a

technical skill after being mentored. Three of the four mentors also reported that their mentees developed technical skills through the use of technology during mentoring.

Each of the interviewees who stated that technology helped/was an enabler of developing technical skills also said that technology promoted learning. The interview excerpts included in this section provide examples of how technology helped promote learning. For instance, Participant 1a (personal communication, January 19, 2017) said both email and MS Word were helpful in promoting technical skills for her as a mentee: "Email helped tremendously in our case because the mentor was able to communicate via email what she was trying to assist me in learning." Her mentor, Participant 1b, reported that technology was an effective means of transferring technical skills to Participant 1a. Participant 1c, the supervisor for Participant 1a, also stated that she saw an improvement in her supervisee's technical skills after the mentoring program.

Participant 2a reported experiencing enhancement of technical skills as a mentee; her mentor, Participant 2b, agreed, and her supervisor, Participant 2c, agreed with both the mentor and the mentee that Participant 2a was able to enhance her technical skills through the mentoring process. The interview excerpts below provide evidence of this finding:

> [After the mentoring] I have a better understanding of both Unity 3D and Maya. It will enable me to explore more on my own. (Participant 2a, personal communication, January 17, 2017)

> She [mentee] has a very good foundational understanding of VR [virtual reality]; now she wants to work on the next phase, which is development of VR software and VR learning components. She has gone from zero to full understanding and implementation of live products. That was pretty good.

> [The mentoring process] has been very instrumental in learning new technologies and expanding knowledge. (Participant 2c, personal communication, January 20, 2017)

Based on the mentoring agreement, Participant 3a sought to develop project management skills as a mentee. In her interview, she stated,

> I really learned a lot through the mentoring process. I now know how to identify the skills of people, how to improve the process, if you get stuck on anything, how to overcome road blocks, how to create project scope for every single project, how users can benefit from this process. (Participant 3a, personal communication, January 17, 2017)

Participant 3c (personal communication, January 20, 2017) relayed that his supervisee, Participant 3a, who was mentored to increase her project management skills, did in fact gain those skills: "For her, it has improved things greatly because now there is less unknown; she can tell if we are making good progress." He also stated that the mentee enhanced her people management skills through the mentoring program:

> The manager [Participant 3a] is enriched by better understanding the technical difficulties that the staff has to face. From that standpoint, the mentoring process has put in place these very good improvements in terms of the people management aspect. (Participant 3c, personal communication, January 20, 2017)

Participant 4a (personal communication, January 24, 2017) described how three different technologies enabled learning for her: "I created that with the Xcode. MacBook helped because hands-on is always better for me. . . . I created the Hello World; would not have been able to do that otherwise. . . . [Email] was very impactful on learning." Participant 4b (personal communication, January 31, 2017) thought his mentee, Participant 4a, gained some technical programming skills:

> It is a work in progress; she definitely got a taste of what it is, but there is a long way to go. It was a first step. Now she knows the terms and the patience of

> debugging. Yeah, you miss a semicolon and you will sit for a whole day debugging. At the end of it, she was getting used to programming concepts and trying to put some debug statements and get used to it.

Participant 4a's supervisor, Participant 4c (personal communication, January 20, 2017), was effusive about the ability of the mentee to develop technical programming skills as a result of the mentoring program:

> Given the fact that she has absolutely zero knowledge of programming and no formal background in programming, she did extremely well in creating these different programs using a platform, maybe Java, to create various applications.
>
> She went from not knowing anything about programming to being able to create a native app that worked on an iPad—tremendous achievement. . . . She was able to create a basic application. This is remarkable. This is remarkable since she had no programming knowledge prior to the mentorship.

Only one mentor provided evidence contrary to the finding that technology enabled the development of technical skills. Participant 3b (personal communication, January 30, 2017) reported,

> I haven't seen any [technical skill development]. I don't know what her [mentee's] outcome is on her end, only what she has told me. She said she got a lot out of that part of it, managing projects and using that [software] tool.

Despite this single mentor who had not witnessed technical skill improvement in her mentee, the technology was overall seen as a means of enabling learning and the development of technical skills by the information technology workers in this study.

Research Subquestion 3

How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of knowledge of soft skills from mentor to mentee?

An analysis of the responses to the questions that pertained to the transfer of soft skills showed that technology was more of an enabler than a barrier, but it was not as much of an enabler in the transfer of soft skills as it was in the transfer of technical skills. Seven of the eight mentors and mentees reported that soft skills were transferred as a result of mentoring with technology. Three minor themes were induced from the interview responses; these themes were that technology helped transfer communication skills, interpersonal skills, and time management skills. Participants varied in their reporting of which soft skills had been transferred through the mentoring process. The quotes included from the responses highlight which skills were transferred to the mentees.

Participant 1a reported an improvement in soft skills of communication through the mentoring process. The link to technology in the improvement of the soft skills was based on the MS Word and PDF documentation. The participant explained,

> As far as communication skills, email was helpful in communication. Again, like I said, I think we [mentor and mentee] communicated well with each other. As far as time management, it really assisted in those times when we could not physically meet. We used email as a source to meet. Not only email but also by phone. But email, it just helped, otherwise we wouldn't be able to proceed without it. We did have a certain amount of meetings to attend to; by doing email, it assisted us to continue to meet and for me to learn. (Participant 1a, personal communication, January 19, 2017)

Participant 1b, the mentor to Participant 1a, also reported that technology helped in their mentoring process. For her, email served to promote soft skills such as communication and interpersonal skills by enhancing relationship building:

> My mentee got sick and was hospitalized during the mentoring process, so technology was the best bet for us to communicate during the mentoring process.

> I sent email to make appointments. (Participant 1b, personal communication, January 17, 2017)

Participant 1b responded in the affirmative when asked if email enabled her to carry on the mentoring despite being in a separate location from her mentee. She also replied that the technology was not impeding at all, saying, "No, not at all. It made us closer via email and phone. It was a relationship builder" (Participant 1b, personal communication, January 17, 2017). The technology was also reported as a means of documentation to record the skill-building activities, whether soft skills or technical skills. In this case, email assisted with documentation:

> The technology—email, sending electronic documents, and phone calls—helped with the mentoring process; it helped serve as a backup of what we did and what was discussed. If the memory fades, there is still the documentation. (Participant 1b, personal communication, January 17, 2017)

In response to the question of how using technology affected the transfer of soft skills, Participant 2a's (personal communication, January 17, 2017) comments included the minor themes of enabling communication and time management:

> Skype IM [instant messaging] is more causal; I use it when I already have familiarity with the person I'm working with. Using IM affected communication positively.
>
> Outlook was useful. It helped with time management; it reminds us of meetings. [It provides] the same . . . usefulness as with other work, not particular to mentoring.

According to Participant 2b (personal communication, January 30, 2017), email assisted with communication skills: "Yeah, email was definitely a big part in terms of keeping on the same page, progress chats, milestones, and project planning in general." Skype and

virtual reality were also reported by Participant 2b as technologies that improved the soft skill of communication.

Participant 3a (personal communication, January 17, 2017) also described MS Word as being beneficial in the transfer of soft skills via documentation: "We documented everything; it helped me so I could review at a later time."

According to Participant 4a (personal communication, January 24, 2017),

> [JavaScript] helped with communication. I sat down with the mentor; he could look at what I had written out. He could explain, "Take this piece. Now run it and tell me what it does." . . . It certainly helped with communication and team building. . . . We were doing that together, but he was still also allowing me to do it myself. He would just point out sections and say, "Now look at this one and see if you can figure out what is wrong with it."

Participant 4b reported, "Definitely, [MS Outlook] was our primary mode of communication, like sending emails, sending attachments, and scheduling meetings. It was really helpful for the nontechnical part of the project."

Technology helped enable the transfer of technical skills during the mentoring relationships according to three of the four mentors and all of the mentees. Three of the four mentees stated that technology enabled the transfer of communication skills, and all three of the corresponding mentors agreed. Time management skills were reported to have been transferred to a different set of three mentees, but only one of the associated mentors identified time management as a soft skill that was transferred during mentoring. The final type of soft skill that was reported as transferred during mentoring was interpersonal skills. Interpersonal skills were only reported by one mentor, but three mentees mentioned that technology assisted with the transfer of interpersonal skills.

Research Subquestion 4

How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of soft skills by the mentee?

An outcome of the data for questions corresponding to Research Subquestion 4 showed that technology helped or was an enabler. Although the major theme was present, technology was not as strong in the development of soft skills as it was in the development of technical skills. Fewer study participants reported soft skill development than reported technical skill development. All the mentees' supervisors reported that soft skills were enhanced as a result of the mentoring relationships. Six of the eight mentors and mentees reported that soft skills were developed as a result of mentoring with technology. Soft skills were not listed by any of the mentees as a goal in their mentoring contracts; the enhancement of soft skills was just a beneficial byproduct of the mentoring relationships. Interestingly, sometimes the mentors and/or supervisors of the mentees recognized soft skill improvements that the mentees did not see in themselves.

A subtheme that was consistent across the study participants' responses was that communication skills were transferred to the mentees through the mentoring relationships. Despite the fact that many participants reported that time management and documentation skills were transferred using technology, in the responses on what skills were actually enhanced in the mentees as a result of the mentoring, only one participant reported an improvement in time management skills. A new subtheme that emerged was the development of interpersonal skills. The interpersonal skills were not planned as an

objective of the mentoring contracts and were only recognized as having been developed after the mentoring program ended. The response excerpts from the participants included in this section reflect the soft skill development that was enabled through technology use during the mentoring relationships.

Participant 1a reported using the documentation as a reference tool to assist in her communication after completing the mentoring program. However, she did not cite being able to create better documentation herself. She stated,

> I feel that the PDF/Word documents impacted me tremendously. Had I not had those—I know how to use a PDF properly and check the bookmarks and use *find*—I wouldn't be able to reference it to assist me to communicate with a user in an email. I can go to it and quickly find what I need and want. So that part is one item that helps me tremendously. (Participant 1a, personal communication, January 19, 2017)

Participant 1a (personal communication, January 19, 2017) did report an improvement in her communication skills:

> I think for the most part, I would say I am starting to take on some of those skills naturally as far as soft skills. At other times, I will stop and I will have that check-in with myself, and then I will reflect on what I learned, and then I will proceed from there as far as trying to communicate with someone or things that I do in my daily job. Sometimes I have to stop and catch myself so that . . . then I go back to what my mentor was trying to relate to me that is helpful for her.

Participant 1b, the mentor to Participant 1a, agreed that the mentee developed communication skills. Her statements also indicated an improvement in Participant 1a's interpersonal skills, in particular relating better with programmers:

> [Email] helped her be a better liaison between technical team and the customers. To communicate with the programmers, she needs to use more technical language, and to communicate with the users, more simple language to explain the project in detail. It [mentoring] enhanced her communication skills in respect to communicating with people. I was mentoring on the soft-skill side. For

> example, she wanted to know how do I know how to deal with people when she does not know the background of the application that the programmers will use. So, I was just giving my own experience on how to learn that, how to discuss it. I feel she benefited from that and improved knowledge. (Participant 1b, personal communication, January 17, 2017)

Participant 1c, Participant 1a's supervisor, also noticed an improvement in the mentee's communication skills. She noted,

> I would say oral communication with users [was improved]. She [Participant 1a] comes in with more understanding now than she used to about what type of questions to pull out of people to understand what the project is about or to ascertain some of the risks that might be associated with it. I have witnessed that firsthand. (Participant 1c, personal communication, January 23, 2017)

The supervisor also stated that "she [Participant 1a] is now leading meetings with the users. She can command a room now" (Participant 1c, personal communication, January 23, 2017).

There was a self-reported improvement in interpersonal skills by Participant 2a (personal communication, January 17, 2017):

> Interpersonal relationship improved with coworker; [we] will be able to work together better in the future. My project management skills changed a little bit. I have a better idea of who does what (helps to distribute work in the future) and who to ask for future questions and troubleshooting.

The participant's mentor, Participant 2b (personal communication, January 30, 2017), reported recognizing an improvement in Participant 2a's ability to communicate more effectively:

> Yes, [I saw a change in her ability to communicate] by helping identify the core of the project and delegating the tasks, to know the background problem and the application. It is a lot clearer level of communication because she understands a lot of these concepts now and has the technical knowledge to clearly understand what we are all about.

Participant 2c was the supervisor of both the mentor, Participant 2b, and the mentee, Participant 2a. Participant 2c reported a noticeable improvement in the soft skills of communication by the mentor in this mentoring relationship but noted no soft skill changes in the mentee yet. He explained,

> [Soft skill improvement] was more on the mentor, because through this process he has learned how to share. . . . So as a mentor, he has definitely improved in how he shares his ideas, because while working with his mentee, he explains . . . it in a way that is obvious to him. But when he shares it, the mentee had to say, "Okay, slow down." He has definitely learned good soft skills, sharing, and teaching skills through this process. (Participant 2c, personal communication, January 20, 2017)

Later he also stated,

> In the last month or so, I have seen a great improvement in communication and sharing with faculty members. The dialogue, the way information is conveyed and questions are asked, and probing instructors, and asking for clarification—I see a huge improvement. (Participant 2c, personal communication, January 20, 2017)

Participant 3a (personal communication, January 17, 2017) reported enrichment in her communication, time management, and people management skills through the use of technology during the mentoring program:

> I have a better understanding of how to look into a project and dissect it, and after that, delegate it and implementation for success. My communication and time management skills improved through the process. I loved seeing AchieveIt. I was impressed with what it does.
>
> My personnel management skills were enhanced through knowledge use of PluralSight, knowing how to master knowledge in a subject.

Participant 3a's supervisor, Participant 3c (personal communication, January 20, 2017), stated the following:

> I see the willingness, and when she [Participant 3a] verbalizes the changes that she wants to implement, I see that she has a full understanding of the steps that

> need to be taken in terms of making changes and improving soft skills. But I think with time and practice, I will be able to assess and quantify how much that has improved.

Participant 3b (personal communication, January 30, 2017) added, "Certainly being able to capture the notes was good. The intake form and the project scope are in Word documents."

Participant 4b also reported recognizing a positive change in his mentee's communication skills and project management skills during and after the mentoring relationship. He noted, "She always had good soft skills. . . . She has, in terms of project management and communication, she always has that talent. Of course, it did improve" (Participant 4b, personal communication, January 31, 2017). Participant 4c stated that time management skills were developed by his direct reports, Participant 4a (mentee) and Participant 4b (mentor), who participated in the mentoring program. He stated,

> There is a great deal of soft skills such as managing a project and sticking to deadlines. They really had the most organized and most specific goals of all the groups. So they had to stick to organizational goals in order to complete their technical goals; that is probably an improvement in terms of soft skills, their ability to stick to a timeline. (Participant 4c, personal communication, January 20, 2017)

Technology enabled the transfer of soft skills from several mentors to their mentees, as reported by all mentors and mentees. Three of the mentees self-reported developing soft skills. The mentee who did not self-identify as having enhanced any soft skills as a result of the mentoring program was reported as having enhanced both time management and communication skills by the mentor and her supervisor. Communication skills were the main soft skills that were gained by the mentees in this

study. Additionally, three developed some time management skills, and another enhanced organizational skills. Not all technology used in the process of mentoring aided in the transfer of soft skills; some was exclusively useful in the transfer of technical skills.

Research Subquestion 5

How does the mentee's acceptance of technology affect the use of technology tools in a mentoring relationship?

As described in Chapter I, the participants' self-reported comfort level with technology related to the unified theory of the acceptance and use of technology (UTAUT; Venkatesh et al., 2003). This study sought to understand if the comfort level with technology impacts individuals' likelihood of using technology. All of the mentoring pairs used technology during their mentoring relationships. The type of software and reason for use were different with each mentee-mentor pair. Only one pair used technology to have meetings; all three other pairs used it as a way to demonstrate a technical skill or provide hands-on experience with the technology. All four pairs of pilot mentoring program participants also supplemented their mentoring by using technology between meetings.

The theme that emerged from this study related to this question was that the mentors and mentees were comfortable and had a general confidence in their ability to utilize the technology successfully. Both mentees and mentors expressed comfort with most of the technology used during the mentoring relationships. There were some

technologies that were unfamiliar at the beginning of the mentoring relationships. Despite being unfamiliar with some of the technology, the users had a general acceptance of technology.

Participant 1a (personal communication, January 19, 2017) reported being very comfortable with all the technologies used during her mentoring relationship. She stated, "[I am] very comfortable with email, MS Word, and PDFs. I work with them [on a] daily basis."

Participant 2a reported varying degrees of comfort with each of the applications used during her mentoring. She had no experience with two of the technologies she used during the mentoring relationship, but she did not express discomfort at the idea of working with an unfamiliar technology. She sought technical skills in those software applications through the mentoring program. She explained,

> I am familiar with UI [user interface] Unity 3D and somewhat comfortable. I have no prior knowledge/experience at all with Maya. I have no prior knowledge/experience at all with VR. I use Skype, Outlook, Google Drive, and shared drives daily; I am very comfortable with these technologies. (Participant 2a, personal communication, January 17, 2017)

Comfort levels for Participant 3a ranged from comfortable to very comfortable with all of the technologies used during the mentorship. She noted,

> I am comfortable with email, . . . and [with MS Word I am] very comfortable. I am well versed in the basics of MS Word; I don't think I am an advanced level, but I was comfortable with the functionality and purposes it was used for during mentoring, [that is,] building a relationship with mentor. I am comfortable in all mediums used. (Participant 3a, personal communication, January 17, 2017)

Participant 4a was comfortable with half of the technologies that were used in her mentorship. Her range of comfort was from very comfortable to uncomfortable. Despite

her initial discomfort with one of the technologies, she reported being more comfortable with it by the end of the mentoring program. She stated,

> [HTML] was fine. I love it! It brought back so many memories; I want to do it more.
>
> Ugh, yeah, [JavaScript] was a challenge at first. My mentor showed me a few tricks when testing your code: how to break out pieces, test individual pieces to figure out where the issue is, and then put it back together to fix the issue. Once he showed me that, I became more comfortable with it, but still I am not particularly fond of it.
>
> I wasn't that comfortable [with the iMac], but mostly because I spend a majority of my time on PC. While I own an iMac at home, I haven't used it in 8 months. I really felt like I was starting fresh. I'm learning things that we [mentor and mentee] both had to go, "Wait, where is the command prompt again?" because I don't use it. There was a learning curve, very much so. The tablet, on the other hand, I use those regularly, so that was fine.
>
> That [Xcode] was new, but because I know HTML, it wasn't that much of a challenge. It was just every time I would get back into Xcode, I would have to remember where to go to do my programming. I think that was fine. (Participant 4a, personal communication, January 24, 2017)

Although the study participants were all technology workers, they did not unanimously report comfort with all of the technologies used during the mentoring relationships. However, participants generally accepted technology as part of the mentoring process, as indicated by their comfort level and usage throughout the mentoring program. The one participant who reported having some discomfort referred to her situation as a "learning curve" and a "challenge," but by the end of the program, she had converted to having some comfort with the technology that was originally thought of as challenging. The mentors and mentees were in alignment with the UTAUT as they reported being comfortable with and utilizing technology for their mentoring relationships.

Research Subquestion 6

How does the use of technology affect the mentor's/mentee's perceived quality of the mentoring relationship?

After reviewing the data for the responses to questions aligned with how the technology affected the quality of the mentoring relationship, an overarching major theme was revealed that the technology was helpful. Minor themes included that the technology helped with both learning and communication. One participant said that although technology was helpful in transferring technical skills, "it didn't have any impact on the quality of the relationship," either negative or positive. This was the only contrary evidence for this question, that the technology was neutral, not helpful. The remaining 11 study participants reported that the technology was helpful; the statements included in this section help substantiate their position.

The first mentoring pair, Participants 1a and 1b, reported that technology aided in the bonding of the relationship and learning:

> I feel it helped tremendously, in regards to the whole mentoring program. Had we not had these resources or tools, it would really make it difficult to meet with [the] mentor or to learn.
>
> [Email] really helped to initially create an introduction or a so-called bond with the person who may eventually become your mentor. That was helpful since we could not meet in person. (Participant 1a, personal communication, January 19, 2017)

> The technology—email, sending electronic documents, and phone calls—helped with the mentoring process; it helped serve as a backup of what we did and what was discussed. If the memory fades, there is still the documentation. . . . We emailed back and forth about her health, and that really bonded us. (Participant 1b, personal communication, January 17, 2017)

The second mentoring pair, Participants 2a and 2b, stated that the technology helped the mentee to learn more quickly and communicate more effortlessly, which helped the overall relationship:

> It was faster to learn having personalized instruction and hands-on access to the software. Using technology improved communication; it was faster. [It] helped achieve goals established in the mentoring contract. (Participant 2a, personal communication, January 17, 2017)

> Overall, it went really well. We accomplished a lot, and we were able to deliver a product that we both felt pretty satisfied about. [Technology]—a lot made it easier to deal with scheduling and deadlines, scheduling, tasks, critiques, and feedback; yeah, it made the overall experience easier to communicate with the mentee. (Participant 2b, personal communication, January 30, 2017)

The third pair of participants in the mentoring program, Participants 3a and 3b, described the technology as helpful to learning and communication in the mentoring program, which enhanced the overall quality of the mentoring relationship. Participant 3a (personal communication, January 17, 2017) reported that technology increased the effectiveness of the mentoring program: "Technology was really helpful. . . . [Technology enabled us] to achieve the objective to enhance learning during the mentoring process." Participant 3b (personal communication, January 30, 2017) stated, "I think the quality was good. For the most part, we stuck to our meetings. . . . We didn't have much down time when we did meet, so it was very, very productive meetings."

The final mentor-mentee pair, Participants 4a and 4b, reported that the technology played a key role in the mentoring relationship, but they had a difference of opinion on its actual impact on the mentoring relationship. According to the mentee, the mentoring

relationship "was great. . . . [The technology] was very important; it was kind of key to what we were doing in helping me gain the technical skills, but I don't think it really had an impact on the relationship aspect" (Participant 4a, personal communication, January 24, 2017). The mentor reported the following:

> [Technology] enhanced it [the mentoring relationship] and made it more seamless, especially with the way we were using Outlook and the documentation so we could track it. So, soft-skills-wise, it was a big plus.
>
> In the development process, since we have access to all the hardware, MacBook and iPad, it made it easy to visualize rather than using a simulator or even a virtual platform. In that way, technology really helped. It was easier for her [mentee] to visualize. In 2 days, she was able to build a Hello World app, and she knows how to deploy an app. It gave her more excitement; that was a psychological boost. (Participant 4b, personal communication, January 31, 2017)

The mentors and the mentees found that technology was helpful in the mentoring relationships. All four of the mentors and three of the four mentees found technology to be helpful in the relationships. It was discovered that technology enhanced the overall quality of the mentoring by helping to improve communication and promote learning, which helped mentees meet the objectives they identified in the mentoring contracts. Being successful at meeting the goals of the mentoring relationships helped both the mentors and the mentees feel like the time spent in the program was worthwhile. Unanimously, all participants reported that they would recommend that others participate in the mentoring program in the future. One study participant said the following in response to the question of whether he would recommend that others participate in the mentoring program in the future:

> Absolutely, I would strongly recommend it, because all the five employees that I have participating have tremendously benefited from the program in improving technical skills, soft skills, administrative skills, and managerial skills. And there

> is absolutely no down side to the experience. All of them have experienced positive outcomes. It has been very helpful for all staff who contributed. (Participant 3c, personal communication, January 20, 2017)

Some mentors experienced skill improvement during the process of helping their mentees. Participant 1b (personal communication, January 17, 2017) stated,

> I was trained as a whole on the technical side, and on the soft skill side, by sharing the information with my mentee, it makes me read more. I think I really benefited; I was . . . blessed in that.

Mentoring with the use of technology was seen as beneficial unanimously by all the mentors, all the mentees, and all the mentees' supervisors. Some asked for more time to continue the mentoring relationships because they were so helpful.

Summary

Technology workers at a private graduate university who participated in a mentoring program engaged in this study to provide information to the researcher about the use of technology during the mentoring process. The central research question of this study was, "How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the desired outcomes, as defined by the mentor-mentee contract?" Six research subquestions facilitated data collection. Qualitative data analysis occurred through the use of coding processes.

Table 4 summarizes the findings of this study, highlighting emergent themes and patterns that surfaced through interviews with mentees, mentors, and supervisors. This study found that the use of technology was an enabler in many ways. The major theme

across the study was that technology helped/was an enabler. One of the subthemes was that it was an enabler of the transfer and development of technical skills and promoted learning. Another subtheme was that technology helped to increase the transfer and development of soft skills, including communication skills, time management skills, and interpersonal skills, in the mentees. A theme that was universal among all mentees was that they were comfortable with the use of technology and accepting of the use of technology during the mentoring relationships. The final theme was that technology enhanced the overall quality of the mentoring by helping to improve communication and promote learning. These themes were pervasive in the interviews of all 12 study participants, who consisted of mentors, their mentees, and the mentees' supervisors.

Table 4

Summary of Findings

Research subquestion	Theme	Terms used	Mentee	Mentor	Supervisor
1. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of technical knowledge from mentor to mentee?	Major theme: Enabler	enabled, helped, improved	1a, 2a, 3a, 4a	1b, 2b, 3b, 4b	
	Subtheme: Enabled transfer of technical skills	helpful, enabler, effective means of learning	1a, 2a, 3a, 4a	1b, 2b, 3b, 4b	
2. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of technical skills by the mentee?	Major theme: Enabler	improvement, improved, helped, assisted, assist, benefited	1a, 2a, 3a, 4a	1b, 2b, 4b	1c, 2c, 3c, 4c
	Subtheme: Enabled learning	helped promote learning, learned, learn, improved knowledge, better understanding	1a, 2a, 3a, 4a	1b, 2b, 4b	1c, 2c, 3c, 4c
3. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of knowledge of soft skills from mentor to mentee?	Major theme: Enabled transfer of soft skills	helped, improved	1a, 2a, 3a, 4a	1b, 2b, 4b	
	Subtheme: Enabled transfer of communication skills	helped communication, improved communication, useful, enhanced communication	1a, 2a, 4a	1b, 2b, 4b	
	Subtheme: Enabled transfer of time management skills	really assisted, helped	2a, 3a, 4a	4b	

Table 4 (*continued*)

Research subquestion	Theme	Terms used	Mentee	Mentor	Supervisor
3. (cont'd)	Subtheme: Enabled transfer of interpersonal skills	better liaison, personnel management skills	1a, 2a, 3a	1b	
4. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of soft skills by the mentee?	Major theme: Developed soft skills	benefited, improvement	1a, 2a, 3a	1b, 2b, 4b	1c, 2c, 3c, 4c
	Subtheme: Enhanced communication	helped communication, improved communication, useful	1a, 2a	1b, 2b, 4b	1c, 2c, 3c, 4c
	Subtheme: Enhanced time management	really assisted, helped, skills improved	3a		4c
	Subtheme: Enhanced interpersonal skills	better liaison, work together better, personnel management skills were enhanced	2a	1b	3c
5. How does the mentee's acceptance of technology affect the use of technology tools in a mentoring relationship?	Comfortable	fine, love it, challenge, somewhat comfortable, very comfortable, high comfort level	1a, 2a, 3a, 4a	1b, 2b, 4b	
6. How does the use of technology affect the mentor's/mentee's perceived quality of the mentoring relationship?	Helpful	aided, helped, enhanced, more seamless	1a, 2a, 3a	1b, 2b, 3b, 4b	

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This chapter begins with an overview of the rationale for conducting the study, followed by a restatement of the purpose of the study. The research questions are included in this chapter to provide the frame of reference for discussing the results of this qualitative case study. A synopsis of the study methodology, data collection process, and data analysis is also provided. This chapter ends with a discussion of the findings and the implications of those findings along with recommendations for future research and actions.

Overview

The rationale for conducting this study relates to an ever-increasing need for a skilled workforce to fill technology jobs. The pool of available workers is shrinking in the United States due to the large-scale retirement of baby boomers (Sightings, 2014) and a lack of sufficient quantity of students studying technology to replace these retirees. The number of computer science degrees awarded in 2012 was less than 88% of the number of the degrees granted in 2005 (National Science Foundation, National Center for Science and Engineering Statistics, 2015). Foreign workers may be a resource; however, the restrictions on visas for these skilled technology workers from abroad prevent sufficient numbers of skilled workers from entering the country to fill needed positions. The U.S.

Department of Labor regularly receives three times the number of requests for foreign worker visas than the number of visas issued (Richter, 2017).

Technology workers are in demand, but they need good technical and interpersonal skills to be effective. While the supply of technology workers is shrinking, the demand is increasing, and the types of skills needed to fill the jobs continue to evolve. As with many of the science, technology, engineering, and mathematics (STEM) fields, there is an increasing demand for skilled technology workers. According to Fayer, Lacey, and Watson (2017),

> Employment in STEM occupations grew by 10.5 percent, or 817,260 jobs, between May 2009 and May 2015, compared with 5.2 percent net growth in non-STEM occupations. Computer occupations and engineers were among the types of STEM occupations with the highest job gains. . . . The computer occupational group is projected to yield over 1 million job openings from 2014 to 2024. (pp. 5, 8)

This rising demand, coupled with the regular changes in software, means information technology industry managers need to grow the skills of existing technology workers and train others.

Due to regular and rapid technology changes, workers need to keep skills up to date to be able to meet related job demands. Technology has been shown to support the transfer of skills in other mentoring relationships (DiRenzo et al., 2010). This study investigated whether technology aids in the transfer and enhancement of technical skills for technology workers as well. Mentoring is a valid means of adding to technical workers' skill set, as evidenced by this study and multiple other peer-reviewed studies including those by Bello and Mansor (2013) and Rowland (2011). Potential mentors with

the skills to train other technology workers may not be in the same geographic area; therefore, e-mentoring or hybrid mentoring can increase the pool of mentors needed to help train other workers.

Purpose of the Study

The purpose of this qualitative case study was to explore how using technology tools during mentoring impacts the desired outcomes, as defined by the mentor-mentee contract, of the mentoring relationships of technology workers at a private graduate university with the main campus in Southern California.

Research Questions

The central research question used to explore how using technology impacts mentoring was, "How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the desired outcomes, as defined by the mentor-mentee contract?" Each mentee set goals of what she wanted to learn in the mentoring process and contracted with a mentor to target that learning. The desired goals of each mentor-mentee contract were set by the individual mentee and could have included technical knowledge and skills and soft skills. The desired goals established by the mentees in this study included technical knowledge and skills such as programming languages, project management, and interface design. The only soft skills listed as stated goals in a mentor-mentee contract were personnel management and process improvement. All the mentees who developed communication and time management soft skills during the mentoring program did so incidentally.

The central research question and the following subquestions helped discover whether technology played a role in helping the mentees achieve the objectives they sought:

1. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of technical knowledge from mentor to mentee?
2. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of technical skills by the mentee?
3. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the transfer of knowledge of soft skills from mentor to mentee?
4. How does the use of technology tools such as video conferencing, email, and social networking applications during a hybrid mentoring relationship affect the development of soft skills by the mentee?
5. How does the mentee's acceptance of technology affect the use of technology tools in a mentoring relationship?
6. How does the use of technology affect the mentor's/mentee's perceived quality of the mentoring relationship?

Study Methodology: Data Collection and Data Analysis

To explore this phenomenon of a pilot mentoring program that was bounded by time and place, a qualitative case study was used. This research design was employed to determine if the use of technology tools impacts the transfer and development of skills during mentoring relationships. Based on the framework of the unified theory of the acceptance and use of technology (UTAUT), interview questions were asked to determine the mentors' and mentees' comfort level with technology and acceptance of technology to help investigate if the individuals' comfort with technology impacts its use. This case study involved interviewing members of an information technology team's pilot mentoring program to determine how the use of technology impacted the attainment of the mentees' desired goals. In-person interviews were conducted with each individual of the triads—the mentors, the mentees, and the mentees' supervisors—to get multiple perspectives on whether the outcomes defined in the mentor-mentee contracts were achieved and how technology impacted those outcomes.

The process of coding the interview data was based on a constructivist paradigm to allow the participants' perceptions of the mentoring relationships to determine the reality of the situation (Yin, 2003). Interviews were transcribed from audio recordings for interviewees who approved recording and typed up from notes for the interviewee who did not approve audio recording of the interview. The interview transcripts were reviewed and approved by the interviewees prior to coding to ensure that the intent of their responses was accurately captured. This process helped the researcher confirm that the results of the qualitative interviews were true to the experiences of the individuals

who participated in the mentoring program. Interviewee response data were then coded into categories by looking for common words and phrases as well as their synonyms. According to Grbich (2007), thematic analysis can be done by reviewing data for words and phrases that are used frequently. Themes in this study were induced from the categories identified through this process. Once the themes were identified by the researcher, an independent reviewer also coded the de-identified interview data. Themes induced by both reviewers were compared for commonality and differences. As per Horvat (2013), who said that "writing is a critical part of the analytic process where we work out ideas" (p. 124), the analysis of the findings of this study continued through the writing of the dissertation.

Discussion

The literature review in Chapter II helped identify common themes of prior studies on mentoring. The themes that emerged from the literature review were mentoring enablers/barriers, technology tools, and mentoring outcomes, including outcomes related to the mentees, mentors, and the company. During the transcription of the interviews and the data coding for this study, themes emerged that helped describe common experiences among the mentees and mentors. The major themes that developed from this study were consistent with the themes identified in the literature review. According to Boyatzis (1998), "A good thematic code is one that captures the qualitative richness of the phenomenon. It is usable in the analysis, interpretation, and presentation

of the research" (p. 31). The codes induced from this study were used to interpret and analyze the data.

The findings of this study showed that an acceptance of the usage of technology by an individual mentee can help improve the quality of a mentoring relationship by using technology to expedite communication and enhance the transfer of skills. Another major theme discovered from this study was that technology was an enabler in the transfer of technical skills and soft skills, providing the mentees with the information about and an awareness of the elements of the skills, making the skills identifiable. Another major finding was that technology enabled the development of technical skills and soft skills. That the mentees' comfort with technology influenced usage and success with technology during mentoring was another major theme. The final major theme induced from this study was that technology was helpful in improving the quality of the mentoring relationships. Following is a discussion of the meaning of these findings and the importance for practice in the field.

Acceptance and Use of Technology During Mentoring

A major theme to come out of the findings that appeared as a result of the UTAUT-related interview questions of this study was that the mentees' acceptance of technology positively impacted the usage of technology during the mentoring relationships. Study participants who were comfortable with technology found themselves motivated to use various technological tools and software applications to enhance the transfer and development of skills and to help in creating a quality mentoring

experience. For example, one mentee said she "love[s] it" when referring to HTML5 (i.e., hypertext markup language for structuring and presenting content on the web). HTML5 is a great tool for developing technical skills in technical workers who want to become web programmers.

The mentee's response above and a majority of other mentee comments regarding comfort level with technology were on the positive end of the spectrum. This finding correlates with the literature that showed that self-confidence with technology would be an enabler in e-mentoring (Panopoulos & Sarri, 2013). In the case of this study, the mentors and mentees had confidence with the technology and saw it as an enabler. This confidence and acceptance of technology by mentees provides a great starting point for the mentoring relationship. The mentee avoids being distracted by any discomfort with technology, and the mentor is able to focus the mentee on specific learning objectives instead of working to resolve user errors with the technology being used.

Despite being technology workers, study participants were not all comfortable with every application used in the mentoring relationships, but they were comfortable with technology in general. When asked about specific technology, participants discussed some applications that were used during the mentoring relationships that they were unfamiliar with, but in the mentor-mentee agreements, they had asked to learn a technical skill that could be developed using that particular software. An important element to a mentee's ability to successfully develop technical skills is his or her willingness to learn and grow. For mentees in a hybrid mentoring relationship to have the interactions using technology, they must accept and be willing to use the technology.

That willingness to use the technology is based on the mentees' acceptance of the usage of technology and comfort level with technology. Without mentees' acceptance of technology, technology can be more of a barrier than an enabler in skill development. Evidence from this study showed that all of the mentees were comfortable using technology.

Use of Technology to Transfer and Develop Skills

When mentees are comfortable with technology, they can effectively leverage technology during a mentoring relationship. It can be used to help transfer both technical skills and soft skills. A PDF reader and MS Word were used by one mentee in this study and her mentor to transfer both technical and soft skills. The mentor provided technical documents to help the mentee learn the requested technical skill. As a result of working with the mentor using Word and email, the mentee also enhanced her soft skills. She reported developing the soft skills of communication and interpersonal skills. These soft skills were not listed in the contract; they were unintentionally enhanced via mentoring. Any technology that mentees are comfortable with or accept usage of can be used to transfer and aid in the development of technical skills or soft skills.

To best utilize technology for the development of skills, consideration should be given to what technology is utilized. Organizations that support implementation of a mentor-mentee agreement form should help the mentor-mentee pair by recommending technologies readily available within the organization that align with the contracted objectives. The organization should establish a written agreement between the mentor

and mentee to set common expectations to increase the probability that the mentee's goals will be met. The mentor-mentee contract should at least establish which skill(s) is to be developed and set the meeting frequency and ground rules (see Appendix B). Based on the organization's technology recommendations, the mentee still needs to accept the usage of technology for it to be an enabler of skill development. Alternately, if the mentor-mentee pair is working outside of a formal mentor-mentee program, the pair may assess technology that both participants have access to and accept the usage for alignment with the learning goals of the mentee.

This major theme that using technology in a mentoring relationship is an enabler is likely predicated on the mentee's acceptance of the usage of technology. In this study, technology was described as enabling the transfer of both technical and soft skills. The enabler theme aligns with the existing literature on mentoring, which shows that self-confidence with the use of technology can be an enabler in a successful mentoring relationship. The results from this study indicate that technology should be adopted as part of the mentoring process when the mentee accepts the usage of the technology.

Technology that allows a mentor to show a mentee specific skills enables the transfer of those skills. Study participants reported that in addition to using technology to demonstrate the skills, mentees and a few mentors were able to develop their own skills as a result of the mentoring with technology. The fact that all mentees reported gaining a technical skill and three of the four mentees also self-reported gaining at least one soft skill through mentoring parallels the literature findings that showed mentees were able to develop specific skills by being mentored (DiRenzo et al., 2010; Mammadov & Topçu,

2014). Specific skill examples from this study follow in the Technical Skills and Soft Skills sections below.

Technical skills. All the mentees in this study self-reported having improved in a technical skill as a result of the mentoring program involving the use of technology. Each of the mentees' supervisors reported that the mentees did in fact develop at least one technical skill due to being mentored. Three of the four mentors also recognized an improvement in the technical skills of their mentees after mentoring.

Unity 3D and Maya were used by one mentor to show 3D development skills to his mentee. The mentor demonstrated/transferred the knowledge about how to use Unity 3D and Maya. He showed functionality and compared developing similar objects in the two programs. Later, the mentee was instructed to practice developing objects in the programs, which helped her develop the technical skills in 3D development. She initially had hands-on time with the software while the mentor was present and then practiced on her own. The same mentoring pair also used Google Drive and file server drives to share technical documentation for transferring knowledge regarding technical skills.

One mentor stated about his mentee, "She has a better understanding of how to go about making something in the program" (Participant 2b, personal communication, January 30, 2017). The same mentor also felt his own technical skills had improved through teaching his skills to his mentee. He stated, "I feel like the teaching process of going about these programs like I would as a new user to an application made it easier for me to understand that certain concepts are taught better in a certain way" (Participant 2b,

personal communication, January 30, 2017). A supervisor stated that a mentee under his direct report

> went from not knowing anything other than having a desire to do 3D to being able to create a 3D environment and interactive site. That was absolutely outstanding, that she was able to do it that fast and learn that fast. (Participant 2c, personal communication, January 20, 2017)

For a mentee with a stated objective to develop technical skills, both a mentor and a software application should be selected that can help develop the desired skills. If the mentee seeks to develop skills in a specific programming language, then the mentee accepts the usage of that technology. Technology can be effective in promoting skill development when used by the mentor to demonstrate the skill. Following the demonstration, the mentee should perform hands-on tasks with the application that supports the desired programming language. The hands-on experience should be in a safe development area while in the presence of the mentor, who should provide feedback and answer questions to aid in the development of the technical skill.

Soft skills. A major theme was that using technology enabled the mentees to develop soft skills. The subthemes identified in this study were that technology enabled the development of communication skills, interpersonal skills, and time management. As an example, if a mentee seeks improvement of soft skills like time management, an appropriate tool would be a calendaring or task-management software like Microsoft Outlook. The mentor can demonstrate ways to schedule tasks using the To-Do list functionality, utilize the calendar to block time for focused work, or record preplanning or postmeeting notes in the Outlook calendar notes. The mentee can then practice during

the meetings and between meetings and report back progress and ask questions. A few examples from this study describe the successful transfer and development of soft skills.

Participant 2a (personal communication, January 17, 2017) reported, "Outlook was useful. It helped with time management; it reminds us [mentor and mentee] of meetings." She and her mentor used Microsoft Outlook to schedule meeting times, utilizing the free/busy time feature to know when they were both available to meet. Another mentee reported that the use of PluralSight helped her improve her personnel management skills. PluralSight is an online technology training site that measures and helps develop technical skills. In this study, a technical manager used it to gain a better understanding of the technology used by her direct report to be able to manage the direct report and his assignments better in the future.

Both mentees and mentors can develop their soft skills with the use of technology. The mentees in this study benefited by gaining soft skills. A few of the mentors also had beneficial outcomes by developing their own skills in the process of mentoring. Previous studies showed benefits to both mentees (Rowland, 2011) and mentors (Starr, 2014) by participating in mentoring programs. Three of the four mentees self-reported developing at least one soft skill through the mentoring relationships even though that was not initially an objective of their mentoring. The one mentee who did not self-report improving a soft skill was reported to have enhanced her communication skills by both her mentor and her supervisor. Three of the four mentors and all the supervisors saw improvement in the soft skills of the participants of the mentoring program.

Only a few prior studies found soft skills were developed during a mentoring relationship using technology. One study identified interpersonal communication skills as a skill developed in a mentee through a computer-mediated mentoring relationship (Shpigelman et al., 2009). This study found interpersonal skills, communication skills, and time management skills were developed. This finding of soft skill development adds to the body of knowledge on mentoring with technology.

Potential mentees wanting to enhance soft skills, including communication skills, interpersonal skills, and time management skills, can name that skill development as an objective of their mentoring relationship. The managers or the potential mentors can then work with the potential mentees to identify software that is accepted by the mentees and serves as a tool to address the soft skills they seek to grow. An example is using a social media application to enhance interpersonal skills. The mentors can coach remotely utilizing technology. This allows the freedom to meet virtually as needed without the need to spend time traveling for the meetings. This can offer the flexibility to have quick, targeted mentoring sessions.

Using Technology to Improve Mentor-Mentee Relationships

A study by Guy (2002) showed that mentees may lose trust in their mentors if response time is delayed. Using instant messaging technology like Skype, used by a mentor-mentee pair in this study, helps expedite the response by instantly alerting the receiver of the message. Utilizing technology for communication can help avoid delays in communication when the mentor and mentee are not face-to-face, which helps grow

trust. According to Eberle (2008), the most important factor in the quality of the mentoring relationship is trust.

Three of the four mentees in this study and all of the mentors indicated that using technology improved the quality of the mentoring relationships. The fourth mentee reported that technology was neutral and was just a tool she and her mentor used to develop technical skills. Technology is a tool most people use in their work on a daily basis. It is tightly integrated into technology workers' jobs; this fact can be leveraged to take advantage of these findings by utilizing technology while mentoring to not only transfer and develop technical skills and soft skills but also improve the overall quality of the mentoring relationship, which in turn increases the effectiveness of the mentoring.

Gender Role in the Need for Skill Development

Prior to transcribing the interview data, the researcher made an interesting observation in the field. All four of the mentees in the university pilot mentoring program were women. However, the majority of attendees at the kick-off meeting for the mentoring program were men. The meeting was held to help the technology workers understand the pilot mentoring program and decide if they wanted to participate in the program. Per the U.S. Bureau of Labor Statistics, in 2012, women made up only 24.5% of workers in computer systems design and related services and 25.6% of workers in computer and mathematical occupations despite constituting 57.7% of the labor force (Fayer et al., 2017). Since women represent a significantly smaller portion of technology workers, they may feel more pressure to demonstrate technical skills and be perceived as

keeping up with their male counterparts. This may be an area for future studies to determine if the women in the technology industry indicate a greater desire to increase their skill set than male technology workers and, if so, why.

Implications of the Study

The implication of these findings is that mentoring outcomes can be enhanced through the use of technology. To best leverage technology to improve mentoring, mentees must accept the usage of technology. The implications for use in formal mentoring relationships and informal mentoring relationships are that regardless of the type of technology used, when users are comfortable with the technology, the quality of the relationship is enhanced and skills are developed. It is important for mentor-mentee pairs to first review the objectives of the mentoring relationship and then determine appropriate technology tools that align with the objectives. Next, the mentees must determine if they are comfortable with the usage of the selected technology.

If the mentee is not yet comfortable with the technology planned for usage during the mentoring relationship, companies should provide options to increase the comfort and acceptance level. The mentee can be asked to do some prerequisite training on the technology prior to starting the mentoring relationship. Alternately, if the mentor is comfortable training on the technology, the mentee's goals can be set to include obtaining certain proficiencies with the software. This makes the mentoring relationship a safe space to learn the technology rather than making the mentee feel the need to already have an existing aptitude for the software.

Once the mentee is comfortable with the technology planned for usage during the mentoring relationship, either from new training or from prior experience, the mentee should review and accept the technology tools. This will enable the mentors to transfer technical skills and/or soft skills as well as help develop both technical skills and soft skills. Both the mentors and the mentees may develop soft skills through mentoring with technology, including communication skills, time management skills, and interpersonal skills. Mentoring with technology can be successfully used to enhance the skills of technology workers, which will provide for improved skills in technology workers to meet the ongoing need for the technical workforce.

Of the four pairs of mentors and mentees who participated in this study, only one used technology in a way that matches the traditional definition of a hybrid mentoring relationship, which is a combination of traditional face-to-face mentoring and online mentoring (Childre & Van Rie, 2015). All four pairs of mentors and mentees augmented their face-to-face meetings with technology. Two pairs used technology during their meetings as a way of transferring skills; the mentor first demonstrated a skill using the technology and then guided the mentee through hands-on use of the technology. One pair used several tools, including HTML5, JavaScript, and Xcode, to transfer and develop technical skills. All mentor-mentee pairs in this study supplemented their mentoring relationships by using technology between meetings to communicate. Some pairs' use of technology between the meetings was in a skill-enhancing capacity by either studying about the desired skill through the use of technology or practicing the desired skill with the technology. The implications of this may be a new way to enhance mentoring.

Technology is integrated in our daily lives; rather than being used exclusively for hybrid or e-mentoring, technology should be considered for a new form of mentoring that is "technology augmented." This new means of mentoring is face-to-face mentoring that utilizes technology to augment the relationship or aid in the transfer and development of skills. Technology can be used during the meetings or between the meetings to aid in skill building or communication.

This study (see Table 3) and the literature review of studies that examined technology use during mentoring (see Table 1) showed a broad range of technology that was effectively used to transfer and develop skills. The acceptance of the usage of technology by mentees can help improve the quality of their relationships by decreasing time between communications, documenting what was discussed during mentoring sessions, and having hands-on technical skill development time with the mentors. The best way to encourage the development of technical skills for technology workers is by aligning the type of technology used with the technical skills the mentees seek to grow. In addition to the desired skills identified on the mentoring agreements, several mentees and mentors in this study developed communication skills during mentoring while utilizing technology designed for communication. Technology is a proven means of helping mentors and mentees develop technical skills and soft skills.

Relevance of the Study

This study provides valuable insight for technology workers, managers of technology workers, companies that employ information technology workers, potential

mentors, and potential mentees. Based on the findings of this study, technology should be used to improve mentoring. The findings help clarify how a person's acceptance of technology impacts the successful use of technology during mentoring. The study can also inform individuals who want to advance their skills on the advantages of being mentored and the opportunities to utilize technology during mentoring. Managers can identify potential mentees based on their acceptance of the usage of technology and the technology available for use in the mentoring relationship.

If used by organizations with technology workers to promote mentoring as a means of developing the workers' technical skills, the study findings can be particularly useful since there is an increasing need for skilled technology workers. Organizations can utilize the concept of user acceptance and usage of technology to identify individuals well-suited for benefiting from mentoring with technology. Organizations trying to promote diversity of cultures and ethnicities may be able to additionally leverage the fact that e-mentoring can reduce the likelihood of mentors selecting mentees who are like themselves, which can often happen in a face-to-face setting (de Janasz et al., 2008; Rowland, 2011). E-mentoring may also help minimize gender gaps in the industry-specific workforce by increasing the pool of potential mentors through limiting mentor bias in the mentee selection process.

Conclusions and Recommendations

Future Studies

The themes that were induced from this qualitative study showed that

1. mentee acceptance and usage of technology positively impacts the use of technology to develop skills during mentoring,
2. the use of technology during mentoring enables the transfer and development of technical skills and soft skills, and
3. technology use in a mentoring relationship enhances the quality of the relationship.

These themes support existing research; however, based on the information gathered in this study, the researcher recommends additional studies.

There are many further opportunities to advance mentoring research. One such opportunity is to replicate this study to investigate how user acceptance of technology is different if the mentoring relationship is a more traditional hybrid mentoring relationship. Only one of the mentoring relationships in this study met the traditional definition of a hybrid relationship with a combination of in-person and technology-assisted meetings. Another future study could assess how user acceptance of technology impacts the outcomes of e-mentoring (mentoring relationships that are exclusively electronic) for technology workers. To interview the e-mentoring participants of this study, the researcher should utilize video conferencing and ask participants about perceptions of face-to-face interviews versus video-conferencing interviews. This could help inform managers and employees alike on whether e-mentoring can help technology workers keep skills current.

Based on the fact that three of the four mentor-mentee pairs in this study augmented their traditional face-to-face mentoring with technology both during their meetings and between meetings, another study should investigate if the utilization of

technology in association with traditional face-to-face mentoring would help improve the benefits for the mentees and the mentors. This study could prove useful for any mentees and mentors who are willing to use technology to document their meetings, provide expert knowledge in electronic form, or just utilize electronic communications during the mentoring relationship.

A recommendation for further study is also made to evaluate if the UTAUT framework applies to workers in other fields, not just technology workers. All of the participants in this study were in the technology field, and while this study showed that they were not all entirely comfortable with all the technologies used during the mentoring relationships, they were generally comfortable with technology. It would be useful to see if any individual who has an acceptance of technology can benefit from using technology during mentoring to successfully develop skills. The outcomes of that study could be used to help inform workers and supervisors in multiple industries.

Since all four mentees who participated in the pilot mentoring program were female, despite the majority of the potential population being male, the researcher also recommends studying how women in technology fields feel about their opportunities for advancement in a male-dominated profession and what steps they take to keep their skills current.

A future quantitative study that applies the UTAUT framework to survey a larger set of mentors and mentees would quantify the findings of this exploratory qualitative study to determine how the use of technology impacts the outcomes of mentoring. A similar quantitative study could be conducted to determine how user acceptance of

technology affects the outcomes of a larger set of hybrid mentoring relationships. Finally, the same quantitative study could be conducted with a larger set of e-mentors and e-mentees to evaluate how user acceptance of technology impacts the outcomes of mentoring. This set of studies can help inform managers and employees as to if acceptance of technology is important in traditional face-to-face mentoring that is augmented with technology, in hybrid mentoring relationships, or in fully electronic mentoring.

Future Actions

The findings of this study should be used to guide companies, managers, and technology employees to do the following:

1. *Managers should create a structured mentoring program to promote the development of skills, both soft and technical, in their staff.* There is an increasing need for skilled technology workers. Providing a mentoring program through the organization provides benefits to the mentees, the mentors, and the organization. Sending employees off-site for skill development training does not promote the interpersonal skills with other employees that a mentoring program does. There is no additional direct expense for utilizing existing employees to help train other employees.
2. *Managers should incorporate technology into the mentoring process when the mentees accept the usage of the technology.* The company, the mentees, and the mentors can benefit from the increase in technical skills and soft skills. The mentees will be better able to perform their jobs, and the mentors can delegate extra work to

the mentees. The managers will have a more able team to get work completed more efficiently.

3. *Potential mentors and mentees should utilize a test to determine their individual acceptance level of technology to see if they are a good fit for utilizing technology in a technology-augmented, hybrid, or e-mentoring relationship.* Standardizing the evaluation of potential mentees' level of acceptance of technology can help identify if the individuals are well-suited for mentoring with technology and will limit the likelihood that the mentoring relationships and objectives will be impaired by a bad experience with technology. Since technology does involve errors and glitches, a person who accepts technology is more adaptable to deal with technical challenges and not have them adversely impact the mentoring objectives.
4. *Companies with employees in multiple geographic locations should consider starting up hybrid or e-mentoring programs to help develop the technical and/or soft skills of the technology workers in the company.* Utilizing hybrid mentoring programs still offers the advantages of building trust through some face-to-face meetings but reduces time commitments and travel costs by adding virtual meetings. Technology can enhance the quality of the mentoring relationships by increasing the time mentors and mentees spend together virtually. E-mentoring can help increase the pool of potential mentors to individuals who do not work near one another. Even when there would otherwise be a long distance to travel to work together, technology can make it possible for mentors and mentees to meet virtually using video-conferencing solutions that simulate face-to-face meetings.

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REFERENCES

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APPENDICES

APPENDIX A

SAMPLE INTERVIEW QUESTIONS

Sample Mentee Interview Questions

The questions below which are open-ended and may lead to follow-up questions based on the interviewees response. These questions will be asked of the mentors and the mentees.

1. Which technologies were used in your mentoring relationship?

2. How would you describe your comfort level with <the above-named technology tool>? (Repeat question for each technology named in Question 1)

3. How did the use of < technology tool responses from Question 1> affect the transfer of technical knowledge to you? (Repeat question for each technology named in Question 1)

4. How would you describe the change, if any, in your technical skills now that the mentoring relationship has completed?

5. How did the use of <the above-named technology tool> affect the transfer of soft skills, such as communication skills, time management, interpersonal relations, and those yet unknown skills which may surface during this study, to you? (Repeat question for each technology named in Question 1)

6. How would you describe the change, if any, in your soft skills now that the mentoring relationship has completed?

7. How do you feel the use of technology affected the quality of the mentoring relationship?

8. How would you describe the quality of your mentoring relationship?

Sample Mentor Interview Questions

The questions below which are open-ended and may lead to follow-up questions based on the interviewees response. These questions will be asked of the mentors and the mentees.

1. Which technologies were used in your mentoring relationship?

2. How would you describe your comfort level with <the above-named technology tool>? (Repeat question for each technology named in Question 1)

3. How did the use of <technology tool responses from Question 1> affect the transfer of technical knowledge from you to mentee? (Repeat question for each technology named in Question 1)

4. How would you describe the change, if any, in the mentee's technical skills now that the mentoring relationship has completed?

5. How did the use of <the above-named technology tool> affect the transfer of soft skills, such as communication skills, time management, interpersonal relations, and those yet unknown skills which may surface during this study, from you to mentee? (Repeat question for each technology named in Question 1)

6. How would you describe the change, if any, in the mentee's technical skills now that the mentoring relationship has completed?

7. How would you describe the change, if any, in the mentee's soft skills now that the mentoring relationship has completed?

8. How do you feel the use of technology affected the quality of the mentoring relationship?

9. How would you describe the quality of your mentoring relationship?

Sample Supervisor Interview Questions

1. Did you notice technical skill improvement in your direct report after the mentorship was complete?
   If yes:
   a. What skill?
   b. How would you rate that skill prior to mentoring?
   c. How would you rate that skill after mentoring?

2. Did you notice soft skill improvement in your direct report after the mentorship was complete?
   If yes:
   a. What skill?
   b. How would you rate that skill prior to mentoring?
   c. How would you rate that skill after mentoring?

3. Would you recommend others participate in the mentoring program in the future?
   a. If no, why not?

APPENDIX B

CONTRACT TEMPLATE

University IT Mentoring Program

MENTOR/MENTEE AGREEMENT

I, _____ (mentee) and

I, _____ (mentor)

Agree to the following commitments that will work toward to ensure this Mentor/Mentee working relationship works as a true partnership and collaboration.

A successful mentee/mentor relationship requires a commitment on the part of both partners. The following agreement is intended to provide a starting framework for the partnership. Either party should understand that they may withdraw from the relationship at any time by contacting Denise Wilcox at x5393 or denise.wilcox@laverne.edu. Each party should keep a copy of this agreement and make every effort to fulfill the terms of the agreement.

MENTEE GOALS

The mentee should establish with the mentor at least three professional development or personal growth goals. ***Goals should be specific, measurable, attainable, relevant, and have a time frame.***

GOAL # 1 _____

_____

GOAL # 2 _____

_____

GOAL # 3 _____

_____

AREAS OF COMMITMENT

- Agree to actively participate by listening and asking questions and providing feedback
- Agree to meet: _____
  (State the frequency, starting date, ending date, with a minimum of 4 meetings)
- Ensure confidentiality between us as part of this mentoring relationship
- Seek support and guidance from a supervisor when necessary
- Commit to be professional, supportive, and open to suggestions/ideas even if these ideas are not used or implemented
- Keep one another informed of changes to meeting times and goals
- Value one another informed of changes to meeting times and goals
- Value one another in terms of commitment and idea exchange
- Agree to co-create the meeting agendas to align with goals
- Other:_____

CONTACT AGREEMENT

The duration of the formal mentoring program is established through this agreement. Mentors are encouraged to continue the relationship on a voluntary basis after the agreement ends. Contacts with mentee may be in person, video conferencing or other telecommunications. Mentee/mentor should allow enough time during a contact for discussion of goals, as well as questions from the mentee concerning their professional and/or personal development.

Mentee and Mentor agree to provide written feedback at the mid-point and the end of the agreement dates.

_____ _____

Mentee Signature and Date Mentor Signature and Date

APPENDIX C

SITE PERMISSION AND IRB APPROVAL

Institutional Review Board
(909)469-5606 irbsubmission@westernu.edu

October 7, 2016

Denise Wilcox

Western University of Health Sciences, Department of Information Technology

Re: Western University's Protocol #16irb072
"Exploring the Use of Technology and its Impact on Mentoring"

Dear Denise Wilcox:

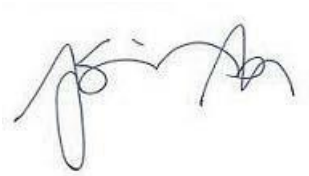
The above referenced protocol was reviewed on 10/3/2016. At this time, it is the opinion of the Institutional Review Board that this project qualifies for Exemption Status under the Western University of Health Sciences' IRB Manual, Section 5, Page 6 & 7 of 16, *criteria for exempt status certification,* Categories 1 and 2, in accordance with federal regulations 45 CFR 46.101 (b).

1. *Research conducted in established or commonly accepted educational settings, involving normal educational practices is exempt, such as (i) research on regular and special education instructional strategies; or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.*
2. *Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk*

of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Having met the above-referenced criteria, your protocol is exempt from further IRB review. If you have any questions, please contact the IRB office at (909) 469-5606.

Sincerely,



Jesus Sanchez, DO, MSHPE, MA
IRB Chair

JS:BW

Institutional Review Board

TO: Denise Wilcox

FROM: University of La Verne, Institutional Review Board

RE: **2016-14-LFCE, Exploring The Use Of Technology In Mentoring**

The research project, cited above, was reviewed by the La Fetra College of Education University of La Verne (ULV) Institutional Review Board (IRB) Committee and the ULV IRB. The college review determined that the research activity has minimal risk to human participants and the application received an Expedited Review. Congratulations, your ULV IRB application has been **APPROVED** and you can proceed with the proposed study.

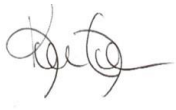
A copy of this approval letter is required to be included as an appendix to your completed dissertation. The project may proceed to completion, or until the **date of expiration of IRB approval, 12/14/2017**.

Please note the following conditions apply to all IRB submissions:

> No new participants may be enrolled beyond the expiration date without IRB approval of an extension.
>
> The IRB expects to receive notification of the completion of this project, or a request for extension within two weeks of the approval expiration date, whichever date comes earlier.
>
> The IRB expects to receive prompt notice of any proposed changes to the protocol, informed consent forms, or participant recruitment materials. No additional participants may be enrolled in the research without approval of the amended items.
>
> The IRB expects to receive prompt notice of any adverse event involving human participants in this research.

There are no further conditions placed on this approval.

The IRB wishes to extend to you its best wishes for a successful research endeavor.



Kanya Godde Chrisco, Ph.D. 12/15/2016

Approval Signature IRB Director/Chair Date

For the Protection of Human Participants in Research
Contact: email irb@laverne.edu or phone (909) 448-4564
ULV IRB Website: laverne.edu/irb

APPENDIX D

SAMPLE STUDY INTRODUCTION LETTER

Dear IT Mentoring Program Participant,

Thank you for recently completed participation in the pilot group of the IT mentoring program. In order to enhance the mentoring program, I would like to get your feedback on the mentoring process. In order to gather your feedback, you would participate in a 1 – 2 hour one-on-one interview to provide your honest feedback on the strengths and weaknesses of the pilot mentoring program.

It will help the IT team overall to understand the merits and the opportunities for improvement in this new mentoring program. Your evaluation of both the strengths and the weaknesses of the pilot program will increase the level of understanding about the program and enable us to make any necessary adjustments to enhance the mentoring program. Your feedback will remain anonymous, information will only be shared in an aggregate form. Nothing you say about the University mentoring program will be provided to your supervisor or your mentoring partner. This letter is to reassure you that there will be no repercussions for your disclosures, nor will anything be held against you.

If you choose to help improve the mentoring program, you will also be participating in a study for my dissertation. You will be provided with an informed consent information sheet that will help you understand more about the study and the potential risks and benefits of the study.

Thank you for your consideration. Please notify me by email if you would like to provide your feedback on the mentoring program you recently participated in.

Sincerely,

Denise Wilcox
Executive Director of Information Technology

APPENDIX E

PARTICIPANT INFORMED CONSENT

ADULT NON-INTERVENTION INFORMED CONSENT FORM

CONSENT TO PARTICIPATE IN RESEARCH

Use of Technology and Its Impact on Mentoring

You are being asked to participate in a research study conducted by Denise Wilcox, MSIT, Executive Director of Information Technology at University, from the Organizational Leadership program at the University of La Verne. Denise Wilcox is completing this study as partial fulfillment of her doctoral degree.

You may participate in this research study if you have participated in the mentoring program for the Information Technology staff at University.

PURPOSE OF THE STUDY

The purpose of this qualitative case study is to explore how the use of technology during the mentoring of technology workers impacts outcomes defined by the mentor-mentee contract of technology workers at a private graduate University.

This study will help identify how technology aids in and detracts from achieving the desired mentoring outcomes. This study will help the Information Technology department refine the mentoring program and enhance its effectiveness. Improving the skills of the IT team members also will benefit A private graduate University in general.

This knowledge will help organizations, potential mentors, and potential mentees know if technology can be successfully used to increase the mentees' skills. Having more skilled workers will help increase the availability of technology workers to meet demands.

PROCEDURES

If you decide to participate in this study, we will ask you to do the following things:

1. Participate in one open-ended question interview. The interviews will be conducted in person, one-on-one, after the completion of the mentoring program. The interview will take place on the University (name redacted) campus and should last between one and two hours.

2. Read over the transcript of your interview and provide corrections and/or approval of the interview transcription. Transcription reviews can be performed electronically from any location of the interviewee's choosing.

3. Send electronic approval of the interview transcript via email or request to withdraw from the study.

Note: There are no experimental procedures in this study. Study participants will be able to read the full dissertation upon publication.

POTENTIAL RISKS AND DISCOMFORTS

There are no potential physical or legal risks for the study subject which are known to the researcher.

Some participants may feel it is uncomfortable to report on mentoring program experiences to the Executive Director of Information Technology. Participants may withdraw from the study at any time if they experience an unacceptable level of discomfort. (see *PARTICIPATION AND WITHDRAWAL* section for more information)

Honest feedback is the most important aspect to making the mentoring program useful and successful which benefits the University and the IT team.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

Participants are not expected to directly benefit from this research. Participants may make personal insights into the value gained through the mentoring program during the interview or in reflection on the interview during the transcript review process.

The University IT team will benefit from any improvements to the mentoring process by making the team stronger. The research may also benefit organizations that have the need to train workers in particular skills, enabling organizations to make educated decisions on how technology may affect mentoring and the successful transferring of skills.

Technology workers in general could benefit from enhancing their soft skills to enhance their overall efficacy and mentoring can be an effective means of building those skills. This study also benefits other individuals who want to be mentored in the future by

helping them understand if it is effective to use technology during mentoring. Potential mentees in any field can use this study to decide if hybrid mentoring or e-mentoring can help them advance their skill set.

PAYMENT FOR PARTICIPATION

Participants will not receive any additional compensation beyond existing salary.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of storing your name, email address and interview identification number separate from the interview data itself. Data with personally identifiable information will be stored in an encrypted, password protected file. Only the researcher will have access to the data. The dissertation chair may have access to the original data upon request. The protected file and the original notes from the interviews will be destroyed upon publication of the dissertation.

By signing this form, you grant permission for information or anonymous excerpts from your interview to be published as part of the results of this study in a dissertation, presentations, or future publications.

Audio recordings of the interviews will be stored in a locked cabinet. Individual interviewees may request to review the recording of their own interview up until the transcript is approved. The audio recording of the interview will be destroyed once the interview transcripts are reviewed and approved by the interviewee.

Data and records created by this project are the property of the University and the investigator. You may have access to information collected on or about you by making a written request to the principal investigator. This right of access extends only to information collected on or about you and not to information collected on or about others participating in the project.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. The investigator may withdraw you from this research if too many questions are unanswered and may invalidate the results.

IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact Denise Wilcox, Principal Investigator or University of La Verne Faculty chair, Deborah

Schreiber. Denise Wilcox can be reached at 909-469-5393 or denise.wilcox@laverne.edu. Deborah Schreiber can be reached at (202) 321-8449 dschreiber@laverne.edu.

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact Sarah L. Dunn, Ph.D., IRB Director, at 909-448-4756, (irb@laverne.edu). University of La Verne, Institutional Review Board, 1950 Third Street, Kinesiology Department B108, La Verne, CA 91750. University employees may also contact the University IRB Office, (phone number redacted).

SIGNATURE OF RESEARCH PARTICIPANT OR LEGAL REPRESENTATIVE

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I am over the age of 18 years and have been given a copy of this form. I have read this information, which is printed in English. This is a language that I read and understand.

_____

Printed Name of Participant

_____

Printed Name of Legal Representative (if applicable)

_____ _____

Signature of Participant or Legal Representative Date

SIGNATURE OF INVESTIGATOR (If required by the IRB)

In my judgment the participant is voluntarily and knowingly giving informed consent and possesses the legal capacity to give informed consent to participate in this research study.

_____ _____

Signature of Investigator Date

APPENDIX F

PARTICIPANT THANK YOU

Dear <Participant Name>,

Thank you for taking time to participate in this study that will help the University Information Technology department refine the mentoring program and enhance its effectiveness. This study and your help is intended to help improve the skills of the IT team members who take part in the mentoring program. It will also benefit, the IT team in general to have a greater depth of skills throughout the team and University in general by having a more skilled IT team.

The knowledge generated in this study will help organizations, potential mentors, and potential mentees know if technology can be successfully used to increase the mentees' skills.

Sincerely,

Denise Wilcox
Executive Director of Information Technology