

## **ABSTRACT**

BREWINGTON, FALLON MCIVER. Examination of Virtual Reality on Online Workforce Development. (Under the direction of Dr. Michelle Bartlett).

The purpose of this qualitative single case study was to better understand the perceptions of how virtual reality impacts quality and effectiveness in online workforce development. The study sought to explore the following research question: How does the incorporation of virtual reality affect the quality and effectiveness of an online workforce development program? This overarching research question was further developed in the following sub question: How do staff at a local non-profit perceive utilizing virtual reality as part of an online workforce development program impacts learner satisfaction?

Nine participants were provided the opportunity to participate in brief virtual reality training modules focused on the critical 21st century skill of public speaking. Participants received instruction as well as had the opportunity to practice public speaking as part of the modules. Then the participants were able to observe their recorded session and share their perspectives on their virtual reality training experience and the impact it had on their public speaking skills.

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Examination of Virtual Reality on Online Workforce Development

by  
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A dissertation submitted to the Graduate Faculty of  
North Carolina State University  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Education

Adult and Community College Education

Raleigh, North Carolina  
2021

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## DEDICATION

“<sup>2</sup>My brothers and sisters, you will face all kinds of trouble. When you do, think of it as pure joy. <sup>3</sup>Your faith will be tested. You know that when this happens it will produce in you the strength to continue. <sup>4</sup>And you must allow this strength to finish its work. Then you will be all you should be. You will have everything you need. <sup>5</sup>If any of you needs wisdom, you should ask God for it. He will give it to you. God gives freely to everyone and doesn’t find fault.” James 1:2-5 NIRV

First and foremost, this dissertation work is dedicated to God who has guided me every step of the way during this process. When I wasn’t sure how I could make it and finish this journey and when it seemed like my world around me was falling apart, I now realize, my faith was being tested and He provided me the strength I needed to finish this work! I have proven to myself, but most importantly my children, that we can do anything when we strive to be better humans and to live lives that are pleasing to him.

I also dedicate my dissertation work to my support system of family and friends who made sure I was good and able to focus when everything around me was crumbling. You took care of me and my children when I needed you the most and ensured I was able to see this to the end. It is also dedicated to my parents who instilled the importance of education in us and made sure we had more opportunities than they did. Daddy, I hope I am making you proud in heaven.

Finally, this work is also dedicated to my children who have sacrificed along with me during this journey. I hope when they are adults and have children of their own, they understand that I pushed so they and the generations that follow them have more opportunities than those before them. I know I’ve been absent, moodier, and always tired, but we are about to enjoy our best days!

## BIOGRAPHY

Fallon Brewington is the CEO of the Boys & Girls Club of the Sandhills. She has a vast background in public non-profit and higher education sectors expanding over 20 years. She is a Certified Professional in Talent Development (CPTD®) and an adjunct Business and Information Technologies Instructor at Richmond Community College. Before beginning her work with the Boys & Girls Club, she worked for Communities In Schools where she served as the Director of Network Relations and Training and Director of Talent Development for Communities In Schools of North Carolina, and Executive Director of Communities in Schools of Richmond County. Prior to transitioning to Communities In Schools she served as a business counselor/e-marketing specialist with the Small Business Technology Development Center at Fayetteville State University, as well as a Vice-President/City Executive for State Employee's Credit Union where she began her professional career as an intern while at North Carolina State University.

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Fallon is also a member of Raleigh Triangle Area Association of Talent Development, VR/AR Association, Golden Key International Honor Society, Kappa Delta Pi International Honor Society in Education, Phi Kappa Phi Honor Society, Texas Computer Education Association (TCEA), the Society for Human Resource Management, and the American Evaluation Association.

Fallon has a 17-year-old daughter Brianna who plans to attend North Carolina State University for biomedical engineering and 8-year-old son Jaiden who loves golf and video games, especially VR.

## ACKNOWLEDGMENTS

Little did I know that a chance meeting in the fall of 2017 at a training hosted by the Research Triangle Area Chapter of the Association for Talent Development would be the impetus to this doctoral journey. Dr. Michelle Bartlett, I'm truly thankful that my introverted self got up the courage to talk to you during lunch that day and share with you my future plans and goal to one day pursue my doctorate. When you handed me your business card, that was the Godly confirmation I needed to take the next step and to stop doubting myself. Even when I felt like I was not good enough, you took my call and convinced me otherwise on speakerphone with Dr. James Bartlett in the background. Now, here I am 4 years later as proof you were right. Thank you for believing in a total stranger that now looks to you as an invaluable advisor, mentor, coach, cheerleader, and what I hope will be a lifelong friendship now that we are here. Thank you for your countless hours of reviewing and encouraging me every step of the way. Dr. James Bartlett, thank you for your assist to Dr. Michelle Bartlett when I needed anything and also agreeing to serve on my committee. You two truly do make a great team!

I would also like to extend my deepest gratitude to my entire committee which also includes Dr. Diane Chapman, Dr. Carol Adams Warren, and Dr. Donna Petherbridge.

I am also grateful for my Executive Mentor Dr. Michael Elam, as well as all of the professors in our program who provided insight, practical advice, and experience in addition to the knowledge gained during the program.

Special thanks to my entire 2018 Charlotte Cohort. I could not have chosen a finer group of people to share this journey with and appreciate the camaraderie and support we all provided to each other during this process.

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## CHAPTER 1: INTRODUCTION

### Introduction to the Study

E-learning in the workplace has emerged for several reasons, but the most touted advantages are flexibility, cost-savings, and reduced time away from work to participate in training. “Feeling the pressure to continually train employees at minimal cost, e-learning has become a popular method in which organizations deliver training” (Nafukho et al., 2017, p. 328). These factors are critical in the overall desire and commitment to training employees. Research shows that to be effective, workplace training must be relevant and efficient. Further, workplace training must be comprised of proper motivation and satisfaction elements for its learners, both of which are elements sought to be addressed by online learning for professional development.

In examining the effects of virtual reality (VR) on online training and workforce development for staff at a non-profit organization, a qualitative method is most appropriate for this study. As the researcher, I am consequently positioned within the organization which allows for an in-depth view of the phenomenon being studied within the participants’ setting. The constructivist worldview is the philosophical assumption and framework within the qualitative method that I am deploying. As summarized by modern researchers:

Social constructivists believe that individuals seek understanding of the world in which they live and work. Individuals develop subjective meaning of their experiences—meanings directed toward certain objects or things. These meanings are varied and multiple, leading the researcher to look for the complexity of views rather than narrowing meanings into a few categories or ideas. The goal of the research is to rely as much as possible on the participants’ views of the situation being studied. (Creswell, 2018, p. 8)

As shown over the past year due to the COVID-19 pandemic, conventional ways of learning, especially workforce development and training, must be challenged yet again. This is similar to the paradigm shift that caused learning to transition from traditional face-to-face instructional methods to hybrid and eventually online learning. While this paradigm shift was needed and benefitted education and organizations in many ways, it needs to be said that this transition for a lot of organizations happened as a means to an end for the organizations as opposed to the needs of the learners.

Quality and effectiveness of online training and workforce development are typically the least considered factors by organizations as opposed to the obvious factors of cost savings related to time, travel, and other easily quantified measures. However, ultimately the process of attracting, hiring, training, and retaining employees is typically one of the most expensive costs to organizations. As such, ensuring that training not only meets the needs of each learner, but is also high quality and effective, will help ensure a ready, willing, and able workforce and will reduce the costs associated with the aforementioned process. Learner satisfaction derived from many components, such as motivation, are major factors that have been shown through research to affect the quality and effectiveness of online training.

“The skills of focus of online workforce development must be those that are considered critical 21<sup>st</sup> century skills of working, tools for working and living in the world” (Saavedra & Opfer, 2012, p. 8). Ensuring that online workforce development learning is aligned with these job competencies is a key component for quality and effectiveness (Cheng, 2012). As a result, online learning for professional development must be structured to best develop these skills for learners. Conventional online methods of training and development must be further developed to include effective methods for adult learners, such as the framework for this study of active

learning theory. In addition, all training needs to keep up with the pace of and incorporate emerging technologies which have the potential to have a greater impact on quality and effectiveness.

### **Background of the Problem**

The needs for today's workforce have changed and therefore workforce development must also change. "The need to equip today's college graduates and professional workforce to excel in a global economy has made online learning an attractive and lucrative approach in both postsecondary education and professional development settings" (Calhoun et al., 2017, p. 45). Online education is not only important to higher education degrees, but also private sector workforce development (Carruth & Carruth, 2013).

In a world that is driven by technological advances, it is to be expected that the effects are far reaching. Organizations are utilizing technology to educate and train today's workforce in a variety of capacities for similar reasons. Most often, technology is a supplement to traditional face-to-face, instructor-led training whether a blended or hybrid learning experience (Carruth & Carruth, 2013). According to the International Data Corporation, the following are advantages to the utilization of e-learning for workforce training and development: measurable ROI, real time learner-centered training, motivation and satisfaction, collaboration, real world scenarios, cost savings, and the ability to attract, train, and retain talent (Carruth & Carruth, 2013).

The literature demonstrates that effective workplace training is relevant and efficient, and comprised of proper motivation and satisfaction elements for its learners. Regardless of the delivery method, "Most researchers agree the failure to transfer training is most often influenced by the training design, learner characteristics, and work environment factors" (Nafukho et al., 2017, p. 328). "Technology, online education, and students continue to change" (Cook &

Sonnenberg, 2014, p. 171). The context of online learning is changing due to changes in students and the needs of employees which drives workforce development. Therefore, the skills developed must align with the skills identified as critical for the 21st century. “The Assessment and Teaching of 21st-Century Skills Consortium (AT21CS), organizes skills, knowledge, and attitudes into four categories: ways of thinking, ways of working, tools for working and living in the world” (Saavedra & Opfer, 2012, p. 8). Aligning online learning outcomes with job competencies and desired performance is vital for quality and effectiveness (Cheng et al., 2012). Online learning for professional development must be structured to best develop these skills for learners.

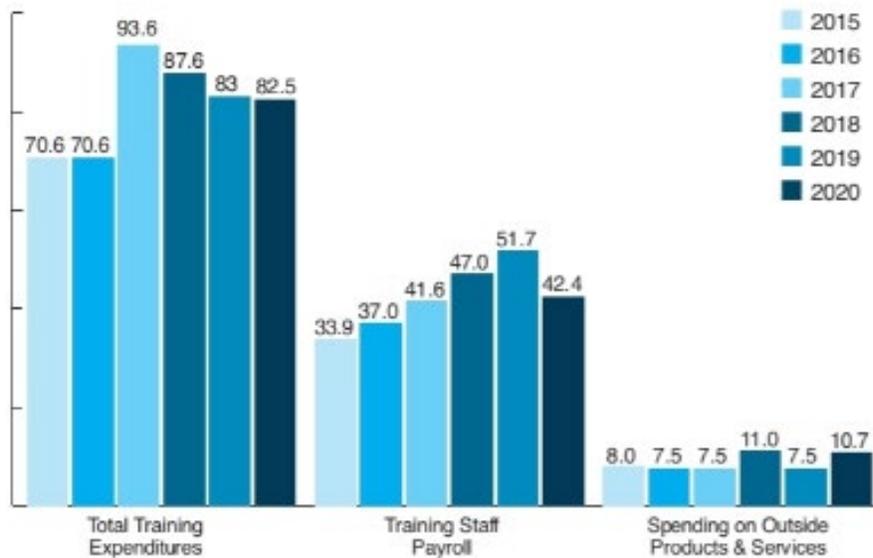
### **Statement of the Problem**

Online workforce development and training costs organizations significant dollars annually. Unfortunately, those dollars are essentially “thrown out of the window” when online workforce development is deemed ineffective. According to the 2020 Training Industry Report, “the highest priorities for training in terms of allocating resources in 2020 are: increasing the effectiveness of training programs” (Training, 2020, p. 29). Organizations cannot afford to continue funding ineffective training programs, especially considering the increasing challenge of attracting, hiring, retaining, and training a high skilled workforce. A snapshot of training expenditures of U.S. companies and education entities from 2017 to 2020 can be seen in Figure 1 from the report.

Figure 1 shows that training expenditures dramatically increased in 2017 with an increase from \$70.6 billion to \$93.6 billion. Since then, training expenditures have slightly decreased year over year. It also shows that interestingly enough, actual training staff payroll continually increased each year with the expected decrease in 2020 due to COVID-19 (Training, 2020).

**Figure 1**

*Training Expenditures 2015-2020 in \$ Billions*



## DEFINITIONS

- ▶ **Total training spending:** All training-related expenditures for the year, including training budgets, technology spending, and staff salaries.
- ▶ **Training staff payroll:** The annual payroll for all staff personnel assigned to the training function.
- ▶ **Outside products and services:** Annual spending on external vendors and consultants, including all products, services, technologies, off-the-shelf and custom content, and consulting services.

*Note.* Adapted from *2020 Training Industry Report* by Training, 2020 (<https://pubs.royle.com/publication/?m=20617&i=678873&p=24>).

Furthermore, the amount spent on training related to budget also offers different insights. As shown in Figure 2, there are significant differences of the average spending based on the organization and industry.

**Figure 2***Average of Training Expenses in Relation to Total Budget*

Organization Type	Large	Midsize	Small	Average
Education	\$2,234,000	\$386,250	\$16,500	\$1,158,909
Government/Military	\$4,242,857	\$594,873	\$1,118,533	\$1,621,318
Manufacturer/Distributor	\$7,257,055	\$731,857	\$328,733	\$2,431,209
Nonprofit	\$7,000,000	\$636,659	\$237,000	\$834,538
Association	N/A	\$850,000	\$1,500,000	\$1,066,667
Retail/Wholesale	\$30,500,000	\$553,000	\$450,000	\$13,839,889
Services	\$34,932,031	\$1,030,700	\$437,971	\$10,488,822
<b>Avg. Across Sizes</b>	\$21,988,775	\$808,355	\$506,819	\$6,426,931

*Note.* Adapted from *2020 Training Industry Report* by Training, 2020 (<https://pubs.royle.com/publication/?m=20617&i=678873&p=24>).

Figure 2 shows that as expected, non-profit organizations spend significantly less on average than others. No matter the type of organization, online learning has become an integral part of adult learning and is one of the fastest growing uses of technology for education (Carruth & Carruth, 2012). Many factors are noted in the research to support this notion, with most referencing the financial aspect. Online learning allows for more students and employees to be trained regardless of location. This results in significant cost savings in relation to time and money for organizations. Online learning provides professional development training with the advantages of providing training anytime and anyplace without the expense of instructors, travel, training facilities, and significant time away from work. Online professional development also offers the advantage of flexibility (Jafari Navimipour & Zareie, 2015). This is evident in the demographics of online students who are typically 25 years of age or older, employed full-time, and support families ranging from children, spouses, and elderly parents (Calhoun et al., 2017). This has been examined globally and in fact, the U.S. is the biggest user of online learning and has been doing it the longest (Calhoun et al., 2017).

The aforementioned factors used to justify implementation of online learning in higher

education and corporate training results in a technology-centered approach designed to produce the desired outcomes for an organization. However, to ensure students are gaining 21st century skills, online learning should utilize a learner-focused approach. “The future success of individuals, as well as the country as a whole, will, in large part, be determined by the success of online learning and how using technology translates into meeting the needs of businesses for an adequately trained and educated workforce” (Carruth & Carruth, 2012, p. 717). As such, the focus of the design of online learning programs must drastically change to primarily meet the needs of the workforce with other desired outcomes becoming secondary.

The factors used to justify implementation of online learning in higher education and corporate training results in a technology-centered approach as opposed to the more effective learner-focused approach. If organizations do not incorporate immersive technologies, such as VR, in online workforce development programs, they will fail to meet the necessary outcome of producing a 21st century competent and job-ready workforce.

### **Purpose of Study**

The purpose of this qualitative study was to better understand the perceptions of how VR impacts quality and effectiveness in online workforce development. Specifically, this study sought to examine learner satisfaction with the quality and effectiveness of an online workforce development program when VR was incorporated. Jafari Navimipour & Zareie (2015) stated, “satisfaction is the most important factor in the success of system implementation, and it is influenced by factors attributed to the student, teacher, course design, technology, system design, and environment” (p. 476). Research suggests there are positive correlations between experiential learning, learning satisfaction, and career competency development (Jafari Navimipour & Zareie, 2015).

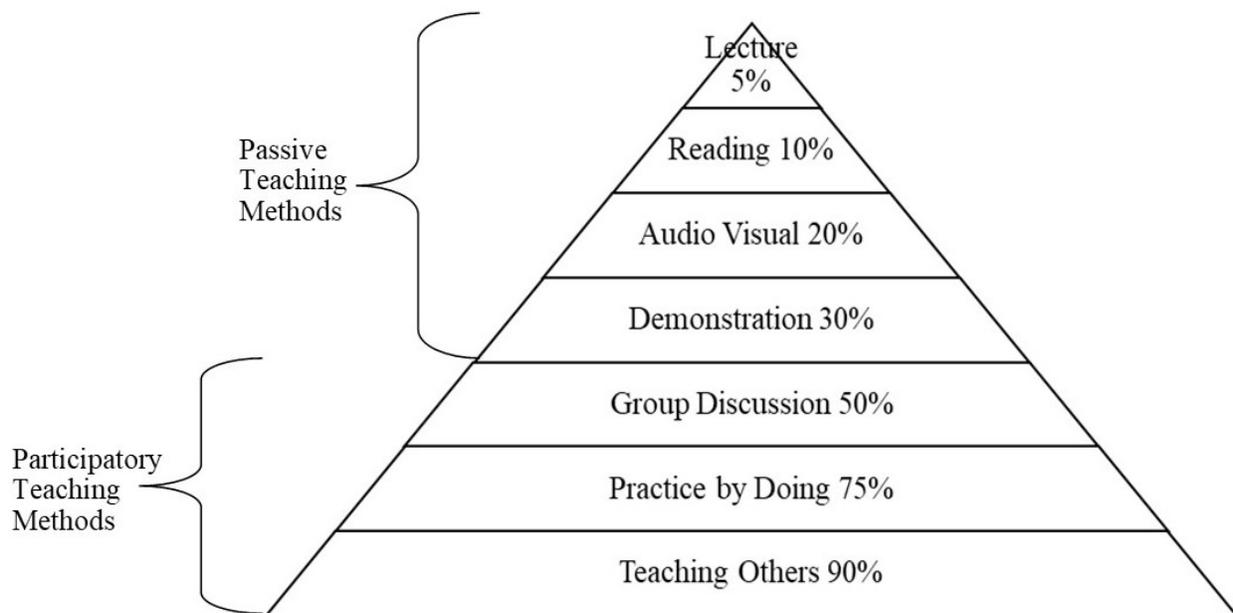
“Since the origins of e-learning, research has underlined major concerns about its quality and effectiveness ... to improve e-learning solutions, there is a need to enrich them with pedagogical principles and state an explicit theory” (Pange & Pange, 2011, p. 932). The educational technologies utilized must be reassessed for relevancy in relation to advancements designed to enhance learning. The Learning Pyramid, developed by National Training Laboratories, shows the types of teaching that are likely to be retained and categorizes these teaching types into passive teaching methods and participatory teaching methods (Laseinde et al., 2015; see Figure 3). Traditionally, online programs have been designed to replicate traditional face-to-face classes, which mostly incorporate passive teaching methods. “A common theme is that passive teaching methods do not prepare learners well to transfer what they learn, but explicit attention to the challenges of transfer can cultivate it (Saavedra & Opfer, 2012, p. 10). The most effective participatory methods which would cultivate learning transfer are rarely seen in online training programs.

Figure 3 shows that most online training programs that only employ slides of information and typically audio and video to accompany those slides are only utilizing passive teaching methods. According to the figure, this only accounts for a maximum of 20% of transfer of learning to the workplace. Yet, there are various immersive technologies available and even being utilized by some businesses for training employees that effectively incorporate participatory teaching methods. Just this year, the U.S. Military began utilizing VR for combat training. This type of training offers immersive training that allows soldiers to simulate typical combat surroundings. Soldiers can practice hundreds of times and try out different scenarios to increase confidence, problem solving, and knowledge prior to stepping foot on the battlefield. This allows for safer training, but also provides soldiers an experience as close to real as possible

prior to combat (Dormehl, 2019). This level of immersiveness and preparedness is being sought by many other industries who have revamped their workforce training to incorporate immersive technologies such as VR; yet, these methods are not being utilized by most online workforce development programs. Immersive technologies must be utilized in workforce training and development programs. Proper development, course design, and implementation of incorporating immersive technologies in online learning are critical. The use of immersive technologies through a learner-centered approach impacts the quality and effectiveness of online workforce development programs and are vital to learner satisfaction and learning transfer.

### Figure 3

*National Training Laboratories Learning Pyramid*



*Note: Adapted from Educating tomorrow's engineers: Reinforcing engineering concepts through virtual reality (VR) teaching aid, by Laseinde et al., 2015.*

## **Research Question**

This qualitative case study sought to explore the following research question: How does the incorporation of VR affect the quality and effectiveness of an online workforce development program? This research question was further developed in the following sub question: How do staff at a local non-profit perceive utilizing VR as part of an online workforce development program impacts learner satisfaction?

## **Theoretical Framework**

The theoretical framework for this study is underpinned by active learning theory by Jean-Jacques Rousseau. This theory was initially developed to explain education and child development. Through the years other researchers expanded this theory into adult learning theory. In fact, this theory can be described as the premise to proponents of lifelong learning due to the necessity for adults to take ownership for their desire and engagement in learning (Cambridge Assessment, n.d.). As such, this theory is critical for this study that focused on improving workforce training and development because as active learning theory explains, workforce development must be learner-centered and effectively motivate adult learners to be engaged in learning. In order to achieve successful workforce training and development outcomes, learners must be motivated, see the importance of the learning, and understand how to effectively transfer learning to the workplace.

Researchers over the years have taken the concept of andragogy introduced by Malcolm Knowles and expanded that work to include various adult learning theories, concepts, and principles. Andragogy was developed after Knowles highlighted the necessity to distinguish a difference between how children learn (pedagogy) and adults learn (andragogy). Andragogy is a conceptual model that examines a set of basic assumptions about adult learners that should be

considered in the design, development, and implementation of adult learning. As adult education has developed over the years, the introduction of technology and the eventual utilization of e-learning has identified gaps in theory and practice whereas the pace and development of such technologies has created a lag. As such, this study reviewed various adult learning theories and incorporated theories related to adult learning, online learning, and online learning in the workplace to examine the effect of immersive technology on the quality and effectiveness of workforce training and development.

### **Significance of the Study**

The study is significant because it examines a way for non-profit organizations to offer quality professional development with cost savings and efficiency. In addition, with the COVID-19 pandemic, the need for versatile options that can be offered anywhere and anytime since many jobs have transitioned to remote work is increasingly just as important as the other factors used to justify the implementation of online workforce training and development programs in organizations. Ensuring that online training and development provides the quality and effectiveness needed in an environment surrounded by uncertainty is crucial to the continued improvement of organizations by increasing the skills of employees.

### **Limitations/Delimitations**

The largest limitation of this study was the impact of the COVID-19 pandemic on my original plan to conduct this study, which had to be altered to incorporate protocols and procedures that promoted the health and safety of all participants. Another limitation was the limited availability of participants for the study because of work schedules and outside commitments that affected participants' ability to participate during the selected time that the

study was conducted. Finally, the limited availability of participants due to COVID-19 was also another limitation.

In addition, there were factors affecting the study that resulted from the study's design and implementation, which are also referred to as delimitations. I serve as the chief executive of the organization studied, so many considerations were made to limit bias and undue influence of participants. Also due to the selection of participants, there was a small sample size which influenced the method utilized for the study due to the uniqueness of the organization and the study.

### **Researcher**

As the researcher for this study, I am an African American female employed as the Chief Executive Officer of a local non-profit organization whose primary focus is youth development. I have been an adjunct instructor at a community college for over a decade. I am dedicated to life-long learning and I enrolled in North Carolina State University's doctoral program in Adult and Community College Education as my passion is training and development as well as technology. My professional experience has mostly been around training and development of staff and/or business professionals. My extensive experience in non-profits and my awareness of the competing priorities of attracting, hiring, and retaining qualified staff and cost effectiveness has led to many workforce development programs that lacked quality and effectiveness, especially when implemented as online learning. My passion and experience is what led to the determination of this topic as I was able to combine training and development with technology.

### **Definition of Terms**

Workplace learning: Learning that occurs in the workplace that ranges from basic to complex skills related to employee job duties (Cheng et al., 2012).

Educational technology: The utilization of technology in education (Jafari Navimipour & Zareie, 2015).

E-learning/online learning: Large range of applications and processes that combine to provide learning through the use of technology (Cheng et al., 2012). The terms e-learning and online learning are used interchangeably in this study.

Immersive technology: Technology that provides realistic situations for users (Strivr, 2019).

Augmented reality (AR): The integration of digital content into a real-world environment (Au & Lee, 2017).

Virtual reality (VR): A fully immersive virtual 3-D digital environment (Au & Lee, 2017).

Mixed reality (XR): A combination of a real-world, digital, and virtual environment (Au & Lee, 2017).

Pedagogy: Known as the practice of teaching children (Payne et al., 2009).

Andragogy: Known as the practice of teaching adults (Griffin et al., 2009); also referred to as adult learning.

## **Chapter Summary**

Efficiency and performance of employees are key metrics examined by organizations. The ROI needed in relation to these metrics ultimately determines and signifies the strength or lack thereof of the organization. “Operational excellence is mandatory, putting the pressure on companies to complete in a war for the best talent—and then develop those employees with optimal training and ongoing learning and development” (Strivr, 2019, p. 3). Most organizations and employees admit that the current learning and development methods are not effective in

meeting these demands. When combined with the fact that most organizations have turned to online training and development programs for cost savings and efficiency, more focus must be placed on the quality and effectiveness of these programs. If organizations do not incorporate immersive technologies, such as VR, in online workforce development programs, they will fail to achieve the necessary outcome of producing a 21st century competent and job-ready workforce. As such, the purpose of this qualitative study is to better understand how the utilization of immersive technologies meets the necessary outcome of producing a 21st century competent and job-ready workforce.

## CHAPTER 2: LITERATURE REVIEW

### **Introduction to the Chapter**

This chapter is a presentation of the literature on the topics selected as the focus of this qualitative case study. To begin the literature review, adult learning theories are explored. Next, theories of online learning in the workplace and theories of online learning in general are discussed. From there, a review of the limited literature on immersive technologies is explored. Literature on training quality and effectiveness is then shared. The chapter concludes with a review of literature related to learner satisfaction through the attributes of motivation and immersion.

### **Adult Learning Theories**

Adult learning principles have changed dramatically over the course of history. Initially, it was thought that adults learned the same way children learned in that teachers taught information and adult learners listened. The teacher controlled what, when, and how learners learned. However, around the 20th century, it became apparent that what had been accepted as pedagogy did not seem to be effective for adult learners. This was more apparent due to economic and political changes experienced during this time frame which required adults to learn and adapt quickly to the workforce demands and needs of that time (Conaway & Zorn-Arnold, 2015). The following sections will outline various adult learning theories and how they have changed over time.

### ***Theory of Andragogy***

The theory of andragogy was developed by Malcolm Knowles in the late 20th century to specifically address adult education and the needs of adult learners. Knowles felt that previous research in education was derived from behavioral and cognitive theorists and solely focused on

animals and children. While he believed that relevant research was produced by humanistic researchers, he felt strongly that research on adult learning was necessary (Knowles, 1978). The following list outlines Knowles' assumptions related to adult learners:

1. Adult learners are self-directed learners and act independently.
2. Adult learners have gained valuable experiences in their lives and value applying their experiences to the learning process.
3. Adult learners are eager and ready to learn what they need to learn to succeed.
4. Adult learners are interested in the application of learning in order to problem-solve.
5. Adult learners are more internally motivated and less so by outside forces.
6. Adult learners are interested in understanding the value of what they are being taught.” (Tainsh, 2016, p. 7)

These assumptions introduced by Knowles serve as a useful starting point to gain a better understanding of adult learners; however, critics of Knowles work noted that he described characteristics of adult learners as opposed to describing how adults actually learn (Allen, 2016; McGrath, 2009). Characteristic of adult learners, such as their motivation, responsibilities, competing priorities, and existing knowledge and experience are deemed critical to understanding how adults learn, and ultimately inform how adult learning can be affected. As such, researchers note that the theory of andragogy should not actually be considered a theory, but more so a conceptual framework for further research and theory. In fact, Knowles' later work and research also substantiated the belief that his work serves as a framework that enables researchers to develop relevant theories of adult learning (McGrath, 2009). These beliefs and

assumptions have been utilized to develop other learning theories and frameworks discussed in this literature review.

### ***Behaviorist Learning Theory***

One of the first adult learning theories was behaviorist learning theory, which was considered to be the prominent learning theory in the beginning of the 20th century (Pange & Pange, 2011). The founder of this theory is recognized as John B. Watson who believed that for theories based on psychology to be scientific, behavior must be properly researched and add credibility. As such, Watson utilized Pavlov's conditioning model to initially develop behaviorist learning theory. Later work by B.F. Skinner related to operant conditioning is noted as the most recognized behavior theory (Schunk, 2019). In essence through this initial work and later research to adapt this theory, the development of this theory as it related to learning is credited to Ivan Pavlov, Watson, and Skinner. Behaviorist learning theory is considered the most influential learning theory (Arghode et al., 2017), which is mainly due to this theory being the premise of pedagogy and the rewarding of the observable behavior of children who sit and learn in the traditional instructor-led lecture format that is most commonly used in the instruction of both children and adults. The problem with using this method of teaching for both children and adults is that it does not take into consideration the knowledge adults already possess and that adults benefit from teaching that includes more dialogue and discussion as opposed to a lecture format.

In addition, critics of this theory believe that not all changes can be validated via observable behavior changes or responses. Later research found that learners could learn new behavior through modeling, as opposed to having to practice the behavior, as people could learn new actions by observing others perform them. Observers did not have to perform the actions at the time of learning implying that reinforcement of behavior was not necessary for learning to

occur (Schunk, 2019). This is often seen with adult learning, especially with workforce training experiences such as job shadowing and internships. As a result, the main assumptions of the behaviorist learning theory were challenged and further developed into later theories for adult learning. Because of these criticisms, the more recent learning theory of cognitivism was developed.

### ***Cognitivist Learning Theory***

Cognitivist learning theory has its beginnings dating back to 400 B.C. from Plato, and was further developed by philosopher Descartes in the 17th century and Jean Piaget in the 20th century (Grider, 1993). As cognitivist learning theory continually developed over the years, it conceived that learning is evident in reflection (Pange & Pange, 2011). In this theory, learners must be active in the learning process, and as such, there must be opportunities for learners to be involved in the learning process, including goal setting and the selection and performance of learning activities (Allen, 2016; Arghode et al., 2017). This concept is commonly seen with adult learning today as learners are encouraged to develop professional development or college plans that includes goal setting, certification or degree program selection, and selection of courses that will fulfill the necessary requirements of the plan and/or program.

Later research and development of this theory also incorporated social cognitive principles with beliefs that behaviorist learning theory research was mostly related to human learning in one-person situations (Schunk, 2019). Assumptions were also made about learning and performance behaviors within social cognitive theory that ultimately addressed how learning occurs (Schunk, 2019). It was even suggested that while andragogy is classified as a conceptual framework as previously noted, it could also be considered a part of cognitive learning theory as Knowles' second assumption explained that adult learners connect their life experiences to the

material and overall learning process (McGrath, 2009; Tainsh, 2016). Methods of learning that are derived from cognitivist learning theory are activity-based learning, inquiry method, and expository learning (Agarkar, 2019).

Critics of cognitivist learning theories noted that memory, verbal inputs, and visual inputs effects on learning are not explored within this theory (Schunk, 2019). Furthermore, learning is also considered to be teacher-centered as opposed to the more effective learner-centered approach. For adult learners, the instructor is less important to the learning process due to adults' existing knowledge and experience, fully developed cognitive structures, and ability to play an active role in their learning. As such, adult learning theory researchers continued their work and developed the constructivist learning theory.

### ***Constructivist Learning Theory***

Constructivist learning theory's creation is credited to educational theorist Paulo Freire; however, it is noted this theory is also influenced by Piaget and Jerome Bruner. This more modern theory is based on the belief that learners must be able to obtain personal meaning from information for learning to occur (Pange & Pange, 2011). Constructivist learning theory is much different than other learning theories as it focuses on the learner's ability to process information as opposed to learning from environmental influences. Researchers explained that earlier learning theories focused only on external factors, and failed to explore and explain how students learn and understand (Schunk, 2019). Constructivists believe that learning occurs through both individual efforts as well as social interaction (Arghode et al., 2017). Another important facet of this theory is that it addresses student motivation for self-directed learning (Hood Cattaneo, 2017). Constructivism contrasts with earlier conditioning theories discussed previously that theorize that environmental factors and the way learners process information are more important

than the context of learning (Schunk, 2019). Constructivists believe that learners are active and therefore are the source of their own learning to some degree if not all. As a result, this indicates that traditional methods of teaching are not effective, and a learner-centered approach is more effective (Schunk, 2019). Methods of learning commonly utilized within this theoretical framework are project-based learning and discovery method (Agarkar, 2019).

Critics of constructivist learning theories note that the role of learners' motivation, memory, and transfer of learning have not been adequately researched and considered (Schunk, 2019). All of which are critical to consider to effectively understand and address adult learning; hence, further adult learning theory research and development yielded active learning theory.

### *Active Learning Theory*

Active learning theory is derived from constructivist learning theory and influenced by many aspects and characteristics of earlier adult learning theories, and serves as the main theory of focus in this dissertation study. This theory was developed by philosopher Jean-Jacques Rousseau and was later further developed by researchers such as Johann Heinrich Pestalozzi, John Dewey, and William Heard Kilpatrick. Active learning theory is similar to constructivist learning theory as it also has a basis that learners should be actively engaged in the learning process (Pange & Pange, 2011). This learner-centered theory is based on the belief that learning should be the focus as opposed to teaching. Active learning theory is more commonly known and referred to by the more specific active learning methodologies of project-based, problem-based, inquiry-based, case-based, and discovery-based (Hood Cattaneo, 2017). These methods are commonly seen in adult learning, whether in the traditional classroom and even workplace training and development programs. While active learning is not a new learning theory, it is gaining increased popularity in literature and policy development as it is being seen as a viable

theory to increase student achievement (Hood Cattaneo, 2017). It is also believed to be a theory that can increase learner motivation and transfer of learning (Hood Cattaneo, 2017). These two factors are critical to this study and thus further support the use of this theory in the conceptual framework of this study. Active learning theory supports all the initial assumptions of Knowles' work while also carrying forward later research and adult learning theory development of researchers over the years. As such, this theory was the most appropriate for this study.

Critics of this theory discuss poor design and implementation and lack of teacher support and guidance for novice learners (Hood Cattaneo, 2017). This suggests that future research utilizing this theory should adequately address and incorporate proper design, implementation, and support and guidance for novice learners; therefore, all of these factors were considered and included in this study.

### ***Other Adult Learning Theories***

Other adult learning theories exist such as transformational learning theory by Jack Mezirow. This learning theory was developed from the basis of Jurgen Habermas' theory of communicative action and is based on the premise that learning takes place through communication that is spurred with debate and discussions with peers. The literature suggests that it is through debate and discussion among peers that learners recognize their own bias and narrow viewpoints and start to view problems from different perspectives and are thus willing to achieve new learning through collaboration with others (Allen, 2016). However, with most online models of online workforce development, there is too often no meaningful interactions with peers. This is especially true with asynchronous programs. Since most online workforce development programs are asynchronous this transformational learning theory was not relevant for this study.

Abraham Maslow and Carl Rogers introduced another learning theory known as the humanism theory of learning. Similar to andragogy, researchers suggest that this theory also requires adult learners to take ownership in their own learning (Arghode et al., 2017). The core of this theory is self-regulated learning, which depends on a learner's perception of their ability to learn and meet the intended and desired goals and outcomes of learning as well as their actual ability to adapt and cope with barriers to learning (Schunk, 2019). The humanism theory of learning is more indicative of a learner's actual motivation to learn and their cognitive processes, and as such, not a particular learning theory.

Motivation of adult learners will be discussed in more detail later in this literature review as a factor of learner satisfaction; however, Schunk (2019) suggested that motivation is directly and positively correlated to adult learners taking ownership of their own learning. The literature introduced the term volition to explain the intersection of not only motivation and cognition, but also emotion. In exploring modern research related to volition, the concept is defined as being able to mediate the relationship of goals and the actions needed to accomplish goals. This supports the underlying assumptions of active learning theory. Volition explains the connection between motivation and the active learning processes described in active learning theory. In fact, the incorporation of active learning theories can increase student motivation, knowledge retention, and transfer of learning (Schunk, 2019).

### **Theories of Online Learning in the Workplace**

The limited literature available related to online learning in the workplace indicates a lack of proper course design and development in online learning. Very little attention has been placed on online instructional strategies, content design and delivery, and most importantly, learning theories for quality and effectiveness of online learning in the workplace (Pange & Pange, 2011).

Research addresses the need for understanding general adult learning principles in the design of online learning, as well as the incorporation of proper educational technologies; yet, the issue remains that when most learning theories were developed traditional instruction was the most prominent method of training and development. With the shift to online degrees and continuing education programs, as well as the use of online learning for workforce training, these learning theories need to be reexamined in the context of online learning (Arghode et al., 2017).

One theory of online learning in the workplace is competency-based learning. The need to ensure that online learning is aligned with work-based competency and performance has been noted as necessary for desired outcomes. With competency-based online learning, a critical component is personalized learning, which is more commonly referred to as a learner-centered approach (Cheng et al., 2011). However, the focus for competency-based online learning has been on technical implementation and not the adult learning theories and application of learning which is needed for effectiveness.

One of the most important theories of online learning in the workplace is transfer of learning since the main objective is to improve actual performance in the workplace (Gunawardena et al., 2010). Research on transfer of learning has produced many variables believed to impact learning transfer, including learner characteristics, learner motivation, e-learning characteristics, peer to peer interaction, and a supportive working environment (Baldwin et al., 1988; Nafukho et al., 2017; Gunawadana, et al, 2010; Sawang et al., 2013). Since actual transfer of learning requires a longitudinal study, this theory was not researched at length for this study; however, learner motivation being a strong predictor of transfer of learning is an area further explored.

## **Other Theories of Online Learning**

There has been continual research of adult learning theories as it relates to online learning due to the increase of distance education programs developed by institutions of higher education which allow flexibility for non-traditional learners (Allen, 2016). Some new theories for online learning have been developed, such as the pedagogical principles of online learning developed by professors John Anderson and Robert McCormick (2005); however, most researchers seek to incorporate existing adult learning theories into the design and development of online learning. Thus, the literature suggests there is a need for a model or framework that incorporates various learning theories into the development of online learning systems (Pange & Pange, 2011). The best method to accomplish this is by conducting qualitative studies that examine how the incorporation of learning theories and theoretical principles affect learning outcomes (Arghode et al., 2017). More work needs to be done integrating adult learning theories in online learning. Hence, this study sought to explore how the utilization of adult learning theories can improve instruction, thereby improving online training and development outcomes.

## **Adult Learning Theories and Theories of Online Learning**

There is very little research that discusses both adult learning theories and theories of online learning. Learning theories alone have been commonly discussed in the literature. There is also a considerable amount of literature related to improving online instruction; however, there exists a large gap in the literature examining how adult learning theories affect online learning (Arghode et al., 2017), which supports the notion that more research is needed in this area to close the gap between theory and practice. As a result, course design utilizing adult learning theories was explored in this study. Research highlights the importance of the instructor and their

ability to apply theoretical principles to online course design to have maximum impact for adult learners. This is also necessary and true for online training programs.

### **Immersive Technologies**

The structure and delivery of online instruction has evolved over the years just as adult learners have changed. However, most changes to online instruction, and especially online instruction for workforce development, have been due to technological advances. Also referred to as information and communication technology (ICT), the incorporation and utilization of technology ensures that knowledge can be accessed almost any time and any place. The utilization of ICT increases access to learning needed for workforce training and development (Dávideková et al., 2017). The most recent technological advances are referred to as providing disruptive changes to online education, which is how immersive technologies are described (Cook & Sonnenberg, 2014).

### ***Immersive Technologies in Business, Military, and Industry***

Immersive technologies, or what is also more modernly referred to as extended reality (XR), provide learners with a simulation that mirrors what they would experience in a real-world setting. In workforce development, this entails providing experiences that adult learners would normally face in a workplace setting. Whether the rationale is reduced time away from work, potential cost savings related to time and travel, or training of high-risk occupations and skills, immersive technology is proving to be a valuable method of training. This is true not only in education, but also for military members, first responders, nurses, surgeons, as well as people working in the mining and coal industry or hospitality and customer service. The literature notes that classroom learning retention is a critical issue in workforce development, and immersive technologies offer opportunities for continuous training and competency development, which

contribute to learning retention. In addition, simulation-based training allows for facilitators and learners to observe where learning breakdowns may be occurring. The literature also notes that XR offers participants consistency in training, which results in increased retention, pinpointed remediation, and the ability to adapt training quickly (O'Donnell, 2019).

The most common XR technologies today are augmented reality (AR), virtual reality (VR), and mixed reality (MR; Morrison, 2019). No matter which immersive technology is selected, all utilize 360-degree or 3D materials and assets for users. Many studies have explored the effectiveness of various immersive technologies on learning and found that the use of these technologies allows users to personalize their learning (Chau et al., 2013). Personalizing learning is a concept within several adult learning theories, but most importantly, it is a key component of active learning theory as well as the concept of a learner-centered approach. Chau et al. (2013) also noted that the experimental group utilizing immersive technology performed better obtaining higher learning outcomes because of the technology. This suggests that immersive technologies have a positive impact on learning outcomes and therefore positively affect the quality and effectiveness of training and development. Another study offered more insight into why this may be the case noting that learners have sensory immersion, more engagement, and less distractions, which all foster effective learning (Rupp et al., 2018). In a study of AR vs. traditional classroom handouts, researchers found that AR improved learner satisfaction and actual learning (Yip et al., 2019).

On the contrary, some research has found that while the utilization of immersive technologies allows for more presence and engagement of learners, the quality and effectiveness of training was diminished as shown by poorer learning outcomes and performance. Makransky et al. (2017) attributed this finding to immersive technology overloading and distracting learners.

As another researcher noted, there are limited studies available that combine learning theories with the practical use of immersive technologies such as VR for education (Zhou et al., 2018).

As a result of these concerns, this study focused on research combining adult learning theories with the implementation of VR for workforce development education. VR was the chosen immersive technology due to its increased perceived value and adoption in workforce development over recent years, but even more so now due to the challenges posed post-COVID. Small to medium size businesses are expected to see an increased use of VR in employee training by 2021. In addition, many will also be using VR for work meetings, collaboration, and customer service (Higginbottom, 2020; Pearson, 2019). The industry is also expected to grow from \$829 million in 2018 to \$4.26 billion in 2023 (Higginbottom, 2020). This is most likely due to the nature of VR environments and the elements it brings to the work environment, such as collaboration and immersive meetings, but also what it brings to the learning environment that is not present in traditional learning methods. One research study attempted to define an immersive learning model based on VR. In the study's literature review, Bhattacharjee et al. (2017) described that VR simulations give learners the opportunity to learn real-world practices, which provide participants meaningful learning. They noted that further research utilizing VR simulations can assist to develop learning theories and methodologies (Bhattacharjee et al., 2017). These methodologies allow learners to develop versatile problem-solving skills.

Studies have shown that the greatest impact of the implementation of VR simulations on learning was when it was combined with traditional teaching models. Another area where VR was touted as crucial for workforce development is its use providing training that allows learners to engage in critical thinking while practicing in a safe environment (Farra et al., 2013). This is notably evident in the incorporation of the use of VR technology in military, police, medical, and

other occupations where lack of training and/or even errors in training could be a matter of life and death.

In fact, organizations and businesses have begun to fully embrace VR for workforce training and development as a supplement to their traditional training programs and have gained headlines recently for the implementation of this immersive technology to provide workforce development that addresses complex problems and competencies that naturally could not be developed outside of on-the-job performance. Strivr, a leading VR technology company focused on corporate training and workforce development discussed the success of VR training in comparison to traditional training methods of client case studies in their recent E-book. They noted that Fidelity Investments had a positive 10% increased customer satisfaction in less than six months; Lucile Packard Children's Hospital at Stanford had 100% of their employees indicate they felt prepared for difficult conversations; 15% of Walmart employees experienced test score improvement of 10-15%; and Nationwide saw an 86% reduction of training time of employees when their three-hour training reduced to 25 minutes (Strivr, 2019).

Most notable in the literature is the benefit of utilizing VR for developing 21st century career skills such as use of emerging technologies, but most commonly soft skills. Press coverage and case studies stories pointed out additional organizations and businesses that utilize VR, including the U.S. Military, Verizon, Lowe's, Chipotle, colleges and universities, and many others have adopted immersive technologies with promising success in soft skills competency development. Perhaps what is the most interesting recent possible case use was introduced in an August 2019 government-related article in which democrats in the U.S. House of Representatives proposed the use of VR to train the federal workforce (Katz, 2019).

Beyond the support and adoption of VR by businesses and organizations, faculty at colleges and universities are also interested in utilizing this immersive technology. A survey with 161 respondents, mostly from public universities, varied in institution size, and 60% of respondents having 21 or more years of experience in education, showed that experienced educators understand the value and potential impact VR technology can have on education and workforce development. This was evident as the two largest school/college types represented by survey respondents were education and business/business administration (Kelly, 2018).

Studies supporting an interest in VR for educational purposes have been conducted across various disciplines including technical fields and social sciences. The medical field is one of the more prominent fields highlighted in the media and was center stage at the 2020 VR/AR Global Summit held in fall 2020. In a quantitative study published in a recent medical journal, researchers concluded that VR could transform medical education (Zhao, 2020).

One common and growing application of VR in education is in the communication field. Researchers are examining how VR affects learners. One study showed that students who were in a group that utilized VR felt that the VR experience resembled real-world speaking more so than traditional face-to-face peer practice sessions (Davis et al., 2020). This premise of real-world experience as well as the exploration of public speaking, an important career soft skill, led to the focus of this study where I examined the use of VR for soft skills training in organizations.

BasuMallick (2019) pointed out how vitally important soft skills training is for employees as 67% of HR recruiters withhold job offers due to a lack of soft skills. Soft skills training (e.g., communications, listening, empathy, etc.) has been considered a type of training that must be done in a hands-on format as learners must learn by doing and as such; however soft skills training needs improvement (BasuMallick, 2019). This is where VR offers a unique

opportunity to improve these skills in organizations by offering real world workplace scenarios where learners can practice and improve their skills. The scalability of VR coupled with the presence that utilizing VR brings provides learners with a cost-effective experience where they are immersed in a training that ultimately feels like they are experiencing real-world, real-time scenarios. VR training has the capability to track completion data, user data such as engagement and behavior patterns, confidence, hesitancy and more which is not achievable with traditional face-to-face methods, or traditional online components (Hines, 2020).

As with any new technology there are critics of it as well. Most of the concerns are around abuse, privacy, and data. These are all concerns that will need to be addressed in formal human resources policies of organizations, but with an understanding that since this technology is so new, there is very little legal precedent established with current law (Higginbottom, 2020).

### **Training Quality**

One of the major frameworks for evaluating training quality is Bloom's taxonomy. In 1948 at an annual meeting of the American Psychological Association, Benjamin Bloom led an effort with others in higher education to start the development of what is now referred to as "Bloom's Taxonomy," however, it is formally known as the "Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook I: Cognitive Domain" which was published in 1956. Though used interchangeably, Seaman (2011) noted that the term "taxonomy" should be used referencing the classification system itself while the term "handbook" should be used when referencing the publication in which the taxonomy is identified. Krathwohl (2002) explained that the taxonomy is a framework for developing desired learning outcomes and therefore is not truly recognized as a theory.

Bloom's framework as originally developed referenced the single cognitive domain being comprised of six categories: knowledge, comprehension, application, analysis, synthesis, and evaluation. Knowledge was understood to be represented throughout the six categories within the original framework, which was ordered from simple to complex (Krathwohl, 2002).

In response to criticisms about the original framework and its lack of actionable terms to translate it from theory to practice, further research and work was done. In 2001, Bloom's framework was revised to include a second dimension of knowledge containing four categories: factual, conceptual, procedural, and metacognitive, and is referred to as the "Revised Taxonomy" (Anderson & Krathwohl, 2001). The revision also included changes to the original cognitive process dimension (see Table 1).

**Table 1**

*Bloom's Taxonomy Revision Comparison*

Bloom's (1956) Taxonomy	Revised Taxonomy (Anderson et al., 2001)
Original	Revision
Knowledge	Remember
Comprehension	Understand
Application	Apply
Analysis	Analyze
Synthesis	Evaluate
Evaluation	Create

The revision of Bloom's Taxonomy clearly shows the transformation to actionable terminology which helps translate this framework and makes it easier for practitioners to implement in course design. Research related to the original taxonomy, as well as the revised version, has developed assumptions that the incorporation of all of these categories in the design and implementation of training positively impacts training quality. To better visualize these assumptions, Figure 4 overlays the cognitive process dimension and the knowledge dimension

with arrows indicating higher levels of quality and in turn, higher levels of learning. Most researchers of Bloom's Taxonomy refer to this as higher order thinking. Figure 4 shows that the more learners are able to activate higher orders of thinking as they access (knowledge dimension) and apply knowledge (cognitive process dimension) via the design of training the better the outcomes.

**Figure 4**

*Bloom's Revised Taxonomy Diagram*

		Cognitive Process Dimension					
		Remember	Understand	Apply	Analyze	Evaluate	Create
Knowledge Dimension	Factual Knowledge						
	Conceptual Knowledge						
	Procedural Knowledge						
	Metacognitive Knowledge						

*Note: Adapted from A revision of Bloom's taxonomy: An overview, by D. Krathwohl, 2002.*

While the original and revised taxonomy are both based on theories of how adults learn, the main goal of the tools was to provide a methodology for the design and implementation of materials intended for adult learners. As a result, this framework was included within the conceptual framework for this study.

### **Learner Satisfaction**

Learner satisfaction is considered to a major factor in the quality of training. Research has shown a positive correlation between learner satisfaction and quality as it relates to desired

outcomes (Palmer & Holt, 2009). The variable most frequently mentioned in the literature regarding learner satisfaction is motivation. As such, motivation is one of the variables chosen for the design of this study.

### ***Motivation***

Motivation is considered one of the most important elements to consider for online learning. If adults are not motivated and satisfied with training, they shut down before the learning even occurs. Desired learning outcomes can never be achieved if adults are not satisfied with their training and motivated to learn. If the content is engaging then it results in positive motivation from learners (Rodriguez et al., 2013). Several theories have been developed that address motivation as a critical factor for learning, such as the ARCS model, which includes components like attention, relevance, confidence, and satisfaction (Pange & Pange, 2011). The literature also discusses the poor ROI for online learning for organizations that do not focus on motivation and satisfaction (Jafari Navimipour & Zareie, 2016).

The expectancy theory of adult learning in the workplace provides some insight into why learners want to participate in workplace learning. This theory names three variables: expectancy, instrumentality, and valence. Expectancy refers to an individual's personal belief that participating in training will result in increased knowledge, skills, and abilities (KSAs). Instrumentality is the individual's belief that increased KSAs will result in desired workplace outcomes. Finally, valency is the assignment of value of those outcomes for the individual (Cheng et al., 2012). The unified theory of acceptance and usage of technology (UTAUT) addresses the learner's perception of usefulness of the educational technologies utilized for online learning (Cheng et al., 2012). Researchers have further developed UTAUT to categorize the components of this theory as extrinsic and intrinsic motivation categories (Kimiloglu et al.,

2017). The technology acceptance model (TAM) is considered to be the most popular theory in exploring acceptance and adoption of corporate online learning. As such, this theory has been expanded by researchers. Kimiloglu et al. (2017) stated:

Research attempts to utilize TAM for this context took an integrative or expansive approach. Lee et al. (2013) have tested and extended TAM model where organizational support, computer self-efficacy, prior experience in using computer technology and task equivocality have been identified as the antecedents of perceived ease of use (PEOU) and perceived usefulness (PU). Findings show that all four antecedents have full or partial effects on the two main independent variables of TAM. (p. 340)

### ***Immersion***

Traditional methods of instruction, especially in an online learning environment, lead to disengaged students (Au & Lee, 2017). Increasing learner satisfaction thereby increases student engagement. In one study, researchers sought to explain how to increase learner satisfaction with the increased adoption and utilization of e-learning in organizations. This study found the design and interactivity of the online learning significantly impacted learner satisfaction (Sawang et al., 2013). This interactivity related to VR is more commonly known as immersion. Immersion can be described from two different perspectives in the research. Slater's research refers to immersion as being a characteristic of the actual technology; however, the work of Witmer and Singer describes immersion as a psychological state of the learner (Szabo, 2020). Immersion therefore is defined as the feeling of the learner's psychological presence being in the virtual world even though their physical presence is in a real environment. This allows for the learner to be fully engaged in the virtual environment and not distracted by the real-world environment. For purposes of this study, the latter definition of immersion was explored and utilized. In

addition, research has also sought to develop more extensive and practical definitions of immersion. One such study noted that immersion is simply the degree of involvement with technology. Furthermore, this study identified the three levels of immersion as engagement, engrossment, and invisible, with each level adding a higher degree of immersion (Cairns et al., 2008). Bouvier et al. (2014) noted that immersion in addition to attention, presence, flow, involvement, and attention are all factors of engagement.

VR offers a unique opportunity to increase learner satisfaction and even the mood of learners through immersion. VR can create an overall increase in positive emotions and an overall decrease in negative emotions (Allcoat & von Mühlennen 2018). A study showed when comparing VR learning to traditional (textbook style) and video learning, the latter had a decrease in positive emotions (Allcoat & von Mühlennen, 2018). Another study noted that learners have increased motivation due to the immersiveness as well as gaming components of the VR experience (Dávideková et al., 2017). Immersion cannot be achieved by any other form of technology; therefore, incorporating VR into an online workforce development program will provide unique results.

As previously noted, this study focused primarily on immersion as the learner's psychological presence in a virtual world in spite of their actual physical presence in the real world and how VR has the potential and evidence to support increasing learner satisfaction.

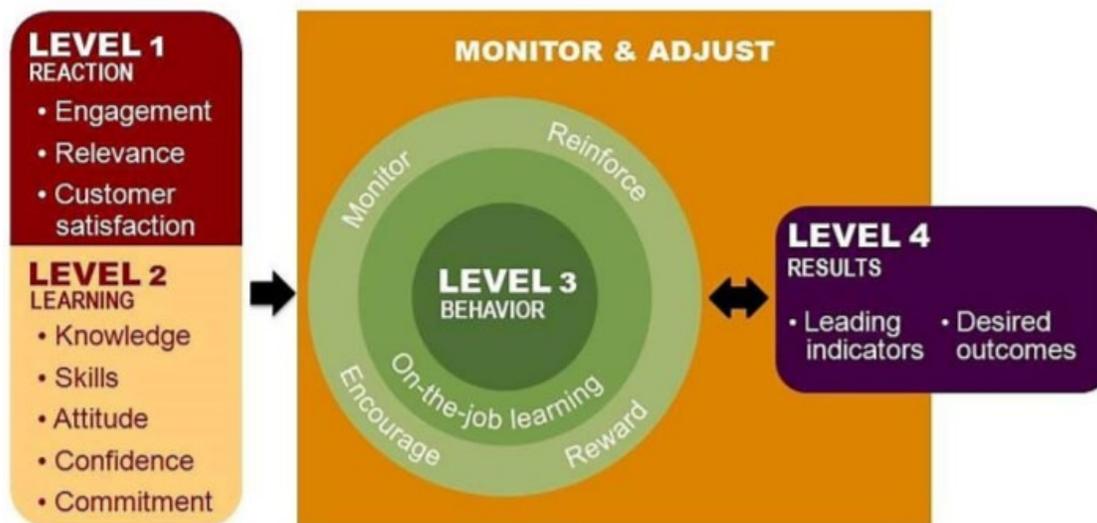
### **Training Effectiveness**

To evaluate effectiveness, Donald Kirkpatrick's New World Kirkpatrick Model of Evaluation was developed and utilized by many organizations to evaluate workplace learning, including online learning. One article described this model as the most commonly accepted and used framework to measure training effectiveness (Rodriquez et al., 2013). This model was

derived from the original model and framework developed by the late Kirkpatrick in the 1950s for his dissertation. Updates to this model were deemed necessary by Kirkpatrick's son and daughter-in-law to be able to redirect focus, but ignored knowledge shared by Kirkpatrick over the years. The revised work is intended to address misconceptions and misappropriation of the model as well as offer a more current and practical approach of the model to be used in modern workforce development. The original model contained the four levels identified and defined in the New World Kirkpatrick Model developed by his family years later. However, their approach in the newer model was to make it more practical and applicable across all types of organizations for practicality of workforce development (Kirkpatrick & Kirkpatrick, 2016).

The New World Kirkpatrick Model of Evaluation contains four levels: 1) learner's reaction, 2) learning, 3) behavior, and 4) results (Kirkpatrick Partners, 2018). The learning in this context refers to an increase in staff knowledge, skills, and/or abilities. The behavior focuses on staff ability to apply knowledge within their role. The results examine how training affects the organization (Wilson, 2012). Critics of this model feel that evaluation is mainly done in the first two levels, with little focus on the remaining two (Wilson, 2012).

Figure 5 shows the visual provided by the Kirkpatrick Partners that summarizes the levels of the model, as well as how each level should interact with the other levels in the evaluation process. The incorporation of this graphic helps address the issues of critics as it shows more emphasis should be placed on Levels 3 and 4 when truly evaluating training effectiveness. In addition, it also shows the continuous nature of behaviors of Level 3 as well as the expected shifts between Levels 3 and 4 as outcomes are monitored and adjusted in the training process.

**Figure 5***The New World Kirkpatrick Model*

*Note.* Adapted from *The New World Kirkpatrick Model*, by Kirkpatrick Partners LLC, 2018.

While this model is well known for evaluation of training, talent development professionals are taught that the incorporation of the levels through a continuum from needs assessment to objective development, training design and delivery, and evaluation will yield the greatest impact, including online learning in the workplace. The model provides important variables to be considered for the development of a conceptual framework for this study.

### **Chapter Summary**

This chapter provides the study's literature review, which serves as the foundation needed to further explore how to affect quality and effectiveness of online workforce training with the utilization of VR. Literature supporting the theoretical framework of this qualitative study is covered in this chapter.

Organizations must ensure that 21st century competencies are developed and further enhanced by learning provided to their workforce (Nelson et al., 2019). Skills noted as important 21st century competencies are more difficult to train and develop with adults using traditional and less effective instructional methods. While there is a plethora of literature exploring adult learning theories and how to apply them in practice, there is much less literature exploring the context of online learning theories. Furthermore, there is even less literature that seeks to explore the context of adult learning theories within online learning, and very little research seeking to examine the intersection of the two and how to improve online learning. This is necessary since online learning has become the default method of training and development due to cost savings and the efficiency needs of most organizations, especially non-profits. Twenty-first century skills, like soft skills, are the type of skills that must be practiced to be applied effectively in practice, and most importantly, in the workplace. This is difficult to do with the typical online learning seen in most organizations. One of the ways this should be done is by incorporating immersive technologies in the development and implementation of e-learning for professional development. Bhattacharjee et al. (2018) explained:

There has been an increased focus on immersive learning using immersive virtual reality in the field of education ... Using this, Barab et al. (2005) suggested that an immersive virtual environment could provide students with playful learning experiences and active learning processes which will engage students in a very effective way. (p. 238)

Past research regarding immersive technologies has traditionally focused on computer aided simulations that primarily involved students with traditional computer usage viewing content on the screen and listening via peripheral audio devices. However, emerging immersive technologies allow for learners to engage technology in a more personalized (learner-centered)

effective way. Universities and educational institutions have used virtual learning environments increasingly as online courses continue to grow in enrollment. In fact, many institutions, including Harvard University and East Carolina University have explored and implemented the use of virtual worlds for teaching and learning (Chau et al., 2013). Virtual technology has become common place in many areas such as entertainment, healthcare, business, and education. Virtual technology places students in immersive environments in the form of VR and AR, or a combination of the two: MR (Yip et al., 2019). Research suggests that VR can improve student engagement, utilize a constructivist learning theory, provide more realistic learning experiences, foster creativity, and create a means for learners to visualize abstract concepts (Au & Lee, 2017).

A quantitative study that examined the learning outcomes from 360-degree videos in a VR learning environment showed statistical evidence that learners utilizing the technology had an increased interest in the subject matter and a greater positive effect in learning outcomes (Rupp et al., 2019). Alternatively, another study found that VR causes more presence, but less learning (Makransky et al., 2017). Hence, more research is needed to design, develop, and implement a study of VR effectiveness. Combining prior literature and research on the history of online workforce development, adult learning theories (specifically focusing on active learning theory), and theories of online learning in the workplace, this study explores immersive technology, and in particular VR. VR is a relatively new and upcoming technology, and there is a lack of specific research regarding the quality and effectiveness of the utilization of VR for workplace training; therefore, utilizing prior literature and research related to learner satisfaction and engagement is necessary. While some aspects sought in this literature review are lacking, this demonstrates there is an opportunity to add to this field of research by conducting this study.

This study was designed with the intent of adding to the practicality of the use of VR for improving online workforce development.

## CHAPTER 3: METHODOLOGY

### Introduction to the Chapter

This chapter provides the structure of the research methodology used for this study. “Qualitative research is an approach for exploring an understanding of the meaning individuals or groups ascribe to a social or human problem” (Creswell & Creswell, 2018, p. 4). A qualitative single case study method was utilized. Participants from a local non-profit organization shared their perspectives about their public speaking VR training experience in Zoom semi-structured recall interviews as part of an online workforce development program on public speaking skills.

As the researcher, I was positioned within the non-profit organization which allowed me to gain an in-depth view of the phenomenon being studied within the participants’ setting. A constructivist worldview was utilized as the philosophical assumption and framework for the study. Creswell and Creswell (2018) summarized:

Social constructivists believe that individuals seek understanding of the world in which they live and work. Individuals develop subjective meaning of their experiences—meanings directed toward certain objects or things. These meanings are varied and multiple, leading the researcher to look for the complexity of views rather than narrowing meanings into a few categories or ideas. The goal of the research is to rely as much as possible on the participants’ views of the situation being studied. (p. 8)

Being in the work environment, I had a unique perspective and understanding of the world in which the participants work, which helped foster deep and more complex inferences in the research design, protocol, and analysis.

## Research Design

The methodology for this study was a qualitative case study. Yin (2018) offered a two-part definition of a case study:

1. A case study is an empirical method that
  - investigates a contemporary phenomenon (the ‘case’) in depth and within its real-world context, especially when
  - the boundaries between phenomenon and context may not be clearly evident...
2. A case study
  - copes with the technical distinctive situation in which there will be many more variables of interest than data points, and as one result
  - benefits from the prior development of theoretical propositions to guide design, data collection, and analysis, and as another result
  - relies on multiple sources of evidence, with data needing to converge in a triangulating fashion. (p. 15)

Becoming more popular in the 21<sup>st</sup> century, qualitative research is most commonly found in “anthropology, sociology, the humanities, and evaluation” (Creswell & Creswell, 2018, p. 13). “Case studies are a design of inquiry found in many fields, especially evaluation, in which the researcher develops an in-depth analysis of a case, often a program, event, activity, process, or one or more individuals” (Creswell & Creswell, 2018, p. 14). Following the Yin (2018) model of case study research design, this study utilized what is referred to as the relativist perspective by “acknowledging multiple realities and having multiple meanings, with findings that are observer dependent” (p. 16). Furthermore, this study utilized what Yin described as the constructivist

approach in that I extrapolated the meaning from the insight provided by different participants in a way that brought light to my research topic. Instead of having preconceived notions of what the outcome would be, the participant responses defined and shaped the outcome of the study (Yin, 2018).

It is noted that case studies have the variables of time and activity in that researchers collect data in various methods over a specified amount of time for each case (Creswell & Creswell, 2018). Case study research is more commonly found in social sciences as well as the field of education (Yin, 2018).

As this study focused on the quality and effectiveness of a new emerging technology (VR) on online workforce development, a case study was the most appropriate methodology. Yin (2018) explained:

Case studies allow you to focus in-depth on a “case” and to retain a holistic and real-world perspective—such as in studying individual life cycles, small group behavior, organizational and managerial processes, neighborhood change, school performance, international relations, and the maturation of industries. (Yin, 2018, p. 5)

Specifically, this study focused on small group behavior and organizational processes through the utilization of VR in an online workforce development program by staff at a small non-profit organization. This study examined a contemporary phenomenon of which I had no control as the researcher; therefore, the case study method was deemed as most appropriate (Yin, 2018).

This qualitative case study utilized an exploratory embedded, single-case design. This was due to the lack of prior research or research design foundations for exploring immersive technologies such as VR and its impact on online workforce development and training. Ultimately this study sought to determine how and why VR affects online workforce

development and training. Yin (2018) noted, “but if you needed to know ‘how’ or ‘why’ the program had worked (or not), you would lean toward a case study or a field experiment” (p. 11).

As such this study does both. Yin further explained, “For case studies, this niche is when

- a ‘how’ or ‘why’ question is being asked about
- a contemporary set of events
- over which a researcher has little or no control. (p. 13)

As with any research method, there are also critics of this method and many regard case studies as inferior to an experiment or a survey. The most common concern about case study research is the perceived lack of rigor. Consideration has to be made to account for systematic processes and the limitation of bias or undue influence on study results (Yin, 2018). This rigor must come solely from the skills of the researcher. While there is no true test to validate or distinguish a researcher as a good case study researcher, Yin (2018) proposed the following basic list of values and skills needed by an individual for quality case study research:

- *Ask good questions* – and interpret the answers fairly.
- *Be a good ‘listener’* not trapped by existing ideologies or preconceptions.
- *Stay adaptive*, so that newly encountered situations can be seen as opportunities, not threats.
- *Have a firm grasp of the issues being studied*, even when in an exploratory mode.
- *Conduct research ethically*, from a professional standpoint but also by being sensitive to contrary evidence. (p. 82-83)

As the researcher, I self-assessed my skills and values according to this list and my knowledge and experience. In addition to conducting the research and the literature review for this study and completing the coursework in my doctoral program, I have extensive work experience that

validates the skills and values outlined in Yin's (2018) aforementioned list. I am a former certified Check & Connect Mentor and former certified Check & Connect Mentor Trainer from the University of Minnesota. I also obtained an InsideOut Coaching Certificate from Spillet Leadership University, a Coaching for Performance Certificate from University of North Carolina—Charlotte, and a Coaching Certificate and a Certified Professional of Talent Development (CPTD) from the Association of Talent Development (ATD). I completed all required as well as some advanced courses through the CITI Program via North Carolina State University all of which focused on active listening, adaptability, and/or ethical research. As such, I have developed and demonstrate a mastery of the skills and values outlined by Yin and can be identified as a good case study researcher. In addition, validated qualitative case study methods and procedures were considered and utilized in the design and implementation of this study.

This qualitative case study was conducted for the sole purpose of fulfilling the requirements of doctoral research for my degree program. As such, there were no competing interests and all funding related to this study was properly disclosed in the IRB application as well as to participants in their consent. Therefore, there was no undue influence on me as the researcher or any influence to the integrity of the data collection process. The potential perceived bias by me conducting a study on employees was adequately addressed and approved by the IRB as well.

### **Research Question**

This qualitative case study sought to explain how the incorporation of VR affects the quality and effectiveness of an online workforce development program by studying its impact on learner satisfaction at a non-profit organization. The following overarching research question was studied: How does the incorporation of VR affect the quality and effectiveness of an online workforce development program? This research question was further developed in the following

sub question: How do staff at a local non-profit perceive utilizing VR as part of an online workforce development program impacts learner satisfaction?

### **Data Sources**

Staff from a small non-profit organization focused on youth development were recruited to participate in the study. The non-profit organization has existed for over 20 years and during years with normal operations serve 2,000 to 3,000 kids annually. COVID significantly impacted those numbers. Also, as a result of COVID, staff size was temporarily affected. Staff size at the organization typically ranges from 35-55 employees depending upon school year or summer operations. Staff demographics vary related to age, gender, educational attainment level, job title, employment classification, and length of employment. At the time of the study, there were 25 staff members that made up the total population of operations staff at the organization. As such, there was an estimated sample size of 10-13 participants. Random simple sampling was used to select participants so that a diverse group participated in the study.

Participants had an opportunity to participate in an online workforce development program on public speaking. Their behaviors were recorded and played back to them prior to a semi-structured recall interview. Participants then answered seven interview questions that were cross-walked back to the research question as shown in Appendix F.

### **Data Collection**

Data collection for a case study consists of a bounded system that requires access to data, data access provided by a gatekeeper and/or trust of participants to provide data, defining the cases, defining the data that needs to be collected, determining how the data will be collected and recorded, and choosing the proper method for storing the data which will allow necessary access for the researcher (Creswell & Poth, 2018). Case study evidence is derived from six sources of

evidence: “documentation, archival records, interviews, direct observations, participant-observation, and physical artifacts” (Yin, 2018, p. 111). Yin (2018) further described four principles of data collection that should be followed to maximize the benefits of data from these six sources:

- Principle 1: Use Multiple Sources of Evidence
- Principle 2: Create a Case Study Database
- Principle 3: Maintain a Chain of Evidence
- Principle 4: Exercise Care When Using Data from Social Media Resources. (p. 126-136)

All of the principles were followed for this study.

For this study, documentation, interviews, and participant-observations were utilized. Upon approval from the Institutional Review Board (IRB) at North Carolina State University, data was collected through surveys and interviews. All participants were surveyed via Qualtrics on their personal and employment demographics and academic background. This initial survey concluded by asking participants to select their desired date and time for participating in their public speaking VR training session. Each participant received two time slots. The first time slot being a one-hour time slot for a public speaking VR training session, and the second time slot being a one-hour and fifteen-minute time slot for the follow-up interview with an approximately one hour break in between that allowed participants to review the recording of the session and reflect. During the public speaking VR training session, each participant was provided a safety briefing and a pre-study orientation on how to use the VR headset prior to participating in the soft-skill training session modules while I sanitized the equipment according to procedures documented in the COVID Additional Procedures as shown in Appendix E. The participants

participated in three predetermined modules focused on different skills and aspects of public speaking. The estimated time for each module was 8 minutes, 7 minutes, and 12 minutes, respectively. The first module was intended as a warm-up module that allowed participants to get used to the headset, as well as using the headset in conjunction with online learning geared toward improving participant public speaking skills by participating in impromptu speaking. The second module provided more intensive public speaking skill training and practice by focusing on literary techniques. The final module focused on the specific skill of eye contact of public speaking and was less intensive to wrap up the public speaking VR training session. The detailed descriptions of each module are shown in Appendix D. Each participant's VR session was video recorded. The recordings captured online and offline behaviors of the study participants during their participation in their public speaking VR training session. Following the training session, every participant received a video stimulated, semi-structured recall interview, which focused on exploring the participants' perceptions and experiences of the public speaking VR training session. The participants' interview data, as well as the observed behaviors of participants, provided data about participants' level of satisfaction and perceived ability to transfer learning to the workplace. These data were examined to understand how participants perceived the quality and effectiveness of the online workforce development program, which incorporated public speaking VR training.

### **Data Storage**

As noted in the four principles of data collection, creating a case study database and maintaining a chain of evidence should be followed in order to maximize the benefits of collected data. Qualtrics was used to store the demographic data which was then summarized and imported into NVivo, which is a computer-assisted qualitative data analysis software

(CAQDAS). The summarized demographic data and the transcribed interviews were both housed within NVivo, and then further analysis was completed within the database to help develop the research report provided in this study. This ultimately led to the development of researcher narratives that are detailed in the report. Furthermore, Yin (2018) noted that maintaining a chain of evidence from the case study questions, to the case study protocol, to the evidence, to the case study database, and to the case study findings helps to increase the construct validity of the study. Utilizing NVivo in this manner reduced the risk of losing data whether by human error or bias.

Each participant was assigned a pseudonym and all evidence related to each participant was added to a node to represent each individual. Organizing the data in this manner as well as using additional features of NVivo allowed for deeper analysis through visualization of the data.

### **Data Analysis**

“Whether using computer-assisted software or not, one starting point for any analysis is to ‘play’ with your data. You are searching for patterns, insights, or connects that seem promising” (Yin, 2018, p. 167). Yin (2018) described four general strategies for this type of analysis as:

1. Relying on theoretical propositions.
2. Working your data from the ‘ground up.’
3. Developing a case description.
4. Examining plausible rival explanations. (p. 168-172)

According to Yin (2018), the eventual explanation is likely to result from a series of iterations:

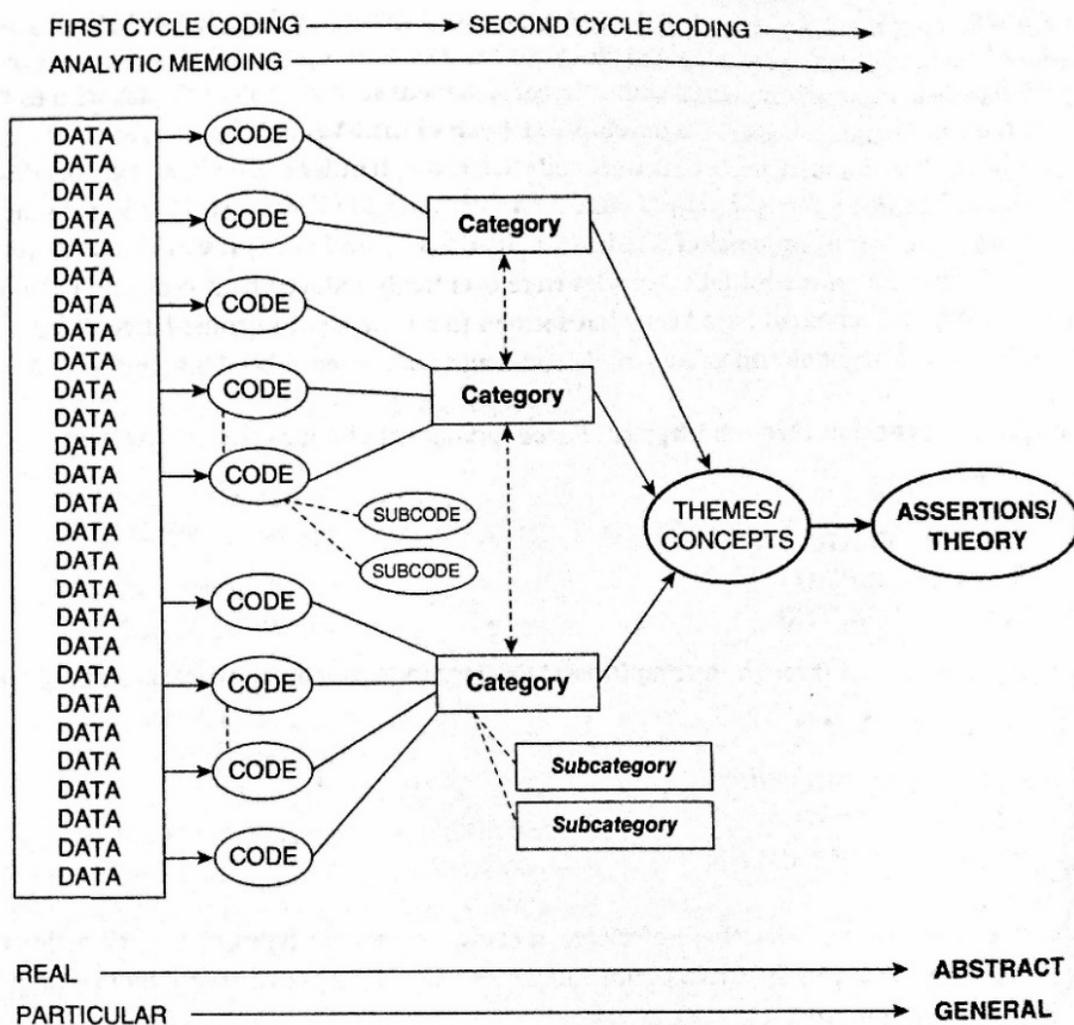
- Making an initial but tentative theoretical statement or explanatory proposition
- Comparing the data from your case study against such a statement or proposition

- Revising the earlier statement or proposition
- Comparing other details of the case against the revision
- If doing a multiple-case study, comparing the revision from the first case with the data from *a second, third, or more cases*, leading to further revisions
- Repeating this process with the other cases as many times as needed. (p. 180)

Researcher Saldaña's (2021) streamlined codes-to-theory model for qualitative inquiry was utilized for data analysis. The visual representation of Saldaña's model in Figure 6 shows data were processed through multiple cycles of coding to arrive at categories, themes, and finally assertions for this study. Specifically, in vivo coding was used for the first cycle of coding. Next, structural coding was used to code the recorded virtual participation behaviors identified by the participants and the remaining interview questions. Then, a focused coding method was utilized for a qualitative thematic analysis with the interview data focused on participant satisfaction through the themes of active learning theory, motivation, and immersion. These analyses were combined to gather descriptive evidence on participant perceptions of the quality and effectiveness of VR components being incorporated into an online workforce development program.

I transcribed the interviews, and then read them each in their entirety. I next converged all data, including the interview transcriptions, self-observations, field notes, participant demographics, and any archival records obtained. These data were entered into the CAQDAS for coding and analysis as summarized in the Data Storage Section of this chapter.

Figure 6

*Streamlined Codes to Theory Model for Qualitative Inquiry*

Note. Adapted from *The coding manual for qualitative researchers* (4th ed.) by J. Saldaña, 2021, p. 298.

To answer the overarching research question, I triangulated the data and examined themes related to the theoretical framework of this study which connected to the overall quality and effectiveness of incorporating VR in an online workforce development program. To answer the sub-question, I also triangulated the data, but focused on themes related to each of the

variables, because “by developing convergent evidence, data triangulation helps to strengthen the construct validity of your case study. The multiple sources of evidence essentially provide multiple measures of the same phenomenon” (Yin, 2018, p. 128).

The analytic technique utilized for the case study analysis was pattern-matching logic. “For case study analysis, one of the most desirable techniques is to use a pattern-matching logic” (Yin, 2018, p. 175). This allowed for comparisons of empirical based patterns and predicted patterns. “If the empirical and predicted patterns appear to be similar, the results can help a case study to strengthen its *internal validity*” (Yin, 2018, p. 175).

Patterns of the case were analyzed to explain how and why the incorporation of VR improves the quality and effectiveness of workforce development (Yin, 2018). To examine the collected data, three cycles of coding were utilized. The first cycle of the coding process was to analyze the data, while the second cycle was to synthesize the data (Saldaña, 2021). “Synthesis combines different things in order to form a new whole, and it is the primary heuristic for transitioning from coding to categorizing (and from categorizing to other analytic syntheses)” (Saldaña, 2021, p. 13). After categorizing, a thematic analysis of the codes was completed which prepared the data for the pattern-matching logic to derive final assertions from the case study. This process was represented in Figure 6, which summarized the process followed in what is described as a streamlined codes to theory model for qualitative inquiry by Saldaña.

## **Chapter Summary**

With the increased use of technology—specifically the dependence on online learning for workforce training and development—improving its quality and effectiveness for organizations needs to be further explored. In this study, staff, and their perceptions of the utilization of VR for online workforce soft-skills training and its impact on learner satisfaction, as measured by

motivation and immersion at a non-profit organization was examined. This chapter details the methodology used for this case study as well as the research design. I established case study procedures and considerations that were intended to improve the validity and reliability of the study with particular focus on data collection and analysis. A qualitative study approach was used “because we need a complex, detailed understanding of the issue” (Creswell & Poth, 2018, p. 45), which can only be done by talking directly with the staff in their workplace setting and allowing them to share their experiences freely as there has not been enough studies on this topic in previous literature (Creswell & Poth, 2018). This study enables us to develop an understanding of a new phenomenon.

## CHAPTER 4: FINDINGS

### Introduction to the Chapter

This chapter provides the results and explains the findings of the study based on the perceptions of staff at local non-profit and how VR affects the quality and effectiveness of an online workforce training program. It provides a discussion of themes that were discovered through data analysis. Applicable themes are discussed in detail and other themes are noted as possible topics for future research. The following sections address the results from the qualitative elements of the study that are included in the overarching research question as well as the sub-question.

### *Participant Demographics*

Purposeful sampling was used to select a sample of participants from a non-profit organization. The demographics of the nine participants are displayed in Table 2. Participants chose their own pseudonyms. Each participant's chosen pseudonym is listed in the table along with details of each individual's personal, employment, and educational attainment level demographics. The table also presents data on participant age, length of employment, employment status, ethnicity, race, gender, and educational attainment. A narrative summary of each of the participants is provided below as well as additional insights from my notes recorded during each of the participant interviews.

**Becky.** Becky was a 35–44-year-old and identified as female. The participant's ethnicity and race were non-Hispanic and African American. The highest level of education completed was a high school diploma or GED. The participant was a full-time employee for the non-profit organization with a length of employment between four to six years.

**Iron Man.** Iron Man was a 25–34-year-old and identified as male. The participant's ethnicity and race were non-Hispanic and African American. The highest level of education completed was a bachelor's degree. The participant was a full-time employee for the non-profit organization with a length of employment between one to three years.

**Life Lessons.** Life Lessons was a 55–64-year-old and identified as female. The participant's ethnicity and race were non-Hispanic and White. The highest level of education completed was a bachelor's degree. The participant was a full-time employee for the non-profit organization with a length of employment of seven or more years. This participant wore glasses, indicated a hearing impairment, and wore hearing aids, and indicated problems with balance during the course of the study.

**Maze.** Maze was a 25–34-year-old and identified as female. The participant's ethnicity and race were non-Hispanic and African American. The highest level of education completed was a high school diploma or GED. The participant was a part-time employee for the non-profit organization with a length of employment between one to three years. This participant wore glasses, indicated having a speech impediment as a child, and described anxiety triggered by lack of awareness of surroundings during the course of the study.

**Smith.** Smith was a 25–34-year-old and identified as female. The participant's ethnicity and race were non-Hispanic and African American. The highest level of education completed was some college, but no degree was obtained. The participant was a full-time employee for the non-profit organization with a length of employment between one to three years. The participant wore glasses during the study.

**Subject A.** Subject A was a 25–34-year-old and identified as female. The participant's ethnicity and race were Hispanic and White. The highest level of education completed was a

graduate or professional degree (MA, MS, MBA, PhD, JD, MD, DDS). The participant was a full-time employee for the non-profit organization with a length of employment between one to three years.

**Superman.** Superman was a 35–44-year-old and identified as male. The participant's ethnicity and race were non-Hispanic and African American. The highest level of education completed was an associate or technical degree. The participant was a full-time employee for the non-profit organization with a length of employment of seven years or more. The participant indicated they had a speech impediment as a child during the course of the study.

**Superwoman.** Superwoman was a 35–44-year-old and identified as female. The participant's ethnicity and race were non-Hispanic and White. The highest level of education completed was a bachelor's degree. The participant was a full-time employee for the non-profit organization with a length of employment of seven years or more.

**Thor.** Thor was a 35–44-year-old and identified as male. The participant's ethnicity and race were non-Hispanic and African American. The highest level of education completed was a bachelor's degree. The participant was a part-time employee for the non-profit organization with a length of employment between four to six years.

### ***Findings***

The findings for this study were developed from an analysis of primary data collected from participant surveys, observations, and video stimulated, semi-structured recall interviews. The analysis of the interview data from the transcripts, which also included self-observed behaviors of the participants, was converged and triangulated with the theoretical framework of the study. Participants were all from the same non-profit organization.

**Table 2***Demographic Summary of Study Participants*

Person	Age	Education	Employment status	Ethnicity	Gender	Length of employment	Race
Becky	35-44	High school diploma or GED	Working full-time	No	Female	4-6 years	Black or African American
Iron Man	25-34	Bachelor's degree	Working full-time	No	Male	1-3 years	Black or African American
Life Lessons	55-64	Bachelor's degree	Working full-time	No	Female	7 years or more	White
Maze	25-34	High school diploma or GED	Working part-time	No	Female	6 months or less	Black or African American
Smith	25-34	Some college, but no degree	Working full-time	No	Female	1-3 years	Black or African American
Subject A	25-34	Graduate or professional degree (MA, MS, MBA, PhD, JD, MD, DDS)	Working full-time	Yes	Female	1-3 years	White
Superman	35-44	Associate or technical degree	Working full-time	No	Male	7 years or more	Black or African American
Superwoman	25-34	Bachelor's degree	Working full-time	No	Female	7 years or more	White
Thor	35-44	Bachelor's degree	Working part-time	No	Male	4-6 years	Black or African American

## First Cycle of Coding

In vivo and structural coding were used for the first cycle of coding. Saldaña (2021) explained, “in vivo coding is appropriate for virtually all qualitative studies, but particularly for beginning qualitative researchers learning how to code data, and studies that prioritize and honor the participant’s voice” (p. 138). Saldaña described structural coding as “appropriate for virtually all qualitative studies, but particularly for those employing multiple participants, standardized or semi-structured data-gathering protocols, hypothesis testing, or exploratory investigations to gather topics lists or indexes of major categories or themes” (p. 130). Data from nine Zoom interviews resulting in 938 quotations were analyzed using in vivo coding and are displayed in Table 3. The first cycle of coding supported 1,690 references during the coding process. The number of codes by each participant ranged from 68 to 146 depending upon the brevity or elaboration provided by the participant during the interview.

**Table 3**

*In Vivo Coding Summary by Participant*

Participants	Number of codes	References in quotation	Coding cycle
Becky	68	110	1st
Iron Man	109	188	1st
Life Lessons	66	110	1st
Maze	121	223	1st
Smith	125	240	1st
Subject A	104	192	1st
Superman	146	270	1st
Superwoman	80	131	1st
Thor	119	226	1st
Total	938	1690	

The 938 in vivo codes were then grouped using structural coding into six clusters which are displayed in Table 4. Saldaña (2021) explained, “structural coding both codes and initially categorizes the data corpus to examine comparable segments’ commonalities, differences, and relationships” (p. 130). As shown in Table 4, the structural coding helped form the six clusters of in vivo codes based on the interview questions supported by 404 references during the coding process. This was done to help see the commonalities and differences of the answers by each participant’s interview data (Saldaña, 2021).

**Table 4**

*Structural Coding Summary by Interview Question*

Structural code	Coding cycle	Files	References
Observation	1st	9	127
Impact	1st	9	105
Advantages	1st	9	53
Disadvantages	1st	9	17
Motivation	1st	9	47
Immersion	1st	9	55

**Second Cycle of Coding**

After the first cycle of coding, a second cycle of coding was conducted to form a structure that allowed the data to be synthesized. Saldaña (2021) stated:

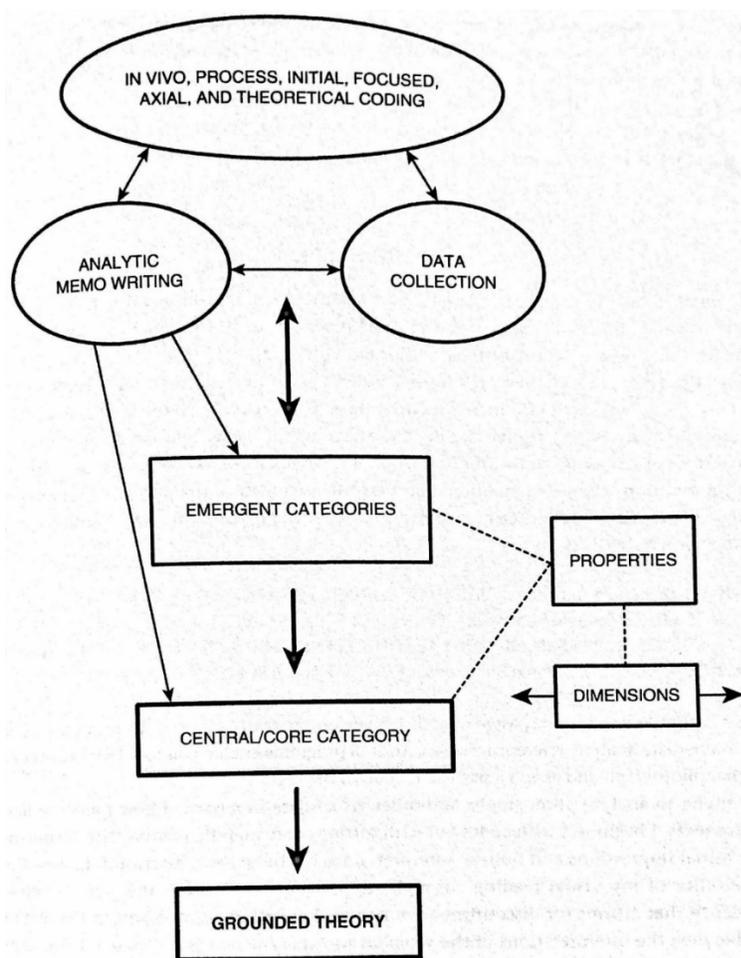
Rarely will anyone get coding right the first time. Qualitative inquiry demands meticulous attention to language and images, and deep reflection on the researcher-constructed patterns and meanings of human experience. Recoding can occur with a more attuned perspective using first cycle methods again, while second cycle methods describe

those processes that might be employed during the second (and third and possibly fourth, etc.) review of data. (p. 15)

As such, recoding was done utilizing the focused coding method which is also considered part of grounded theory coding (Saldaña, 2021). A graphical summary of this coding cycle and process is detailed and shown in Figure 7.

**Figure 7**

*An Elemental Model for Developing “Classic” Grounded Theory*



*Note.* Adapted from *The coding manual for qualitative researchers* (4th ed.) by J. Saldaña, 2020, p. 203.

Figure 7 shows how the data collected flow through the coding cycles and eventually lead to categories that are utilized to help develop grounded theory. “Focused coding follows in vivo process, and/or initial coding—first cycle grounded theory coding methods—but it can also be applied with other coding methods to categorize the data” (Saldaña, 2021, p. 303).

The second cycle of coding produced four categories as displayed in Table 5. Three of the four categories were attributes of active learning, directly or indirectly, which was the theoretical framework of the study. One additional code was developed for an outlying category.

**Table 5**

*Second Cycle Focused Coding Summary by Categories Resulting from First Cycle Coding*

Focused code	Coding cycle	Files	References
Learner-centered approach	2nd	8	35
Learner satisfaction	2nd	8	42
Active learning theory	2nd	9	64
Transfer of learning	2nd	5	7

References to active learning from the participants appeared 141 times in the qualitative analysis of the in vivo coding derived from the interviews. This is shown by combining the first three focus code references (learner-centered approach, learner satisfaction, and active learning theory) in Table 5. While transfer of learning was not directly identified in the research question, seven references to transfer of learning were identified in five different participant quotations which suggests that VR also affects learning transfer in the workplace as shown in Table 5. Interestingly, every participant referenced an aspect of active learning because of their participation in the study, indicating VR does incorporate active learning.

Finally, a third and final cycle of coding was conducted with a method described as the second cycle cumulative coding method (Saldaña, 2021). A summary of this final cycle is displayed in Table 6.

**Table 6**

*Third Cycle Cumulative (Pattern) Coding Method Summary*

Pattern code	Coding cycle	Files	References
Quality	3rd	9	35
Effectiveness	3rd	9	152
Poor design and implementation	3rd	5	9
Learner dissatisfaction	3rd	6	13
Lack of access	3rd	1	1
Emerging technology	3rd	3	5
Physical discomfort	3rd	3	8

As displayed in Table 6, this final cycle produced a total of seven patterns that appeared 223 times in the qualitative analysis. These seven patterns identified were then synthesized. Saldaña (2021) described, “second cycle cumulative coding methods attempt to synthesize the analytic work from first coding methods. These three approaches do not just build on previous codes but integrate them into richer, condensed forms of meaning” (p. 321). In addition, Saldaña noted, “pattern coding develops a ‘meta code’—the category/conceptual label that identifies similarly coded data. Pattern codes not only organize the corpus but attempt to attribute meaning to that organization” (p. 321). Each focus code was grouped using pattern coding into two categories outlined in the overarching research question: quality and effectiveness. These categories allowed for a deeper analysis of the data, while also consolidating the previous coding structures to codes that directly examined the variables outlined in the research question. These

codes allowed me to discover themes that contributed to quality and effectiveness. However, the data analysis also revealed five additional patterns with 36 references that imply a negative effect on the quality and effectiveness of public speaking VR training. These patterns are detailed in the discovery of outlying themes and should be further examined and explored in future research to gain a better understanding of the impact.

### **Findings by Research Question**

This qualitative case study aimed to explain how the incorporation of VR affects the quality and effectiveness of an online workforce development program, by its effect on learner satisfaction at a non-profit organization. The following overarching research question was studied: How does the incorporation of VR affect the quality and effectiveness of an online workforce development program? The pattern coding summary displayed in Table 6 shows that all nine participants made references that were attributed to quality and effectiveness with 187 references.

The overarching research question was further developed in the following sub question: How does staff at a local non-profit perceive utilizing VR as part of an online workforce development program impacts learner satisfaction? The focused coding summary displayed in Table 5 shows that eight of the nine participants in the study indicated they experienced learner satisfaction with their public speaking VR training experience as referenced in 42 quotations.

Through qualitative data analysis, the findings provided answers to the overarching research question and sub-question through four themes that emerged which were in alignment with the theoretical framework of this study: active learning theory. These themes were then synthesized to specifically answer how VR affects quality and effectiveness of public speaking training. Five outlying themes were also discovered which could potentially negatively impact

quality and effectiveness, so they were noted as areas where further research can be focused in the future. Overall, each participant shared ways that public speaking VR training demonstrated aspects of active learning, positively impacted their satisfaction as a learner, and ultimately contributed positively to the quality and effectiveness of the online workforce development program.

### **Identification of Themes**

During data collection, participants observed their recorded behaviors during a public speaking VR training session on public speaking. Next, they shared their perspectives on the experience and how it impacted their public speaking skill development during a semi-structured interview. The interview questions focused on the following topics, which also served as the initial codes and themes examined during the first cycle of coding: observation, impact, advantages, disadvantages, motivation, and immersion. From there, the second cycle of coding helped categorize the data into four themes directly related to active learning theory: learner-centered approach, learner satisfaction, active learning theory, and transfer of learning. The third and final cycle of coding helped to synthesize the data into the themes contained in the research question, which were quality and effectiveness. Four additional minor themes were also noted, but they were not considered major for purposes of this study. Those minor themes were poor design and implementation, learner dissatisfaction, lack of access, emerging technology, and physical discomfort, and could all potentially negatively impact quality and effectiveness. The latter themes warrant additional future research. Figure 6 in Chapter 3 displays a visual overview of the process outlined above.

This process produced 938 in vivo codes, six structural codes, four focused codes, and seven pattern codes for a total of 955 codes that were referenced 2,465 times in the analysis of

the nine participant interviews to determine the impact of VR on public speaking skills. Table 7 presents the frequency of the focused and pattern codes that eventually became major themes from the participants responses.

**Table 7**

*Focused and Pattern Codes and Major Themes*

Code	References in quotation	Coding cycle	Example response
Learner-centered approach	35	2nd	“Everything involved in the training was geared towards me” (Superman).
Learner satisfaction	42	2nd	“Fact that it was enjoyable, made me want to continue with the sessions” (Superwoman).
Active learning theory	64	2nd	“I realized a lot, I just figured out a lot in the 40 minutes about even though it wasn’t real, I felt like it as real” (Iron Man).
Transfer of learning	7	2nd	“The immediate feedback, you know, told me things that I can improve in, that I get to literally do today with my, my kids” (Subject A).
Quality	35	3rd	“With virtual reality, you know people are actually moving, you know, they are moving, and it feels real. And, and it really puts you in that setting of who you’re speaking to, and what you’re getting ready to do versus you sitting in your living room, kitchen table, in your office. It makes a difference on that” (Thor).
Effectiveness	152	3rd	“That experience was needed” (Becky).
Total	335		

## **Major Themes**

The frequency of the responses from participants as well as examples of the in vivo codes related to each code are displayed in Table 7. The next sections provide more details on the six themes of learner-centered approach, learner satisfaction, active learning theory, transfer of learning, quality, and effectiveness.

### ***Learner-Centered Approach***

Learner-centered approach refers to the necessity that learning be focused on the learner and their individual needs as opposed to a one-size-fits-all approach. This is a key difference between child and adult learning theories. As noted in the concept of andragogy by Malcolm Knowles (1978)—which was the basis and core for later adult learning theories including active learning theory—adults are self-directed learners. As such, the traditional methods of instruction are not desired by adult learners and ultimately are not as effective as methods developed that center the needs of the learner. In this study, participants were able to engage in a learner-centered individualized VR training session on public speaking skills.

In the analysis of the data, eight of the nine participants attributed the learner-centered approach to their experience with 35 references (see Table 5). Many of the participants mentioned they were “hands-on” learners or preferred a “hands-on” approach to learning. However, the most direct quotes related to the learner-centered approach were from Superman who referenced the concept 12 times in his interview. He shared that the public speaking VR training session “gave me all of the control” and that “everything involving the training was geared towards me. I was focused.”

### ***Learner Satisfaction***

Learner satisfaction is an important factor in any learning, but especially adult learning. It is a major component of most adult learning theories. The literature describes learner satisfaction primarily as a by-product of learner motivation. It is also a major factor of online learning and workplace learning theories such as the expectancy theory of adult learning in the workplace, the unified theory of acceptance and usage of technology (UTAUT), and the technology acceptance model (TAM).

In the analysis of the data, eight of the nine participants described satisfaction with their learning experience with 42 references (see Table 5). The majority of the participants indicated directly or indirectly that they were satisfied with the public speaking VR training experience. The most notable references came from interviews with Maze and Superwoman. Maze noted, “I prefer the VR over traditional” when discussing the advantages of VR over traditional online training methods. Superwoman said, “unless you’re just not talking, you’re not paying attention or asleep, you’re reaping benefits.” She added, “the fact that it was enjoyable, made me want to continue with the sessions” in reference to her VR training experience.

### ***Active Learning Theory***

Active learning theory was the primary theory utilized for the conceptual framework for this study. VR is a new and emerging technology that has yet to have any substantive research related to how it fits in and/or can be used to incorporate adult learning theories. The immersiveness and interactivity of this technology can be more effectively examined through the lens of active learning and active learning theory due to the belief that this theory can increase learner motivation and transfer of learning (Cattaneo, 2017). This study examined how VR can

do this as it incorporates and can easily adapt to the active learning methodologies of project-based, problem-based, inquiry-based, case-based, and discovery-based learning (Cattaneo, 2017).

In analyzing the data, each of the nine participants described their experiences connected to active learning theory with 64 references (see Table 5). All participants referenced one or several of the active learning methodologies. Most interestingly, the feeling of the public speaking VR training experience being real or as close to real as possible positively impacted participant learning. Smith had 12 different references noted, such as “you’re active, you’re able to participate and be a part of something” and “I was engaged in it, because it seems so, so real.” Subject A explained, “I think having that in person feeling, it kind of added ... a chip to my shoulder ... made me more confident in speaking again.” Iron Man also shared his perspective active learning when he said, “I realized a lot. I just figured out a lot in the 40 minutes ... Even though it wasn’t real, I felt like it was real.” He went on to say, VR “is so, so hands-on ... that this right here ... this might be it for them. This might be the spark, this might be the motivation, not only for me” as he shared how he believes VR could not only be used for employee workforce development training, but also for youth. Discovery-based learning was referenced by Thor when he stated, “coming in here and not having a game plan put me in a situation where I had to respond to the best of my ability. It kind of made me just think a lot.”

### ***Transfer of Learning***

Adult learning theorists, such as cognitivists, also support the belief that active learning theories can increase student motivation, knowledge retention, and transfer of learning (Schunk, 2019). While it was not intended for this variable to be directly validated in this study, transfer of learning is an attribute of active learning, as well as the overall quality and effectiveness of online workforce development training. In essence, the overall goal for organizations is for

employees to be able to transfer what they learn directly to the workplace to improve performance.

In the analysis of the data, five of the nine participants explained how transfer of learning was applicable from their public speaking VR training experience with seven references (see Table 5). Expectedly since this was not a variable directly explored in this study, fewer participants described their perspectives on how VR affected transfer of learning, but it is important to note that many of the participants references were attributed to this theme. Superman explained that VR could be utilized as “just in time training.” Participants specifically talked about how to transfer the learning, such as when Iron Man shared, “I would really put what they tell us into action.” The same was seen with Smith as they shared, “I’m able to read it, it was easy to transfer it to do it, put it into action.” Subject A implied she would transfer learning immediately to the workplace when she said, “the immediate feedback, you know, told me things that I can improve in, that I get to literally do today with my kids.”

### ***Quality***

The major focus of this study was to determine how the incorporation of VR affects the quality and effectiveness of an online workforce development program. The limited research available regarding online learning in the workplace identified proper course design and development as major issues that need to be explored further through research. As such, this study’s aim was to gain a better understanding of general learning principles, but especially adult learning principles in online course design and the incorporation of an immersive technology in doing so. The shift from traditional learning to online learning left little to no thorough research on how to properly incorporate these elements into online workforce development (Arghode et al., 2017); therefore, the final coding analysis of the data was pattern matching coding to align

participant responses to quality and effectiveness, and examine the outcomes to explain how VR affects the quality and effectiveness of an online workforce development program.

In the analysis of the data, each of the nine participants indicated that the public speaking VR training session affected the quality and effectiveness of the online workforce development program with 35 references to quality and 152 references to effectiveness (see Table 6).

Quality can be derived from many of the examples and references provided in other sections. However, a few references not already referenced that spoke directly to the quality of public speaking VR training were seen in comments made by Thor. He said:

With VR, you know people are actually moving ... they are moving, and it feels real.

And, and it really puts you in that setting of who you're speaking to, and what you're getting ready to do versus you sitting in your living room, kitchen table, in your office. It makes a difference on that. (Thor)

Subject A also referenced this when she stated, "it makes it feel ... as real as possible without having an actual audience." Iron Man also noted, "and then I take the VR, and it's like, all your attention is ... in VR.

### ***Effectiveness***

Effectiveness can also be derived from past examples and references to the aforementioned themes. All of the participants had an opportunity to share what impact the VR training session had on their public speaking skills and shared that the experience had a positive impact. Becky said, "that experience was needed" and that she "found it helpful." Iron Man shared, "my public speaking skills are not that good. But that showed me how not good they were ... I know that they weren't in the past, but just watching myself." Life Skills noted several areas where she would like to improve her skills after the experience which implies the public

speaking VR training was effective for her as well. She explained, “I would like to present different body language ... I would understand my speech time better and so I think I would be just a little bit better prepared for that” (Life Skills). Maze explained, “I got to remind myself like, sit still. Stand up straight. You know what I mean? Relax your shoulders ... Now that I know how I stand and look while I’m talking, a lot will change.” Smith shared that the public speaking VR training experience was “helpful as a whole because you’re able to enhance your public speaking.” Subject A expounded on her experience when she shared, “from today ... I’ve already improved my public speaking ... I think this ... prepared me for my [omitted] meeting for tomorrow.” Superman referenced how his experience with the public speaking VR training positively impacted him personally from his childhood. He explained:

Growing up, I had a speech impediment, you know, and I used to stutter very bad. So to be able to see, you know, that the speed that I normally used to do when I had speech impediment, is lower than what it was, then that's a major plus ... my hesitation and my words were super low. I mean ... I don't you know, 377 that was, that's good. So, you know, that part showed me, you know, that I've made progress over the years in my public speaking. (Superman)

Superwoman also had a different perspective as she shared that the public speaking VR training session, “helps me in a comfortable setting to become more aware of my shortcomings in public speaking.” Finally, Thor stated:

I’m just saying it can help me in my position, it can help me and I know it’d be beneficial ... But on my day to day, I know it’s going to help me because I speak to a large group every day and I can see the things that I was not doing after I finished the program ... I had a good time and I’m still nervous, but it’s all for good reason. It’s all for good reason.

## **Conclusion**

This study explored how employees at a local non-profit organization perceived their experience of a public speaking VR training session and how it affected the quality and effectiveness of an online workforce development program. Nine employees at a non-profit organization participated in the study. Each participant participated in an online public speaking VR course comprised of three pre-selected modules. Upon completion of the public speaking VR training, participants were able to watch a video recording of themselves in the VR experience and participate in a video stimulated, semi-structured recall interview via Zoom. Through the interviews, participants were able to share their experiences and perspectives on how the VR training session impacted the quality and effectiveness of the online workforce development program on public speaking.

## **Chapter Summary**

This process produced 938 in vivo codes, six structural codes, four focused codes, and seven pattern codes for a total of 955 codes that were referenced 2,465 times in the analysis of the nine participant interviews to determine how public speaking VR training affects the quality and effectiveness of an online workforce development program.

The six focused codes were developed from the interview questions regarding observation, impact, advantages, disadvantages, motivation, and immersion. As part of the interview questions all participants contributed data to each of the six areas examined in the interview questions.

Then, the four focused codes were derived from the conceptual framework and active learning theory and were learner-centered approach, learner satisfaction, active learning theory, and transfer of learning. The existing codes were used to arrive at these four focused codes.

Next, the structural codes led to the seven pattern codes of which two were the main focus of the analysis and synthesis of the study: quality and effectiveness. The outlying five codes of poor design and implementation, learner dissatisfaction, lack of access, emerging technology, and physical discomfort will be discussed in Chapter 5 as implications for further research.

Finally, after the analysis was complete there were several conclusions derived from the insight of the nine participants in the study as well as the implications for further research which are all covered in detail in Chapter 5.

## **CHAPTER 5: CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS**

### **Introduction to the Chapter**

Chapter 5 provides an in-depth discussion of the data analysis and resulting findings that were detailed in Chapter 4. The conclusions drawn from the findings are addressed. The conclusions are presented through the conceptual framework lens of evaluation (New World Kirkpatrick Model) and the theoretical framework lenses of Bloom's Taxonomy and active learning theory. Then the implications of the findings for practice as it relates to quality and effectiveness and further theory development are discussed.

This qualitative single-case study explored how the incorporation of VR affects the quality and effectiveness of an online workforce development program, by its effect on learner satisfaction at a non-profit organization. This chapter presents the conclusions, implications for practice and theory, and recommendations for further research. All of which will contribute to the limited literature related to VR and its impact on online workforce development and training, as shared from the perspectives of staff at a local non-profit organization.

Non-profit organizations are vital organizations in the world today. Their goal is similar to all organizations in that they seek to fulfill their mission, vision, and purpose for their stakeholders. The primary difference between non-profit and for-profit organizations is how revenue is distributed. Revenues for non-profits are expected to be minimal if even existent. Non-profits budget to break even yearly, which is in stark contrast to for-profit organizations that focus on maximizing revenue that can be returned to shareholders. Non-profit organizations budget differently because the intent is that all revenue should directly support the mission and services provided by the organization. As such, expenses and costs are always scrutinized. Unfortunately, this often means that investment in staff development is minimal or nonexistent.

To cut costs, many non-profit organizations, as well as other types of organizations, have implemented online learning. This is due to organizations being required to focus on continuous improvement which requires continuous learning while keeping costs at a minimum (Nafukho et al., 2017). Providing continuous training also requires a commitment to quality and effectiveness to ensure online workforce development programs produce the desired outcomes of a ready and willing workforce equipped with the skills needed in the 21st century.

Prior research reveals that reaching the ultimate goal of transfer of learning in the workplace is influenced by several factors, such as the design of training, learner attributes, and environmental factors of the workplace (Nafukho et al., 2017). Organizations can fail to achieve transfer of learning effectively. This is critical as organizations were already struggling to attract, train, and retain qualified employees, but the COVID-19 pandemic has exacerbated this issue. Organizations are struggling to find a 21st century competent and job ready workforce. Even worse, with so many unfilled positions, organizations are struggling even harder to keep talent from being recruited to higher paying competitors. This makes it even more critical for organizations to ensure they have high quality online workforce development programs that demonstrate a positive ROI. Consequently, a way that these issues can be addressed is developing a better understanding of how the utilization of immersive technologies impacts online workforce development.

To understand how specifically the incorporation of VR improves the quality and effectiveness of an online workforce development program, this study examined the perspectives of staff at a local non-profit organization who completed a public speaking training module in VR as a part of an online workforce development program. Developing this understanding can inform organizations—such as non-profits where budget and costs are always a major concern

for sustainability—how to improve the impact of online workforce development programs by incorporating immersive technologies such as VR. Carruth and Carruth (2012) explained:

The future success of individuals, as well as the country as a whole, will, in large part, be determined by the success of online learning and how using technology translates into meeting the needs of businesses for an adequately trained and educated workforce. (p. 717)

To enhance the development and implementation of online workforce development programs and provide the necessary outcomes of a 21st century competent and job-ready workforce, this study examined the perspectives of staff at a non-profit about their VR training sessions and how they perceived it affected their development of public speaking skills.

## **Conclusions**

### ***Evaluation (New World Kirkpatrick Model)***

The New World Kirkpatrick Model was designed to provide a practical and modern way to evaluate the effectiveness of workforce development (Kirkpatrick & Kirkpatrick, 2016). The four levels of the model include: 1) learner's reaction, 2) learning, 3) behavior, and 4) results (Kirkpatrick Partners, 2018). The design of this case study, including the public speaking VR training session, observations, and semi-structured recall interview questions, were developed in a manner intended to evaluate as many aspects of these levels as possible given the short period of time. Due to the time constraint, I understood and accepted that there would not substantive data addressing level four since a longitudinal study is most appropriate for evaluating this level. Pattern matching logic was used for the case study analysis. In considering the quality and effectiveness of the public speaking VR training as part of an online workforce development

program, the connections between the participant perspectives and the New World Kirkpatrick Model of Evaluation were evident and produced several conclusions.

**Level 1: Reaction.** Level 1 of the New World Kirkpatrick Model is described as “the degree to which participants find the training favorable, engaging, and relevant to their jobs” (Kirkpatrick & Kirkpatrick, 2016, p. 39). The three components of this level are identified as “engagement, relevance, and customer satisfaction” (Kirkpatrick & Kirkpatrick, 2016, p. 41). Participants utilized public speaking VR training as part of an online workforce development program and their interview responses described how the utilization of VR positively enhanced their online learning experience. As demonstrated in the findings, participants specifically quoted how VR engaged them in the learning experience in ways not normally experienced with traditional online workforce development programs. In addition, the relevance of this immersive experience and the effect of experiential learning that was fostered by VR significantly impacted the relevance of the public speaking training. Many shared details of how this training could and would be utilized in their roles, which bolstered the relevance of VR. In fact, many of the participants enjoyed the experience so much, comments were made indicating they would like to further develop their public speaking skills in the training they experienced utilizing VR soon. Finally, all of the questions were structured to extrapolate the participants’ perception of how utilizing VR as part of their online workforce development program impacted their satisfaction as a learner. As seen from the patterns and identification of the major theme of learner satisfaction from the data analysis, participants’ attitudes toward VR were that it positively impacted their satisfaction in ways online learning could not alone.

**Level 2: Learning.** Level 2 in the model is described as “the degree to which participants acquire the intended knowledge, skills, attitude, confidence, and commitment based on their

participation in the training” (Kirkpatrick & Kirkpatrick, 2016, p. 42). The five components of this level are identified as “knowledge, skill, attitude, confidence, and commitment” (Kirkpatrick & Kirkpatrick, 2016, p. 48). Participants described how engaging in just three short VR modules impacted their public speaking skills. Participants used terminology and skills that were taught in the training during their interview sessions as they described their experiences and how it impacted their skills. They often repeated skills, tips, and cues shared in the modules that shows participants immediately retained knowledge and skills from the training. While this was a new experience for most participants as revealed in the interviews, they described nervousness and other feelings that were attributed to the natural feelings typically experienced with public speaking. However, the safety and privacy of the VR training allowed them to learn and practice in a manner that boosted their self-esteem and their confidence with public speaking. Participants remarked how they felt they experienced immediate improvements that could be seen as they got more comfortable and further into the lessons. The immediate feedback and coaching provided by the VR experience was referenced often which also contributed positively to their attitudes, confidence, and even commitment to further developing their public speaking skills with VR. These positive effects are often seen with just-in-time training and the ability to use the VR headset anytime and anywhere could also be seen and categorized as just-in-time training if desired or necessary. Participants shared how they were eager to do more of the VR public speaking training and shared specific examples of how they would use the training personally and/or with other stakeholders in the organization ranging from staff training, board training, and even youth development.

**Level 3: Behavior.** Level 3 is described as “the degree to which participants apply what they learned during training when they are back on the job” (Kirkpatrick & Kirkpatrick, 2016, p.

49). It is further explained that “Level 3 behavior is the most important level because training alone will not yield enough organizational results to be viewed as successful” (Kirkpatrick & Kirkpatrick, 2016, p. 59). As a result, there are four elements of this level that are presented as required drivers: (a) monitoring, (b) reinforcing, (c) encouraging, and (d) rewarding (Kirkpatrick & Kirkpatrick, 2016). Level 3 of the model could not be directly evaluated in this study as a longitudinal study would be necessary to adequately analyze the effects of VR on actual behavior in the workplace; however, as noted in the literature, the presence of the required drivers leads to the ability to collect the necessary data needed to analyze this level of evaluation. Participants in this study remarked how the public speaking VR program allowed their performance to be monitored by the technology and that immediate feedback was provided during the training. They noted how this helped them to see their progress and improvement during the sessions as they began to self-correct and implement the skills learned in the training. This has implications in that this type of training helped reinforce the skills and desired outcomes of the training in ways that could not be accomplished with online training alone. In sharing about this experience, some participants also explained that the gamification of the public speaking training through the incorporation of VR had the components of encouragement and rewards. Participants were provided with a heads up display (HUD) of their feedback and results, and they were extrinsically motivated to want to try again to improve their feedback and scores by continuing the training or even repeating modules and skills that were identified as needing more focus or work. Although gamification was not a particular variable examined in this study, I have formal training in gamification and understand how VR can be considered a form of gamification for workforce training.

Participants shared how they wanted to improve their public speaking skills within the VR experience, but most importantly, they shared how they wanted to translate these public speaking skills and improve in the workplace. Participants described how they felt they had already improved or how they immediately changed their behaviors related to public speaking because of the VR training experience. Many noted that their skills improved from one module to the next as shown in the feedback provided by the public speaking VR training sessions because of the experience. So, while actual data related to behavior change was not evaluated in this study, there was evidence that all the required drivers needed to evaluate this in further research were present in this case study design.

**Level 4: Results.** Level 4 is described as “the degree to which targeted outcomes occur as a result of the training and support and accountability package” (Kirkpatrick & Kirkpatrick, 2016, p. 60). This level requires a lot of time to fully evaluate as the desired outcomes of the training for learners and their impact on the desired outcomes for overall business objectives are generally examined at short-term and long-term intervals. As such, the utilization of leading factors for this level are critical. These predictors are “short-term observations and measurements that suggest that critical behaviors are on track to create a positive impact on the desired results” (Kirkpatrick & Kirkpatrick, 2016, p. 60). As previously noted in the Level 3 conclusions, Level 4 would require a longitudinal study that would measure the impact of the public speaking VR training on desired outcomes of the organization for this online workforce development program. It is this level of evaluation that would be able to determine the ROI of the training to the organization. Consequently, the New World Kirkpatrick Model acknowledges that incorporating short-term observations and measurements would allow for continuous monitoring to ensure that the behaviors are on track to have a positive impact on the desired results for the organization

(Kirkpatrick & Kirkpatrick, 2016, p. 60). So, for this study, the incorporation of the participant observations in addition to the measurements within the public speaking VR training itself could be used over time to show whether the training was on track with positive trends and improvement on public speaking skills ultimately leading to a positive impact on the desired results for the organization. An example of a desired organizational outcomes related to this could be increased funding if staff are able to improve their public speaking skills for fundraising events for the organization.

### ***Findings and Theoretical Framework***

**Bloom's Revised Taxonomy.** Bloom's original taxonomy was presented in 1948 and revised in 2001 to allow for the framework to be utilized in practice. Of specific importance and relevance to this study are the knowledge and cognitive process dimensions as displayed in Figure 4 in Chapter 2. These dimensions are to be considered when developing desired learning outcomes for learners. In practice, learning outcomes are then utilized as the starting point for the development of training. Deeper knowledge and cognitive development are critical to quality and effectiveness of training with the goal being producing the desired learning outcomes. The figure shows that in order for high levels of learning to occur learning must be designed and implemented intentionally and with all of the aspects pictured considered. When online workforce development helps ensure deeper knowledge and cognitive development, the greater the learning outcomes. VR offers the unique ability to move beyond conceptual knowledge of the knowledge dimension and understanding of the cognitive process dimension. When considering traditional online workforce training, there is virtually no way for this to be done. However, when you introduce VR, learners are then able to practice procedural and metacognitive knowledge in the realistically simulated environments made possible by VR. In

addition, VR also offers the unique ability to move beyond the understanding level of the cognitive process dimension. In fact, with VR a learner can actually apply, analyze, evaluate, and even create within the learning environment. This is essentially impossible with traditional online learning.

Incorporating VR in the design and implementation of online workforce training provides opportunities never experienced before in traditional methods of delivering training and development. If those within the learning development function fully understand the possibilities of VR, then it can be effectively incorporated in the design and implementation of online workforce training to ensure that learners are able to access the highest orders of learning and development.

**Active Learning Theory.** Many adult learning theories use active learning theory as a basis or framework explicitly or implicitly, such as active learning. However, in translating active learning theory to online learning, it can be difficult to have the practicality needed to move to the complexity needed in the dimensions for greater impact. The incorporation of VR into online workforce development allowed for the higher complexity needed to reach the deepest levels of the two dimensions. The rationale for how this is done with the knowledge dimension is that while online workforce development and training programs can provide knowledge, rarely is this knowledge more than factual. In higher quality online workforce development, adaptive learning is applied that allows for the development of some conceptual, procedural, and metacognitive knowledge. However, for adults to truly learn complex skills that affect their conceptual, procedural, and metacognitive knowledge, active learning theory principles must be applied, and this cannot be done without utilizing a learner-centered approach and active learning theory components. The same sentiments apply to the cognitive process

dimension. In most online workforce development, learners merely show they remember information shared via summative assessments inside or outside of the online training. Unless formative assessments are incorporated into the online workforce development there is no way to evaluate if learners can understand, apply, analyze, evaluate, and/or create. The incorporation of VR into online workforce development addresses all of this. While reflecting on their experience with the public speaking VR training, participants shared perspectives where all levels of both dimensions could easily be seen. Participants shared their experiences of how they were immediately able to take the knowledge they remembered from the lessons in the public speaking VR sessions and understand well enough to apply the knowledge. They also shared how they were able to analyze and then evaluate their knowledge as the public speaking VR training sessions provided real-time cue and feedback based on their performance within the training. At the end of each session, a formal assessment was provided to learners which then allowed them to create new knowledge that was then applied to subsequent mini courses and then this cycle of understanding, application, analyzing, evaluation, and creation was repeated. Ideally, each reiteration should produce improved performance and greater progress toward the desired learning outcomes. Also important to note is that the learning process within the VR environment is a safe way for the learning process to occur as opposed to having learners in real-time trial and error. This is extremely important when considering online workforce training of hazardous, medical, or even human service fields that could have devastating effects if desired learning outcomes are not achieved. Furthermore, and most importantly, the study participant perspectives provided the context for active learning theory being apparent in the utilization of VR. This was seen through the major themes that were developed and the references to active learning methodologies mentioned by the participants.

### *Findings and the Literature*

The findings of this study add to the existing literature regarding impact on quality and effectiveness of adult learning in general, online learning, and adult learning within the context of online workforce development and training when adult learning theories are the framework for design and implementation. The literature reinforces the notion that quality and effectiveness are by-products of proper design and implementation of learning. The findings further the research demonstrating that proper design and implementation of learning while incorporating adult learning theory and principles especially within online learning designed for workforce development and training is critical. This study does support the belief that active learning theory is particularly important and necessary for workforce development and training if the ultimate goals of transfer of learning and improving the ROI of the training are the key factors of organizational learning.

In addition, the findings add to existing research regarding the impact on learner satisfaction through the lenses of motivation and immersion by incorporating immersive technologies such as VR. All participants in the study acknowledged that they were motivated whether intrinsically or extrinsically by the incorporation of VR in the online workforce public speaking training. Some participants were intrinsically motivated by incorporation of VR due to the gamification attributes fostered, such as the immediate feedback within the HUD which then influenced them to engage and try harder to improve public speaking skills to see improvement in the feedback provided. All of the participants acknowledged their motivation by the realistic nature of the public speaking VR training and the ability to practice skills in settings that seemed as close to a real-life scenario as possible. They shared how this feeling of immersion motivated them to not only want to continue with the subsequent modules within the study, but most also

shared their desires to experience the public speaking VR training sessions again in the near future. Some even shared how their satisfaction suggests that others may feel the same and recommended different uses and application of the VR training within the organization. This supports the literature that VR positively impacts learner satisfaction via motivation and immersion.

The findings differ from existing research in that there is limited research that sought to combine the utilization of adult learning theories and immersive technologies into the design and implementation of online workforce development and training to impact quality and effectiveness. Furthermore, there is even more limited research that examines how the incorporation of VR in online workforce development and training can affect quality and effectiveness. This study was intended to add to these very limited areas of existing literature.

## **Implications for Practice and Theory**

### ***Implications for Practice***

The findings of this study yield assertions about how the utilization of immersive technologies such as VR can improve the overall quality and effectiveness of an online workforce development program. These assertions address the design and implementation of online workforce development through the incorporation of VR. The assertions of this study also provide relevancy of the findings to the theoretical framework of active learning theory. As noted in the literature review, there are limited studies that combine learning theories with the practical use of VR for education including educating a workforce (Zhou et al., 2018).

While this study was conducted at a non-profit organization, the findings would be valid for and should be considered by any type of organization that provides online workforce development in public or private sectors, such as non-governmental organizations, governmental

organizations, for-profit organizations, K-12 schools, and institutions of higher education. As with any new and emerging technology costs may be a barrier to entry for certain types of organizations. However, the costs associated with VR have been steadily decreasing and now have entry points that can be justified especially considering the costs wasted annually on ineffective online workforce development and training programs. This study shows that the advantages of incorporating VR in the online workforce development program for public speaking far outweigh the disadvantages. How these advantages are quantified and factored into ROI will look different depending on the organization. However, ROI in relation to workforce development and training should be the driving factor on decisions within all the types of organizations.

**Implications for Practice #1: Design (Quality).** VR is still a relatively new and emerging technology. As such, not much research exists that explains how to properly incorporate VR into the design of online workforce development. In fact, new technology introduced to online education is described as “disruptive” innovation (Cook & Sonnenberg, 2014); however, these disruptive innovations are needed if we are to improve the outcomes of online workforce development. While there are not extensive analyses on how incorporating VR in the design of online workforce development impacts desired outcomes and results in organizations, certain skills such as those identified as needed for a 21st century workforce must be learned by doing (BasuMallick, 2019).

This study clearly shows that VR provides this necessary component to online workforce development that has been lacking in traditional online learning formats. The participants in this study overwhelmingly shared their perspectives on how the utilization of VR in the design provided a learner-centered approach, incorporated elements of active learning, and positively

impacted their motivation to learn and ultimately their satisfaction. Cumulatively, this shows that VR had a positive impact on the quality and effectiveness of the online workforce development program for public speaking.

As organizations are planning online workforce development programs, it is imperative that they consider adding VR as a part of their programs. This can be done concurrently with online learning programs or as a supplement where learners can use the VR complimentary to the curriculum or once an online program is completed for reinforcement. Even a combination of any of the aforementioned methods has the potential for greater success with learner and organizational learning outcomes. As noted in the interviews, VR can even be incorporated as a means of just-in-time training for certain skills and workforce needs. This type of training is considered to be one of the most effective methods of training for adult learners in workforce development and training.

Since VR does not require synchronous learning, the learning can happen at any time deemed appropriate in the online workforce curriculum design. In fact, a virtual professional learning community (PLC) could even be facilitated within the confines of VR which is also another area of online workforce development not explored within this study. PLCs are regarded as having significant impact on adult learners especially within organizations.

However, asynchronous learning is also a possibility with VR as colleagues and facilitators can simultaneously be in the same VR environment depending upon the application. Multiple VR users can meet within the same virtual space at the same time and experience the same simulation. VR incorporates the use of avatars to represent each user and avatars can talk and interact with other learners similarly as they would in the real-world.

**Implications for Practice # 2: Implementation (Effectiveness).** VR allows learners to improve key skills by providing real world examples. Learners can practice and improve their skills in simulated environments that are as close to reality as possible without the pressures of reality. This allows learners a more authentic way to practice and improve these skills within the confines of safety. Mistakes are not at the detriment to anyone or any organization when done this way. In addition, VR training offers costs savings, flexibility, and scalability. VR training also has the capability to capture data such as completion and engagement, as well as track and immediately provide coaching and feedback to learners about behaviors such as confidence, hesitancy, and other behaviors, which is impossible with traditional online workforce development programs in isolation (Hines, 2020). Participants in the study reported the public speaking VR training sessions had a major and immediate positive impact on their public speaking skills development. Many shared how they could and would immediately transfer the learning to the workplace as a result of the public speaking VR experience, which is the desired outcome of any workforce training.

Minimizing risks for organizations while also ensuring that learning can be transferred quickly and positively in the workplace positively impacts ROI for organizations. ROI is the ultimate measure of effectiveness for organizations. Also ensuring that learners are satisfied with online workforce development affects employee morale and ultimately the ability to attract, hire, and retain qualified staff. This too affects ROI for organizations.

### ***Implications for Theory***

This study was explored through the frameworks of Bloom's revised taxonomy and active learning theory. Bloom's revised framework allows for the framework to be utilized in practice. The knowledge and cognitive process dimensions of the taxonomy were most relevant

to this study. These dimensions are to be considered when developing desired learning outcomes for learners, which should be used as the starting point for the development of training. Deeper knowledge and cognitive development are critical to quality and effectiveness of training with the ultimate goal being to achieve desired learning outcomes. When online workforce development helps ensure deeper knowledge and cognitive development, the greater the learning outcomes for learners as well as an organization.

In translating active learning theory to online learning, it can be difficult to have the practicality needed to move to the complexity needed in the dimensions for greater impact; however, incorporating VR in online workforce development allows for the higher complexity needed to reach these deepest levels of the two dimensions. The rationale for how this is done within the knowledge dimension is that while online workforce development and training programs can provide knowledge, rarely is this knowledge more than factual. In higher quality online development, adaptive learning is applied that allows for the development of some conceptual, procedural, and metacognitive knowledge. However, for adults to truly learn complex skills that affect their conceptual, procedural, and metacognitive knowledge, active learning theory principles must be applied, and this cannot be done without a learner-centered approach and components of active learning theory.

The same sentiments apply to the cognitive process dimension. In most online workforce development, learners merely show they remember information shared via summative assessments inside or outside of the online training. Unless formative assessments are incorporated into the online workforce development, there is no way to evaluate if learners can understand, apply, analyze, evaluate, and/or create. The incorporation of VR into online workforce development addresses all of this. Reflecting on their experience with the public

speaking VR training, participants shared perspectives where all levels of both dimensions can easily be seen. Furthermore, and most importantly, their perspectives provided the context for active learning theory being apparent in the utilization of VR. This was seen through the major themes that were developed and the references to active learning methodologies made by the participants.

### **Recommendations for Further Research**

This qualitative single case study explored the perceptions of how VR impacted public speaking skills of employees participating in an online workforce development program at a local non-profit organization. The study identified four top themes related to the impact of VR as part of an online workforce development program: (a) learner-centered approach, (b) learner satisfaction, (3) active learning theory, (4) transfer of learning. These themes were then synthesized into the overall themes in respect to the research question: quality and effectiveness. Through the process of analyzing the findings, four minor themes were also discovered which are recommended as areas for further research. Learner dissatisfaction, which was then synthesized into the specific themes of (a) poor design and implementation, (b) lack of access, (c) emerging technology, and (d) physical discomfort, which could potentially negatively impact quality and effectiveness of utilizing VR as part of an online workforce development program.

Learner dissatisfaction was the overall catch-all theme developed to capture negative perspectives from participants. These perspectives were then further clarified into the four categories of (a) more assessable design and implementation, (b) lack of access, (c) emerging technology, and (d) physical discomfort that provide more insight. The four categories better articulate the areas where further research will be helpful in the future.

***Recommendation for Further Research #1: More Assessable Design and Implementation***

While VR was considered new and exciting and participants were eager to try something new, some participants offered perspectives on how the design and implementation of VR could be improved. This ranged from the actual physical design of the headset to aspects of the modules.

During the study it was noted that one participant was hearing impaired, so they suggested that taking this into account in design would be helpful. The participant had to take extra care in putting on and removing the headset to ensure their hearing aids were not disturbed. Additionally, the participant noted that they were unable to hear very well even though the headset's volume was adjusted higher taking this into consideration. Participants wearing glasses also had to take extra care in putting on and removing the headset in order to ensure their glasses were not disturbed. VR headset designers should think about ways to make the headset more accessible and comfortable for visually and hearing-impaired users. Some participants also noted the weight and discomfort of wearing the headset over time. Several accessories have been developed for the headset used in this study, but unfortunately, they were on backorder and not available at the time of the study. Researchers and/or organizations looking to implement the use of VR in online workforce development will want to note this and ensure that they are able to provide the most comfortable experience as possible for users in the future.

Others suggested improvements to the design of the actual VR training modules, such as improving the navigation or making the digital graphics of the people more realistic to add to the experience. Also noted were the ways implementation of the VR modules could be improved, such as the user having the ability to incorporate things typically used in public speaking such as notecards or notes. Also mentioned by participants was the lack of ability to participate or share

the VR experience with peers. One of the modules that participants experienced used heat maps from the eyes to determine how long participants gazed in certain spots during their public speaking training session. It was discovered that this module could not be completed properly by those who were wearing glasses since the lenses blocked the heat from the eyes. It should also be considered how apps should be designed to ensure alternative methods are available for users if needed. VR app developers should also think about ways to make their applications more accessible for visually and hearing-impaired users.

All of these perspectives offer various ways further research could add to the limited literature regarding poor design and implementation of VR. Ultimately these perspectives also demonstrate how further research could add to the even more limited literature regarding more assessable design and implementation of VR in online workforce development programs.

### ***Recommendation for Further Research #2: Lack of Access***

As with all technology, there will always be barriers to access, mostly due to costs and socioeconomic factors that affect the accessibility of technology to everyone. VR is no different. VR initially presented significant barriers to entry to average consumers when it first became available due not only to the high price tags of the headsets, controllers, and accessories, but even as prohibitive if not more, was the necessity to have a personal computer or laptop that was equipped with the speed and graphics capability needed to support them. Since those early days of adoption, VR headsets have broken into the broader consumer market by finally being able to be used independently of the personal computers and laptops with hefty price tags. The price of the technology has also declined and more brands are offered with varying price points for consumers. These consumers also include business and educational entities. This is extremely important to consider as organizations such as non-profit organizations and educational

institutions will have budgetary restraints which may affect the ability to purchase and or scale the use of VR in online workforce development. Budgetary restraints may also exist for other types of organizations since new emerging technologies typically are not considered routine budgeted items in technology line items. These types of purchases typically require advocating and buy-in from those in charge of making those decisions. Hence, it must still be noted that any type of purchase that is not a necessity can still be considered a barrier of entry.

In relation to socioeconomic factors, it should also be taken into account that some individuals may not be comfortable using new emerging technology because they have not had much access to technology in general. While this is primarily an issue that arises outside of work or educational settings it should be noted that personal feelings and discomfort often times translate to other settings. Not being comfortable with technology and especially the notion of utilizing emerging technology should also be considered a barrier of entry. Similarly, another factor is lack of prior access to technology based on age. This is best explained by the terminology of digital immigrants. Digital immigrants are those who based on their age did not grow up with technology, but later had technology introduced to them and had to adapt or learn how to use it. Digital natives on the other hand were born in an era where technology was commonplace. They grew up using technology and therefore are more comfortable using technology and would be more amenable to using emerging technology. As such equity and accessibility of this type of technology should be further explored.

### ***Recommendation for Further Research #3: Emerging Technology***

Another area for further research stemmed from the fact that VR is an emerging technology. Emerging technology always has room for improvements since there is no historical precedent for best practices for the technology. For example, participants in this study referenced

experiencing feelings of discombobulation due to not being aware of surroundings and getting used to the sense of presence. These are areas that could be new or recurring issues with users that should be considered or addressed. Typically, new iterations or reworks of emerging technology takes a couple of years before new iterations are introduced to market. Changes may or may not be included in the next cycle of improvements, but suggestions and recommendations that are frequently mentioned by consumers tend to take priority. Hence, the more users using emerging technology more frequently and suggestions being captured will lead to positive changes more quickly. Consequently, it will always be necessary to have further research that identifies the weaknesses of emerging technology and how to best improve upon those weaknesses effectively and efficiently.

#### ***Recommendation for Further Research #4: Physical Discomfort***

The final area recommended for further research was based on participant perspectives of physical discomfort. Participants reflected on the sense of presence and how it affected them such as the previously mentioned feelings of discombobulation. For some users, these feelings may even cause motion sickness or dizziness. Participants also noted that due to the lack of awareness of their surroundings, sudden movements or loud noises could cause nervousness of users, especially among those who experience anxiety. Finally, the physical characteristics of the headset caused discomfort for some users. This ranged from the weight of the headset to the fit around the head, and adjustments were needed for personal peripherals such as glasses or hearing aids. Further research should address these areas of concern and should be viewed through the lens of inclusion.

This study contributes to existing literature on how adult learning theories affect online learning, online learning in the workplace design and implementation, and the incorporation of

immersive technologies by filling in the gaps on these topics from the perceptions of employees utilizing VR as part of an online workforce development program at a local non-profit participating. Limitations of this study that should be documented are the small size of the organization and subsequently small number of participants. Further research should be done at larger organizations which would allow for more participants. Also, this study was conducted at a non-profit organization. Varying types of organizations would be conducive to further research studies to compare findings and conclusions.

### **Chapter Summary and Personal Reflection**

This qualitative case study examined how the utilization of immersive technologies meets the necessary outcome of producing a 21st century competent and job-ready workforce. Specifically, this study examined how the incorporation of VR improves the quality and effectiveness of an online workforce development program, by its effect on learner satisfaction at a non-profit organization. Participants perceived that their public speaking VR training experience improved the quality and effectiveness of their online workforce development program on public speaking skills. This was accomplished by the VR being learner-centered, motivating through learner satisfaction, incorporating active learning theory methodologies, and fostering transfer of learning to the workplace. Through the framework of Bloom's taxonomy and active learning theory, participants shared how their public speaking VR training experience impacted their public speaking skills and ultimately how it affected the quality and effectiveness of the online workforce development program. Their perspectives were then synthesized and patterns examined through the framework of the New World Kirkpatrick Model to further explain how the incorporation of VR in the online workforce development program for public speaking affected quality and effectiveness.

Having been involved in non-profit organizations for over 20 years, and at times being responsible for the talent development of non-profit staff, I personally know the importance of high quality and effective training. Unfortunately, in non-profit organizations funding is rarely adequate to ensure high quality and effective training of employees. Most often the organizations place individuals in charge of training with little to no knowledge of proper training design and implementation. As a result, training ends up being more of the same and rarely produces the desired outcomes of the organization. The organizations assume this is an issue with the staff being trained but fail to realize the importance of proper training design and implementation and that there are adult learning theories and online learning theories that should be incorporated in all online learning. Furthermore, to cut costs to the organization, what were once in-person trainings have been reduced and transferred to learning management systems and called online workforce development programs when in reality, information has just been moved from printed materials to an online format. No care or concern has been placed on the best way to present this information to adults or on how to assess whether or not the desired learning outcomes have been achieved. Most importantly, no care or concern has been placed on what the learner needs and how online workforce development programs should be designed and implemented to have maximum impact on desired learning outcomes and the outcomes needed most by the organization. Most certainly, considering the technology needed for providing high quality and highly effective learning experiences is also a moot point. Nonprofit organizations tend to lack refresh cycles on primary technology and are often using technology that is outdated, lower quality, and in some instances recycled or donated technology from other organizations or even donors. As a result, any consideration for new and emerging technology is a not an option. Unfortunately, that is at the expense of obtaining and utilizing technology that may actually

improve and increase the success of learning programs. In essence, a lot of time and money is wasted on these “online workforce development programs” with no real results.

In the middle of preparing for this research, the COVID-19 pandemic hit crippling many organizations. Those that were able to survive had to figure out quickly how to continue with learning remotely causing a panic and mad dash to convert what was traditionally in-person and face-to-face to instruction online. This exacerbated the problem, but also highlighted for me why a study such as this was needed now more than ever. If online workforce development programs are going to adapt to meet the needs of learners and organizations, conduits for theory to practice must be implemented, such as immersive technologies which foster this connection and ensure high quality and effective programs. The time is now.

I have always been excited by technology, so when VR became more prevalent, and the costs became more reasonable I was able to obtain my first headset. I experienced it firsthand, and I was hooked. I initially used the technology gaming but then began to explore the educational apps within the technology. I happened upon an app that allowed me to act as a bartender. In utilizing this app, I was able to act as a bartender and learned how to make cocktails for customers. Every aspect of this process was taught within the app from which glass to choose, the proper drink recipe including the mixes and garnishes, and how to properly present the drink to a customer. It was during this experience that I realized that while I was using this app for fun, this app could be a valuable asset to the bar industry. Bar owners could train their employees or even assess potential employees prior to hiring on their abilities without worrying about wasting valuable time and money. Wasted time of hiring and training employees or wasted money of paying employees, trainers, or even wasting alcohol while employees or potential employees practice in real-life. I immediately knew this would be the focus of my dissertation. I

wanted to share with others how learning could not only be fun but effective by allowing people to have active learning experiences compared to traditional online training.

I have experienced my fair share of ineffective online training within the workplace. In all honesty, I was even the conduit for some of this ineffective training because I was responsible for talent development in various organizations. Most notably was my experience converting in-person trainings to online formats. I too fell into the trap of setting up a learning management system to do almost the same thing done in typical face-to-face training. I created PowerPoint presentations and then narrated the content for users which some jokingly refer to as “death by PowerPoint.” There was no care or consideration for accessibility and no way for practical application of learning to take place. It was not until I sought formal training and professional development related to adult learning, curriculum and course design, and training and development that I began to understand how important getting it right from the beginning is crucial to obtaining the desired outcomes. Now, I want to add to this field with my research and show how we can get it right, improve learner motivation and satisfaction, and ultimately improve outcomes by incorporating this exciting emerging technology.

I remember the early advice I was given was to not focus on a topic or subject I loved because I would hate it by the end of this process. I can honestly say that luckily was not true for me. In fact, I had to make a personal commitment during the course of this program to only use my VR headsets for research purposes to ensure I stayed focused and on task. Instead, this study has made me love and appreciate VR even more. I have had the opportunity to see how far the technology has come over the past three years and I have watched this technology become more accessible as a result of the lowering price points. What was once seen as technology that only cutting-edge organizations with large budgets could obtain, I am now seeing this technology

being used more commonly in varying types and sizes of organizations. Even more interesting is the fact that this technology is also being seen more commonly in households and used by individuals. I see the full potential of this technology, especially for innovations in adult learning. Organizations can adopt and use this technology as part of their training programs, especially their online workforce development programs. Individuals could even choose to develop professionally and utilize VR inclusive or exclusive of their organization for workforce development. This study confirmed my initial thoughts and beliefs that others would feel the same.

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**APPENDICES**

## Appendix A: Participant Recruitment Email

*Email sent via Qualtrics*

Good morning,

As some of you may or may not be aware, I am Fallon McIver Brewington, and I am the CEO for Boys & Girls Club of the Sandhills and a doctoral candidate in the Adult & Community College Education program at North Carolina State University. As part of my doctoral dissertation, I am conducting a research study to better understand how the utilization of immersive technologies meets the necessary outcome of a 21st century competent and job-ready workforce. Specifically, this study examines how the incorporation of virtual reality improves the quality and effectiveness of an online workforce development program, by its effect on learner satisfaction at a non-profit organization.

Participation in this study will take about 2 hours. If you would like to participate, I will ask that you:

- Be 18 years of age.
- Participate in a Virtual Reality training session.
- Participate in a one-on-one interview with me.

In addition, screening for COVID-19 will occur two times, when determining initial eligibility and on the “day of” in-person interaction for eligibility to participate. If deemed ineligible you will not be able to participate in the research study.

Participation is voluntary and there are no consequences for choosing not to participate or withdraw from the study. Confidentiality of all participants will be maintained. The data will be kept and secured.

Any additional questions regarding the project can be directed to me, Fallon Brewington at 919-669-9525 or [fmbrewin@ncsu.edu](mailto:fmbrewin@ncsu.edu). Please review and complete this consent if you are interested in participating in the study.

## Appendix B: Adult Consent Form

*Form shared via Qualtrics*

### Examination of Virtual Reality on Online Workforce Training: A Qualitative Study Informed Consent

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#### Start of Block: Informed Consent

Q1

Welcome to the research study!

We are interested in understanding [STUDY TOPIC]. For this study, you will be presented with information relevant to [STUDY TOPIC]. Then, you will be asked to answer some questions about it. Your responses will be kept completely confidential.<sup>[L][L][L][L]</sup><sub>[SEP][SEP]</sub>

The study should take you around [SURVEY DURATION IN MINUTES] to complete. You will receive [INCENTIVE] for your participation.<sup>[L][L][L][L]</sup><sub>[SEP][SEP]</sub> Your participation in this research is voluntary. You have the right to withdraw at any point during the study. The Principal Investigator of this study can be contacted at [NAME/ EMAIL ADDRESS].<sup>[L][L]</sup><sub>[SEP]</sub>

By clicking the button below, you acknowledge:

Your participation in the study is voluntary. You are 18 years of age. You are aware that you may choose to terminate your participation at any time for any reason.

#### End of Block: Informed Consent

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#### Start of Block: Informed Consent Addendum

Q2

Welcome to the research study!

We are interested in understanding [STUDY TOPIC]. For this study, you will be presented with information relevant to [STUDY TOPIC]. Then, you will be asked to answer some questions about it. Your responses will be kept completely confidential.<sup>[L][L][L][L]</sup><sub>[SEP][SEP]</sub>

The study should take you around [SURVEY DURATION IN MINUTES] to complete. You will receive [INCENTIVE] for your participation.<sup>[L][L][L][L]</sup><sub>[SEP][SEP]</sub> Your participation in this research is voluntary. You have the right to withdraw at any point during the study. The Principal Investigator of this study can be contacted at [NAME/ EMAIL ADDRESS].<sup>[L][L]</sup><sub>[SEP]</sub>

By clicking the button below, you acknowledge:

Your participation in the study is voluntary. You are 18 years of age. You are aware that you may choose to terminate your participation at any time for any reason.

- I consent, begin the study (1)
- I do not consent, I do not wish to participate (2)

*Skip To: Q3 If Informed Consent Addendum Research During COVID-19 Pandemic These research activities are takin... = I consent, begin the study*

*Skip To: End of Survey If Informed Consent Addendum Research During COVID-19 Pandemic These research activities are takin... = I do not consent, I do not wish to participate*

Q3 Please enter your First and Last Name

---

Q4 Please enter your email address.

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**End of Block: Informed Consent Addendum**

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**Start of Block: Preview - Certified Demographic Questions**

Q5 How old are you?

- Under 18 (1)
- 18-24 years old (2)
- 25-34 years old (3)
- 35-44 years old (4)
- 45-54 years old (5)
- 55-64 years old (6)
- 65+ years old (7)
-

Q6 How do you describe yourself?

- Male (1)
  - Female (2)
  - Non-binary / third gender (3)
  - Prefer to self-describe (4)
  - Prefer not to say (5)
- 

Q7 What is the highest level of education you have completed?

- Some high school or less (1)
  - High school diploma or GED (2)
  - Some college, but no degree (3)
  - Associates or technical degree (4)
  - Bachelor's degree (5)
  - Graduate or professional degree (MA, MS, MBA, PhD, JD, MD, DDS) (6)
-

Q8 What best describes your employment status over the last three months

- Working full-time (1)
  - Working part-time (2)
  - Unemployed and looking for work (3)
  - A homemaker or stay-at-home parent (4)
  - Student (5)
  - Retired (6)
  - Other (7)
- 

Q9 How long have you been employed by Boys & Girls Club of the Sandhills?

- Less than 6 months (1)
  - 6 to 12 months (2)
  - 1 to 3 years (3)
  - 4 to 6 years (4)
  - 7 years or more (5)
- 

Q10 Are you of Spanish, Hispanic, or Latino origin?

- Yes (1)
  - No (2)
-

Q11 Choose one or more races that you consider yourself to be:

- White (1)
- Black or African American (2)
- American Indian or Alaska Native (3)
- Asian (4)
- Native Hawaiian or Other Pacific Islander (5)
- Other (6)

**End of Block: Preview - Certified Demographic Questions**

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**Start of Block: Scheduling**

Q12 Thank you for agreeing to participate in this study. To complete this survey, please follow this link and select the date and time that works best for you to complete the study: <https://calendly.com/fmbrewin/vr-training-session-follow-up-interview>

**End of Block: Scheduling**

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## Appendix C: VR Session and Interview Scheduling and Reminder Template Emails

Hi,

You are scheduled for <insert day, date, and time>. As a reminder, the VR training session will take approximately 1 hour and will be video recorded. The follow-up interview will take approximately 1 ¼ hour and will be audio and video recorded via Zoom.

<insert details about interview that the participant needs to know, such as web conferencing platform or phone number verification, the meeting details, troubleshooting tips, transmission of passwords for access, etc.>.

These research activities are taking place during the COVID-19 Pandemic. The researchers involved in this study have no symptoms of COVID-19 and have not knowingly interacted with anyone demonstrating symptoms or diagnosed as COVID-19 positive. The sanitation and cleaning measures in place during all study activities are each participant will be provided Skin Friendly VR HMD Cleaning Wipes for wipe-down and sanitation of all areas of skin contact of the VR headset and controllers before and after use. The personal protective equipment that the researchers will use includes VR Disposable Hygiene Covers. As a participant, you will be provided VR Disposable Hygiene Covers as personal protective equipment and you must wear it while participating in this research.

I look forward to our session and conversation together. If you have any questions or need to cancel, please do not hesitate to contact me at [fbrewin@ncsu.edu](mailto:fbrewin@ncsu.edu) or 919-669-9525

Thank you,  
Fallon McIver Brewington

---

### VR Session & Interview reminder email

Hi,

Just a reminder that you are scheduled for <insert day, date, and time> for a VR training session that will be video recorded and an interview that will be audio and video recorded interview via Zoom.

<insert details about interview that they need to know about, such as webconferencing platform (ZoomPro or Webex are OK), the meeting details, troubleshooting tips, etc.>

These research activities are taking place during the COVID-19 Pandemic. The researchers involved in this study have no symptoms of COVID-19 and have not knowingly interacted with anyone demonstrating symptoms or diagnosed as COVID-19 positive. The sanitation and cleaning measures in place during all study activities are each participant will be provided Skin Friendly VR HMD Cleaning Wipes for wipe-down and sanitation of all areas of skin contact of

the VR headset and controllers before and after use. The personal protective equipment that the researchers will use includes VR Disposable Hygiene Covers. As a participant, you will be provided VR Disposable Hygiene Covers as personal protective equipment and you must wear it while participating in this research.

Please do not attend this data collection session if:

- You knowingly interacted with someone who has been diagnosed or demonstrated symptoms of COVID-19
- You have any symptoms of COVID-19 such as cough, fever, shortness of breath or difficulty breathing, chills, muscle pain, new loss of taste or smell, sore throat (secondary symptom)
- You do not agree to follow all safety and sanitation procedures while participating in this study including wearing appropriate personal protective equipment.

Please plan to arrive on <insert date and time> at the XXXXXXXXXX. Once you are there the researcher will confirm your appointment. Before normal research procedures for this study occur, there will be a “day of” screening for COVID-19 related issues which may determine your ineligibility. This will include a temperature check and screening questions.

I look forward to our session and conversation together. If you have any questions or need to cancel, please do not hesitate to contact me at [fbrewin@ncsu.edu](mailto:fbrewin@ncsu.edu) or 919-669-9525

Thank you,  
Fallon McIver Brewington

## Appendix D: Day of Participant Instructions

Thank you for agreeing to participate and completing all your forms.

1. This study is exploring how the incorporation of virtual reality improves the quality and effectiveness of an online workforce development program.
2. About the Oculus Quest 2 (turn on/off, controls)  
For this study we are using what is called a six degrees of freedom (or DoF) device. 6-DoF headsets allow us to track translational motion as well as rotational motion. We can determine whether a user has rotated their head and moved:
  - Forward or backward
  - Laterally or vertically
  - Up or down

This type of tracking is important for VR experiences with translational motion and gives the user a lot more freedom to explore locations, inspect details and perform real life tasks in VR. This means that the directions you can move in a digital world are the same as your movements in the real-world. You are able to get up and walk around. You can move your head around to look in any direction, and you can walk around freely if you choose.

1. This is the Oculus Quest 2. The content you will need will already be loaded to the device. You will need to adjust it to fit your head (here and here - showing sides). You won't be able to adjust the top. Please don't try. Only lift the headset by the stretchy strap or by handling the sides.
2. Once you have the unit adjusted for your head, put on a face mask to add a layer of protection for your skin. If this was your personal headset, you wouldn't need that.
3. Turn on the unit by pressing the power button (show). If you don't put it on quickly the sensor (show) will notice and turn it back off. Make sure you are ready to start when you press the on button.
4. Put the headset on and hold the controllers.
3. About the content
  1. Once you are in the module, please start by selecting the VR Speech Application. You will complete the following modules. More details are provided on the back.
    1. Impromptu Speaking
    2. Literary Techniques
    3. Eye Contact Training
4. What to do if...
  1. If you start to feel funny while wearing the headset, stand still and grip the podium. If this doesn't help, take off the headset and take a break. There's no reason to force yourself to complete the modules if you're physically unable to do so.
  2. If your controller battery is dead, let the researcher know.
  3. If your headset gets warm and the lenses fog up, ask the researcher to help you loosen the straps. You have them too tight and no air can get it.

4. If the picture is blurry, move the headset around a little on your face to see if there is a better view with it in a slightly different location. When you see better in VR, you feel better.

## Appendix E: COVID Additional Procedures

*Describe how COVID-19 screening activities will occur and detail them step by step.*

**\*\* Information from screening will not be used for any type of analysis, nor is it included in an activity covered by HIPAA\*\***

1. Before the activity, a COVID screener/awareness form will be part of the consent. Parents will agree that they are aware of risks despite precautions, and state that they will not participate should they have been exposed to or determined to be carrying COVID-19.
2. Day of - participants will be asked the screening questions before approaching the equipment.
3. After passing the screening questions, the participants will still need to retain nose and mouth mask until time to put on the equipment, at such time, they will use the disposable hygiene covers provided, and sanitize hands before touching the equipment.
4. Only one user will be using a particular device between the cleanings. Cleaning will be performed on the gear, and new PPE stocked before the next participant.
5. Cleaning, sanitizing and presentation:
  - a. Clear plastic boxes will hold the materials to be refreshed between each use.
  - b. Boxes will contain hand sanitizer, a disposable hygiene cover, the headset and controller, and instructions (laminated).
  - c. Boxes will be placed at the station at least six feet apart from where the researcher will operate video equipment.
  - d. After use (and before the next user), the headsets will be wiped with a PPE antimicrobial wipes.
  - e. The boxes, hand sanitizer bottles, and laminated instructions will be cleaned with either wipes or spray using dry clean paper towels before restocking for the next session.

COVID screening information will not be retained, it is merely used as a gateway for beginning. After participants complete their activity, their responses will be deleted from the survey software. It will NOT be downloaded as part of the survey results.

The researcher will have the participant schedule via Calendly to note who the participants were each day for contact tracing.

● *Provide all supplemental documents regarding screening activities. These should be uploaded as separate documents with the title "COVID-19 Screening Survey" (will be on Qualtrics) and "COVID-19 Day Of - Screening Tool" (will be on laminated paper for the researcher).*

23783 COVID day of - screening tool

Even if the person was deemed eligible via the online screening survey, on the day of interaction they need to be re-screened. These questions will be printed for the researcher. The answers will be verbal, not recorded.

The researcher will ask the participant:

1. Do you have any of the following?
  - a. a fever and/or shortness of breath (Y/N)
  - b. unexplained cough (Y/N)
  - c. extreme fatigue (Y/N)
- If yes to any, disqualify and recommend seeking health care.
2. In the last 14 days, have you been in close contact with someone who has been diagnosed as having COVID-19 by a healthcare professional? (Y/N)
- If yes, disqualify.

If yes to either of the above questions for “Day Of Screening”, deem ineligible and tell them to “Please contact your medical provider to discuss your needs.”

### Appendix F: Interview Guide

<i>Interviewees will watch the videos of their VR training session.</i>	
Interview Question	Research Question
<p>Having watched your public speaking in the VR training session, describe the experience in each of the areas I address:</p> <ul style="list-style-type: none"> <li>• How did you feel?</li> <li>• What did you see?</li> <li>• What did you hear?</li> <li>• What were you thinking about during the experience?</li> <li>• Is there anything else you would like to share about your observation?</li> </ul>	<p>How does staff at a local non-profit perceive utilizing virtual reality as part of an online workforce development program impacts learner satisfaction?</p>
<p>Can you describe how the VR training session impacts your public speaking skills?</p>	<p>How does staff at a local non-profit perceive utilizing virtual reality as part of an online workforce development program impacts learner satisfaction?</p>
<p>What do you feel are the advantages of VR in public speaking skill training as opposed to traditional online training?</p>	<p>How does staff at a local non-profit perceive utilizing virtual reality as part of an online workforce development program impacts learner satisfaction?</p>
<p>What do you feel are the disadvantages of VR in public speaking skill training as opposed to traditional online training?</p>	<p>How does staff at a local non-profit perceive utilizing virtual reality as part of an online workforce development program impacts learner satisfaction?</p>
<i>Define Motivation &amp; Immersiveness for Interviewee before asking the remaining questions.</i>	
<p>Describe how the VR training session impacted your motivation as a learner.</p>	<p>How does staff at a local non-profit perceive utilizing virtual reality as part of an online workforce development program impacts learner satisfaction?</p>
<p>Describe your feeling of immersion during the VR training session.</p>	<p>How does staff at a local non-profit perceive utilizing virtual reality as part of an online workforce development program impacts learner satisfaction?</p>
<p>Based on observing your VR training session, is there anything you would do differently or change regarding your public speaking skills or given the opportunity to do the VR training session again?</p>	<p>How does staff at a local non-profit perceive utilizing virtual reality as part of an online workforce development program impacts learner satisfaction?</p>

## Appendix G: Interview Protocol

Interview # \_\_\_\_\_  
Date \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

### Interview Protocol

#### *Script*

Welcome and thank you for your participation today. I am a graduate student at North Carolina State University conducting my Special Study in partial fulfillment of the requirements for the degree of Doctorate in Adult & Community College Education. Thank you for completing the survey, VR training session, and this follow-up interview will take about 60 minutes and will include 7 questions regarding your experiences in the Virtual Reality training session and what might affect your public speaking skills as a staff member at a non-profit organization.

Your responses will remain confidential and will be used to develop a better understanding of how you and your peers view the impact of Virtual Reality on your public speaking skills. The purpose of this study is to increase our understanding of how virtual reality may impact online workforce training and development.

Time of Interview:

Place: ONLINE (ZOOM)

Interviewer: Fallon Brewington, Doctoral Candidate

Interviewee: (Pseudonym)

Position of Interviewee:

Questions:

*Interviewee will watch snippets of the videos of their VR training sessions prior to questions.*

1. Having watched your public speaking in the VR training session, describe the experience in each of the areas I address:
  - How did you feel?
  - What did you see?
  - What did you hear?
  - What were you thinking about during the experience?
  - Is there anything else you would like to share about your observation?

2. Please describe how the VR training session impacts your public speaking skills?
3. What are some advantages of VR in public speaking skill training as opposed to traditional online training?
4. What are some disadvantages of VR in public speaking skill training as opposed to traditional online training?

*Define Motivation & Immersiveness for Interviewee before asking the remaining questions.*

5. Describe how the VR training session impacted your motivation as a learner.
6. Describe your feeling of immersion during the VR training session.
7. Based on observing your VR training session, is there anything you would do differently or change regarding your public speaking skills or given the opportunity to do the VR training session again?

## Appendix H: Research Timeline

The following research timeline was followed after IRB approval.

<b>Task</b>	<b>Target Date(s)</b>
IRB Approval	04/28/2021
Solicitation period for participants	05/03/2021–05/13/2021
Begin VR training sessions and interview period with participants	05/11/2021–05/19/2021
Begin transcribing interviews	05/11/2021
Analyze data for themes	05/22/21–05/24/20
Begin drafting final dissertation based on findings	05/24/2021
Update Chapters 1-3	05/24/2021
Begin Chapter 4 draft	05/24/2021
Begin Chapter 5 draft	06/07/2021
Submit final dissertation draft to editor	07/01/2021
Submit dissertation draft to committee	07/26/2021
Dissertation defense	08/13/2021