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# Lived Experiences of Instructional Designers Who Designed Online Information Technology Courses With Hands-On Activities

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Cheryl Bagshaw Frederick

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Walden University
2021

Abstract

Lived Experiences of Instructional Designers Who Designed Online Information Technology Courses With Hands-On Activities

by

Cheryl Bagshaw Frederick

MSE, University of Central Florida, 1988

BSE, University of Central Florida, 1986

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Education

Walden University

May 2021

Abstract

As part of the process for designing an online information technology (IT) course, hands-on activities may be included; however, the literature has not readily revealed the best practices and challenges instructional designers (IDs) face with including hands-on activities in an online IT course. Research has shown that hands-on learning increases student performance and engagement and prepares IT students for the workforce. The purpose of this qualitative, descriptive, phenomenological study was to explore the lived experiences of IDs in the development of an online IT course when the course included hands-on activities. Constructivism and active learning were used as the conceptual framework. Semistructured interviews with 11 IDs were conducted to understand their unique experiences, including any challenges they faced or recommendations they had for improvement to the course design experience for including hands-on activities in an online IT course. Data were analyzed using the Colaizzi method of data analysis. The study revealed that challenges with subject matter experts, the technology used to support hands-on activities, and resistance to active learning were three main challenges IDs experienced. The study also revealed recommendations for success including leveraging IDs to provide the student perspective and ensuring IDs are skilled in project management and communication. The findings of this study contribute to social change because education is a positive force for change and online IT-related education continues to grow. The findings could be used to increase access to hands-on IT activities for underserved student populations who are unable to attend a brick-and-mortar institution and are experiencing their IT education online.

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# Chapter 1: Introduction to the Study

The U.S. economy has a growing demand for information technology (IT) related professionals (Bureau of Labor Statistics, 2021). This makes it essential for online universities and colleges to provide degrees in the field of IT. In the United States, the number of students taking at least one online course at an online higher education institution has grown each year from 2016 through 2020 (National Center for Education Statistics, 2020). Data shows that the COVID-19 pandemic had an impact on enrollment in higher education in the United States; just prior to the pandemic, the number of students taking at least one online course grew from 34.7% in 2018 to 36.6% in 2019 (National Center for Education Statistics, 2020). After the pandemic, there was an overall enrollment decline in higher education for Fall 2020; however, there was a 7% increase in enrollment in primarily online institutions for Fall 2020 and Spring 2021 (EducationData.org, 2021). Historical data show this trend in the growth of online enrollment has been prevalent for nearly 2 decades. A 2016 study conducted by the Babson Survey Research Group indicated that online education enrollment grew each year from 2002 to 2016 (Seaman et al., 2018).

This growth in online enrollment and the projected growth of IT jobs will likely put pressure on online higher educational institutions to provide effective learning experiences that prepare graduates for the workforce. Research has shown that hands-on activities have positive effects on student performance and engagement (Autthaporn & Koraneekij, 2016; Johari et al., 2020; Mitchell et al., 2017; Woodward, 2016). Hands-on learning transitions students from educational settings to the workforce through application of knowledge and skills, problem solving, and experiential opportunities (Podeschi, 2020; Wells et al., 2019). Students are more prepared for the workforce when they are provided with hands-on learning (Podeschi, 2020). Online education has expanded the reach of education and has allowed students to learn in a setting not located on a traditional college campus. This flexibility and expanded access to education come with challenges because students are now learning at a distance from their instructor and peers. Because online students may not have physical access to a laboratory, the hands-on practice must be provided in other ways (Puzziferro & McGee, 2021; Wright & Bartholomew, 2020). Active engagement opportunities and providing online, hands-on practice to teach practical skills are essential but come with challenges (Bhute et al., 2021; Moye et al., 2017; Puzziferro & McGee, 2021). Examples are challenges with the technology required to support the activities, resources required for production of high-quality multimedia content, and limited time for instructors to prepare (Moye et al., 2017; Puzziferro & McGee, 2021).

Instructional designers (IDs) have options when including hands-on activities in online courses. For instance, these activities could be simulations, virtual labs, and third-party online lab environments (Bhute et al., 2021; Mitchell et al., 2017; Puzziferro & McGee, 2021). Another option is to have subject matter experts (SMEs) create formative activities that provide students with hands-on practice. Some universities use SMEs, with content expertise in their field, to collaborate with IDs when developing an online course (Arnold et al., 2018). IDs could also curate existing hands-on practice resources that are available as open educational resources (Ren, 2019). When this study was conducted, there was minimal information about the lived experiences of the IDs who designed online IT courses that included hands-on activities. Research was needed to gain insight into the lived experiences of the IDs taking part in designing hands-on learning activities for online IT courses to aid in identifying the challenges they faced and obtain their recommended best practices. More detailed information concerning current literature on this topic is presented in the literature review located in Chapter 2.

Chapter 1 is an introduction to this study. A brief summary of the research literature related to the scope of this study begins the chapter. A description of the gap in the literature and an explanation of why the study was needed is the presented. I also provide a description of the problem statement, the purpose of the study, the central research question and subquestions, and the conceptual framework. The chapter also includes a description of the nature of the study, definitions, assumptions, the scope and delimitations, and the limitations of the study. The chapter concludes with a description of the significance of the study and a summary.

## Background

Course design is often a collaborative endeavor between IDs and SMEs (Arnold et al., 2018; Mutlu, 2016; Outlaw & Rice, 2015; Stevens, 2013). In my past 15 years in online higher education, I have participated as part of an instructional design team to develop online courses for four different universities. My personal experience has resulted in a strong interest in understanding the best practices and challenges with incorporating hands-on activities in online IT courses.

Research has shown that there is a need to incorporate hands-on practice within IT courses (Autthaporn & Koraneekij, 2016; Kressler & Kressler, 2020; Mitchell et al., 2017; Woodward, 2016; Wright & Bartholomew, 2020). The COVID-19 pandemic accelerated the need for educators to find ways to effectively provide hands-on activities for technology and engineering students in an online learning environment (Bhute et al., 2021; Puzziferro & McGee, 2021; Wright & Bartholomew, 2020). According to the Bureau of Labor Statistics (2021), IT jobs are growing faster than the average for all occupations. A survey conducted by McGraw-Hill Education (2018) revealed that only 4 in 10 U.S. college graduates felt prepared for the workforce. Courses that are designed to include hands-on practice opportunities could prepare graduates to fill the growing number of IT jobs. Hands-on learning strategies in science, technology, engineering, and math (STEM) courses have positive benefits to learning (Autthaporn & Koraneekij, 2016; Freeman et al., 2014; Han et al., 2016; Kressler & Kressler, 2020). Researchers have found that it is essential to provide learning by doing opportunities for technology and engineering students (Moye et al., 2017). Moreover, there continues to be increased interest in effective approaches to providing hands-on practice in an online course (Bhute et al., 2021; Wright & Bartholomew, 2020).

Bonwell and Eison (1991) described active learning as strategies that require students “doing things and thinking about what they are doing” (p. 2). Hands-on learning activities that encourage a student to do things and think about what they are doing are a way to include active learning activities in a course. Active learning assignments have shown to improve student learning in STEM-related courses (Chisholm, 2015; Freeman et al., 2014; Mitchell et al., 2017). Moreover, there are studies that also show that a lack of active learning can have a negative effect. For example, Freeman et al. (2014) found that students in traditional lecture courses were 1.5 times more likely to fail than students enrolled in courses with active learning.

Research has shown that virtual labs and simulations provide effective hands-on opportunities for students (Bhute et al., 2021; Mitchell et al., 2017; Zhang & Li, 2019). Technology-mediated experiences, including virtual reality, augmented reality, and mixed reality, are effective for engaging students in authentic practice of skills in a realistic setting (Alfalah, 2018; Carruth, 2017; Hu-Au & Lee, 2017). Game-based learning is another active learning strategy that is trending in STEM education (Ting et al., 2019). There are multiple options for including hands-on learning including virtual labs, simulations, and immersive experiences with technology equipment (Carruth, 2017; Hu-Au & Lee, 2017; Mitchell et al., 2017). With hands-on learning, the students experience shifts from passively listening to an instructor to active engagement. IDs who have experience with developing courses that included hands-on activities could provide helpful insight to the course design process.

Online IT curriculum typically covers a broad range of technologies. The Association for Computing Machinery (ACM, 2017) developed curricula recommendations for IT, computer science, and computer engineering that include knowledge areas in computer programming, information security, networking, database design and management, and web technologies. ACM's IT curriculum learning outcomes are focused on what a student can do over what students know (Sabin et al., 2016).

Employers agree that colleges should prepare graduates with relevant workforce skills and knowledge (McGraw-Hill Education, 2018). IT is a discipline that requires the application of technology, and courses that include applied learning experiences could produce job-ready graduates (ACM, 2017; Sabin et al., 2016).

The U.S. government has demonstrated a commitment to STEM education. In 2018, America's Strategy for STEM Education was released and highlighted projects that leveraged hands-on activities (Committee on STEM Education of the National Science & Technology Council, 2018). The goals for this strategic plan include a priority on STEM workforce education and developing Americans with a computer technology mindset. In the fiscal year of 2019, the U.S. Department of Education invested $540 million in STEM education. This focus on STEM education, particularly in the technology and engineering disciplines, could expand the demand for online IT courses. In addition, growth in online education continues (National Center for Education Statistics, 2020). IDs who are designing an online IT course could likely face the challenge of including learning experiences that develop proficiency with IT skills.

IDs who have experience with designing online, college-level IT courses that included hands-on activities could provide helpful insight into best practices and challenges. Exploring what the IDs' experiences were as they designed online IT courses with hands-on learning embedded was of interest to me. To validate what I perceived as an uncharted investigation, I explored this topic through discussions with members of course design teams at the university where I worked and reflected on my own experiences in instructional design. As a contributing member to the design of online IT courses, I personally had encountered a variety of experiences that ranged from creating installation instructions and original hands-on assignments to utilizing a prebuilt, virtual lab environment.

There was a gap in knowledge concerning the lived experiences of IDs who designed online IT courses that gave students hands-on practice. The literature review revealed limited extant research that allowed IDs to describe the best practices for and challenges with effectively incorporating hands-on practice opportunities within an online IT course. The literature review revealed almost no extant phenomenological studies on this topic. I conducted this study to gain insight into the experiences of these IDs to identify their challenges with and gather their recommendations for successfully including hands-on learning in an online IT course.

## Problem Statement

The general problem was best practices for and the challenges of including hands-on activities in the course design process for an online IT course were not readily revealed in the literature. Hands-on learning in online IT courses has been shown to have a positive impact on the student learning experience (Freeman et al., 2014; Mitchell et al., 2017; Moye et al., 2017). Development of online courses is often a collaborative project between SMEs and IDs (Mutlu, 2016; Outlaw & Rice, 2015; Stevens, 2013). IDs are experienced with course design but often use SMEs to help design the hands-on activities. An ID with limited experience with including hands-on activities in course design could have challenges effectively guiding a SME. Some SMEs may not understand what active learning theory is or be prepared for the potential challenges with including hands-on activities (Chi et al., 2018; Khan et al., 2017). Hands-on assignments are examples of active learning (Bonwell & Eison, 1991; Chickering & Gamson, 1987). To better prepare IDs and better inform online course design projects to include hands-on activities, an exploration of IDs' lived experiences with these projects was needed.

At the time of this study, there had been little research conducted to understand the lived experiences of IDs in the development of an online IT course that gives students hands-on practice. There were only a couple of extant phenomenological studies related to students with a focus on hands-on learning (Healy & McCutcheon, 2008; Tarekegne, 2019). Healy and McCutcheon (2008) conducted a phenomenological study to explore the lived experiences of 41 Irish accounting students taking a course that used active learning. I also only found a few quantitative studies exploring instructors' perceptions of active learning. Tarekegne (2019) studied the perceptions of instructors, deans, department heads, and students on active learning in higher education in Ethiopia. Another phenomenological study explored IDs' lived experiences with including hands-on activities, but the was on a biology course (Scripture, 2008).

This study contributes to the body of knowledge on course design for online IT courses in which hands-on activities are included. The results of this study add to the scholarly literature regarding the best practices for designing and implementing hands-on activities according to experienced course designers. By exploring the lived experiences of IDs who designed an online IT course, the findings of this study provide recommendations for and challenges experienced when including hands-on activities. The experiences shared by the IDs who participated in this study may provide future IDs with a better understanding of best practices for including hands-on activities in an online course. The results of this study could also contribute to increased success when designing online IT courses that include hands-on activities.

## Purpose of the Study

The purpose of this phenomenological study was to explore the lived experiences of IDs who designed an online IT course that included hands-on activities. In the study, I aimed to understand the unique experiences of these IDs, including any challenges they faced or recommendations they had for improving the course design experience when including hands-on activities.

## Research Questions

The central research question of this study was: What are the lived experiences of IDs who designed an online IT course that included hands-on activities?

The two subquestions were:

Subquestion 1: What do IDs describe as challenges with including hands-on activities when designing an online IT course?

Subquestion 2: What do the IDs recommend to ensure successful inclusion of hands-on activities in an online IT course?

## Conceptual Framework

The conceptual framework for this study was based on two theories. The first was the constructivist learning theory. Constructivist learning involves active and reflective learning practices that develop target skills (Driscoll, 2005). IT practitioners require the application of skills (Sabin et al., 2016). Employers want quality curriculum that prepares graduates with work-ready skills (Mardis et al., 2018). Constructivism theory can be applied to the development of online coursework so that knowledge and skills are not passively learned but actively created. An early founder of constructivism, Dewey (1938) was a proponent of active engagement with real-world problems and advocated for hands-on learning/learning by doing. Constructivist experiences have been described as active learning, learning by doing, and hands-on learning (Driscoll, 2005). Constructivism was important to this study because it provided focus on the data collection process and a perspective on the IDs' experiences.

The second theory that served as part of the conceptual framework was active learning. Active learning means the students are actively involved and engaged in higher order thinking activities (Bonwell & Eison, 1991). Active learning, goal-based scenarios, and problem-based learning are applications of constructivist learning (Driscoll, 2005). With active learning, students learn by being engaged in activities instead of listening passively to an instructor (Freeman et al., 2014). Active learning is one of the key principles of Chickering and Gamson's (1987) effective practices in undergraduate learning. There are many forms of active learning, and hands-on activities are one form (Bonwell & Eison, 1991; Chickering & Gamson, 1987). Hands-on assignments involve learning by doing and cause the learner to think about what they are doing (Bonwell & Eison, 1991). The concept of active learning was important to this study because it describes learning activities that are hands-on that could be incorporated in an online IT course. In a dedicated section of the literature review in Chapter 2, I will provide more information about the theory of constructivism and the concept of active learning.

Constructivism and active learning paired well for this study. Constructivism has been applied to study the benefits of active learning in STEM-based courses (Autthaporn & Koraneekij, 2016; Freeman et al., 2014; Han et al., 2016; Woodward, 2016). IT graduates need to be proficient with the application of knowledge and skills to perform IT-related tasks (Mitchell et al., 2017; Woodward, 2016). ACM's IT curriculum learning outcomes are focused on what a student can do over what students know (Sabin et al., 2016). Active learning theory served to explain the experiences of the IDs tasked with incorporating active learning activities in an online IT course. A phenomenological study might not employ any explicit theory, but theory could be used to focus how the issue or experience will be explored (Moustakas, 1994). The phenomenon explored in this study was the experiences of IDs who designed online IT courses to include active learning or learning by doing activities.

The conceptual framework supported the approach taken in this study and the analysis of the data collected. I developed the interview questions to focus on the IDs' lived experiences with incorporating active learning approaches in an online course. Collectively, the use of constructivism theory and the active learning framework provided a way to organize and analyze the study's results related to the IDs' experiences.

## Nature of the Study

In this study, I used the qualitative method. A quantitative approach was not considered because I aimed to understand a phenomenon of "how" instead of "how many." This study was exploratory, which aligned with a qualitative approach. The quantitative method is used to quantify a problem, analyze numerical data, or test causal relationships (Goertzen, 2017). A mixed-method approach was not selected due to the limited timeframe for conducting this study.

In this study, I employed a phenomenological design. A phenomenological design is used to explore the essence of a phenomenon by gathering the lived experiences of the participants (Moustakas, 1994). Phenomenological research gives an opportunity for participants to share their points of view and lived experiences. This design is appropriate when trying to identify crosscutting themes among the participants who shared in the experience. Through in-depth, semistructured interviews with each participant, I gathered data to understand their lived experiences of the course design process. The data were analyzed to identify recurring patterns and emerging themes to address the central research question and subquestions.

I considered using a case study design but did not select it for this study. Case study research is appropriate for studying "a contemporary set of events" that the "researcher has little or no control" of (Yin, 2014, p. 14). According to Yin (2014), a multiple case study is used to compare and contrast between the cases with the purpose of getting an in-depth look at one or more cases. If I was interested in studying the cases of one or two IDs, then a case study would have been appropriate. The purpose of the current study was to explore the lived experiences of the participants, so the phenomenological design was more appropriate than a case study. The objective of this study was to conduct an in-depth exploration of the lived experiences of 11 IDs.

I also considered using, but did not select, a descriptive qualitative study design. This type of design can be used when a basic understanding of the phenomenon is not understood and a large data set could be analyzed for patterns (Loeb et al., 2017). A descriptive qualitative study describes the phenomenon and may not use a theoretical lens (Loeb et al., 2017). The purpose of this study did not align with a descriptive qualitative design because I aimed to explore the phenomenon through the lens of a conceptual framework and understand the lived experiences of the participants.

A grounded theory approach was not a suitable option as the research design for this study. Using the grounded theory design, a theory is constructed from the study's findings (Patton, 2015). Creswell (2013) recommended grounded theory be used when the goal of a qualitative study is to develop a theory that is grounded in the collected qualitative data. Using this design, the theory is developed to explain the phenomenon or issue affecting the participants of the study (Creswell, 2013). With grounded theory design, the suggested sample size is between 20 and 60 participants in order to have enough data to develop a theory (Creswell, 2013). The central research question and subquestions for the current study did not align with a grounded theory approach. The data collected in this study were analyzed for patterns and themes. The role of theory in this study was as a conceptual framework to design the study and with which to analyze the data.

## Definitions

The definitions of terms related to this study are provided in this section for consensus of meaning and are given in alphabetical order.

*Active learning theory*: Students learn by being actively engaged in hands-on activities (Bonwell & Eison, 1991; Chickering & Gamson, 1987; Freeman et al., 2014). Active learning means students learn by doing (Bonwell & Eison, 1991).

*Designer-by-assignment*: Merrill (2007) coined this term to describe SMEs who develop instructional activities but do not have instructional design training.

*Electronic portfolio or ePortfolio*: A collection of artifacts and files, stored electronically, that demonstrate a student's abilities, skills, and experiences that are relevant to the workplace (Ring et al., 2017; Weber, 2018).

*Hands-on learning or experiential learning*: Learning that transitions students from education to the workforce through application of knowledge and skills, problem solving, and experiential opportunities (Wells et al., 2019). Hands-on learning is learning by doing (Moye et al., 2017).

*IT curriculum*: The current ACM (2017) curriculum standards outline the essential IT domains to include cybersecurity, information management, networking, systems paradigms, user experience design, web and mobile systems, platform technologies, software fundamentals, and web and mobile systems.

*ID*: An individual with experience and training in the planning, design, and development of instructional material (Villachica et al., 2010). For the purposes of this study, IDs are part of a course design team tasked with designing an online IT course at the university or college level.

*Master course shell*: The content of an online course that can be duplicated to offer multiple sections of a course. The learning content, assignments, and instructor supporting materials that were designed by the IDs and the SME are stored in the master course shell (Franetovic & Bush, 2013).

*Problem-based learning*: Learning activities in which students focus on one or more problems with a real-world focus and may or may not require collaboration (Mackey, 2016).

*STEM education*: Education that in the disciplines of science, technology, engineering, and mathematics. IT falls under the technology portion of STEM. According to Microsoft (n.d.), computer science falls under all four areas because it blends science, technology, engineering, and mathematics to solve computing problems.

*SME*: Someone who has content expertise in a specific subject. An example is a SME in the field of IT. A course design team may include a SME as part of the team in order to have the requisite content expertise during the course design process (Eichler & Peeples, 2016; Trammell & LaForge, 2017). Although not always the case, the SMEs used in course design could be the instructors who teach the course.

## Assumptions

I assumed that the participants answered the interview questions openly and honestly, that they were capable of self-reflection to the point that their responses to interview questions would elicit more than just simple answers, and that they would have experience with including hands-on activities within the IT courses they helped design as part of a course instructional design team. It was also assumed that the participants were the IDs for the course design process, the course designed was an online IT course at the college or university level, and the course included at least one hands-on activity.

These assumptions were necessary because I needed to interview participants who were willing and capable of sharing their experiences. The assumptions that the participants truthfully met the criteria stated in the recruitment materials were also necessary because the study was aimed at exploring the lived experiences of IDs that met these criteria.

## Scope and Delimitations

I selected IDs who had experience working as part of an instructional design team with developing courses for an online university or college-level courses. The IDs could have worked part-time or full time for the institution. Online courses in K–12 were excluded because the study was focused on incorporating hands-on activities for online IT courses at the college level. The social change implications of this study could strengthen the ability of colleges and universities to provide hands-on learning activities for students who are learning IT skills in an online course. The findings of the study revealed best practices for including hands-on learning activities in an online course. Underserved students who are unable to attend a traditional, brick-and-mortar, college-level institution could benefit because they would get hands-on experience in an online IT course. The specific focus of this study was also chosen because I assumed that most employers would be hiring graduates from degree programs at the college level. Only IDs residing in the United States were included because I am most familiar with U.S. online higher education. I also wanted to avoid any misinterpretations of the descriptions of experiences due to a language barrier. According to Patton (2015), cross-cultural interviews could result in misunderstandings because similar words or phrases could have different meanings. Similar studies in colleges and universities outside of the United States may complement this study.

## Limitations

Several limitations impacted this study. First, due to the time constraint of this study, participants were only interviewed once. A follow up interview could have prolonged contact with each participant and enabled an opportunity to conduct member checking by interview (Lincoln & Guba, 1985). To ensure the participants' lived experiences were effectively captured, the interview questions were reviewed by my dissertation chair, dissertation committee member, and several experts with qualitative research experience. The interview questions were open ended to give the participants an opportunity to express their experiences (see Patton, 2015). I also recorded and transcribed the interviews to ensure the participants' responses were accurately captured. The participants had the opportunity to review the transcripts for accuracy.

Another limitation was the interviews were conducted using internet video conferencing technology. This was necessary due to the inability to meet with participants face-to-face. A limitation with using video conferencing is that the participants may have limited experience with the video conferencing tool. The interviewer is responsible for ensuring the participant feels comfortable during the interview (Moustakas, 1994). To mitigate any impact the technology may have had on the comfort level of the participant, I gave them an opportunity to practice using the tool in advance of the scheduled interviews.

There were two contributing factors that influenced the decision to use video conferencing technology. Firstly, the COVID-19 pandemic occurred during the timeframe the data were collected. Social distancing limited my ability to interview participants face-to-face. Secondly, the participants were from online universities within the United States, and it was unlikely that all IDs lived within a reasonable commuting distance from me. These limitations offer opportunities for future research. A researcher could conduct a case study to explore the lived experiences of IDs at one university or conduct a study that studies IDs in a different country.

I was aware that my life experiences in course design and teaching online might carry into the work. Bracketing is the process of blocking personal biases, assumptions, and experiences in order to explain the phenomenon from a neutral position (Moustakas, 1994; Patton, 2015). To reduce bias, I practiced bracketing my thoughts before collecting the data, analyzing the data, and explaining the phenomenon. To limit the impact of my own biases influencing the phenomenon under study, I listened carefully, avoided interjecting any biased cues during the interviews, and kept an open mind.

## Significance

This research partially filled a gap in understanding the lived experiences of IDs in the course design process of an IT course that included hands-on learning activities. Although there had been studies of faculty developing online courses (e.g., Outlaw & Rice, 2015; Stevens, 2013; Trammell & LaForge, 2017), this study was unique because at the time of the study there had been little qualitative research on the lived experiences of IDs developing hands-on activities for an online IT course. I did not find any phenomenological research that revealed best practices for incorporating hands-on practice opportunities within an online IT course. The findings of this study could help inform future course design projects for online courses that cover IT topics. The results of the study should also be of interest for online course designers and educational technologists who are interested in developing strategies and learning technologies for online IT courses.

Online education that teaches relevant workplace skills in IT is in demand. This study contributes to social change because best practices for and opportunities to address challenges with including hands-on activities in an online IT course were revealed. Education has long been considered an important force for improving society (Tyack & Cuban, 1995). IT is part of STEM, and STEM education has attracted national concern. According to the Bureau of Labor Statistics (2021), growth in computer and IT positions is projected to increase by 11% from 2019 to 2029. In 2015, most of the STEM positions were information systems and computer related (Fayer et al., 2017). Moreover, over 99% of STEM jobs require some college education (Fayer et al., 2017). The 2017 New Media Consortium Horizon Report on Higher Education listed real-world skills in the top 10 educational changes facing higher education and underscored the need for hands-on learning (Becker et al., 2017). The results of this study could also increase access to hands-on IT learning activities for underserved student populations who are completing their education online.

## Summary

In this chapter, I introduced the study and provided the background, a brief summary of the literature related to the study, and the research gap. The problem statement, the purpose of the study, the central research question and subquestions were presented. I also introduced the conceptual framework and the nature of the study.

In Chapter 2, I will provide a review of the literature relevant to this study. The chapter will include a description of the literature search strategy and the conceptual framework. I will also review existing literature on the use of active learning in the classroom, the importance of hands-on learning in IT courses, approaches to including hands-on learning in an online IT course, challenges to including hands-on learning in an online course, and the course design team's role in designing courses that include hands-on learning. Chapter 2 will conclude with a summary and conclusions.

# Chapter 2: Literature Review

To date, there has been little research conducted to understand the lived experiences of IDs in the development of an online IT course in which hands-on practice was included. In my review of the literature, I did not find peer-reviewed phenomenological research related to IDs' challenges and recommended best practices for including hands-on opportunities in an online IT course. There is a need to incorporate hands-on practice in IT courses to adequately prepare learners (Autthaporn & Koraneekij, 2016; Mitchell et al., 2017; Woodward, 2016), and IDs play a key role in the design of courses (Mutlu, 2016; Outlaw & Rice, 2015; Stevens, 2013). As part of a course design team, IDs may have to collaborate with, lead, and manage others (Arnold et al., 2018). This could include instructors or other SMEs who are part of the course design team. Instructors may not understand what active learning is (Chi et al., 2018). This could present additional challenges for the IDs in the course design process when trying to include hands-on activities.

The purpose of this phenomenological study was to explore the lived experiences of IDs in the development of an online IT course that included hands-on activities. With this study, I aimed to understand the unique experiences of these IDs including any challenges they faced or recommendations that had for improving the course design experience for including hands-on activities.

This chapter includes a description of the strategies I used to retrieve seminal work and current literature relevant to this study as well as the conceptual framework. In this chapter, I present the extant literature in an attempt to describe the importance of including hands-on, authentic, active learning activities in an online, postsecondary course that teaches IT concepts and skills. Literature related to the application of active learning in the classroom, importance of active learning in IT courses, approaches and barriers to including active learning in an IT course, active learning through hands-on activities, and the SME's role in the course design process is also reviewed.

## Literature Search Strategy

To locate literature for this review, I conducted a thorough search of several databases and Google Scholar. Peer-reviewed articles were retrieved databases accessible through the Walden University Library, namely Education Source, ProQuest, and ERIC. At the start of the literature search, I did not have themes to begin with, so I started broadly and eventually themes emerged that helped focus my search criteria.

The useful search words that emerged from the initial broad search included *online, faculty*, *designer-by-assignment*, *instructional design*, *instructional design team, university, information technology*, *computer science, barriers, success, hands-on, skills-based learning*, *active learning*, *constructivism*, and *experiential learning*. Only sources relevant to the present study, including seminal works, literature to show the historical progress, and relevant research studies, were used. The majority of the research studies included were published between 2015 and 2021. I also selected material from government websites and reports that were relevant to a discussion of the importance of college graduate preparation for the IT workforce. The government sources were not always found to be peer reviewed; however, they were included because they provided data on colleges and job outlooks.

## Conceptual Framework

I conducted this study to explore the lived experiences of IDs in the development of an online IT course that included hands-on activities. Dewey's work in constructivism and active learning theory were used as the conceptual framework for this study. For the purposes of this study, hands-on learning refers to Dewey's (1938) theory that students learn by doing and construct knowledge and skills through active engagement. Dewey emphasized learning through experience, experiment, and interaction. Dewey's learning by doing approach resonates with constructivism and was significant to this study because for online IT courses to be designed in a manner that prepares a student with relevant workforce skills, the best practices for and challenges with the inclusion of online, hands-on learning activities needed to be explored. Constructivism was relevant to this study because learning by doing and active engagement with relevant real-world problems are activities that research has revealed to be valuable to the learners' experience (see Freeman et al., 2014; Mitchell et al., 2017; Moye et al., 2017).

Active learning theory extends constructivism and is based on the learning theories of Vygotsky and Piaget (Lumpkin et al., 2015). Hands-on learning, a category of active learning, includes direct contact with real-world scenarios, laboratory exercises, and hands-on experiences (Freeman et al., 2014). Hands-on learning activities include simulations, direct application of technology to personal equipment, and virtual lab environments (Bhute et al., 2021; Mitchell et al., 2017). Vygotsky's (1978) theory described learning as a process that occurs in a zone of proximal development and that children learn more when supported by peers. Learning within the zone of proximal development occurs when the activities challenge the learner to stretch their skills with guidance from a more experienced individual (Vygotsky, 1978). According to Vygotsky, the factors that influence learning are engagement in topic relevant activities, time for practice and development, and a community of inquiring learners (as cited in Driscoll, 2005, pp. 420-421). Piaget (1978) posited that learning occurs through interaction with the environment and is action based. Action-based learning that aligns with Piaget's cognitive development theory includes exploration-based activities, hands-on activities, and collaborative problem solving (Driscoll, 2005). Piaget believed that teaching strategies should actively engage learners and present challenges. Dewey, Vygotsky, and Piaget seem to agree that learning is not passive, and students construct knowledge based on active engagement. Exploring the successes of and barriers for incorporating active learning activities in an online course was a focus of this study.

In their seminal work on the topic, Bonwell and Eison (1991) posited that active learning could be incorporated into any classroom regardless of size or discipline. Hence, hands-on learning could be possible in an online IT course. Active learning theory was relevant to this study because it gave focus to the phenomenon experienced by IDs designing hands-on activities learning activities for an online IT course. Active learning activities include students using higher order thinking skills (Khan et al., 2017). Best practices for the student learning experience focus on active engagement, hands-on activities, and learning through doing (Bonwell & Eison, 1991; Chickering & Gamson, 1987; Dewey, 1938). Active learning and constructivism are both centered on promoting active engagement from the student and the use of higher order skills to achieve success

(Chickering & Gamson, 1987; Khan et al., 2017). Active learning theory and constructivism align well with teaching future IT practitioners through the use of applied learning and hands-on experiences (ACM, 2017; Sabin et al., 2016).

Promoting student engagement in an online course could be challenging partially due to the lack of physical social presence between the students and instructors (Khan et al., 2017). Strategies and deliberate course design that foster active engagement are important to student success (Bonwell & Eison, 1991; Khan et al., 2017). Bonwell and Eison (1991) identified barriers for incorporating active learning in a course. Barriers included faculty perception that active learning preparation takes too much effort and faculty would not have adequate technology and support. The barriers they identified were used as a lens in this study to explore what IDs perceived as challenges to successful incorporation of hands-on learning activities in an online course.

In a phenomenological study, theories can be used to focus the inquiry and understand the findings (Patton, 2015). A phenomenological design is used to reveal the essence of a lived experience (Moustakas, 1994). The current phenomenological study benefitted from the earlier work of active learning researchers in that it provided a foundation on what hands-on activities are and their importance to student engagement in an online course. In the next section, I present a review of seminal writings of active learning and related research on active learning.

## Use of Active Learning in the Classroom

Active learning has long been recognized as having potential in education to move student engagement from a passive role to a more active one. One of the earliest studies on active learning was conducted by Orlansky (1979) to compare the effects of a lecture-based approach and an active learning approach on 50 students enrolled in an introductory special education course. Orlansky defined a lecture-based course as requiring 75% of class time spent listening to the instructor lecture and active learning as restricting the instructor from speaking to the students for no more than 25% of the class time and further restricting the engagement to include no lectures. Instead, active learning relied on problem-based learning, discussions, simulations, and role playing. One group of 25 students was taught using the lecture-based approach, and a second group of 25 students was taught using active learning. The students' attitudes towards the need to provide special education services for children with a variety of special needs were measured at the start and end of the course. Special needs included having communication disorders and being gifted, hard of hearing, or a person with intellectual disabilities. The active learning group of students showed more gain in positive attitude in most categories. Orlansky concluded that an active learning approach showed promise as an alternative to a traditional, lecture-based approach. It is important to note that this study was limited to a specific special education focus and was conducted in a traditional, instructor-led, face-to-face classroom.

Active learning continued to gain more attention from researchers over the years. In their seminal paper, Chickering and Gamson (1987) developed the "Seven Principles for Good Practice in Undergraduate Education" and active learning was included as one of the seven. Chickering and Gamson stated that "learning is not a spectator sport" (p. 4), and students must be encouraged to actively engage by discussing, writing about, relating to, and applying what they are learning. Bonwell and Eison (1991) described active learning as strategies that require students “doing things and thinking about what they are doing” (p. 2). The seminal writings on active learning by Chickering and Gamson and Bonwell and Eison were completed before online learning transformed higher education. In reviewing the extant literature, I discovered a trend in research on active learning strategies in online STEM courses that began in the 1990s.

Chickering and Ehrmann (1996) revisited the seven principles that they developed in the 1980s, repurposing the original principles to include best practices for leveraging the advances of communication and IT in education. The principle to use active learning techniques was enhanced to encourage the use of “tools and resources for learning by doing, time-delayed exchange, and real-time conversation” (Chickering & Ehrmann, 1996, p. 5). Chickering and Ehrmann recommended learn by doing activities to include simulations and “apprentice-like activities” (p. 5) and emphasized the potential for the sciences (i.e., the S in STEM). Hathaway (2014) outlined how to apply Chickering and Ehrmann’s 1996 version of the seven principles of good practice to online courses, reporting that online learning supported active learning because students often initiate their own research on the internet and online learners are self-directed. Active learning strategies have presented opportunities to enhance student learning in STEM education.

One of the earliest studies on active learning to teach a STEM topic was a quantitative study by Kyriacou (1992) examining how active learning was used to teach secondary school mathematics. Kyriacou justified the need for the study through an examination of the changes to the teaching of mathematics in secondary schools, noting increased advocacy for active learning. Kyriacou surveyed 100 secondary school mathematics department heads to determine the extent that active learning was being used in England. Fifty-two schools reported that their department heads perceived a shift towards investigational and problem-solving approaches with a greater use of active learning.

Since 1992, the impact active learning had on STEM courses has continued to be studied with favorable results. Freeman et al. (2014) meta-analyzed 225 studies that compared student performance under traditional lecturing versus active learning in undergraduate STEM courses. The authors reported that active learning increased student performance in science, engineering, and mathematics and outperformed traditional lectures in STEM courses. Mitchell et al. (2017) reviewed the literature from 2000 to 2016 to explore active learning strategies used in Information Systems courses. The result of their analysis was the identification of 20 active learning strategies to provide guidance for IT instructors to implement in their classrooms. Mitchell et al. grouped these 20 types into five categories: visual presentations, collaborative student projects, technology interaction, assessment, and games. Their effort demonstrated the potential that active learning strategies present for effective online education in IT topics. The findings of Freeman et al. and Mitchell et al. complement each other. Freeman et al. underscored the value of active learning in STEM while Mitchell et al. identified potential strategies for including active learning within STEM courses.

Over the years, best practices for undergraduate education have been developed that include active learning to provide students with opportunities to apply what they are learning (Chickering & Ehrmann, 1996; Chickering & Gamson, 1987; Hathaway, 2014). Active learning assignments enhance STEM courses (Freeman et al., 2014; Kyriacou, 1992; Mitchell et al., 2017) and have enhanced the student experience in IT courses (Chisholm, 2015; Mitchell et al., 2017). Active learning includes hands-on activities that could be offered in an online course through the use of technology, including virtual labs (Chisholm, 2015; Jagannathan & Blair, 2015). Online education and educational technology have generated interest and opportunity in new and interesting ways to incorporate active learning including STEM education (Chisholm, 2015; Freeman et al., 2014; Mitchell et al., 2017). As demonstrated by the research discussed in this section, active learning includes hands-on activities. This literature review of the history of active learning motivated me to review the literature on the importance of including active learning activities in IT courses, which is covered in the next section.

## Importance of Hands-On Learning in IT Courses

Researchers have found that hands-on learning strategies in STEM-based courses have positive benefits to learning (Autthaporn & Koraneekij, 2016; Freeman et al., 2014; Han et al., 2016; Kressler & Kressler, 2020). Freeman et al. (2014) reviewed the results of 225 studies that compared pass rates for STEM courses that used traditional lectures versus active learning and the results found that active learning had a positive impact on student performance in STEM courses. Woodward (2016) reached a similar conclusion on the positive impact of active learning with his study. Woodward conducted a quantitative study where 41 students were given two homework modules using traditional lecture and homework and two modules using active learning and found that the students reported that active learning increased student self-perceived engagement and increased learning. Researchers Autthaporn and Koraneekij (2016) conducted a quantitative experimental study on the effects of providing online active learning activities to 30 students. Similar to findings from Freeman et al. and Woodward, Autthaporn and Koraneekij found that active learning enhanced observed learning behaviors. Han et al. (2016) explored the effect of STEM project-based learning on students' achievement in mathematics topics by comparing the achievements of two groups of students longitudinally. The results of the study conducted by Han et al. were the students who had problem-based learning lessons had improved scores in math. Although the study by Han et al. was focused specifically on the effect of project-based learning, project-based learning is a form of hands-on learning. A reform in online IT education to move learning activities towards constructivist approaches that leverage active learning could prove beneficial.

Kressler and Kressler (2020) conducted an exploratory mixed methods study with 33 students who were ethnically and racially diverse. The students were enrolled in a high enrollment kinesiology course that was redesigned with active learning. The result was all 33 students perceived that the active learning improved their higher order thinking skills. Kressler and Kressler's study revealed that active learning has potential for developing not only skills for a particular discipline but higher order thinking skills valued by employers. Their study revealed that active learning could provide underrepresented students equal opportunities for engagement in a large enrollment course. In a survey conducted by McGraw-Hill Education (2018), only 56% of employers believed graduates were prepared with critical thinking and problem solving skills. Active learning provides opportunities to develop a wide range of skills for students including soft skills.

Amgen Foundation and Change the Equation (2016) conducted a survey of high school students ages 14 to 18 and received a total of 1,569 online survey responses. The results showed that students wanted more career relevant and hands-on activities. Although this study focused on science and biology students, it highlights the need for active learning activities when teaching STEM courses.

Even online courses with massive numbers of enrolled students could benefit from hands-on learning. Koedinger et al. (2015) compared the learning benefits of passive learning activities (video lectures and text) for 18,645 students enrolled in a massive open online course (MOOC) with learn-by-doing activities for 9,075 students enrolled in an Open Learning Initiative course. The results of this quasi-experimental comparison study found that students engaged with learn-by-doing activities learned more than students watching videos or reading pages. Alario-Hoyos et al. (2018) reached a similar conclusion in their study of MOOCs. They studied the effect of integrating a software development tool within three introduction to Java programming MOOCs when running in instructor-paced or self-paced mode. Alario-Hoyos et al. posited that learn by doing in online education has challenges but is best achieved through resources and tools that are external to the course materials. The results from Alario-Hoyos et al.'s quantitative study showed that the software development tool was useful to promote learn-by-doing in both instructor-paced and self-paced modes.

As a participant observer, Bali (2014) evaluated four MOOC courses produced by Coursera and found that all four courses depended on videos and discussions for student engagement. Bonafini et al. (2017) conducted a quantitative study with 222 students to explore the effects of videos and discussion forums on student achievement in a Creativity, Innovation, and Change MOOC. Bonafini et al.'s literature review for their study revealed the pedagogical practices used in designing most MOOCs. MOOCs have historically used video lectures, text, and discussion forums for learning (Bali, 2014; Bonafini et al., 2017; Koedinger et al., 2015). The results from Bonafini et al.'s study revealed that student discussion contributions showed limited critical-thinking but videos increased student achievement. Bonafini et al. revealed that implications for MOOC design practice would be to create interactive videos and discussions that fostered discussions on application of concepts. Research findings on massively distributed online courses support that there is value in understanding successful incorporation of more hands-on activities in online courses (Bali, 2014; Bonafini et al., 2017; Koedinger et al., 2015).

Researcher Podeschi (2020) revealed that students are more prepared for the workforce when they are provided with hands-on learning opportunities that involve real-world projects. Podeschi found that internships and student-run entrepreneur ventures are an effective option for authentic hands-on learning opportunities. In an information systems course, which was built to provide students an opportunity to work with real clients, students developed entrepreneur skills, project management skills, and gained practice working in an environment with real risk and real reward (Podeschi, 2020).

These examples of authentic and relevant hands-on experiences could be implemented in an online IT course.

IT and computer science disciplines fall under the STEM umbrella (Department of Homeland Security, 2016). IT students would benefit from access to hands-on activities within an online course (Wu et al., 2014). Researchers Wu et al. (2014) conducted quantitative research to study the effect of hands-on practice activities on 124 students enrolled in an introduction to computer science course. A group of students were provided supplementary hands-on practice and the other group were not. The researchers found that supplementary hands-on practice benefited student learning in the introductory computer science course. Students who engaged in hands-on practice had better performance and were less stressed about computer science. Similarly, a qualitative study conducted by researchers Johari et al. (2020) found that hands-on activities in an engineering course improved student knowledge and motivation for both engineering and non-engineering majors. In spite of demonstrated benefits hands-on practice brings to student learning, research has indicated that education is falling short in providing these benefits (Hart Research Associates, 2015; McGraw-Hill Education, 2018; Moye et al., 2017).

Employers benefit if they have a large pool of workforce prepared graduates to fill open positions. A graduate would need to be prepared to apply those hard skills specific to their discipline but also be proficient with soft skills. A survey conducted by the National Association of Colleges and Employers revealed that written communication skills, problem-solving skills, and teamwork were the top nondisciplinary, soft skills of interest to employers (Gray, 2021). Hart Research Associates (2015) found that although 88% of employers think graduates should be prepared to complete an applied learning project, 58% of employers felt that colleges and universities need to make improvements to prepare graduates for entry-level positions. Shortcomings included application of knowledge and skills in real-world settings and critical thinking skills (Hart Research Associates, 2015). These findings coincide with the McGraw-Hill Education study. Employers reported that students were not prepared in the key critical skills of problem solving, leadership, and critical thinking (McGraw-Hill Education, 2018). Students reported that they needed more preparation for transitioning into the workforce including development of interviewing skills and resume writing (McGraw-Hill Education, 2018). Active learning can develop those skills that are critical to employers (Podeschi, 2020). A benefit of hands-on learning is the resulting project artifacts could be included in an electronic portfolio and could demonstrate application of real-world skills to future employers. In a quantitative study that surveyed 85 recruiters, Leahy and Filiatrault (2017) found that employers expressed a high level of interest in ePortfolios as part of the recruitment process of job candidates. In a qualitative study conducted by Weber (2018), 11 engineering hiring managers were interviewed. Weber's study revealed that a candidate's electronic portfolio could help employers assess the candidate's potential fit with a company and allowed a candidate to showcase application of skills and knowledge. Employers value documented application of real-world skills as evidence of readiness for the workplace (Hart Research Associates, 2015; Leahy & Filiatrault, 2017; Weber, 2018).

Khan et al. (2017) discussed strategies to incorporate active learning in an online course. The researchers found that active learning had positive effects on student engagement but acknowledged the unique challenges with incorporating hands-on activities in an online course. Hands-on activities could be challenging to incorporate in an online course where neither faculty nor students engage with each other in face-to-face interactions. Hands-on learning engages the student and could include collaborating on designing a software application, hands-on software development activities, group problem-based learning, or role-playing (Khan et al., 2017). Given the reported benefits to incorporating hands-on learning in the classroom, it is important to explore approaches to including hands-on activities in online IT courses.

## Approaches to Including Hands-On Learning in an Online IT Course

Researchers have found that there are a growing number of approaches to providing active learning and hands-on practice in an online IT course (Alfalah, 2018; Chen et al., 2018; Mackey, 2016). Research has demonstrated a growing interest in what approaches should be taken to design online STEM lab spaces to promote interactivity and distance collaboration (Chen et al., 2018; Mackey, 2016). Chen et al. (2018) conducted survey research with 537 students who were enrolled in a university-level online STEM course. The purpose of their study was to explore which design elements appeared most frequently in online STEM courses and which design elements impacted student perceptions of learning and student learning satisfaction. At the time Chen et al. conducted their literature review, they reported finding limited research on STEM online education. The top active learning activities revealed by the study were special software applications, solving real-world problems, and analyzing scenarios or case studies (Chen et al., 2018).

Estes et al. (2014) conducted a case study on designing for problem-based learning in a collaborative STEM lab. Estes et al.'s case was a master's degree granting university that partnered with STEM faculty from a research university to redesign the lab to promote student-centered learning, interactivity, and distant collaboration. The Estes et al. case study revealed that the lab should be designed to support students' ability to solve and discuss authentic problems and to use videoconferencing to support virtual engagement. Mackey (2016) reached a similar conclusion and suggested that best practices in problem-based learning involve critical thinking, analysis, and development of original solutions.

Virtual reality is another emerging approach to providing hands-on learning in an online IT course. Alfalah (2018) conducted a quantitative study to explore 30 IT faculty perceptions of the use of virtual reality in IT education. Alfalah's study revealed that most of the IT faculty perceived virtual reality technology to have positive potential to enhancing student learning and that the technology could provide opportunities for collaborative experiences. Contextualized teaching and learning include gaming, simulation, and immersive occupational environments with augmented and mixed reality (Mohammadi et al., 2020). There seems to be a growing number of digital, technology-enhanced educational options for online IT courses.

According to the 2018 New Media Consortium Horizon Report Higher Education, a trend in higher education is to redesign learning spaces to accommodate more active learning (Becker et al., 2018). To support remote active learning experiences, higher educational institutions are exploring mixed-reality technologies, simulations, and are continuing to move towards including learning experiences that resemble real-world environments (Becker et al., 2018). Social media-based role-playing has been used in healthcare education (Woodward, 2016). Engaging students with real-life problems and hands-on experiences were found to be best practices for online STEM courses (Chen et al., 2018). In online education, students need hands-on activities that can be facilitated at a distance (Becker et al., 2018; Conrad & Donaldson, 2011).

Although the literature revealed that there are multiple ways to achieve hands-on learning in an online course, research also revealed that instructors may not understand what active learning is (Chi et al., 2018). Chi and Wylie (2014) developed the interactive, constructive, active, and passive (ICAP) framework for categorizing learning tasks into four levels of activity: passive, active, constructive, and interactive. The framework defines the kind of student engagement that constitutes active learning. Studies have been conducted where it was used to observe student learning activities at each level of the ICAP framework (Menekse et al., 2013). This framework has been used to help educators understand what active learning is beyond just avoiding heavy reliance on lectures (Chi & Wylie, 2014).

Examples of active learning from STEM literature include students learning from virtual labs (Bhute et al., 2021; Jagannathan & Blair, 2015; Zhang & Li, 2019). Virtual labs, where the learner engages in lab-like activities in a virtual or simulated experience, has promise for creating hands-on experiences for online IT courses. A virtual lab is a simulated environment that presents students with an opportunity to practice hands-on skills. Virtual labs are beneficial in online courses because they do not require a student to physically visit a lab. Chisholm (2015) performed a sequential explanatory mixed methods study to explore students' perceptions of the usefulness of virtual labs for hands-on assignments in cybersecurity. Cybersecurity is an IT discipline and falls within the technology discipline of STEM. Seventy students enrolled in an undergraduate cybersecurity course participated in a questionnaire and were interviewed for the study. Chisholm's study found that students perceived virtual labs to be valuable and students suggested that more virtual labs be added to their course. Jagannathan and Blair (2015) reached a similar conclusion. Jagannathan and Blair conducted a comparative study of students' grades from in-class physical labs and grades from virtual labs. A comparison of grades for assignments from four IT courses in an undergraduate engineering program revealed students had better performance overall through virtual lab activities compared to traditional physical labs. Jagannathan and Blair found that virtual labs improved student learning outcomes in IT and engineering coursework.

Problem-based learning is another approach for including real-world experiences in a course. Chen et al. (2021) reviewed the literature for 108 research articles over two decades. Their findings were widely used problem-based learning opportunities included small working groups solving open-ended problems, team oral presentations, opportunities for peer feedback. Problem-based learning assignments could present students with authentic and active learning opportunities (Mackey, 2016).

Hands-on learning activities have also shown to have positive benefits in computer science education. Hands-on practice, in a foundational computer science course, improved student learning and reduced stress for non-computer science students required to take the course (Wu et al., 2014). Computer programming is an applied science. Graduates seeking employment in the field need to know how to solve real-world problems by writing computer programs. Most of the research found on the application of hands-on learning in an online computer programming course were for MOOCs. Chan et al. (2017) studied the effect of incorporating a web-based Java development environment to support hands-on learning on student perception, motivation and utility. The study involved 34,967 students registered for the self-paced Java Fundamentals for Android Development edX MOOC. Chan et al. found that the integration of the web-based development environment was considered useful by students for practicing learned concepts. Krugel and Hubwieser (2017) reached a similar conclusion in favor of the use of web-based tools for hands-on activities. Krugel and Hubwieser developed an object-oriented programming MOOC that incorporated a web-based development environment to support programming exercises that were auto-graded. The participants were 187 registered students. Due to the overall positive feedback on the interactive exercises, Krugel and Hubwieser supported the use of web-based tools for hands-on assignments instead of installing software on the students' computers. Making an informed decision to find and use web-based labs and development environments versus the installation of software on students' computers could be a challenge to the successful incorporation of hands-on activities.

## Challenges With Including Hands-On Learning in an Online IT Course

Hands-on learning in traditional classrooms positions the learner within physical reach of lab equipment. The literature has shown that there are barriers and challenges with including hands-on activities in an online course. The literature revealed that barriers originate with the students, faculty, and the technology environment.

In a seminal book on active learning by Bonwell and Eison (1991), the authors identified several barriers to implementing hands-on learning in a course. Limited class time to cover the required material was one barrier. Faculty were concerned by the amount of time it would take to prepare hands-on learning content. Hands-on activities could become increasingly difficult to manage for a large number of students. Another barrier reported was concern for acquiring the needed material and equipment required to support the hands-on activities. Moreover, Bonwell and Eison determined that the most significant barrier was perceived risk that if students did not participate in the active learning activities, the faculty would be criticized for teaching in an unorthodox way.

In a qualitative study, Finelli, Daly, et al. (2014) observed instructors for 26 engineering courses to understand ways faculty used active learning strategies. The purpose of the study was to determine factors that influenced faculty adoption of teaching practices with the goal of using the results to create a plan to improve STEM education. Finelli, Daly, et al. found that 60% of faculty did not include active learning strategies. Their findings were used to reform the university’s instructor training plan to cover best practices on how to include active learning in the classroom. Although the study found that the inclusion of active learning was limited, it did not reveal why. It would be helpful to interview IDs to find out what the potential barriers are to including hands-on activities.

Nguyen et al. (2017) reached a similar conclusion concerning barriers with including active learning. Nguyen et al. revealed adoption of active learning strategies has been slow by engineering instructors. Nguyen et al. conducted an empirical study with 179 students at three U.S. institutions. The purpose was to measure students' expectations with active learning, students' experiences with active learning, and instructor strategies for using active learning. The results of the study revealed that neither course nor instructor evaluations were negatively impacted by adopting active learning strategies. Nguyen et al. reported that one barrier was instructor belief that inclusion of active learning activities would negatively impact instructor and course evaluation. The results support the need for further research to understand and remove barriers to active learning.

Van Hunnik (2015) reviewed the literature on challenges with incorporating hands-on labs in an online course. One challenge was technical difficulties with the technology involved (Van Hunnik, 2015). With a traditional face-to-face hands-on lab, there is an instructor available to assist with technology challenges. A student studying online does not have an instructor physically in the same room. Another challenge reported by Van Hunnik was the upfront cost for the student to set up lab equipment at home. Although Van Hunnik's study revealed barriers that were different from those revealed by Finelli, Daly, et al. (2014) and Nguyen et al. (2017), the findings underscore the need to explore barriers faced when including hands-on activities.

Shadle et al. (2017) conducted a quantitative study to examine how 169 faculty from a 4-year public institution responded to a new vision for teaching and learning consistent with recommendations for STEM education reform. The study explored what faculty express are barriers to the vision. Barriers revealed were time constraints and instructional challenges (Shadle et al., 2017). Shadle et al. suggested that a better understanding of faculty-identified barriers could reveal strategies for successful implementation of a change in teaching strategies. The implications of the results support the need to conduct research on faculty-identified barriers. Research has shown that barriers to instructor adoption of active learning strategies in STEM courses include a concern that students would feel negatively about the instruction, students would run into technical challenges, and instructors were concerned with the preparation time requirement (Finelli, Daly, et al., 2014; Shadle et al., 2017). Barriers to adoption of hands-on activities could also be due to student resistance. Research conducted by Finelli, DeMonbron, et al. (2014) found that student resistance was a barrier to active learning. Moreover, Finelli, DeMonbron, et al. observed that student resistance to active learning was particularly problematic when the activities involved problem solving tasks and group work.

Khan et al. (2017) reported that there are unique challenges when including hands-on activities in an online course. One challenge is due to the social presence between student and faculty when the course is online only (Khan et al., 2017). Another challenge is the course design and development of the online course material often happens before faculty teach their sections (Khan et al., 2017). This course design model could limit a faculty member's ability to customize the course while it is running (Khan et al., 2017).

Nicol et al. (2018) compared the effectiveness of high-technology-based and low-technology-based classrooms. These researchers agreed that active learning was beneficial but wanted to know to what extent. The study was conducted at a Canadian military college using two sections of a low-technology active learning course and two sections of a high-technology active learning course. The participants were 37 students enrolled in the low-technology active learning classes and 37 students enrolled in high-technology active learning classes. Active learning strategies used in the low-technology course included group exercises, group discussions, and lectures that involved interactive discourse. The high-technology courses were more hands-on and used computer stations, interactive whiteboards, and computer programs for supporting the group activities. Nicol et al. found no significant difference in performance between the students enrolled in high-technology classes compared to the students enrolled in the low-technology classes. However, the results of this study that are of significance to this research study are the number of technology challenges experienced. Nicol et al. reported that some students had difficulty using the technology, the technology sometimes did not work as it should, and students were often distracted by the technology. Researchers Zhang and Li (2019) found that student satisfaction and perceived usefulness of virtual remote labs were affected by the quality of the experience. Zhang and Li surveyed 238 students enrolled in an introduction to computer science course that used a virtual lab. Students that had a focused, positive experience with the lab had higher satisfaction (Zhang & Li, 2019). IDs could face challenges with providing learners with a high quality online hands-on experience.

Koohang et al. (2016) conducted a survey study to determine if there were significant mean differences between learners' mean age, gender, and type of degree (graduate or undergraduate) and their perceived views about the importance of including active learning elements in online course. Data from 145 surveys were analyzed and revealed that students aged 30-35 scored higher than other age groups on the perceived view of the inclusion of active learning. The survey revealed that males scored higher than females and graduate students scored higher than undergraduates in perceived views of inclusion of active learning elements. All elements of active learning received above average to high mean scores indicating students viewing these as important in active learning. The findings did not explore barriers or reasons why some age groups or some females perceived active learning as less important.

In a qualitative study, Tharayil et al. (2018) explored strategies that professors use to reduce student resistance to active learning in undergraduate engineering courses. After solicitation on listservs for engineering instructors who self-identified as frequent practitioners of active learning, 17 participants were interviewed. The study revealed that the instructors used two broad types of strategies: explanation and facilitation. Explanation strategies consisted of explaining the purpose of the activity, explaining course expectations, and explaining activity expectations. Facilitation strategies included approaching non-participants to offer help, assuming an encouraging demeanor, grading on participation, walking around the room, inviting questions, developing a routine, designing activities for participation, and using incremental steps. Similar to the study conducted by Finelli, Daly, et al. (2014), the study conducted by Tharayil et al. was focused on understanding instructors' use of active learning strategies. The difference is that Tharayil et al. interviewed the participants directly whereas Finelli, Daly, et al. observed how instructors were using active learning. Hearing directly from those involved with including active learning in a course could provide useful insight into the challenges experienced and strategies to overcome the challenges.

## Course Design Team's Role With Including Hands-On Learning

IDs and SMEs could be part of a course design team to collaborate on designing the learners' experience. As part of a team approach to course design, IDs must be competent with collaboration, leadership, and the management of others (Arnold et al., 2018). This would include leading the team with the task of designing hands-on learning activities in a course. The analysis, design, development, implementation, and evaluation (ADDIE) model of course design consists of the five elements of analysis, design, development, implement, and evaluation (Mutlu, 2016). Both traditional instructional design models, such as ADDIE and more contemporary instructional design models, require subject matter expertise to design and develop a course (Mutlu, 2016). A course design team would most often consist of IDs and at least one SME. In a study conducted by Baldwin et al. (2018), 14 instructors who participated as SMEs in a course design process indicated that they first started with objectives. Baldwin et al. noted the model observed was similar to the ADDIE model with an emphasis on a backward-design process.

The course design team could work together to design a master course shell for an online course. The master course shell would store all of the course materials created by the course design team (Franetovic & Bush, 2013). This master shell could be used to create multiple sections of an online course that an institution could offer term-over-term. SMEs play a role in developing online courses that include hands-on activities. Merrill (2007) coined the term designer-by-assignment to describe SMEs who develop instructional content but do not have instructional design training. IDs would collaborate with and guide SMEs through the process of designing an online course (Arnold et al., 2018). The ID could lead and advise the SME through the process of designing hands-on activities for an online course.

IDs clearly have an important role in the design of a course. Insight from experiences of IDs who designed an online IT course is limited and experiences focused on including hands-on activities even more so. The literature review revealed one phenomenological study of the lived experience of IDs who included hands-on activities for a biology course (Scripture, 2008). The literature review did not reveal any phenomenological studies of IDs who incorporated hands-on activities in an online IT course. In earlier work, Merrill (2002) studied instructional design theories and identified five instructional design principles found to be in common within these theories. According to the principles, learning occurs when new knowledge is applied and by engaging in real-world problems (Merrill, 2002). IDs could collaborate with members of the course design team to develop instructional content that is applied, engages the student in real-world problems, and is hands-on in nature.

Researchers Outlaw and Rice (2015) conducted a case study where Outlaw was tasked to develop best practices for IDs and faculty to work together to develop online courses for a small online university. The subject matter expertise was provided by the instructor and sound instructional design practices were provided by the ID. The Outlaw model stresses the importance of a SME and ID partnership when developing an online course.

Stevens (2013) conducted a qualitative case study with five IDs and five faculty members. This research examined the reported experiences of faculty and IDs when engaged in the course development process. The results found that communication had a positive effect on the course development process and lack of time had a negative impact on the course development process. Further exploration on barriers to course development, specifically with including active learning and hands-on activities are needed.

Trammell and LaForge (2017) conducted a meta-study on the common challenges for instructors facilitating large online courses. One challenge found centered around course design. Of note, Trammell and LaForge found a wide variation in who designs the course. Some online courses were designed by faculty, IDs, or collaboration between faculty and IDs (Trammell & LaForge, 2017). Faculty provided the subject matter expertise needed for the course design process (Trammell & LaForge, 2017). Trammell and LaForge found that at some institutions, one faculty member in collaboration with IDs, developed one course shell that was duplicated for one or more sections of the course. This course shell is also referred to as the master course shell (Franetovic &

Bush, 2013). Faculty were often involved as part of a course design team (Eichler & Peeples, 2016; Trammell & LaForge, 2017). IDs are dependent on SMEs for their content expertise but have the requisite instructional design expertise to understand best practices with course design.

Arghode et al. (2018) conducted a literature review to explore the instructor's role designing online instruction to increase learner engagement. Their findings revealed there was an interpersonal dimension in online learner engagement. Their findings also uncovered limited exploration into the instructor's role in creating engaging online active-learning content based on learner needs. A study by Dixson (2015) reached a similar conclusion on the importance of instructor presence as it related to student engagement in an online course. Dixson created the Online Student Engagement (OSE) scale to measure student engagement in an online course. Dixson used the OSE scale on 34 students to measure student engagement with content, other students, and instructors. Although the purpose of the study was to validate the OSE scale, Dixson’s study revealed that students needed interaction with content and some form of hands-on activities to be engaged with their learning.

Green et al. (2018) conducted a case study to share the impact that active learning had, in the form of a course community, on a statistics course. The statistics course had high failure rates and inconsistencies in content and average success. The course community allowed the faculty members to meet regularly and support each other during their efforts to change the course from lecture-based activities to active learning approaches. Involved in the study were 32 course sections with 14 different instructors.

Green et al. reported that instructors collaborated in the course community to find videos and hands-on learning activities. Instructors used their subject matter expertise to curate and share course content (Green et al., 2018). Trammell and LaForge (2017) reached a similar conclusion in that there is benefit to instructor collaboration when developing active learning activities. Green et al. also reported on barriers, noted by instructors, in creating active learning activities. These barriers included a concern for the fast pace of the course, student engagement with the activities, and students skipping activities to keep up with the pace of the course. Wurdinger and Allison (2017) surveyed 295 faculty teaching in undergraduate programs to examine faculty perceptions and their use of experiential learning. The theoretical framework for the study defined experiential learning as approaches that include hands-on learning, problem-based learning, project-based learning, service learning, and place-based learning. The study revealed that while there may be increased awareness of the value of experiential learning, there remained a limited use of experiential approaches in higher education. Lectures remained the dominant approach. Barriers to experiential learning included limited class time, classroom structure not conducive for active learning, class size too large, not enough time to include experiential learning, and faculty resistance. Similar to the findings by Green et al., barriers to including experiential learning included not enough time to include experiential learning. Neither Green et al. or Wurdinger and Allison explored IDs' perceptions with including hands-on activities in an online IT course.

Course development models leverage a course design team that include IDs and SMEs (Outlaw & Rice, 2015; Stevens, 2013; Trammell & LaForge, 2017). Sometimes an instructor that teaches the course is used as the SME. IDs with experience in designing a course would have significant insight on the barriers to creating online courses that include relevant, hands-on learning activities. Moreover, delivering online hands-on learning content to teach IT coursework could present additional challenges. This is due to the use of technology to deliver the online hands-on experience. IDs involved with the course design process could reveal important insight into the best practices and challenges involved with incorporating hands-on learning activities in online IT courses. This study was conducted so that IDs could be interviewed to gain a better understanding and insight into the best practices and challenges with developing an online course that contains hands-on activities.

## Summary and Conclusions

Hands-on learning is deeply rooted in constructivism learning theory as described by Vygotsky and Piaget (Lumpkin et al., 2015) as well as Dewey's (1938) learning by doing. Hands-on learning is also rooted in active learning theory. Types of active learning activities found in the literature included the use of virtual labs, simulations, problem-based learning, and hands-on activities. Much research surrounded the implementation of hands-on learning in STEM related courses as a way to ready the graduate for STEM careers. The development of electronic portfolios was another benefit of active learning revealed in the literature. Artifacts derived from active learning activities could be used fill these electronic portfolios and these could be shared with potential employers.

Although most of the studies found were conducted in traditional classrooms, there was growing research surrounding the implementation of hands-on learning in an online course. The literature review pointed towards the need to explore and understand the approaches and challenges with incorporating hands-on activities in online IT courses. The literature revealed that course designers have used hands-on learning to increase student interest and engagement in STEM. Much of the research was focused on evaluating instructors' perceptions of active learning, including hands-on activities, and evaluating the impact active learning had on student success. A gap in the research remained to explore the lived experiences of IDs in the development of an online IT course where they had included hands-on activities.

Some faculty rely on technology to teach technology (Eichler & Peeples, 2016). There are several barriers to implementing hands-on activities in a course (Bonwell & Eison, 1991). The literature review revealed a gap in the research to hear directly from IDs on what these barriers are for online IT courses and to explore these IDs' ideas for moving past these barriers. An exploration into the experiences of IDs who are using technology to deliver hands-on activities in online IT courses could gain insight into how to support the online course design process. In Chapter 3, a phenomenological approach to this study is described to explore IDs' lived experiences in the design of an online IT course where the course included hands-on activities.

# Chapter 3: Research Method

The purpose of this phenomenological study was to explore the lived experiences of IDs who designed an online IT course that included hands-on activities. In this study, I aimed to understand the unique experiences of these IDs including any challenges they faced or recommendations they had to improve the course design experience for including hands-on activities. There was a gap in the literature concerning IDs' experiences with designing online IT courses that included hands-on activities.

This chapter includes an explanation of the methodology used in this study. In this chapter, I discuss the research design and rationale as well as aspects of phenomenological research. A description of the data collection plan and procedure as well as the role of the researcher are provided. The chapter also includes a description of how participants were selected; the instrumentation; procedures for recruitment, participation, and data collection; data analysis plan; issues with trustworthiness; and ethical procedures. Finally, the chapter concludes with a summary of the main points.

## Research Design and Rationale

In the present study, I used a phenomenological research design to answer the following central research question and subquestions:

> What is the lived experience of IDs who designed an online IT course that included hands-on activities?
>
> Subquestion 1: What do IDs describe as challenges with including hands-on activities when designing an online IT course?

Subquestion 2: What do IDs recommend to ensure successful inclusion of hands-on activities for an online IT course?

The study was not focused on exploring how to leverage educational technology, but instead on the lived experiences of IDs in the development of online IT courses that included hands-on activities that could be used to teach IT topics through learning by doing. Phenomenology is appropriate when the objectives of the study are to understand the essence of a phenomenon by studying the lived experiences of the participants (Moustakas, 1994). A phenomenological approach is used to find crosscutting themes amongst the participants who shared in the same experience (Moustakas, 1994). Moustakas (1994) stated that data collected through interviews using open-ended questions present opportunities for in-depth analysis for research. In a phenomenological study, the researcher constructs a rich, detailed description of a central phenomenon (Moustakas, 1994).

The phenomenological approach aligned with the central research question and subquestions for this study. The experiences of IDs were central to understanding the challenges with and best practices for including hands-on activities in an online IT course. Since the purpose of the study was to explore the lived experiences of IDs, the phenomenological approach was the most suitable research design. This design was also perceived as most appropriate because it allows participants to share details of their experience.

## Role of the Researcher

I served as the primary investigator in this qualitative study. I was responsible for selecting the study design, developing the procedures for recruiting the participants, creating the interview questions for data collection, analyzing the data analysis, and using strategies that ensured the trustworthiness of the study. Moustakas (1994) stressed that the researcher conducting a phenomenological study should be devoid of supposition and judgment. My goal was to conduct the study with an openness to the meanings and patterns that would emerge (see Moustakas, 1994). The researcher should describe what is going on in the phenomenon without making causal explanations (Moustakas, 1994). My objective was to develop a rich, detailed description of a central phenomenon (see Moustakas, 1994).

My role as a researcher required me to be absent of presuppositions and be open to the patterns that emerged. During the time that I conducted the study, I was employed as the interim executive director of the STEM academics department at an online university. In that role, I supervised deans and managed the STEM curriculum for the university's online division. To avoid bias or conflict related to my job position, I recruited participants who did not work for the university in which I was employed.

## Methodology

In this section, I discuss the methodology of the study. The research methodology is the steps taken to conduct the study (Maxwell, 2013). The participant selection logic, the instrumentation, procedures for participant recruitment, and data analysis process used are described. Evidence of trustworthiness and ethical procedures used are also addressed.

**Participant Selection Logic**

The participants for this study were IDs who met the following inclusion criteria: (a) had experience with the design of an online IT course that included hands-on activities and (b) had specifically designed an online, college-level course in IT.

I used the purposeful sampling strategies for this study. Purposeful sampling is where participants are selected based on specific criteria and the objective of the study (Moser & Korstjens, 2018; Patton, 2015). In phenomenological research, purposeful sampling means purposefully selecting the participants who have experienced the same phenomenon (Moustakas, 1994). I planned to use the snowball sampling technique only if necessary, to ensure that I had enough participants to reach saturation (see Patton, 2015). The snowball technique is where a small pool of potential participants could refer other participants who meet the eligibility criteria for a study (Patton, 2015). I was able to recruit enough participants through purposeful sampling; therefore, I did not need to use the snowball technique.

These combined sampling strategies were justified because a small number of purposefully selected participants could yield the desirable results that only information-rich cases could provide (see Maxwell, 2013; Moustakas, 1994). Creswell (2013) recommended that the number of participants for a phenomenological study be eight to 12. Guest et al. (2006) found that saturation in qualitative research occurred within 12 interviews. As recommended by Moser and Korstjens (2018) and Patton (2015), I continued recruiting participants until data saturation was achieved. Data saturation is reached when no new information or themes are observed in the data (Guest et al., 2006). For this study, I had planned to recruit eight to 12 IDs as participants. The opportunity to explore a phenomenon deeply is representative of the hallmark of qualitative inquiry (Patton, 2015). A small sample size would support spending more time collecting and analyzing the data. For this study, I spent significant time with each participant to gain insight into their lived experiences.

I identified potential participants by searching for IDs on LinkedIn. Potential participants were recruited by sending an initial contact email that provided the inclusion criteria for participants. Participants were recruited who met the following inclusion criteria:

- The participant must have been an ID who developed an online course.
- The course must have been an online IT course at the college or university level. Courses at the K–12 level did not qualify the participant for the study. Courses that were not offered online also did not qualify the participant for the study.
- The ID could have been either full-time, part-time, or contracted for the college or university for which the course was developed.
- The course must have resulted in the inclusion of at least one hands-on activity where hands-on was defined as learning by doing. Examples could have been, but were not limited to, interacting with a simulation, completing a

task in a virtual lab environment, designing or developing a computer system, troubleshooting a network environment, or working with cloud servers.

During the recruitment process, I described hands-on activities as learning by doing that included direct contact with real-world scenarios, laboratory exercises, simulations, problem-based learning, virtual labs, or immersive experiences. Potential participants were emailed a Participant Criteria Questionnaire to establish if they met the criteria. The IT courses were within any discipline of IT, including cybersecurity, network administration, database design, software development, and data analytics. I was able to secure enough participants to reach saturation without needing to use the snowball technique. There were 11 participants in the study.

## Instrumentation

I gathered data through semistructured interviews. In a phenomenological study, data are collected through interviews and observation (Creswell, 2013; Moustakas, 1994; Patton, 2015). I developed the interview questions specifically for this study so that the participants could describe their experiences. Open-ended questions were appropriate for this study because they allowed the participant to express themself freely and for an in-depth exploration of participants' experiences (see Moustakas, 1994; Patton, 2015). I had planned that each interview would take approximately 1 hour. Based on guidelines suggested by Moustakas (1994), I began each interview with a suggestion that the participant take a few moments to focus on the experience. I aimed to make each participant feel comfortable enough to respond honestly and thoroughly (see Moustakas, 1994).

I designed the interview questions to inform the central research question and two subquestions that were grounded in constructivism and active learning theories. The central research question had four interview questions associated with it, while Subquestions 1 and 2 had three interview questions associated with each subquestion. The recruitment materials and the interview protocol defined what hands-on learning activities meant for this study.  To establish content validity, I created a table that illustrated how each interview question aligned with a research question (see Appendix C).

To ensure the interviews were effective, the interview questions were vetted by a panel of experts who had experience with qualitative research. The goal was to determine if the interview questions were clear and effective for getting a participant to share their experiences with developing a course that included hands-on activities. After a couple of iterations of review and revisions with the experts, I developed a set of clear and effective interview questions. A copy of the interview questions is provided in Appendix B. Following each interview, I provided a summary of key points to each participant to review for accuracy.

**Procedures for Recruitment, Participation, and Data Collection**

I recruited participants through purposeful sampling. Due to the limited timeframe, I used social media, specifically LinkedIn, to begin recruiting participants. At the time of completing this study, I had over 800 professional connections in LinkedIn. Most of these connections were within the industry of online education. I searched through my LinkedIn connections for IDs who may have met the participant criteria.

Participants must have been IDs who had participated in the design of at least one college-level online IT course that had included hands-on activities. Next, I sent an initial contact message through LinkedIn to prospective participants who met the criteria, were available for the study, and were interested in providing their experiences that would advance research on the topic. A copy of the Participant Criteria Questionnaire and initial contact email are provided in Appendices A and B, respectively.

I had planned to use a snowball approach only if I had challenges with recruiting enough participants. My planned snowball approach was to ask participants if they knew anyone who met the study criteria who did not work within their organization and if they could share their contact information with me. I was able to secure 11 participants through recruitment on LinkedIn, so I did not need to use the snowball approach.

Per guidelines suggested by Maxwell (2013), I decided on the type of interview that would be the most practical and would result in collecting useful data. Due to the time limitations and the fact that the participants were not physically located near where I live, the procedure for interviewing involved conducting synchronous interviews. Teleconferencing technology was used.

Data were collected through semistructured interviews using open-ended questions. I conducted the interviews via Zoom and recorded them. Each interview lasted approximately 1 hour, as planned.

**Data Analysis Plan**

For this phenomenological study, I conducted data analysis using an inductive coding method. Inductive qualitative analysis is appropriate when the researcher knows little about the research subject and is conducting exploratory research (Patton, 2015). Data analysis strategies include identifying codes, counting frequency of codes, and reducing codes to themes (Creswell, 2013; Miles et al., 2014). Data were analyzed using the Colaizzi (1978) method of data analysis in descriptive phenomenological research.

I transcribed, coded, and analyzed the interview data. The data collected from open-ended interviews were coded while keeping the central research question and subquestions in focus. Coding the transcripts reduced the data into meaningful segments and made it easier to see what themes emerged (Creswell, 2013). Miles et al. (2014) recommended applying descriptive coding techniques, which is the process of assigning a word or short phrase to text.

Colaizzi (1978) developed a seven-step data analysis process. Per Colaizzi’s process, I first read and re-read a transcripted interview and extracted significant statements that were relevant to the study. These statements were analyzed for meanings and themes (Colaizzi, 1978). This was the point in the data analysis process where I had planned to use a data analysis tool to help code the data. Because the interview transcripts produced a large amount of rich data to be analyzed, I used a data analysis tool. MAXQDA, a Computer Assisted Qualitative Data Analysis Software package, was used to code the data.

After the data were coded, I looked for patterns or themes that emerged. According to Miles et al. (2014), pattern coding is used to summarize the codes into themes, extract data that is relevant to the research questions, and find recurring themes. A description of the phenomenon’s essence was developed followed by the step of generating a description of the fundamental structure of the phenomenon (Colaizzi, 1978). Per Colaizzi's process, the findings were presented to each participant for feedback. This was completed by sending an email to each participant with a summary of key points from their interview.

Part of the data analysis plan was knowing how to treat discrepant data. Discrepant data are data that are outliers from the rest of the data that are supportive. According to Maxwell (2013), discrepant data should be as rigorously examined as supporting data and care should be taken to ignore the pressure to discount the data that does not fit. If discrepant data surfaces and cannot be coded into a theme, it was to be simply reported. It is important to identify discrepant data because this could present opportunities for further research. My plan for dealing with discrepant data included examining the data again to see if themes were missed during the original analysis. If the discrepant data seemed to persist and did not align with the majority findings, it would be simply reported and noted as suggestion for further research. No discrepant data were found in this study.

## Issues of Trustworthiness

Trustworthiness is important to qualitative research because the researcher is the major instrument of data collection and analysis (Patton, 2015). Credibility, transferability, dependability, and confirmability are four criteria for establishing trustworthiness (Lincoln & Guba, 1985). For this reason, it is important that the researcher is aware of threats to validity and strategies for establishing trustworthiness.

**Credibility**

Credibility is the correctness of a description, interpretation, or conclusion (Maxwell, 2013). According to Maxwell (2013), validity threats to a qualitative research design could be categorized into bias and reactivity. Research bias is the theories, beliefs, and perceptual lens the researcher brings into the study (Maxwell, 2013). Reactivity is the potential influence a researcher has on the study (Maxwell, 2013). According to Maxwell, although eliminating researcher bias and researcher influence is impossible, it is important for the researcher to describe how threats to validity will be handled in the study. Credibility of the researcher is developed when it is evident the researcher understands how their biases and influence affect the validity of their interpretations and conclusions (Maxwell, 2013). Strategies to establish credibility include triangulation, prolonged contact, member checks, saturation, and peer review (Maxwell, 2013; Patton, 2015).

I was the instrument for data collection in this study. Strategies were used to guard against research bias during data collection. This was handled by using open ended questions and having a panel of research experts review the interview questions to check for bias or leading questions. To avoid a conflict of interest or bias, I also avoided using participants who worked within the same online university as me. According to Patton (2015), the purpose of interviewing is to “enter into the other person’s perspective” and to “find out what is in and on someone else’s mind to gather their stories” (p. 426). This study was a phenomenological study. Phenomenology focuses on descriptions of experiences and seeks to retain the accuracy of these experiences (Moustakas, 1994).

Member checking was used to ensure accuracy of the participants' experiences (Patton, 2015). During each interview, I aimed to build a rapport with the participants to make them feel as comfortable as possible. After each question was answered, I summarized what I heard and gave the participant time to correct or expand on their answer.

Patton (2015) recommended that the researcher create their own transcriptions because it presents the researcher the opportunity to get immersed in the data. Verbatim transcriptions reduce the chance of inaccurate interpretations of the data (Patton, 2015). To preserve the accuracy of the participants descriptions of their experiences, I played back the recordings and reviewed the verbatim transcriptions from the recorded interviews. A summary of key points from each transcript was shared with each participant as a form of member checking. Member checking also involves following up with the interviewees to provide opportunity to deepen responses and to review findings and interpretations (Patton, 2015).

Validity of a qualitative study could be influenced by the researcher's participation (Patton, 2015). The researcher needs to avoid influencing the site (Maxwell, 2013; Miles et al., 2014). According to Maxwell (2013), participants are always influenced by the interviewer. To help mitigate influence, care was taken to not lead a participant's responses to align with my views of the experiences of developing active learning activities for an online IT course. Maxwell (2013) also stated that the researcher's reaction to participant response could influence interview data. Kvale and Brinkmann (as cited in Creswell, 2013) described the unequal power dynamic between the interviewer and the interviewee which is inherent during an interview. To further mitigate potential influence, I used open-ended questions and gave the participant plenty of time to respond. This prolonged contact was an opportunity to let the participant respond freely.

I did not have face-to-face access to participants and I anticipated that some participants would prefer to not to use video conferencing. For this reason, I had to be mindful of how the loss of nonverbal cues and participant observation are challenges for online interviews (Patton, 2015). Because I used a web conferencing tool to conduct the interviews, establishing a rapport with the participant may have been more challenging due to the apparent distance. In a face-to-face interview, the proximity between the participant and the researcher has advantages. According to Patton (2015), “every interview is also an observation” (p. 428). Because there is value in being able to observe nonverbal gestures such as head nodding, facial expressions, and body language, I had initially planned to use the video conferencing feature of Zoom. With video conference tools, the researcher and participant can see each other despite physical distance. After further consideration and the realization that not all participants would be agreeable to using the video, only the audio feature of the conferencing tool was used.

Researcher bias could also be a threat to the validity of the analysis of the data (Maxwell, 2013; Patton, 2015). According to Patton (2015), “analysts have an obligation to monitor and report their own analytical procedures and processes as fully and truthfully as possible” (p. 531). In phenomenology, the researcher has a vested interest in the phenomenon and their perceptions are the primary evidence (Moustakas, 1994). Peer review of my data analysis was conducted to ensure my own perceptions, experiences in the phenomena, and judgements did not influence the data analysis.

**Transferability**

Transferability was discussed in my research findings to identify potential situations, contexts, and populations where the findings could be transferable. Gerber et al. (2016) cautioned that transferability may be difficult to establish in online learning spaces because demographic data, interests, and practices may vary widely from one learning space to another. Describing the boundaries and purpose of the study could help establish the degree of similarity in which the findings could be transferred (Gerber et al., 2016; Patton, 2015). Thick descriptions of the interviews help other researchers make conclusions on how the study could be transferred to other situations and scenarios (Patton, 2015). The discussion of transferability was used to inform my section on suggestions for future research.

**Dependability**

Dependability ensures the study was conducted using a carefully documented approach and an accurate and unbiased analysis of the findings (Patton, 2015). The research process must be logical and documented without distorting results (Lincoln & Guba, 1985). The approach for collecting data was well documented by providing the interview questions. The study was documented with enough detail so that the study is repeatable. I ensured that I collected the data accurately. The interviews were recorded and transcribed. I emailed a summary of key points from the transcripts to the participants to provide them with an opportunity to review for accuracy and feedback. In the design of the study, I have presented a clear description of the methods I used to collect the data and the interview questions. My goal was to be transparent with the research procedures used to collect and analyze the data. Audit trails were used to further establish dependability through transparency. Audit trail information includes the raw data, process descriptions, notes from data analysis, and reflexive notes (Lincoln & Guba, 1985). To ensure the study could be replicated, the interview questions, my notes during each interview, the transcripts, notes from data analysis summaries, and the interview protocol have been archived. I also kept a reflexive journal to note my reactions and potential biases as I conducted the interviews and analyzed the data.

## Confirmability

Following the guidelines presented by Patton (2015) to enhance trustworthiness through confirmability, measures were taken to address potential research bias. Phenomenological research requires bracketing and internal reflection to set aside personal assumptions and biases (Patton, 2015). Moustakas (1994) referred to this as epoche' and described the process as when "the everyday understandings, judgments, and knowings are set aside, and the phenomena are revisiting, visually, naively, in a wide-open sense, from the vantage point of a pure or transcendental ego" (p. 33). I practiced reflexivity as I conducted the interviews and analyzed the data. I considered how my background might influence data analysis and interpretation of results. To be openly transparent to the readers of this study, I have experience with developing online IT courses that included hands-on learning. I refrained from sharing my positive and negative lived experiences during the interviews.

## Ethical Procedures

The trustworthiness of qualitative research depends on how researchers follow ethical procedures. I followed ethical procedures by submitting an application to the Institutional Review Board at Walden University after I defended my proposal and my committee approved it. Upon approval (11-30-20-0364351), I began recruiting the research participants and collecting data. Privacy during data collection was ensured by not providing the name of the participants in the data analysis and writeup within the study. The analysis and findings does not include the participant identities nor does it include any information related to the academic institution that employed the ID. The participants agreed to a consent form and measures were taken to ensure they did not feel coerced to participate. Participant recruitment was conducted using approaches that did not coerce participation. The consent form and information about the study were provided by electronic messaging to potential participants. The consent form detailed the purpose of the study and disclosed my name. This gave the participants the option to consider if they already knew me and if they were comfortable participating in the study. This form included a consent to record and transcribe the interviews. The interview data has been stored securely on my personal computer which requires authentication to login. The data will be stored at least 5 years. After 5 years, the data will be deleted from the computer.

## Summary

Chapter 3 included the research design, the role of the researcher, the methodology, ethical considerations, and issues with trustworthiness for this phenomenological study. A description of how the participants were recruited to participate in the study was provided. A discussion of how the interviews were conducted and how the interview questions were developed and tested was also provided. A description of the technology used to conduct the interviews with remote participants was discussed in this chapter. I also discussed how I analyzed the data by transcribing the interviews and then coding for themes and patterns. In Chapter 4, I will present an analysis of the data. I will present the findings of the study in Chapter 5.

# Chapter 4: Results

The purpose of this phenomenological study was to explore the lived experiences of IDs who designed an online IT course that included hands-on activities. With the study, I aimed to understand the unique experiences of these IDs including any challenges they faced or recommendations they had to improve the course design experience for including hands-on activities.

The central research question and subquestions of this study were:

What are the lived experiences of IDs who designed an online IT course that included hands-on activities?

Subquestion 1: What do IDs describe as challenges with including hands-on activities when designing an online IT course?

Subquestion 2: What do the IDs recommend to ensure successful inclusion of hands-on activities in an online IT course?

In Chapter 4, I present the results of this study. A description of the setting and demographics is provided. The chapter also includes a discussion of the data collection process, including information on the number of participants, location and duration of the interviews, how the data were recorded, variations in data collection from the plan presented in Chapter 3, and any unusual circumstances encountered. A description of how data were analyzed is also provided, including the process of moving from coded units to categories and themes. Specific codes, categories, and themes that emerged are described. I also discuss discrepant cases, evidence of trustworthiness, credibility, transferability, dependability, and confirmability. The results are presented by addressing the research question and subquestions. This chapter concludes with a summary.

## Setting

There were no personal or organizational conditions that influenced the participants or the results of this study. I recruited 11 participants for this study by searching for IDs on LinkedIn. No participants were recruited who worked for the university where I was employed at the time of the study. All 11 interviews were conducted using only the audio feature of Zoom, a web conferencing tool; video was not used during the interviews.

## Demographics

I recruited 11 participants who were IDs that met the following inclusion criteria: (a) have been an ID who developed an online course; (b) the course must have been an online IT course at the college or university level; (c) the ID must have been either full-time, part-time, or contracted for the college or university for which the course was developed; and (d) the course must have resulted in the inclusion of at least one hands-on activity where hands-on was defined by learning by doing. The IT courses could have be within any discipline of IT, including cybersecurity, network administration, database design, software development, or data analytics. Table 1 provides the number of online IT courses and types of courses for each ID.

**Table 1**

*Participant Course Development Experience*

| Participant ID | Approximate number of courses | Types of courses |
|---|---|---|
| ID1 | 100 | Foundational IT topics, software programming, computer hardware, IT networking. |
| ID2 | 7 | Computer science |
| ID3 | 235 | Software development, data management, data analytics, IT, security, IT networking, IT infrastructure |
| ID4 | 2 | Software development, Web 2.0 technology |
| ID5 | 30 | Data analytics, software development, robotics |
| ID6 | 20 | Network administration, cybersecurity, software analysis and development, digital investigations, information security, scripting and programming. |
| ID7 | 4 | Computer programming |
| ID8 | 100 | Software development, networking, security, data analytics, user experience design, user interface design. |
| ID9 | 12 | Cybersecurity, software architecture |
| ID10 | 125 | IT networking, Windows operating systems, computer forensics, data analytics, SQL, digital media, IT project management |
| ID11 | 20 | Foundational IT, artificial intelligence, cybersecurity, three-dimensional printing, computer science |

## Data Collection

I collected data from the 11 participants through semistructured interviews using an interview protocol with open-ended questions that I developed (see Appendix B). The interviews were conducted and audio recorded using the Zoom web conferencing application. Each interview lasted approximately 1 hour. There were no variations in the data collection plan presented in Chapter 3, and there were no unusual circumstances encountered in the data collection process.

## Data Analysis

I transcribed all interview data word for word using an automated transcription tool, Happy Scribe. Because the automated transcription software was only somewhat accurate, I listened to the recordings and corrected each transcript by hand as needed. I conducted data analysis using an inductive coding method, specifically Colaizzi's (1978) seven-step data analysis process. The first step of the process had me familiarize myself with the data. I first read and then re-read each interview transcript while listening to the audio recording. For each transcript, I then extracted significant statements that were relevant to this study. I then imported the significant statements into MAXQDA, a computer-assisted qualitative data analysis software package. Using MAXQDA, I formulated meanings from the significant statements by coding this data. Next, I organized the codes into categories and themes. The themes that emerged were organized by research question (see Tables 2, 3, and 4). Validation of the findings was conducted by emailing each participant a summary of their significant statements and having them acknowledge their accuracy. There were no discrepant cases that emerged.

Table 2 presents the codes and themes that emerged from the data in response to the interview questions that aligned with the central research question. This first set of questions was used to gather general experiences from the participants when they designed an online IT course that included hands-on activities. I looked into these codes for patterns or similarities. The themes of used a backward-design process and focused on authentic and relevant hands-on activities emerged.

**Table 2**

*Central Research Question and Categorization of Codes*

| Theme | Codes | Sample text |
|---|---|---|
| Used a backward-design process | Lack of comfort with backward design<br>SME role in in backward design<br>ID role in backward design<br>Alignment with competencies and skills<br>Influence on selection of activities | "You start with backwards-design. Here are all the skills. Here are all the things that the student should be able to do when they graduate." |
| Focused on authentic and relevant hands-on activities | Authentic activities<br>Realistic activities<br>Currently relevant to industry<br>Would be doing in the workplace<br>Required to be successful<br>Authentic to the real-world<br>Safe environment to practice<br>Guided labs for practice<br>Exploration activities<br>Instant Feedback during practice | "Where the student is actually doing the same sort of thing that they would be doing in the workplace."<br><br>"Give students an environment to practice where it is safe to fail in a safe space, to examine all possible outcomes, from experiential standpoint is invaluable." |

Table 3 presents the codes and the themes that emerged from the data in response to the interview questions that aligned with Subquestion 1. I used these interview questions to explore what the IDs described as challenges with including hands-on activities when designing an online IT course. The emergent themes related to challenges were challenges with SMEs, resistance from stakeholders, and challenges with the content used to support hands-on activities.

**Table 3**

*Subquestion 1 and Categorization of Codes*

| Theme | Codes | Sample text |
|---|---|---|
| Challenges with subject matter experts | SME Missed deadlines<br>SME Lack of role clarity<br>SME Collaboration problems | "Probably my the most the biggest challenge I face every day is working with subject matter experts." |
| Resistance from stakeholders | Resistance from SMEs<br>Do not want to give up ownership of content<br>Resistance from faculty<br>Resistance from other IDs<br>Resistance to active learning | "the subject matter expert was not a willing participant to get their course put online. They didn't necessarily want to give up their knowledge as much as they wanted to kind of control it." |
| Challenges with the content used to support hands-on activities | Technology challenges<br>Vendor challenges<br>Overly reliant on old ways and textbooks | "They build their course, not with what students need to learn in regard to learning objectives or their or their profession, they build a course around what a publisher is offering." |

Table 4 presents the codes and the themes that emerged from the data in response to the interview questions that aligned with the Subquestion 2. I used these interview questions to explore what IDs recommended to ensure successful inclusion of hands-on activities in an online IT course. The emergent themes were effective collaboration required, IDs provide a student perspective, and ID skills required to support a successful course design process.

**Table 4**

*Subquestion 2 and Categorization of Codes*

| Theme | Codes | Sample text |
|---|---|---|
| Effective collaboration required | Effective communication while collaborating<br>All in it together<br>Adaptive and flexible while collaborating | "So that their ability to be collaborative and communicate well themselves is important" |
| IDs provide a student perspective | Feels like to be in students' shoes<br>Students' point of view of activities<br>Empathize with students new to active learning | "If I don't understand, the student is not going to understand either" |
| ID Skills required to support a successful course design experience | Project management<br>Communication<br>Influence and negotiation<br>Problem solving | "Needs great written communication, great verbal communication, have to be a problem solver" |

## Evidence of Trustworthiness

This section includes the approaches used to ensure trustworthiness during data collection and analysis. I followed the four criteria of credibility, transferability, dependability, and confirmability for establishing trustworthiness, as suggested by Lincoln and Guba (1985).

### Credibility

The credibility strategies planned in Chapter 3 were used to avoid bias and reactivity. I conducted one in-depth interview with each of the 11 participants. To avoid a conflict of interest or bias, I avoided recruiting participants who worked within the same online university as me. To guard against research bias during data collection, I developed a semistructured interview protocol including the same open-ended interview questions for each participant. Experienced researchers reviewed the interview protocol to check for bias or leading questions before I began data collection.

To avoid reactivity, I conducted the interviews without using the video feature of Zoom. This was also done in an attempt to maintain a similar form of interview across participants because I anticipated that some participants might not be comfortable being on video. Because the interviews were conducted using the Zoom web conference application, I took time at the beginning of the interview to build rapport with the participant. I felt it was necessary to take this step because it may have been more challenging for a participant to feel comfortable during the interview due to the apparent distance of the Zoom interview. To help mitigate influence, care was taken to not lead a participant's responses to align with my views of the experiences of developing active learning activities for an online IT course. To further mitigate potential influence, I used open-ended questions and gave the participant ample time to respond. This prolonged contact was an opportunity for the participant respond freely.

Member checking was used to provide the interviewees with an opportunity to review my interpretations to ensure the accuracy of their experiences (see Patton, 2015). After each question was answered, I summarized what I heard and gave the participant time to correct my interpretation or expand on their answer. To improve efficiency, I first used an automated transcription tool, Happy Scribe, to provide an automatically generated transcript. I then listened to the interview repeatedly for accuracy and updated the automatically generated transcript by hand as necessary. The original plan for member checking was to provide each participant with a copy of the transcript for their review for accuracy. Per the Institutional Review Board's feedback though, it was determined this step was too burdensome for a participant and that the participant might not remember exactly what they said. Hence, the member checking step was revised to provide each participant with a summary of their significant statements from the interview for their review and follow up.

**Transferability**

The strategies planned in Chapter 3 were followed to enhance transferability. This was achieved by having clear boundaries for the study and the use of thick descriptions of the interviews. I provided the characteristics of each participant that were relevant to this study. To further assist researchers to decide if the results from this study are transferable to their context, the criteria for the participants were clearly stated:

- The participant must have been an ID who developed an online course.
- The course must have been an online IT course at the college or university level. Courses at the K-12 level do not qualify the participant for the study. Courses that were not offered online also did not qualify the participant for the study.
- The ID could be either full time, part-time, or contracted for the college or university for which the course was developed.
- The course must have resulted in the inclusion of at least one hands-on activity. Hands-on is defined as learning by doing that includes direct contact with real-world scenarios, laboratory exercises, simulations, problem-based learning, virtual labs, or immersive experiences. The online IT courses could

have covered topics including but not limited to networking, cybersecurity, database design, and programming.

The discussion of transferability was used to inform my section on suggestions for future research.

**Dependability**

To ensure dependability, the strategies planned in Chapter 3 were followed. I carefully documented the design of the study and documented the study steps with enough detail so it is repeatable. The approach for collecting data was well documented and the interview questions were provided in Appendix B of this study. To ensure the data were accurately collected, the interviews were recorded and transcribed. I presented an accurate and unbiased analysis of the findings. A summary of the significant statements for each transcript was emailed to each participant for member checking. Each participant was given an opportunity to review the summary for accuracy and to provide feedback. In the design of the study, I have presented a clear description of the methods I used to collect the data and the interview questions. My goal was to be transparent with regard to the research procedures used to collect and analyze the data. Audit trails were used to further establish dependability through transparency (Lincoln & Guba, 1985). To ensure the study could be replicated, the interview questions, my notes during each interview, the interview recordings, the interview transcripts, notes from data analysis summaries, and the interview protocol were archived. I also kept a reflexive journal to note my reactions and potential biases as I conducted the interviews and analyzed the data (Lincoln & Guba, 1985).

**Confirmability**

The strategies planned in Chapter 3 were based on guidelines presented by Patton (2015) to enhance trustworthiness through confirmability. I practiced reflexivity as I conducted the interviews and analyzed the data. I frequently reflected on how my background might be influencing the data analysis and interpretation of results. In an effort to be openly transparent to the readers of this study, I have experience with developing online IT courses that included hands-on learning. I refrained from sharing my positive and negative lived experiences during the interviews.

## Results

This next section includes the results of the study. Data were collected and analyzed in this study to answer the central research question and subquestions.

The central research question and subquestions of this study were:

What are the lived experiences of IDs who designed an online IT course that included hands-on activities?

Subquestion 1: What do IDs describe as challenges with including hands-on activities when designing an online IT course?

Subquestion 2: What do the IDs recommend to ensure successful inclusion of hands-on activities in an online IT course?

The interview questions were aligned to these questions. Some of the interview questions were used to gather background information on the participants' experience level with designing online IT courses that included hands-on activities. Knowing their background helped build rapport and gave each participant time to reflect back on their experiences.

## Findings by Research Question

When examining the lived experiences of IDs who designed an online IT course that included hands-on activities, there were 8 themes that emerged. Two themes related to the central research question were used a backward-design process and focused on authentic and relevant hands-on activities. The three themes related to Subquestion 1 were challenges related to the SMEs, resistance from stakeholders, and challenges with the content used to support the hands-on activities. For Subquestion 2, three themes that emerged related to recommendations for success were effective collaboration required, IDs represent the student perspective, and ID skills required for successful course design. A description of the themes per research question is provided in the next sections.

### Experiences of IDs Who Designed Online IT Courses With Hands-On Activities

The first set of interview questions aligned with the central research question: What are the lived experiences of IDs who designed an online IT course that included hands-on activities? These interview questions were used to gather general experiences from the participants when they designed an online IT course that included hands-on activities. Asking the participants to reflect at the start of the interview helped establish the context of their experiences. The first set of interview questions was also used to gather background on the types of hands-on activities included and considerations when determining what type of hands-on activities to include in an online IT course. Themes related to the central research question were used a backward-design process and focused on authentic and relevant hands-on activities.

### *Theme 1: Used a Backward-Design Process*

Participants interviewed were asked to reflect on and describe their experience when including hands-on activities in the design of an online IT course. In nearly every interview, participants referred to a process called backward-design to describe their experience. In describing backward design, participants stated they did not start with the hands-on activities. They first started with the outcomes, competencies, and skills, and then worked backward to select the hands-on activities. Participants ID1, ID2, ID3, ID4, ID8, and ID10 described what backward-design process is and their experience with using it to select hands-on activities for the course.

ID1 described backward-design process as:

> You start with backwards design. Here are all the skills. Here are all the things that the student should be able to do when they graduate. And then you step that back to which of those things are taught or should be taught in this particular course. And then how do you measure if the student has attained that skill or knowledge? And then what do you have in the class as far as content and activities that teach and or support that?

ID1 also described how they use SMEs during the backwards design process:

> I use a team of subject matter experts and instructors and I'll even start early with advisory boards. What are the skill-sets that you expect a graduate to have when

> they come to you and they've got a Bachelor of Science in IT and you're going to hire them? What are the skills that you're expected to have?

Participants ID4, ID8, and ID10 described how backward-design was used in the process to determine which hands-on activities to include. Their perspective underscores the considerations when designing hands-on activities that are well suited for the online course.

ID 4 said:

> You start always in backward design with what it is you want the student to be able to do. SMEs see the end product and they know what they want a new colleague to come in with. So, they have a good idea of the goal, which is great, because that's central to backwards design. But they have usually a less clear idea of how you get to that goal.

ID8 emphasized the importance of working backwards to identify appropriate hands-on activities. ID8 stated, “Being sure to throughout the process, challenge your assumptions about whether you're meeting the outcomes that you're hoping to achieve are actually being met by your hands-on activities that you're designing.”

### *Theme 2: Focused on Authentic and Relevant Hands-On Activities*

Participants were asked to describe the types of hands-on activities they included in the course and those considerations used when determining the type of hands-on activities to include in an online IT course. Nearly all participants described the need for the hands-on activities to be authentic and relevant to what the student would be doing in the workplace, and providing students with the opportunity to practice. For example, ID1 stated: “I get what I call authentic assessment, where the student is actually doing the same sort of thing that they would be doing in the workplace.”

ID4 had an experience where students were given assignments that they considered to not be authentic. This experience underscores the need for the hands-on activities to be authentic. ID4 shared, “The feedback I got from a lot of the students was that the assignments were stupid. Didn't feel that they were directly applicable to problems they felt they would run into.”

ID5 expanded on the perspectives of ID1 and ID2 in that the activities should be relevant and current to the real world. ID 5 said, “Faculty members really did a great job of incorporating real life scenarios. And part of the requirement is that the activities have to be highly relevant and we consider the currency of the supporting articles and materials.”

ID7, ID8, and ID10 emphasized the online hands-on activities should be position the student in an authentic context and prepare the student for the real world. ID7 said:

> So the hands on activities are based on an authentic context for whatever the requirement is for the mastery level. …defining what the student’s role is for the activity would make a student feel that they were in that context where they're applying their practical knowledge, learning real industry skills.

ID8, ID10, and ID11 discussed that the activities should help the student get a job in the field. ID10 stated:

> The overarching goal of what we're trying to do with these IT courses is to get a student a job. So in my experience, everything that I have ever designed related to

> IT courses with faculty and working with subject matter experts has always been to hit that goal at the end, which is to hopefully potentially get them employed.

Participants also emphasized that the types of hands-on activities they included should provide students with opportunities to practice real world skills. The benefit of online practice environments giving students a safe place to practice was mentioned by some of the participants. Some participants also mentioned that online practice environments could be designed with instant feedback.

ID1 and ID2 emphasized that practice provides students with a safe place to fail and try a variety of scenarios. ID1 stated:

> Some companies would produce simulations where a student could see the inside of a computer and you click on the network card and click on the place where you're supposed to install it as a safe practice. It is the ability to fail in a safe environment which also improves their competence. If you get it right every single time but then but you screw it up in a performance and you don't know what to do from there because you never got it wrong. Give students an environment to practice where it is safe to fail in a safe space, to examine all possible outcomes, from experiential standpoint is invaluable.

Some IDs mentioned that the practice activities were done on the student’s computer and in some cases the practice activities were done within a virtual or simulated environment. ID3, ID5, and ID6 shared perspectives that show the pros and cons for each approach. ID3 said, “We provided guided labs where we asked the student to practice a series of tasks in their own computer systems.”

ID5 described how students navigated to online hands-on activities from the course learning management system. This is an example of where students are provided an environment to practice. ID5 said, “We build a course that links out to different sites so students can practice in simulations or really be able to interact with some type of practice site for different types of IT disciplines.”

Consideration for the student’s computer and designing hands-on activities that do not put the student’s computer at risk was also mentioned. ID6 stated, “Give them experience where there is no risk to their computer because it's in a virtual environment; that's super rewarding. Having them download, install and configure even a simple integrated development environment is problematic.”

Participants ID3 and ID8 mentioned the benefit of students getting instant feedback and results from online practice activities. ID3 said:

> As far as the student experience, having a practice activity where they can write their own code, execute it first, and once they are confident on the results, submit it and get instant, automated feedback on whether they got the right or wrong is a very powerful learning tool.

**Challenges With Including Hands-On Activities**

Several themes emerged from the interview questions related to Subquestion 1: What do IDs describe as challenges with including hands-on activities when designing an online IT course? There were several contributing factors described by the participants that made including hands-on activities in an online IT course a challenging experience. Some of those challenges were related to the hands-on activity content and some challenges were related to the dynamics within the instructional design team. The SMEs were mentioned in nearly every interview as a source of challenges and a center point of frustration. Several participants also mentioned that they experienced resistance from key stakeholders during the process of designing the courses.

### *Theme 3: Challenges With SMEs*

Nearly all participants discussed challenges with the SMEs commissioned to help design the online IT course with active learning. There were challenges related to lack of the SME's collaboration skills, missed deadlines, and role clarity.

**Subtheme: Challenges During Collaboration.** ID5, ID8, and ID10 shared that collaborating with SMEs was a significant challenge. ID8 described how SMEs could deviate from the established instructional design process and how this challenged collaboration:

> We know about each part of the process that needs to get done. I was working with a couple of subject matter experts who insisted on kind of doing things their own way, even though we have established a process.

ID10 emphasized that collaborating with SMEs was the biggest challenge and purported that this would be a shared sentiment by all instructional designers:

> Probably my the most the biggest challenge I face every day is working with subject matter experts. And that is one thing that all designers will probably reiterate to you, that that is a challenge for everybody. We come from two different worlds. So it's hard to understand each other, but we do need to be flexible and adaptable.

ID2 and ID7 shared that their belief as to why collaborating with SMEs was challenging was due to poor communication skills on the SME's part. ID2 stated, "Subject matter experts, especially in the world [of IT], they don't have communication skills. And that's just the bottom line. A lot of IT people work alone. They work solo."

**Subtheme: SME Missing Deadlines.** Several participants discussed their challenging experiences with SMEs were related to missed deadlines and the impact it has on the IDs. ID7 described the challenges with trying to get the SMEs to provide their contributions on time:

> That's probably the biggest friction point, because people get busy in their own lives and their own work, things come up. As an ID, you really don't have control over that. And, you know, you're counting on this person. It can be difficult to navigate to make sure you can get over that hurdle and get the information that you need to move the course on the timeline that's expected. The most challenging thing is when they [SMEs] don't have enough time to spend with you or they didn't accomplish what they needed to accomplish.

ID9 emphasized that because the SME has the requisite expertise needed to design the course a SME could greatly impact the course design workflow. ID9 stated:

> Because of the way that is structured is that we don't own the content, we just own shaping it and distributing it. Depending on the rate that we get content from our SMEs greatly affects our workflow. We've had instances of getting content for very desired, very highly coveted products at the very last minute and having to really respond to it to a fire alarm whenever we were sitting with our hands open.

**Subtheme: Confusion with Role Clarity.** Role clarity was another factor that created challenges between the IDs and the SMEs. ID2 shared their perspective with challenges they face as part of the design process. SMEs are critical since they have the content knowledge. But SMEs do not always understand the role that the ID plays in the course design process and helping to include hands-on activity. ID2 described this challenge as:

> I think that the word instructional designer is the most subjective word, because can have so many different skill-and the organization is expecting different things from this skill set. You need to recognize the environment that you're in and the role that you're playing and the level of respect that the ID has in that environment. Doesn't mean that people respect you or even understand what you do.

ID2 also discussed the challenges with determining which role has the most authority:

> Who is king? There is no room for the ID’s own personal creativity, if the subject matter expert really is the king. Then you start thinking about your approach and how you're going to influence the approach so that they would implement your ideas. Some environments, the IDs can implement as many ideas as they want. You can try many things out.

ID3 discussed how role clarity could influence who and how hands-on activities are selected and how lack of role clarity could even negatively impact vendor relationships. ID3 stated, “And I think the stakeholder identification is necessary not only to build the activities, but as you evaluate potential vendors.”

ID4 shared how lack of role clarity created an environment where they felt that their role was reduced to that of a secretary:

> And if the administrators themselves don't have a clear vision of what IDs should do, because they're, you know, in academia, there's sometimes two kinds of IDs, they're the kind that help develop courses in alignment with curricular objectives and career objectives. And then there are troubleshooters whose job it is to go and help the poor faculty figure out their email. Those are two very different roles. I think often there's cognitive dissonance when an SME is thrown together with an ID and the SME thinks the ID is a secretary and there's not a meeting of minds as to the nature of the team and the nature of the work that needs to be done.

ID 6 discussed the challenge with gaining respect from the SME whom they are collaborating with and how valuable IDs are to the design projects:

> SMEs often times think that they don't need anyone else, they can write a course in whatever the topic is, they're experts in it. They can write a course. They've taught it forever. They can create it. But, you know, they're not instructional designers. And there is great value in having an instructional designer. I know that the courses where I have a dedicated ID on my team, they're better products in the end. And it's hard to convince a SME of that. But these [IDs] are really the unsung heroes in our courses. We can create great courses from a content

> perspective, but making sure that it's instructionally sound, often takes someone that has that specific mindset.

ID7 also shared challenges centered in role clarity and how it is necessary to define the division of labor between the ID and the SME:

> There are different roles who support each other. So just that human interaction of two people who are working on a project. So as in terms of being an ID, that's one of the key challenges is clarity of the role. I think one of the misconceptions is that the instructional designer is somehow doing all the work, but we can't do our work without the SMEs work. We can’t just make the course out of thin air and just write everything.

ID8 described their experiences with how the SME role could differ from institution to institution and that IDs should be mindful of this challenge. ID8 shared:

> One challenge we often face here is getting subject matter experts because we often have subject matter experts do a lot of what instructional designers traditionally do in other institutions. We will often have some subject matter experts be the ones actually writing a lot of the content that goes into a lesson, for example.

ID11 explained the challenges could happen if role clarity is not outlined for the SME and ID early in a project. ID11 shared, “And if you don't do this on the kickoff call, then the SME is lost and confused and doesn't get what they're doing.”

### *Theme 4: Resistance From Stakeholders*

Five participants mentioned that they were concerned about stakeholder resistance to creating an online IT course with hands-on activities. The stakeholders mentioned by the participants included other IDs and SMEs involved with the course design process as well as the instructors who would teach and students who would take the resulting online course. It is important to note that sometimes the instructor who teaches a course is the SME used in a course design process. ID1 felt resistance from instructors with using new approaches for giving students hands-on practice. ID1 stated, "So those negative experience [challenges] have always come from entrenched educators that think there's no other way to do something than the way they have done it."

ID3 and ID7 felt resistance from the instructors serving as the SME in the course design process and shared that they felt it was centered on ownership of the course content. They felt the resistance was because the instructor felt that putting their course online meant giving up ownership of their knowledge of the course content. ID7 collaborated with an instructor who was serving as the SME. ID7 shared, "the subject matter expert was not a willing participant to get their course put online. They didn't necessarily want to give up their knowledge as much as they wanted to kind of control it."

In some cases, the participants felt that some SMEs were actually resistant to the theory of active learning. This is a challenge that could be compounded when an instructor who is used as the SME in the course design process does not support the use of active learning in an online course. ID10 described their experience:

> I would say the biggest challenge was the resistance of our faculty to move to a more active learning environment. These experts in the field just were not adaptable to active learning concepts at that time. The teaching ability of some of our SMEs may not be in line with what our instructional designers have maybe designed for active learning experience, and there's always a disconnect and that comes with some teaching moments. We want our SMEs to have the same adaptive and flexible background as well.

Even instructional designers could be resistant to active learning. ID10 discussed the reasons behind this:

> So, you know, there does need to be some patience with instructional designers because, again, the way that instructional design first were taught in an educational master's program is not exactly beneficial for IT related courses that require an active learning component, because most of the content that those designers are used to is, you know, the captivate the videos with the interactive quizzes. That's not active learning. That's just not going to cut it in IT related courses.

In addition to resistance from SMEs, instructors, and other IDs, the participants expressed concern that some students may be resistant to taking an online IT course that includes hands-on learning. Although students do not participate in the course design process, the participants expressed empathy for the students who would be taking the resulting online course. This awareness factored into the experience of some of the IDs. It was pointed out from ID10 that students may be resistant to hands-on activities in an online course because this type of learning may be new to them:

> So often when they enter a program that has active learning in it, they have not been taught to learn actively, to listen actively. So the experience for some can be difficult at first because they do not know how to become an active learning student. And they I think they're surprised by how much effort or how different it is compared to prior learning experiences that they've had. And that's true, too, for our nontraditional students, our older generation who are getting reskilled. They're older. This is might be their third career. They may not be very happy about learning a new skill.

***Theme 5: Challenges With the Content Used to Support the Hands-On Activities***

Content for the hands-on activities came up as a challenge with seven of the participants. In some cases, the challenge was with the technology used to produce the learner's experience in the hands-on activity. ID1 stated:

> They [stakeholders that own the curriculum] love technology for technology sake. A whole bunch of technology shoved in all of those classes that in many cases had nothing to do with the particular learning objectives they have. And it was more it was more of a budgetary thing.

Sometimes the challenge with the content has to do with the technology used to connect the hands-on activity with the learning management system to present the learner with the experience. ID2 described an experience with his type of challenge:

> So a lot of times those two things don't speak. So whatever they're doing at this other website, a lot of times does not automatically go into the learning management system. The instructor actually has to go to the publisher website to be able to find all the grades. The ID should make arrangements to have that content put into our learning management system so that it had a seamless look and feel, it's more unified, and more standardized.

Sometimes the hands-on activities were designed by the instructional designer and in some cases, the instructional designer was able to find a content vendor who provided the hands-on activity. Vendor provided content is not without its challenges as ID3 pointed out:

> Most platforms have been designed for the vendor to create these activities, but the user interfaces that serve the IDs are seen as secondary. They focus a lot on the student while the instructional designer is also a user. And the user experience of the instructional designer as a user lacks in almost every tool that I have observed in the market.

A content vendor may be willing to provide a customized hands-on activity. Although these opportunities could yield a hands-on activity that closely aligns with the instructional designers’ vision, challenges needed to be resolved as described by ID8:

> We went looking at external vendors. We explored building a custom solution. Which is what we ended up doing. They were able to put together a solution that was highly customized to exactly our specifications. The solution didn't really

> work very well to begin with, and so I continued participating even after launch with the vendor.

Planning for maintenance of the hands-on activities was mentioned as a challenge by ID9 and ID10. The instructional designer has to anticipate that the content may need to be updated in the future, as mentioned by ID9:

> Sometimes they'll sneak in updates and not tell you about them. And then something will start to work differently than it had before. I find myself in more positions to be reactive, we do exhaustively test our courses operationally. We test every browser, every device. We have drafted recommendations for the best browser to use for certain products, but they're still those things that are going to pop up that you didn't plan for.

There is also the challenge that links to online resources that are used to support hands-on activities may move or disappear. ID7 discussed the challenge with persistent links to content:

> And when you're producing a course, you've got to have links that are going to be persistent. And sometimes you feel very limited because you could have a very good resource, but you really can't guarantee it is going to be persistent and you're making courses that are going to be around for 3 to 5 years.

Another challenge with content is when the course design team decides to rely too heavily on a textbook publisher for the hands-on activities. ID1and ID2 discussed that this presented a challenge because it does not necessarily provide students with hands-on activities that ensure students are learning what they need to learn. ID1 stated:

> They build their course, not with what students need to learn in regard to learning objectives or their or their profession, they build a course around what a publisher is offering. They write a course by getting the textbook and they open it up. OK, unit one, chapter one, unit two, chapter two, whatever exercises, whatever the publisher sends me as an extra simulation or whatever that I could say to my students, whatever comes on that CD or whatever, whatever extra like little things they can log into.

## Recommendations to Ensure Successful Inclusion of Hands-On Activities

Several themes emerged from the interview questions related to Subquestion 2: What do the IDs recommend to ensure successful inclusion of hands-on activities in an online IT course? There were several themes that emerged related to recommendations shared by the participants based on their experiences that resulted in successful inclusion of hands-on activities. In nearly every interview, participants shared that effective collaboration was required. Most IDs shared that the IDs' ability to understand the students' perspective contributed to successful inclusion of hands-on activities. Another theme that emerged was related to skills the participants felt that IDs should be proficient in to ensure successful inclusion of hands-on activities.

### *Theme 6: Effective Collaboration Required*

Nearly all IDs shared that effective collaboration with course design team members was instrumental to a successful experience. ID1 and ID2 discussed how role clarity could improve collaboration. Participant ID2 shared similar sentiments related to role clarity in support of collaboration. Participant ID2 said:

> It feels like the SME thinks the content can go into a blender and out comes the course. The stakeholders in charge need to realize the amount of effort it takes to build a course. more problem solving and collaborating in a team of people I think that the word instructional designer is the most subjective word, because can have so many different skill-sets and the organization is expecting different things from this skill set. Comes down to a group of people that are working together.

ID3 and ID4 stressed the need for the ID to be proficient in collaboration. ID3 stated:

> I don't believe there's an instructional designer out there that can work alone and create a high-quality course, especially since we are called to work on courses for which seldom we are the subject matter experts. So that their ability to be collaborative and communicate well themselves is important.

ID5 also emphasized the importance of collaboration in the success of designing online IT courses that included hands-on activities. ID5 went a step further and expressed their enjoyment of collaborating with others:

> I love collaboration, too, so I love to be creative and I love to bring in other people and who can share ideas. And I think collectively you can make a better product than any one person by themselves. I would say to another instructional designer to keep the big picture in mind, know that is a collaborative experience and it's a project that has several types of requirements, you have to get it done. I love to brainstorm and work through different possibilities with others, other

people in the instructional design space, whenever I get the chance, it's very, very enjoyable to me.

ID7 shared that successful collaboration depends on stakeholder contributions and a shared sense of accountability for success of the project:

> But in a situation where everybody is on board with creating a fully online course, and there are different roles who support each other as long as the instructional designer knows that whoever they can ask for help and guidance and how do we do this? What needs to happen here? And everybody who answers is kind of like and let's put it this way, an equal in terms of providing that kind of support and information is extremely comforting. We all want to get it done. We are all on the same timeline. We're all in this together. So to me, that's a very positive environment to work in. They can be at all different levels in the organization and yet they're totally willing to help. In other words, there aren't any walls put up to prevent you from accomplishing something. No barriers to getting the work done. They want you to be successful. It's positive because the work atmosphere is such that everybody feels like we're all in this together, we're all on the same team. And if you need help, we're going to find it. We're going to get it. A supportive environment is highly collaborative, but there's also that shared sense of ownership and getting the product done.

ID7 further explained recommendations for the dynamics during the collaboration process. ID7 recommended:

> Just if you have multiple IDs, for example, just in terms of division of labor and maybe point person who's communicating with the SME, primarily that kind of thing. And I think it does help to have a point person and maybe someone else who's doing most of the listening, And the other person can kind of be like kind of taking notes and kind of refining. And that way you're more effectively collecting that information So that kind of collaboration with IDs can be really effective.

Flexibility with consideration of alternative ideas was also reported as necessary to effective collaboration. ID2 and ID6 indicated that collaboration relied on respectful communication and a willingness to be open to alternative ideas. ID2 stated, “You can't get mad if they don't like your ideas. You can't get mad if they don't implement your ideas.”

Both ID7 and ID8 stressed that instructional designers needed to be able to pivot to account for new options that emerge during collaboration. ID7 stated:

> You have to be open, willing to pivot. If someone is coming into the role of feeling like they have the absolute perfect way to accomplish this, then it's probably going to be just their course and it's not going to be a big reflection of like something new. And I think that's important that it's a reflection of something that is kind of unexpected.

ID10 and ID11 emphasized the need for SMEs to be flexible. ID10 stated:

> We want our SMEs to have the same adaptive and flexible background as well. We need to be open to change and being flexible. Talk a little bit about being flexible and open to change, you know, in terms of not only just the process itself

> for developing a course or just improving the course, but what about those relationships with content experts and other stakeholders?

***Theme 7: IDs Provide a Student Perspective***

Nearly all participants explained the importance of student empathy to successful design of online IT courses that included hands-on activities. Participants explained that IDs are best positioned to understand the student's perspective since it is unlikely the ID would have knowledge in the content area covered by the course. ID2 explained, "If I don't understand, the student is not going to understand either."

ID7 shared similar experiences regarding student empathy and interpreting ideas presented by the SME:

> Your subject matter expert is it such a high level that they don't necessarily recall what it was like doing one of these types of task. when you're an instructional designer, you don't have the background. You don't know all the vernacular. You really don't know what the context is really like. And giving them what you think, even if it's a misunderstanding, helps to form what it really should be.

ID7 went further to state that the ID's perspective of the student helped ensure the hands-on activities were designed clearly. That because of the ID's perspective, the student would be able to follow the activity instructions and produced the expected results. ID7 stated:

> The SME should go through the motions of producing that project. Because they are just thinking, yes, that's a hands-on activity that's good. But if the SME

doesn’t actually do it and produce the project themselves in some form, then later on, they might find certain steps they might have forgotten about.

In order for a SME to understand how students would get to the point where they complete the actual hands-on activity, the SME also needed to think about what those formative activities or those little milestones were that the students would have to complete. Student empathy could help IDs get the cognitive load appropriate for the students. Moreover, as reported by some of the participants, students might not know what active learning is and that active learning might be new to them.

ID10 expressed the recommendation to empathize with a student that may be new to active learning:

> They're older. This is might be their third career. They may not be very happy about learning a new skill, but because they were laid off, they receive key funding to be retooled. So many of them may not be in an optimal place when they come to us. And so we have to be cautious of that as well and educate folks on what active of learning is. We do need to be cautious and always put our students first. When we think of active learning, it's really, truly about them and their pathway and how this course is going to contribute to their next stage. Lots of empathy, lots of patience.

ID11 shared their projection of their students’ profile while trying to go to school during a pandemic. ID11’s empathy for students going to school in a pandemic helped them keep in mind the stresses in their students’ environment while designing hands-on activities.

> I'm brand new to working remotely, I'm trying to figure this out. So my job is really stressing me out. When I'm not working, I'm stressed out because I'm trying to essentially become a tutor for my kids. When I'm not doing that, I'm trying to make sure that everyone's healthy and safe. So on top of all of these things, I am then going back to school. Somebody only has hypothetically three hours to do schoolwork and the courses are designed to be self-paced. How am I going to be able to fit this into this student's schedule?

### *Theme 8: ID Skills Required to Support a Successful Course Design Experience*

Participants recommended specific skills that instructional designers needed to be proficient in in order to be successful with designing online IT courses that included hands-on activities. The skills mentioned were communication and project management skills.

**Subtheme: Communication Skills.** Several participants emphasized the need for IDs to have solid written and verbal communication skills.

ID2 stated:

> You really have to have great communication skills to be an instructional designer, to work with all different types of subject matter experts and personalities at all levels of the organization with all stakeholders. Needs great written communication, great verbal communication, have to be a problem solver. It's about the communication and how you can work with the subject matter experts to get the result that you're looking for.

ID2 stressed the need to be personable during all communications. That the ID was central to the collaboration that occurs to design courses.

> I think that you need to be personable. If you're not personable, you're probably going to end up in a job where you work solo or because you really have to have great communication skills to be an instructional designer, to work with all different types of subject matter experts and personalities at all levels of the organization with all stakeholders.

ID9 felt that a strategy for eliciting the best ideas from SMEs on the type of activities to include was to provide examples:

> I say that every designer should try to start the conversation earlier with their subject matter expert, don't wait until that fatigue settles in. I would suggest that instructional designers have a couple of demos on hand, short examples of things that they can do.

ID10 recommended establishing rapport and trust through their communication with SMEs early in the course design process. ID10 stated, “So, you know, forming trust within that first couple of weeks that you need somebody is just critical. I mentor the instructional designers to build that trust.”

ID2, ID8, and ID11 emphasized that IDs needed to be skilled with the ability to influence when communicating with SMEs.

ID11 stressed the importance of being skilled with influencing:

> So it is arguably one of the most number one things as far as for an instructional designer needs to do when working with a SME is the instructional designer

needs to be able to figure out how to influence, how to negotiate and how to persuade.

ID8 stated that influence can also help keep the SME focused and meet deadlines. ID8 stated "Reminding folks of deadlines, but being able to do so in a pleasant, cheerful way. Killing with kindness is always the way to go."

IDs have to be able to influence other stakeholders than just the SMEs. ID3 described the potential influence IDs could have on the content vendor market. ID3 stated, "ID could have some influence in the market, and ask the content vendor if they could change it this way. ID can provide free design advice to vendors and they'll take it most of the time."

From their experience, ID2, ID6, ID7, and ID11recommended that IDs be proficient with interviewing SMEs in a way that leads to clarity on the hands-on activities to include.

ID6 discussed using questions to elicit ideas and expertise from the subject matter experts. According to ID6's experiences, "The ID's best tool is to ask questions like why is this important? maybe we can cut this out or how would they replicate this in the workforce after they graduate?"

ID2 shared how they use their interview skills to elicit clear instructional content from the SME:

> So that's where you prompt them and that's where your communication skills come in and you say, you know what, I have no idea what that means, but I'm sure that the student wouldn't know what that means either. And it's a lot of

> prompting and it's a lot of communicating. It's a hard balance, to be able to not insult someone and then get the information that you need from them as well.

ID7 carried this perspective further on the importance of interviewing skills by describing how they use questions to help the SME see the student's perspective:

> So I think communication is really probably one of the most important things. And just asking those really pointed questions and being willing to sound kind of stupid and uninformed, because you're just kind of like, well, here's my interpretation. And I found that when you are authentic in your understanding that the SME is much more likely to kind of say, oh, OK, I need to explain this here's what you really need to know.

ID7 also shared that IDs needed to be skilled with effective interactions to get clarity on what the IDs are recommended for the hands-on activities. ID7 referred to this interview process as a dance:

> You're looking at what the SME is writing. So sometimes they're not necessarily the best writers. So you want to make sure that you interpret what they're saying in a way that can be understood by students. And that can be the tedious part, which is literally walking through each sentence and saying, is this what you meant? That's not what I meant. Well, you wrote it and you basically approved it. So those are those are misunderstandings. But that's just part of the kind of that dance between the instructional designer and the SME.

**Subtheme: Project Management Skills.** Project management skills were recommended by ID3, ID7, ID8 and ID10. ID3 stated, "Some project management skills are absolutely required from all. And that is a skill of managing stakeholders' expectations, really, that goes beyond the design itself."

ID7 described recommended strategies that IDs could take to keep a SME on track with producing the right deliverables and to ensure the SME met deadlines:

> Weekly notes from the meeting is helpful: Here's what we discussed, here's what we agreed upon, and here's what everyone's doing until the next meeting and here's when we're meeting. Most SMEs are so occupied with another full-time job and maybe another extra job on the side. They definitely need kind of a summary and direction and a list of tasks otherwise they're just not going to come up with it themselves. So project managing is, I think, a key role of an instructional designer.

ID8 specifically called out how effective project management was important to the success of creating courses that included hands-on activities:

> And so I think being able to project management is definitely a big skill that I think instructional designers need to foster in themselves and grow within themselves. So just being prepared that when you are in the lead instructional designer on a project, you very often have to herd cats and act as a project manager. And they may have other commitments, like full time jobs, most likely if it's an external subject matter expert or even internal. So being able to just anticipate that and be willing to be very persistent, constantly reminding, reminding folks of what needs to be done, reminding folks of deadlines, but being able to do so in a pleasant, cheerful, you know, way so that I think that killing

> with kindness is always the way to go. So since you're in a position where you have to be the one kind of watching the deadline and being the most knowledgeable of the tasks that need to be done in order for deadlines to be met. Yeah, I think that's a very important skill: project management.

ID10 had progressed to a point in their career where they mentor instructional designers and shared that they observed a gap with IDs' proficiency in project management. ID10 stated, "IDs, the professional development they need is they don't really have the project management or even the relationship building that this takes."

**Subtheme: Inclusion and Accessibility.** Additional skills mentioned were related to inclusion and accessibility. ID3 explained their experiences with applying their ID skills to ensure hands-on activities were designed to be inclusive:

> Very aware of diversity, equity and inclusion topics. I think the instructional designer has to believe in those values and they have to be the keepers and champions for those values. I wonder some designing courses why they might doing that is challenging for a woman or a person of color or like or somebody who like is less able than me.

ID10 shared, "We do have students with disabilities and students who have vision disorders or who are deaf. We have to design with this in mind."

## Discrepant Cases

I examined all data for discrepant cases. There were no discrepant cases encountered. All of the results appeared to relate to one of the themes that emerged, leaving no discrepant cases.

## Summary

The results from this study provided insight into the lived experiences of instructional designers who designed an online information technology course where the course included hands-on activities. The results provided an understanding of the unique experiences of IDs including any challenges they faced or recommendations for improvement to the course design experience for including hands-on activities. This chapter included a description of the setting and participants' demographics. The data collection process, the data analysis process, and evidence of trustworthiness were discussed. In this chapter, I presented thick descriptions of the interview data collected from participants in response to these research questions.

Interview questions that aligned with the central research question were used to ask participants to describe their experiences with designing an online information technology course that included hands-on activities. Participants often described their experiences by first explaining the backward-design process for course design. Participants described the types of hands-on activities they provided and the factors that influenced their choice of activities. Hands-on activities that were authentic and provided students with a safe place to practice were the themes that emerged from the participants' responses.

Interview questions that aligned with Subquestion 1 were used to ask participants to describe challenges they experienced with including hands-on activities when designing an online IT course. Themes that emerged as challenges were centered on SMEs, resistance, and the content used. Nearly all participants stated that they experienced challenges with the SMEs involved with designing the courses. These challenges included challenges with collaborating with SMEs, missed deadlines, and lack of role clarity. Stakeholder resistance was another challenge that emerged. IDs encountered SMEs who were resistant to the course design process. Some participants encountered instructors who did not want to put their content online. Participants also experienced challenges with the selection and delivery of the hands-on activity content.

Interview questions that aligned with Subquestion 2 were used to ask participants to describe recommendations to ensure successful inclusion of hands-on activities in an online information technology course. Measures to support effective collaboration emerged as a theme in participants' responses. Another theme that emerged was student empathy. Student empathy was articulated as a success factor in that IDs best represent the point of view of a student who would be engaged with the hands-on activities. Participants also identified skills required for IDs to be successful including project management and communication skills.

In Chapter 5, I will summarize key findings of the study, provide an analysis and interpretation of the findings, describe the limitations of the study. I will also describe recommendations for further research, implications for positive social change, and a conclusion.

# Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this phenomenological study was to explore the lived experiences of IDs who designed an online IT course that included hands-on activities. With this study, I aimed to understand the unique experiences of these IDs including any challenges they faced or recommendations they had to improve the course design experience for including hands-on activities. This study was conducted to address the gap in knowledge concerning the lived experiences of IDs who designed online IT courses that gave students hands-on practice.

I conducted one-on-one interviews with 11 IDs. The semistructured, open-ended interview questions were guided by the central research question and subquestions. The interviews presented an opportunity for each participant to recall their own experiences with designing online IT courses that included hands-on activities as well as the challenges they encountered and the recommendations they had for successful inclusion of hands-on activities when designing online IT courses.

Themes emerged from analysis of the data collected. The key findings of the study show that a backward-design process, where the ID and SMEs collaborate, was central to the experience of designing an online IT course that included hands-on activities. The participants were focused on selecting authentic, hands-on activities and including activities that provided students with an environment to practice the IT skills covered within the course. The participants relied on collaborating with these SMEs to provide the requisite content expertise to include relevant hands-on activities. The study findings also showed that this collaborative experience could come with challenges from the SME. Additional key findings showed that the IDs' recommendations for success with designing courses that included hands-on activities included ensuring role clarity for each course design team member and ensuring IDs had the requisite skills needed to perform their role.

In Chapter 5, I provide an in-depth discussion of these findings, the limitations of the study, further study recommendations, implications for positive social change, and a conclusion.

## Interpretation of the Findings

In this section, I share an interpretation of the results and how the findings confirm, disconfirm, or extend knowledge on the existing literature about including hands-on activities in online IT courses. The findings are compared to the peer-reviewed literature that I described in Chapter 2 and the theories embedded in the conceptual framework.

### Used a Backward-Design Process

For the central research question, I asked the participants to reflect on and share their general experiences with designing an online IT course with hands-on activities. The first key finding was most of the IDs indicated that the backward course design process was essential to determining what type of hands-on activities to include and that it was a team effort. Daugherty (2006) described backward course design as starting first with identifying what students should be able to do at the end of the course and then determining what activities should be included to develop students' proficiency. This concurs with the participants' description that the hands-on activities would be derived from the competencies, outcomes, and skills that a student must be able to perform as a result of the taking the online course.

Study participants collaborated with SMEs to design the course as a team. Outlaw and Rice (2015) described the content expertise provided by SMEs as essential to the course design process. This study's findings concur with observations made by Baldwin et al. (2018) in that course design teams used a backward-design process.

Although IDs and SMEs are critical to course design, the participants described that one challenge to the course design process is role clarity. In alignment with this study's findings, Trammell and LaForge (2017) found that there could be variations in understanding of whether the instructor or the ID was responsible for the design of the course. The findings concur with the literature in that course design models leverage a team that includes IDs and SMEs (Outlaw & Rice, 2015; Trammell & LaForge, 2017).

**Focused on Authentic and Relevant Hands-On Activities**

The second key finding related to the central research question was nearly all participants stressed that hands-on activities must be authentic and relevant to the real world. The participants also explained that the hands-on activities should provide students with an opportunity to practice the skills covered in the course. These findings align with theories on active learning and constructivism used as the conceptual framework of this study. Constructivist Dewey (1938) advocated learning by doing and the development of practical skills. When writing on active learning, Bonwell and Eison (1991) focused on hands-on activities and learning through doing. Chickering and Gamson (1987) stated that one of the best practices for learning is when students apply what they are learning in a relevant context. Mitchell et al. (2017) found that IT graduates needed practice with skills that were relevant to the workplace. The literature supports the IDs' focus on including hands-on activities that were authentic and relevant for the student.

Participants mentioned that students should be given a safe place to practice and make mistakes. This finding aligns with researchers who supported the use of simulations, technology interaction, and virtual labs (Bhute et al., 2021; Chickering & Ehrmann, 1996; Chisholm, 2015; Jagannathan & Blair, 2015; Mitchell et al., 2017; Zhang & Li, 2019). Bhute et al. (2021) found that virtual labs were effective for hands-on assignments, while Jagannathan and Blair (2015) and Zhang and Li (2019) reached a similar conclusion in their research on the value of virtual labs. Chickering and Ehrmann (1996) were proponents of simulations as a safe environment to provide learners with a place to practice. Simulations and virtual labs were used by the participants to give students hands-on practice with applying real-world IT skills. The participants described that these environments removed the burden on students to configure the technology required for the hands-on activities.

## Challenges With Including Hands-On Activities

Subquestion 1 focused on the challenges IDs encountered with including hands-on activities when designing an online IT course. Most participants reported having negative experiences with working with SMEs. As part of a course design team, IDs may have to collaborate with, lead, and manage SMEs (Arnold et al., 2018) because subject matter expertise is required to design and develop a course (Mutlu, 2016).

An analysis of the results found that the experiences of all IDs were characterized by challenges with collaborating with the SME. Outlaw and Rice (2015) stressed the importance of an effective SME and ID partnership when developing an online course. SMEs provide the content expertise and the IDs develop quality courses using learning theories (Outlaw & Rice, 2015). IDs do not have the necessary background in the content to design the hands-on activities on their own. The collaboration with one or more SMEs is needed but comes with challenges. Challenges with SMEs were reported as being a significant disrupter to the successful and timely design of a course. Participants reported that SMEs missed deadlines, and this would significantly impact the workflow of the course design process. Challenges with role clarity was also reported to have an impact on the collaboration between the IDs and the SMEs. The participants shared that they felt a lack of respect from SMEs and that this was likely attributed to a lack of role clarity and that SMEs viewed an ID as a secretary or just another administrator. Although Stevens (2013) found that respect for each team member is essential to the success of online course design, the findings in this study reveal this respect between team members is not always the case.

Another challenge IDs described was that they experienced resistance from SMEs, including faculty who served as the SME, in the course design process as well as from faculty and students who would teach or take the resulting online course. Some participants shared that some of the resistance was centered on a lack of understanding of active learning. Instructors often provide the subject matter expertise needed during the course design process (Trammell & LaForge, 2017). Chi et al. (2018) found that instructors may not understand what active learning is. Nguyen et al. (2017) found that a barrier to the inclusion of hands-on activities was instructor belief that the activities would negatively impact instructor and course evaluation. The findings of Chi et al. and Nguyen aligned with the findings of the current study in that some instructors were resistant to putting their course online. The findings of the current study also showed that students may be resistant to courses that included hands-on activities. The findings of this study concurred with those of Finelli, DeMonbron et al. (2014) in that student resistance is a barrier to active learning. The participants of this study shared that they felt some students may not be used to or ready for this type of learning.

The findings of this study also revealed IDs’ experiences related to challenges with the technology that was required for providing students with online hands-on activities. This finding aligns with Van Hunnik’s (2015) literature review that indicated that technology difficulties were a challenge to incorporating online hands-on activities. Finelli, Daly, et al. (2014) found that a barrier to instructor adoption of active learning is the concern that students would run into technical challenges. Instructors’ time constraints to support shifts in course norms is another barrier to adoption of new instructional strategies (Shadle et al., 2017). Instructors could resist the use of hands-on activities if they do not feel that they have the time or knowledge to assist students through any technology challenges. Challenges with integrating the hands-on activities with the learning management system were also reported by the participants.

The findings also showed that SMEs, faculty, and IDs could be stuck in old ways of designing courses and be overly reliant on traditional textbooks. This result aligns with

Shadle et al.'s (2017) findings that faculty may resist shifts from teaching norms. The participants in the current study reported experiencing resistance from instructors to shift away from following a textbook curriculum to using a backwards course design process to include hands-on activities.

**Recommendations for Including Hands-On Activities**

Subquestion 2 focused on IDs' recommendations for successfully including hands-on activities when designing an online IT course. The first key finding was effective collaboration was required. An analysis of the results showed the experiences of the participants who contributed to successfully including hands-on activities in an online IT course involved using strategies that made the collaboration process more efficient. Stevens (2013) stressed that effective communication had a positive effect on the collaboration between the IDs and SMEs during course design. Participants shared that they were more likely to experience success with designing online IT courses when there was effective collaboration and a shared sense of accountability among course design team members.

The findings also provided insight into what skills an ID should have to maximize their effectiveness during the course design process. Participants mentioned that IDs have to be competent with skills related to project management and communication. Participants experienced challenges with SMEs missing deadlines and shared that it is essential that IDs are able manage the SMEs. The findings of the current study aligned with Arnold et al.'s (2018) view of course design and that it is a team approach where IDs have to be competent with collaboration, leadership, and the management of others.

Participants reported that it was IDs who provide the student perspective during the course design process. Participants felt that because IDs are not familiar with the content taught in the IT course, they can represent a student who also does not yet have the content knowledge taught in the course. Student empathy was also mentioned as a perspective that IDs provide. Because the hands-on activities are being developed for students, participants stated that this perspective is important when designing activities that meet students where they are with their current knowledge and skills.

## Limitations of the Study

In this study, I explored the lived experiences of IDs who have designed an online IT course that included hands-on activities. In addition to the limitations presented in Chapter 1, this research was limited by a few other factors. The experience level of the IDs varied. Of the 11 participants, four had designed less than 20 online IT courses. A larger sample of participants with more experience may generate different results.

In this study, I sought out IDs who designed online IT courses at the college or university level within the United States. IDs who designed courses in other countries were excluded. Therefore, the study results cannot be generalized to IDs outside of the United States, IDs designing hands-on activities for courses that are not IT related, or IDs who are designing online IT courses at the K–12 level.

Due to my 15 years in online higher education and my large number of LinkedIn connections, I had no issues with recruiting participants. I guaranteed confidentiality for the participants through the consent form and ensured none of the participants worked at my current place of employment. For these reasons, I felt that I was able to establish trust with the participants; however, there is always the possibility that the IDs recounted experiences that were not an exact recollection of the actual events. Because of my background in overseeing online curriculum within the STEM fields, I was aware of issues where I might be biased. I consciously designed the study to use audio only during the interviews to reduce the influence of my body language or facial expressions. I also worked to limit my bias through bracketing my own experiences with designing online courses.

## Recommendations

In terms of future research, any study that examines further the challenges between the IDs and the SMEs during course design would be encouraged. Some of the challenges with SMEs were related to missed deadlines and challenges with role clarity in the design process. The participants indicated that SMEs are essential because of their expertise in the discipline of IT. IDs may not have the requisite IT background to design online IT courses without SMEs. To this end, effective collaboration with and contributions by SMEs are necessary. Further research that dives deeper into these challenges or explores potential solutions would be encouraged.

A second recommendation would be to explore how to prepare future IDs for the experience of designing online IT courses that include hands-on activities. In this study, IDs were recruited based on their experiences with developing online IT courses. It is unknown how much formal training the IDs had with instructional design. With the potential rapid expansion of moving courses online in response to COVID-19, it is likely necessary to provide effective and rapid training of IDs to meet the demand.

A third recommendation would be a study that focuses on the challenges related to the technology used to support the hands-on activities. The study could be qualitative in nature. Either the IDs' perspectives or SMEs' perspectives could be explored.

A fourth recommendation would be a study that focuses on the challenges IDs faced when collaborating with SMEs during a pandemic. The data collected for this study occurred in the middle of the COVID-19 pandemic. COVID-19 was mentioned during several of the participant interviews but was unrelated to the research questions. A phenomenological study on IDs' experiences during the pandemic may contribute important findings to the instructional design discipline.

A final recommendation would be to complete the study again with online IT courses at the high school level. The findings could be compared with this study. Extending the study from college level to high school level could strengthen the findings of the study by reaching a larger population.

## Implications

This phenomenological study is unique because it filled a gap in understanding the lived experiences of IDs in the course design process of an IT course where the course included hands-on learning activities. Best practices and challenges with developing an online IT course where the course included hands-on activities was described in the experiences. By listening to the IDs and being open to their experiences, future IDs, educational institutions, and course design teams could together improve the future experience with designing these types of courses.

The data gathered from this study can promote positive social change. The experiences of the IDs who participated in this study could help inform future course design projects for online courses that cover IT topics. The experiences described detail the challenges encountered when an ID takes part in development of online IT courses. These detailed descriptions could provide those who are organizing similar course design projects insight into some of the challenges they may encounter and creative solutions to mitigate these challenges. Some IDs took a proactive strategy to mitigate issues with SMEs by initiating personable communication before the project started. The goal was to build rapport, respect, and trust early. To mitigate challenges with selection of hands-on content, some IDs leveraged expertise from their professional network and put in effort to stay current with vendor offerings of hands-on activities. The detailed descriptions of best practices could inform future IDs and help them be successful with future IT course design projects. The detailed experiences from the participants of this study could strengthen colleges' and universities' ability to provide hands-on learning activities for students who are learning IT skills in an online course.

Finally, this research study offers an opportunity for institutions that are new to putting courses online an opportunity to learn from past experiences of IDs. COVID-19 has expanded the necessity for students to attend college online. Underserved students may be unable to attend a traditional brick-and-mortar institution and online education could be their only option. It is reasonable to anticipate that some of these remote learners could be interested in or need to take online IT courses. Success with designing online IT courses that include hands-on experience could benefit these remote learners. The findings of this study could increase access to hands-on IT learning activities for underserved student populations who are completing their education online.

## Conclusion

The purpose of this phenomenological study was to explore the lived experiences of instructional designers who designed an online information technology course where the course included hands-on activities. I conducted the study to understand the unique experiences of these IDs including any challenges they faced or recommendations for improvement to the course design experience for including hands-on activities. The Bureau of Labor Statistics (2021) projected a continued strong job growth in the field of IT. The number of students in the United States who are enrolled in an online college-level course continues to grow (National Center for Education Statistics, 2020). It is essential that higher education institutions are able to effectively prepare students for the IT workforce. Students are more prepared for the workforce when they are provided with hands-on learning in their coursework (Podeschi, 2020; Wells et al., 2019). Research has found that it is essential to provide learning by doing opportunities for IT students (Mitchell et al., 2017; Moye et al., 2017). There was a gap in the previous literature that focused on the lived experiences of IDs who were tasked with designing an online IT course which included hands-on activities.

This study provided a phenomenological account of IDs experiences in the course design process of an IT course where the course included hands-on learning activities. Active learning theory and Dewey's (1938) work in constructivism were used as the conceptual framework to guide the study. Data collected from the interviews were analyzed for themes related to participants' general experiences with designing online IT courses with hands-on activities and themes regarding challenges and recommendations. Two main themes emerged from the participants' descriptions of their general experiences with designing an online IT course to include hands-on activities. The study revealed that IDs used a backward course design process to identify appropriate hands-on activities for the course. A second theme that emerged was that IDs were focused on hands-on activities that were authentic to the workplace and that provided students with a safe place to practice.

Several challenges emerged with including hands-on activities when designing an online IT course. Challenges with collaborating with SMEs were revealed as a commonly encountered challenge. Additional challenges that emerged were perceived resistance from students who would take the resulting course and resistance from instructors who would be teaching the course. If the students or instructors were resistant to courses that include hands-on learning, then this presented challenges for the IDs. Instructors may need to serve as the SME in the course design process. When the SME did not support the concept proposed for the course, the resistance had an impact on the IDs experience during the course design process. When the ID was concerned that the students who take the course might resist the hands-on activities, the ID kept this potential challenge in mind as they designed the course. Although student resistance was not revealed to impede the course design process, it was a challenge that required careful consideration for the design of the course. Challenges with the technology used to support delivery of the hands-on activities were also revealed. Further exploration into the challenges and barriers to course development, specifically with including active learning and hands-on activities are needed.

Several recommendations emerged from the participants' description of their experiences to ensure successful inclusion of hands-on activities in an online IT course. The participants identified that effective collaboration with the design team members was important to success. Essential ID skills was another theme that emerged regarding recommendations for success. The participants' experiences revealed that IDs must be skilled in project management, verbal and written communication, influencing, negotiation, and problem-solving. Another recommendation that emerged was to leverage the fact that the ID, due to the fact that they are likely to have limited IT experience, has a similar perspective as a student with respect to understanding how to complete a hands-on activity. This perspective was described as valuable in ensuring clarity of instructions for and the scaffolding of the hands-on activities for students.

This study provided a view into the IDs' experiences with designing an online IT course that includes hands-on activities. The results of this study provided best practices and challenges with developing an online IT course where the course included hands-on activities. The findings of this study could be valuable as online education continues to grow and with it, the continued growth of opportunities to design online IT courses with hands-on activities.

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# Appendix A: Participant Criteria Questionnaire

How many online Information Technology (IT) courses at the college or university level were you the instructional designer? __________

Did the design of these online IT courses result in the inclusion of hands-on activities? Hands-on is defined as learning by doing. Examples could be but are not limited to interacting with a simulation, completing a task in a virtual lab environment, designing or developing a computer system, troubleshooting a network environment, or working with cloud servers. If yes, please briefly identify the hands-on activity or activities.

_____________________________________________________

What topics did these courses cover in IT. For example, networking, cybersecurity, database design, programming?

_____________________________________________________

What were the names of the courses that you were the instructional designer for?

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

# Appendix B: Instructional Designer Interview Protocol

Study: The lived experiences of instructional designers (IDs) in the development of an online information technology (IT) course where the course included hands-on activities. The study seeks to understand the unique experiences of these IDs including any challenges they faced and best practices for including hands-on activities.

Process for the interview:
The interview will be recorded using the recording feature in the online meeting software. Interviewees will be given an alphanumerical code for data analysis and reporting. Participation is voluntary. Informed consent will be obtained prior to the interview. Interviewees can choose to end the interview at any time. In the event this occurs, the data collected will be destroyed.
Recorded interviews will be transcribed. The transcript will be provided to the participant for review. The participant has the opportunity to provide corrections.

Date:
Time of Interview:
Method:
Interviewee Alphanumerical Code:

Script:
My name is Cheryl Frederick and I am a doctoral student at Walden University. I appreciate your willingness to participate in my study. The purpose of this interview is to explore the experiences of instructional designers who designed an online information technology course where the course included hands-on learning activities. In order to protect your identity, please refrain from using your name at any point in this interview. I will be recording this interview in order to obtain a permanent record. Is it okay with you if I begin recording now?

1. Reflecting back on your experiences as an instructional designer who designed an online IT course that included hands-on activities, how would you describe your experience?

2. Describe the types of hands-on activities you included in the course.

3. What kind of considerations did you make when determining what type of hands-on activities to include in an online IT course?

4. How would you describe your experience when including these hands-on activities in the design of the course?

5. Describe any challenges you faced with including hands-on activities in the design of the online IT course(s). What do you think are challenges other IDs may face in attempting to include hands-on activities while designing an online IT course?

6. Given your previous experiences, what recommendations would you make to other IDs who want to include hands-on activities in an online IT course? How do you think they could make sure the inclusion of hands-on learning activities into the course is successful?

7. Were there any other positive experiences with including these hands-on activities?

8. Were there any other negative experiences with including these hands-on activities?

Concluding Statement:
Is there anything else that you would like to share with me before we finish this interview?

Thank you so much for taking the time to participate in my study. Your responses will remain confidential, and I appreciate your cooperation.

Appendix C: Connecting Research Questions with Interview Questions

| Research Question | Interview Questions |
|---|---|
| What is the lived experience of instructional designers in the course design process for developing an online information technology course where the course included hands-on activities? | Reflecting back on your experiences as an instructional designer who designed an online IT course that included hands-on activities, how would you describe your experience?<br>Describe the types of hands-on activities you included in the course.<br>What kind of considerations did you make when determining what type of hands-on activities to include in an online IT course?<br>How would you describe your experience when including these hands-on activities in the design of the course? |
| What do instructional designers describe as challenges with including hands-on activities when designing an online information technology course? | Describe any challenges you faced with including hands-on activities in the design of the online IT course(s).<br>What do you think are challenges IDs may face in attempting to include hands-on activities while designing an online IT course?<br>Were there any other negative experiences with including these hands-on activities? |
| What do instructional designers recommend to ensure successful inclusion hands-on activities in an online information technology course? | Given your previous experiences, what recommendations would you make to other IDs who want to include hands-on activities in an online IT course?<br>How do you think they could make sure the inclusion of hands-on activities into the course is successful?<br>Were there any other positive experiences with including these hands-on activities? |