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EFFECTIVE CONTRACTING WORKFORCE TRAINING TACTICS IN A TELEWORK POST-PANDEMIC ENVIRONMENT

June 2021

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Air Force Life Cycle Management Center (AFLCMC) is considering the future of the telework workforce, with an interest on private industry tactics and technologies that may improve its workforce training in the post-pandemic era. During the current COVID-19 pandemic, the Air Force (AF) recognized an increase in productivity with 100,000 Air Force personnel working remotely. Our study examines the main barriers faced during the pandemic by the AF in its ability to effectively remote-train new and current contracting (1102) personnel. We analyze data from surveys and interviews with AF personnel and private industry training personnel to catalogue the main opportunities and challenges in delivering virtual training. Given the post-pandemic workforce profile and environment for AFLCMC, we make recommendations for best practices from the private industry that may increase training efficiency for the contracting (1102) workforce in post-pandemic environment.

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ABSTRACT

Air Force Life Cycle Management Center (AFLCMC) is considering the future of the telework workforce, with an interest on private industry tactics and technologies that may improve its workforce training in the post-pandemic era. During the current COVID-19 pandemic, the Air Force (AF) recognized an increase in productivity with 100,000 Air Force personnel working remotely. Our study examines the main barriers faced during the pandemic by the AF in its ability to effectively remote-train new and current contracting (1102) personnel. We analyze data from surveys and interviews with AF personnel and private industry training personnel to catalogue the main opportunities and challenges in delivering virtual training. Given the post-pandemic workforce profile and environment for AFLCMC, we make recommendations for best practices from the private industry that may increase training efficiency for the contracting (1102) workforce in post-pandemic environment.

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LIST OF ACRONYMS AND ABBREVIATIONS

AF	Air Force
AFLCMC	Air Force Life Cycle Management Center
COAs	Courses of Action
CDC	Center for Disease Control
CVR	Commercial Virtual Remote Environment Teams
DOD	Department of Defense
DIY	Do-It-Yourself
FPCT	First-Person Cultural Trainer
GSA	General Services Administration
ILAW	International Lawyers Assisting Workers
JPL	Jet Propulsion Lab
MS Teams	Microsoft Teams
NASA	National Aeronautics and Space Administration
OJT	On-the-Job
PCO	Procurement Contracting Officer
RAT PK	Rapid Acquisition Team Contracting
SME	Subject Matter Expert
TRADOC	Training Doctrine Command
VPN	Virtual Private Network
Wi-Fi	Wireless Fidelity

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EXECUTIVE SUMMARY

During the COVID-19 pandemic, society redefined a new "normal" to life and work. Everyone continues to make adjustments to limit the pandemic's immediate and longer-term impact. This thesis analyzes one specific area of adjustment: the mass and sudden transition to virtual training in the workforce. Specifically, the thesis identifies the best practices from private industry that the Air Force Life Cycle Management Center (AFLCMC) can implement to increase the effectiveness of their training programs in the post-pandemic environment. We use the assumption that private industry uses more efficient virtual training than AFLCMC. This assumption seems credible because historically, private industry has been on the leading edge of technology advancement and, therefore, more advanced in virtual training.

Our research approach starts with a literature review on virtual training. We review theories explaining adult learning and focus in particular on the approach of storytelling in learning. In the literature review, we evaluate different training methods that engage the brain and drive memory retention for adult learners and identify the practical aspects implementation of virtual training. Next, we compile evidence from the literature on how private industry utilizes various virtual learning (eLearning) tactics, such as gamification. eLearning advancements dramatically expand content delivery techniques options through commercially available plug-and-play platforms. In our research, we catalogue the challenges and solutions to virtual training in a telework environment.

We apply our findings from the literature review to analyze relevant data on training. Specifically, our project team was engaged by the AFLCMC in the Rapid Acquisition Team (RAT) Contracting (PK), an annual tiger team tasked with finding solutions to the acquisition workforce's challenges. RAT PK 4.0 conducted a survey in November 2020 and provided us access to the collected data containing feedback from the contracting workforce on the transition from training in-person to training in virtual environments.

During the pandemic, AFLCMC abruptly changed how the contracting workforce accesses training and recognized the need for enhancements mimicking private industry. The COVID-19 environment affected the training plans, platforms, and practices within a portion of the AFLCMC contracting workforce, primarily among the younger generation. Prior to the pandemic, AFLCMC contracting workforce delivered training in the office via self-access and live instruction, consisting of slide presentations, hour-long training videos, and webinars.

Working with AFLCMC executive leadership and through our contacts, we interviewed large DOD industry partners to learn about their training tactics—these interviews are the primary data for this study. We cataloged the findings from the interviews for later analysis. The goal of asking the interview questions was to understand the industry's best practices, applications, challenges, metrics, techniques, and trends of virtual training, allowing us to determine what AFLCMC can utilize.

After analyzing the private industry best practices, their competitive advantages in delivering virtual training, AFLCMC should consider the following Courses of Action (COAs):

COA1. Design and develop a 24/7 centralized training portal with ease of access from personal and work devices.

COA2. Create training materials and instructional design with a younger generational mindset. Incorporate gamification, knowledge checks, and short video segments into training materials.

COA3. Incorporate and apply data analytics to the training platform strategy; data analytics inform the efficacy of the training, what types of training, and the adjustments in the delivery of training and instructional design.

The private industry quickly adapted and provided employees with the necessary minimum equipment (cameras and microphones) for better virtual training engagement, which resulted in higher participation. In addition, the private industry provided 24/7

access to virtual training through personal devices, which allowed for greater flexibility in training access and meeting employee preferences. Applying instructional tactics such as knowledge checks and surveys measure the efficacy of virtual training. Private industry utilizes more case-study analysis and scenario-based exercises and implements generational audience design, thereby improving higher engagement and retention. AFLCMC can utilize the conclusions of this paper to implement more effective virtual training methods and platforms.

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Thank you to our family and friends for supporting us throughout the creation of this thesis and completion of our graduate program. We appreciate your encouragement and support through every facet experienced.

This journey was not easy, we leaned on each other through the stresses, deadlines, and share in the joys of completing the graduate program. Our cohort was extremely close knit and we have built close friendships that will last a lifetime.

We look forward to sharing our NPS experiences, knowledge, and pay it forward to those that serve alongside us in our various missions supporting the warfighter.

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I. INTRODUCTION

> Unless we accelerate the changes we need, the U.S. Air Force will be ill-prepared to compete, deter, and win. Urgent actions are required now to secure the U.S. Air Force's continued ability to deliver global effects on strategically relevant timelines. Demonstrating strength, adaptability, and resilience to primary competitors is necessary to deter future armed conflict.
>
> —Brown (2020, p. 1)

The unprecedented event of the COVID-19 global pandemic—which officially began in the United States in January 2020—changed personal lives and the working world. As most of the population was forced to remain in their homes for the safety of all (Taylor, 2020), businesses had to adapt by implementing teleworking (Office of Personnel Management, n.d.) and online training. The government and the military were not exempt from this necessary adaption. This is the first event of its kind within the era of 21st-century technology; it was—and continues to be at the writing of this thesis—an opportunity to pioneer the capability of "working from home." Therefore, the United States Air Force Life Cycle Management Center (AFLCMC) contracting leadership proposed a study of this capability to create strategies for optimizing teleworking and online training. The Rapid Acquisition Team of Contract Specialist (RAT PK 4.0) consisted of three teams, each assigned a selected topic concerning teleworking. As part of Team 1, we, the authors of this thesis, were tasked with studying training in a virtual environment to contribute to the overarching goal.

A. BACKGROUND

In December of 2019, a new strand of the Coronavirus was identified within Wuhan, China; soon after, cases were diagnosed all over the world. On January 30, 2020, the World Health Organization declared a global health emergency (Taylor, 2020); in response, the American Center for Disease Control (CDC) issued numerous guidelines to limit the virus's spread. In addition to wearing masks, one of the most stressed guidelines was to "social distance," which the CDC defined as remaining "at least 6 feet (about two

arm lengths) from other people who are not from your household in both indoor and outdoor spaces" (Centers for Disease Control and Prevention [CDC], 2020). To follow these guidelines, many U.S. states and territories issued "stay-at-home" orders, the variations of which are shown in Figure 1. The stay-at-home orders restricted people's movements to essential activities, forcing many businesses to implement telework, reduce staff, or close. According to Business Insider (2020), "A record 3.28 million Americans filed for unemployment benefits in the week ending March 21 as coronavirus-induced layoffs surge around the US" (Insider, 2020). The Department of Defense (DOD) enforced the Department of Defense Instruction (DoDI) Number 1035.01 on April 7, 2020, that "authorized telework for the maximum number of positions to the extent that mission readiness is not jeopardized" (p. 2). The AFLCMC has committed to "fully adopting telework and engraining it into post COVID plans" (Maucione, 2020). With as many as four million DOD military and civilians teleworking (Brown, 2020), implementing requisite training has become increasingly challenging.

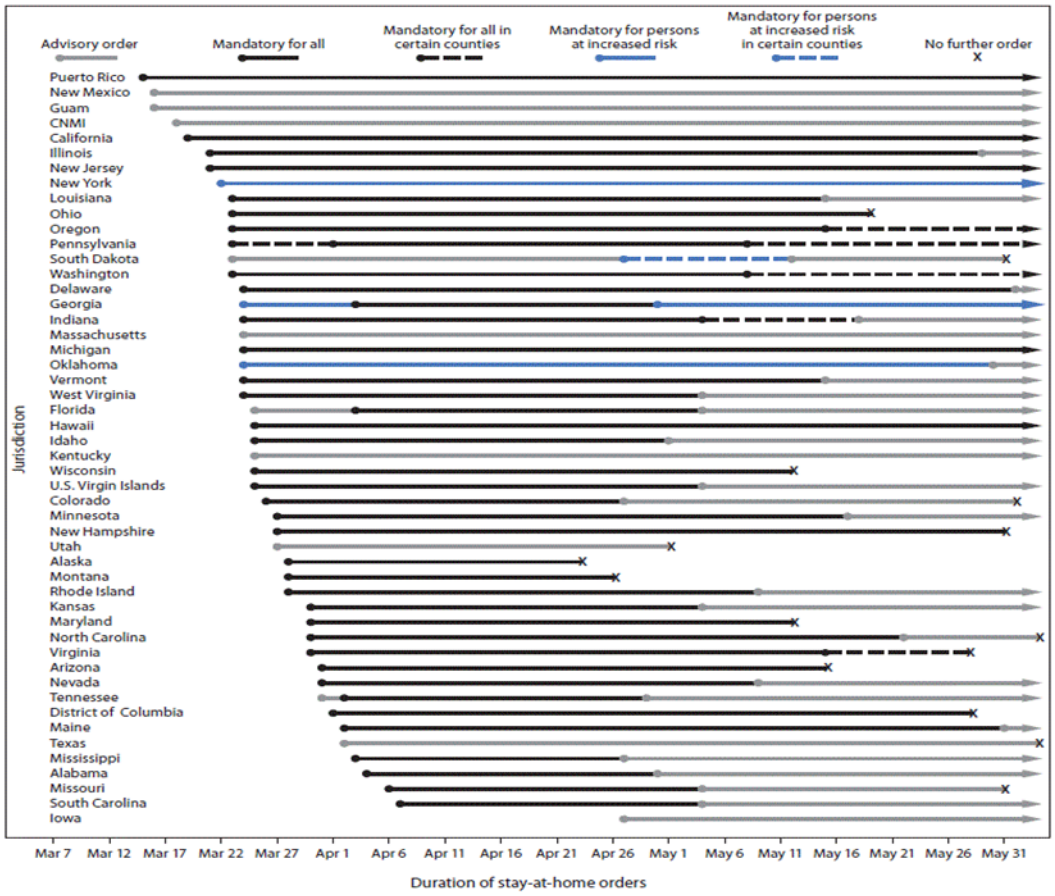


Figure 1. Duration of Stay-At-Home Orders. Source: CDC (2020).

B. RESEARCH QUESTIONS

This thesis summarizes data-driven courses of action (COAs) for Air Force senior leaders to meet a remote workforce's training needs. In association with the RAT PK 4.0, private sectors, and public sectors, the research aims to formulate a cost-benefit analysis that outlines the advantages, best practices, and tradeoffs to support training application decisions. The research questions outlined to achieve this goal are as follows:

- How did the COVID environment change the training plans, platforms and practices for interns/CopperCaps and journeymen within the 1102 series at AFLCMC?

- What are the effects of the COVID environment changes on training outcomes and experience, compared with the pre-COVID training outcomes?
- What has private industry done to accommodate a virtual workforce, specific to training?
- Which training platforms and best practices from the Private industry can be utilized to benefit the DOD contracting workforce? Formulate COAs to evaluate for DOD adoption and conduct a cost-benefit analysis.

This thesis hypothesizes that the private and public sectors have robust virtual training platforms and programs AFLCMC can benefit from to build better training programs to support mission needs. This paper's extended goal is to extract best practices from the data to help other DOD services and agencies implement effective training programs based on their workforce profile and environment post-pandemic.

C. METHODOLOGY

Team 1 of RAT PK 4.0 is a partnership between selected AFLCMC contracting professionals and the authors of this thesis that collected and analyzed data on the effects of virtual training. The AFLCMC members facilitated data collection using questionnaires distributed through Survey Monkey to their contracting workforce across the enterprise, representing seven bases. We conducted interviews using Zoom and Microsoft Teams, with eight private- and one public-sector organization. The responses collected from both sources were each inserted into MS. Excel spreadsheets to catalog them; these responses then underwent text analysis to convert them into empirical data. This data was transferred into graphs and discussed; these discussions inform the concluding suggestions and remarks for the research questions.

D. LIMITATIONS TO RESEARCH

The research of this thesis took place during the ongoing COVID-19 pandemic; the environment in which the pandemic was created presented some of the most notable limitations for the authors. The interviews and data collection efforts occurred between the fall of 2020 through the spring of 2021 at the height of the pandemic, forcing the authors to perform all efforts in a telework environment. Interviews performed virtually introduced issues such as technological malfunction. For example, one interviewee had a defective microphone and could not communicate effectively; the authors of this thesis asked the individual to email her notes for her contribution later. In addition, not all interviewees had access to interview platforms; for instance, one company could not access the Microsoft Teams platform utilized by the authors. Thus, the interview had to be adjusted to an alternative platform, in this case, Zoom. The pandemic-based guidelines of social distancing and teleworking denied any opportunity to participate in or sit in any in-person industry training; therefore, no first-hand basis could be obtained about pre-pandemic in-person training to contrast with the pandemic-era virtual training. The teleworking platform also limited the point of contact to the executives of the company's interviewed (instead of, e.g., the trainers or the employees); therefore, the authors could only receive limited perspectives of the companies' virtual training.

As with any interview-based research, limitations arise with time and scheduling. First and foremost, the authors of this thesis work within different time zones and therefore had to coordinate their schedules. This inter-author coordination then had to consider the time zones of the corporations with which they were performing interviews. It is the very nature of business and their executives to be busy and short of time; consequently, it proved challenging to find workable coinciding hours for both the interviewers and the interviewees.

Another major limitation of this research is that, as mentioned earlier, this is the first crisis of this magnitude during the modern era of technology. Therefore, there is limited basis of research on which the authors could build from. Other studies of the effects

of the COVID-19 pandemic on personal and professional lives were written and published parallel—see Chapter II Section D. Nonetheless, this literature is very preliminary and not a substantial foundation for the study of this thesis. More importantly, our research focuses specifically on pandemic-era virtual training for the U.S. Air Force -- an objective which no other study has focused on. In effect, there is no baseline study or data of USAF virtual training to expand upon; no AFLCMC baseline metric was available for virtual training in the development of this research. Therefore, the authors had to develop research for pioneering through this new research landscape. Finally, as this research was undertaken during the ongoing pandemic, there is no post-pandemic era data. Therefore, this paper is unable to discuss points of long-term results or outcomes and is limited to the time and scope of the pandemic era.

E. LAYOUT OF THESIS

The following thesis unfolds the data collected from AFLCMC and the private industry and its analysis. Chapter II contains the literature review and discusses current and/or pertinent research of virtual training platforms and methods used by industry and adult learning theory to provide insight into engaging the learner. Chapter III lays out the methodology, explaining how the data was collected and processed through text analysis. Chapter IV breaks down the collected data and discusses analysis findings and takeaways. Chapter V provides the study and recommendations for corrective actions that the AFLCMC leadership can implement into their virtual training to maximize their workforce's attainment.

II. LITERATURE REVIEW

A. INTRODUCTION

This chapter discusses the most relevant publications, including peer-to-peer articles, blogs, and a book related to adult learning theory. The findings allow us to gain the understanding and foundation needed to develop the analysis framework for this study. The first discussion centers around current research on the orientation and motivation of adult learners and processes, techniques, and content to increase instruction effectiveness.

The primary publication of this section is Merrill's 2002 article, which reviews adult learning theory with particular focus on instructional theories and models. Included in this is a discussion of the science of storytelling and its correlation to adult learning theory. This analysis focuses on Storr's 2020 book, which illustrates the science behind how people learn, as well as how to present the information to keep them engaged.

Next is a discussion of the literature regarding the private industry's use of virtual training through e-learning and gamification, in addition to the benefits and disadvantages. Three articles are discussed in order to examine how private industry implements the principles of learning to increase the effectiveness of their virtual training. These articles explain how technology provides globalized organizations access the same training through various platforms that assure consistency across borders. Finally, the literature review discusses the challenges of virtual training and provides solutions to those challenges.

B. ADULT LEARNING THEORY

The focus of our study is remote workforce's training needs for adult learners. There has been extensive research regarding adult learning with a spectrum of theories, models, and methods. In a thesis titled *Adult Learning and Naval Leadership Training* examining curricula correlation to adult learning theory, the author argued that "particularly in the United States, adults are self-directed and need ownership of both the

process and content to learn effectively" based on writings from Abraham Maslow (Hitchcock, 2004, p. 15). Another thesis titled *Andragogy: Adult Learning and Education at Its Best?* also cited key distinguishing differences between adult learners and non-adult learners based on writings by Malcolm Knowles between 1968–1998, where adult learners exhibit the following attributes "self-concept of autonomy and self-direction, higher level of life background and experience, the need to understand the reasons for learning something, learning motivation based upon personal need, pragmatic orientation, and an internally driven motivation to learn" (Clardy, 2005, p.5-6). Knowing what makes adult learning different based on the learner's orientation and motivation, the prescriptive processes, techniques, and content can then be aligned for instruction effectiveness. David Merrill (2002), researcher and teacher, examined six distinct instructional theories and models, most of which were based on problem-centered instruction; the purpose of his research was to "identify and articulate the prescriptive design principles on which these various design theories and models are in essential agreement" (p. 43). The author calls these essential characteristics "first principles of instruction," of which there are five (Merrill, 2002, p. 44).

Merrill frames each principle in the same results-orientated statement, beginning with the first: "learning is promoted when learners are engaged in solving real-world problems" (Merrill, 2002, p. 44). Specifically, he cites Van Merrienboer's "Whole Task Practice in 4C/ID model," where the first instruction "should be a worked example that shows the students the type of the whole task that they will learn to complete" (Merrill, 2002, p. 46). The second principle is "learning is promoted when prior knowledge is activated as a foundation for new knowledge" (Merrill, 2002, p. 45). Activation can occur in three different ways either by the learner's past experience, providing a new experience to the learner through relevancy, or by asking the learner to recall a structure or theme to organize the new knowledge. The third principle is "learning is promoted when new knowledge is demonstrated to the learner" (Merrill, 2002, p. 45). The demonstration is often done through scenario-based activities where the learner observes an instructor's actions or the steps involved, providing cognitive modeling for the learner. The fourth

principle is "learning is promoted when new knowledge is applied by the learner" (Merrill, 2002, p. 45). Instructors "performing parts of the task that the student cannot perform and gradually reducing the amount of guidance and shifting the control to the student" is an example of a diminishing coaching tactic (Merrill, 2002, p. 50). The fifth principle is "learning is promoted when new knowledge is integrated into the learner's world" (Merrill, 2002, p. 45). The research cites three ways for the learner to publicly demonstrate their learned skills by way of an opportunity, reflecting on their knowledge, and exploring or creating with their new skill or knowledge.

Figure 2 illustrates the phases of effective instruction, where, at the twelve o'clock position, the focus is the problem; it then moves in clockward progression to all phases required for effective instruction. Merrill argues that this formula approach is most effective when all the phases or principles are applied, "learning from a given program will be promoted in direct proportion to its implementation of first principles" (Merrill, 2002, p. 44).

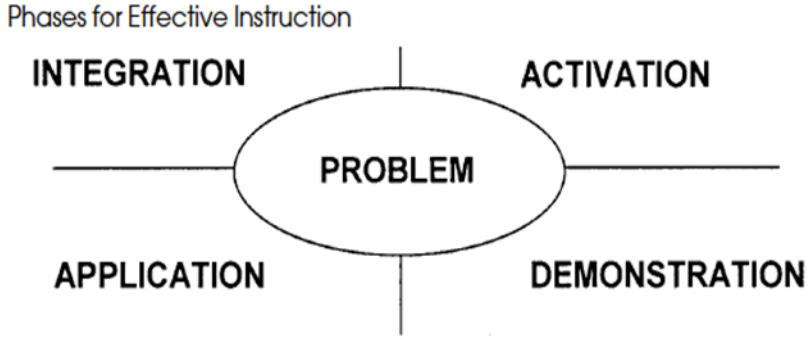


Figure 2. Phases for Effective. Source: Merrill (2002, p. 44)

1. The Science of Storytelling

It's story that makes us human. Recent research suggests language evolved principally to swap "social information" back when we were living in Stone Age tribes. In other words, we'd gossip. We'd tell tales about the moral rights and wrongs of other people, punish the bad behavior, reward the

> good, and thereby keep everyone cooperating and the tribe in check. Stories about people being heroic or villainous, and the emotions or joy and outrage they triggered, were crucial to human survival. We're wired to enjoy them. (Storr, 2020, p. 2)

Will Storr's book *The Science of Storytelling* contains hundreds of profound references distilled from distinguished authors, researchers, scientists, and doctors that decode and simplify how and why our brains will respond best to a story. Similar to Merrill's (2002) "first principles of instruction" where the goal is to be effective, Storr (2020) explains that "the challenge any of us faces is that of grabbing and keeping the attention of other people's brains" (p. 4). Both Merrill and Storr convincingly provide research-driven formulas in being effective instructors and storytellers. Storr breaks down all the symphonic pieces a reader responds to and why: "Storytellers engage a number of neural processes that evolved for a variety of reasons and are waiting to be played like instruments in an orchestra: moral outrage, unexpected change, status play, specificity, curiosity, and so on" (Storr, 2020, p. 6). Storr walks the reader through scientific explanations of the brain utilizing quotes from neuroscientist, Professor Sophie Scott, "almost all perception is based on the detection of change" (Storr, 2020, p. 11); then Storr concludes, "brains are on constant alert for the unexpected" (Storr, 2020, p. 12) in an effort to obtain control. Storr's quote of renowned psychologist Professor George Loewenstein has striking similarities to Merrill's first principles:

> In his paper "The Psychology of Curiosity," Loewenstein breaks down four ways of involuntarily inducing curiosity in humans: (1) the "posing of a question or presentation of a puzzle"; (2) "exposure to a sequence of events with an anticipated but unknown resolution"; (3) "the violation of expectations that triggers a search for an explanation"; (4) knowledge of "possession of information by someone else." (Storr, 2020, p. 19)

Storr goes on to reference research suggesting "we're more likely to attend to that which we find meaningful" (Storr, 2020, p. 39) and cited psychologist Professor Brian Little's work "his studies have found that, in order to bring us happiness, a project should be personally meaningful, and we ought to have some level of control over it" (Storr, 2020, p.187). Again, Merrill's first principles are similar to Storr's, pointing out a connection

must exist to the problem or project; the more significant the connection, the more considerable effect it will have (Merrill, 2002, p. 44). Storr provides an analogy regarding neuroscientist Professor Benjamin Bergen's work "grammar acts as a film director, telling the brain what to model and when" and quoting Bergen, "grammar, 'appears to modulate what part of an evoked simulation someone is invited to focus on, the grain of detail with which the simulation is performed, or what perspective to perform that simulation from" (Storr, 2020, p. 28). Modeling behavior and scenario-based learning is a key attribute discussed as the "demonstration phase" in Merrill's first principles (Merrill, 2002, p. 44). Further alignment exists where Storr states, "It's cause and effect that powers curiosity. Human brains and human stories ask, 'Why did that happen? And what's going to happen next?'" (Storr, 2020, p. 52). Specifically, Merrill's first principle, "trigger" at work, is when the learners activate prior knowledge of a similar problem whereby, they would be familiar with known cause and effect. However, now they are challenged to take on a new problem that needs understanding and "control" either by performing or even mastering the skill/ knowledge (reaching higher status than from initial outset) (Merrill, 2002, p. 44). Storr's statement "to accept story's challenge and win is to be a hero" (Storr, 2020, p 206) is the same pursuit of the adult learner in accepting and overcoming a problem or obtaining new skills or knowledge and then using it; we become our own hero, in our own story.

2. Conclusion

The literature is a strong basis of our research, both with the primary questioning, and the concluding theories. The interviews for data collection included questions regarding current implementation of the Adult Learning Principles. As is discussed in the following section, this data is used to test the efficacy of these principles on an online format, and further theorize their benefits for the AFLCMC virtual training goals.

C. PRIVATE INDUSTRY AND VIRTUAL TRAINING

The use of virtual training has evolved with the advancement of technology. E-learning is "the use of computer network technology, primarily over an intranet or through the Internet, to deliver information and instruction to individuals" (Welsh, Wanberg,

Brown, & Simmering, 2003, p. 246). Researchers concur that the advancements in technology have drastically altered education and training landscapes (Welsh et al., 2003, p. 245; DeRouin et al., 2004, p. 148; Reynolds, 2020, p. 48). Reynolds (2020) states that: "e-learning might be the most radical discovery to transform education technology since the invention of the chalkboard" (p. 50). This advancement in technology expands access to training through numerous online platforms, including web-based learning, computer-based learning, virtual classrooms, and digital collaboration (Kaplan-Leiserson, 2002, p. 5-6). As the modern world expands business horizons to a global workforce and market, there is an increasing necessity to maintain the same levels of quality worldwide (Reynolds, 2020, p. 48). As shown by the continuous increase of technology-based training in organizations (Welsh et al., 2003, p. 245–246), online platforms are the preferred and most efficient strategy for maintaining this quality. The utilization of technology can connect people worldwide into a single online training or training system with the same resources and guidance. It is also possible to access one training at a single time within numerous countries, regardless of distance or time zone. Technical training therefore assures both consistency, and an efficiency of both time and cost. Let us now explore the advantages and disadvantages of e-training in order to expand upon these points.

1. Advantages / Benefits

The advancement of technology provides private industry training programs the benefit of reaching employees worldwide. Welsh et al. state that the increased use of internet technologies to deliver training has created an "e-Learning Revolution" (2003, p. 245). This is no surprise as the benefits of virtual training in our modern world are numerous and growing for both employers and employees. First, there is the matter of globalization, in which numerous companies extend their business past their home shores and into other countries. For example, Walmart has a global presence within twenty-four countries and is committed to maintaining a standard of ethics throughout (Walmart, 2021a); in addition, the corporation provides career development and training for its employees (Walmart, 2021b). As "E-learning allows for training to reach diverse and

geographically dispersed workforces cost-effectively" (DeRouin et al. 2004, p. 147–148), it should come as no surprise that Walmart utilizes the latest technology to assure training consistency; for more information on how Walmart is training with technology see Incao (2018).

Organizations are also turning to e-learning for cost savings and retention tracking. Corporations can "reduce travel and classroom costs and time off-the-job associated with off-site training" (Welsh et al., 2003, p. 248; Reynolds, 2020, p. 50). Virtual training also has the benefit of reducing delivery cycle time. Virtual classes are not limited by instructor-led classroom capacity; therefore, less time is required to train more people (Welsh et al., 2003, p. 248). When companies require swift training to a high volume of people, this is the most effective and efficient method. Progress and retention can be tracked and recorded through tools such as data analytics, online surveys, and certification exams to assess mastery of material efficiently (Welsh et al., 2003, p. 248; Reynolds, 2020, p. 48). Such assessments provide evidence that online training is beneficial to information retention; for example, Reynolds (2020) has found that "the culmination of multiple path-breaking technologies result in a tailor-made suite of applications that streamline employee training and boost trainee knowledge retention" (p. 49). It is also theorized that retention benefits from information delivered over a longer period of time (Welsh et al., 2003, p. 248; Reynolds, 2020, p. 46), an option that e-learning provides.

Employees also benefit from virtual training; most notably, classes, development, and materials are available at better personal convenience. Training can be accessed via computer programs or platforms at a time and place convenient to the employee and within a self-paced course format (Reynolds, 2020, p. 50; Welsh et al., 2003, p. 248). Furthermore, training is generally more specific to the employee's level of understanding and occupation (Reynolds, 2020, p. 50). The convenience and easy access to information has been correlated to increased learner interest (Reynolds, 2020, p. 50; Welsh et al., 2003, p. 248; DeRouin et al., 2004, p. 148) which is a mutual benefit for both employer and employee.

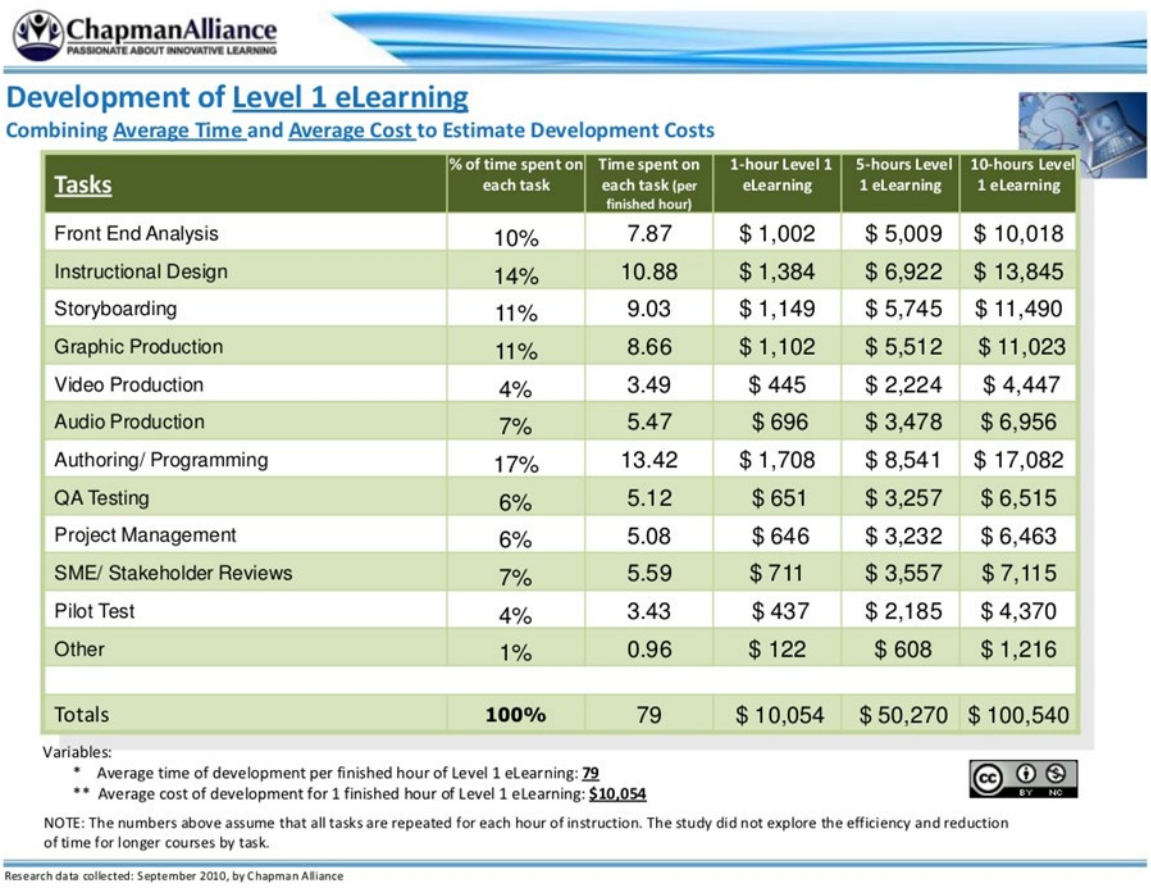
An additional and significant benefit for the employee is more tailored material and programs. Some companies achieve this through "gamification"—a buzzword used in the business world to describe anything related to gaming (Reynolds, 2020, p. 50). In a sense, training is turned into a game, including any of the following: leadership boards, progress bars, in-game currencies, and other elements which one may be familiar with within videogame settings (Reynolds, 2020, p. 50). Turning a training session into a "game" promotes teamwork, communication and a boosted collective morale (Reynolds, 2020, p. 50). Unfortunately, this strategy of "gamification" is not widely employed (Reynolds, 2020, p. 50). However, one can find an example of gamification within the U.S. Army; the U.S. Army and Training Doctrine Command (TRADOC) sponsored the development of the First-Person Cultural Trainer, or FPCT (Roth, 2011). This experience trains Army soldiers on weapons systems and tactics, leadership skills, and knowledge of the culture into which they will be deployed, all within an immersive gaming environment (Roth, 2011). The "game" inserts the soldier, as a first-person point of view avatar, into a virtual community of Iraq or Afghanistan; the goal of the player is to "move through the community, learn the social structures and issues, then address those issues and work with the community to affect missions" (Roth, 2011). This gamification program was awarded first prize in the category Serious Games Challenge (government category) at the InterService/Industry Training, Simulation, and Education Conference at Orlando, FL, on December 1st, 2011.

2. Disadvantages

Online training programs do not come without disadvantages. The most notable to any business employing virtual training methods would be the considerable upfront costs of technology and staff (Welsh et al., 2003, p. 249). According to a Chapman Alliance study of 249 organizations (Chapman, 2010), the average cost to produce one hour of "Level 1" or "Basic" e-learning content—defined as "Content pages, text, graphics, perhaps simple audio, perhaps simple video, test question" (Chapman, 2010, slide 10)—is $10,054 (see Figure 3; Chapman, 2010; referenced in Cobb, 2014). As the training becomes

more interactive, as in “Level 2” or “Interactive”—defined as “Level 1… plus 25% (or more) interactive exercises (allowing learners to perform virtual ‘try it’ exercises), liberal use of multimedia (audio, video, animations)” (Chapman, 2010, slide 16)—this average cost for 1 hour of training jumps to $18,583 (Chapman 2010, slide 20). If one wished to develop a highly interactive “Level 3” or “Advanced” program—defined as “possibly simulation or serious game-based, use of avatars, custom interactions, award-winning caliber courseware” (Chapman, 2010, slide 22)—such as the army TRADOC program, this average cost jumps once more to $50,371 for 1 hour of training (Chapman, 2010, slide 26). The company itself may not produce this e-learning content but rather outsourcing it; therefore, additional “market” prices for the product would increase from this average production rate (Cobb, 2014).

In addition, although it is a benefit that employees can train at their own pace at their convenience, this implies solitary training or limited interaction—except when the rare gamification method is employed (Reynolds, 2020, p. 50; Welsh et al., 2003, p. 249). In effect, limited teamwork and communication have been reported to minimize trainee fulfillment (Reynolds, 2020, p. 50).



ChapmanAlliance
PASSIONATE ABOUT INNOVATIVE LEARNING

Development of Level 1 eLearning

Combining Average Time and Average Cost to Estimate Development Costs

Tasks	% of time spent on each task	Time spent on each task (per finished hour)	1-hour Level 1 eLearning	5-hours Level 1 eLearning	10-hours Level 1 eLearning
Front End Analysis	10%	7.87	$ 1,002	$ 5,009	$ 10,018
Instructional Design	14%	10.88	$ 1,384	$ 6,922	$ 13,845
Storyboarding	11%	9.03	$ 1,149	$ 5,745	$ 11,490
Graphic Production	11%	8.66	$ 1,102	$ 5,512	$ 11,023
Video Production	4%	3.49	$ 445	$ 2,224	$ 4,447
Audio Production	7%	5.47	$ 696	$ 3,478	$ 6,956
Authoring/ Programming	17%	13.42	$ 1,708	$ 8,541	$ 17,082
QA Testing	6%	5.12	$ 651	$ 3,257	$ 6,515
Project Management	6%	5.08	$ 646	$ 3,232	$ 6,463
SME/ Stakeholder Reviews	7%	5.59	$ 711	$ 3,557	$ 7,115
Pilot Test	4%	3.43	$ 437	$ 2,185	$ 4,370
Other	1%	0.96	$ 122	$ 608	$ 1,216
Totals	**100%**	79	$ 10,054	$ 50,270	$ 100,540

Variables:
* Average time of development per finished hour of Level 1 eLearning: 79
** Average cost of development for 1 finished hour of Level 1 eLearning: $10,054

NOTE: The numbers above assume that all tasks are repeated for each hour of instruction. The study did not explore the efficiency and reduction of time for longer courses by task.

Research data collected: September 2010, by Chapman Alliance

Figure 3. Chapman Alliance Findings of E-Learning Development Costs. Source: Chapman (2010, Slide 14).

3. Conclusion

It is essential to understand the virtual training industry as it currently stands, including all discussed advantages and disadvantages. To collect and analyze data for the study, one must first discover the most effective and efficient platform that the industries are currently implementing. The current literature prepared the authors to both create the relevant interview questions and best understand and evaluate the interview answers. Namely, the current literature allows depth to the answers of the interviews with background and technical information. The combination of research from literature and first-person interviews achieves the most effective conclusion for this research question.

D. VIRTUAL TRAINING CHALLENGES AND SOLUTIONS IN A PANDEMIC

Training posed challenges to companies prior to a pandemic taking over the world; now that the majority of workers are telecommuting, the challenges of training have become exponentially more severe. With employees remotely working, they do not have the ability to participate in in-person training, conferences, workshops, or instructor-led classes, which they heavily relied on previously. Informal training, such as discussions between colleagues or newer employees shadowing more established employees, became nonexistent in the remote environment.

1. What Are the Challenges?

A Practical Guide on Teleworking during the COVID-19 Pandemic and Beyond (International Lawyers Assisting Workers Network [ILAW], 2020), *Tackling 3 Challenges of Training a Remote Workforce* (Glass, 2020), and *Training Challenges in the Workplace, 2020 Edition* (Eudy, 2020) all highlight challenges of training while working remotely. Each of these three studies note that one of the primary challenges was the inability to establish a cohesive work environment that allowed for ad-hoc training. Face-to-face or impromptu training is not occurring as it previously had—the virtual environment strains employee cohesiveness. This directly affects the amount of support the coworkers are willing to provide and the knowledge they are willing to share. Without a cohesive work environment, professional isolationism becomes prevalent. This is where employees feel they are missing opportunities that they would have been able to take advantage of if they were working on site. The isolation causes a disconnect for mentorship opportunities, learning experiences, and networking due to the loss of contact with fellow employees.

The articles also outline Online learning technologies as significant challenges to successful training in a virtual environment. Virtual platforms such as Zoom and Microsoft Teams work sufficiently for a status meeting, but they are not always effective for training. These platforms allow members to turn off their camera, which contributes to disengagement, lack of interest, and employees multitasking when they should be engaging

with the instructor and material. The breakout rooms are not always effective at encouraging employees to contribute or allow for open communication. The chat feature on the platforms can be distracting and take away from the primary content.

In its 2020 study, author Ryan Eudy noticed that the lack of structure and accountability caused day-to-day work to blend into each other, inhibiting learning continuity, and caused employees to put off training. Teleworking employees have blurred start and end times to their workday, often causing employees to over-work. Without the need for commuting or traveling to different meeting locations, schedules get booked with back-to-back meetings consuming the majority of the workday. To prevent training from being put on the backburner or becoming a low priority, Eudy recommends that scheduled training sessions become part of the daily workflow (p. 20).

2. What Are the Solutions?

Creating a cohesive work environment in a virtual world requires as much communication as possible, including direct message, email, text message, and the occasional phone call to coworkers. Maintaining good team collaboration requires effort on the management's part, encouraging sharing ideas and best practices from coworkers, and openly sharing the challenges employees may face. *A Practical Guide on Teleworking during the COVID-19 Pandemic and Beyond* (ILAW, 2020) outlines how to train in a remote environment. The actions include conducting surveys regularly on teleworkers' challenges and needs, specifically targeting training and coaching sessions (ILAW, 2020). Another recommendation is to offer training that focuses on soft skills, such as mindfulness and time management skills designed for teleworking (ILAW, 2020). This will help the employees "learn about and acquire skills to minimize health risks, set boundaries between work and personal life, and improve effectiveness. Getting enough exercise, eating and sleeping well, and disconnecting from digital devices are just as important if not more so in the context of teleworking during the pandemic" (Eudy, 2020). To avoid potential over-working, Pinola (2020) identifies steps that include setting appointments on your calendar

that includes “end of the day,” set reminders to take breaks, and turn off notifications on your mobile devices once you are off work so that you are not pulled back in (p. 2).

Implementing a self-directed learning approach can assist with schedules that are unstructured. Creating access to a 24–7 online learning library will enable employees to view training content when it is convenient for them (Eudy, 2020). The training programs should utilize video recording capabilities to review topics, facilitate thorough discussions and incorporate knowledge checks to test the employee’s retention of the material (Eudy, 2020).

3. Conclusion

As can be gathered from the publication dates in the literature, the topic of virtual work during a pandemic became a critical talking point during the height of the COVID-19 pandemic. As discussed in the previous chapter, the COVID-19 pandemic forced many individuals and companies to adapt to online work and training; therefore, the effects and responses to this change became a “current event” which authors flocked to discuss. We also found the relevance and importance of this topic; however, our overarching goal is to find the best solution to virtual training for the U.S. Air Force, this is our distinction from the rest. The Air Force is generally the forefront of innovation and current trends; they therefore understood the importance of this topic. Our partnership with the Air Force includes us in this initiative to find solutions in this changing virtual landscape, including how the AFLCMC will be affected post-pandemic regarding teleworking and virtual training.

E. FINAL REMARKS

We reviewed the most current publications of the effects of COVID-19 on businesses and teleworking and learned the importance of tailoring the training for the intended audience. With the advancement of technology and e-learning, the number of participants increases with flexibility and unlimited seats. The use of gamification as a training can enhance knowledge retention and provide essential knowledge checks.

Further, reviewing—Adult Learning Theory and the Science of Storytelling allowed us to summarize information on training methods that engage the brain and support learning for adult learners.

In reviewing scholarly articles on virtual training, we learned how private industry used Gamification techniques in their eLearning platforms. As seen in the following chapter, some of the industry findings incorporated gamification into their training programs, which helped the authors better understand the effectiveness and importance of the techniques. Additionally, eLearning advancements have dramatically improved in content delivery techniques and are more affordable and commercially available plug-and-play since the writing of these articles.

The publications, written before and during the pandemic, highlight virtual training challenges and solutions experienced. The challenges are still prevalent and seen in the various learning techniques, as stated in the readings and industry interviews. The findings from this literature review provided a foundation for the authors to build upon and to develop research questions in studying effective virtual training in telework environments.

III. DATA COLLECTION

We examine how AFLCMC, private sectors, and public sectors used virtual training during the COVID-19 pandemic, using an exploratory and ethnographic research approach. Primary and secondary qualitative data methods gathered from cross-sectional surveys and interviews were analyzed using summary statistics and text analysis.

To collect data pertaining to this research project, we commenced with a collaboration between with RAT PK 4.0; half of the corpus consisted of secondary data provided by the AFLCMC contracting workforce. The data collected focuses on the impact of virtual training, it collected data during the fall of 2020 using Survey Monkey to distribute a questionnaire to the AFLCMC contracting workforce. Appendix A shows the complete survey, which consisted of twelve questions; of these twelve, only four were pertinent to our research. These four relevant questions highlighted are:

- Which training platform or method did you find most effective prior to COVID-19?
- Which training platform or method do you find most effective during COVID-19 the telework environment?
- How has training been accomplished during training?
- Are there barriers you are experiencing that negatively impact training in a telework environment?

There were 434 responses out of 1,877, representing a twenty-five percent response rate. The text analysis method enabled the authors to study patterns and correlations in the data; we then exported that data into an excel spreadsheet for ease of filtering. RAT PK 4.0 Team 1 met weekly to discuss the findings from the AFLCMC survey. Chapter IV analyzes this data and discusses the results.

We obtained the primary data through interviews with eight private and one public sector entity; the number of employees per company is noted in Table 1. The meetings were scheduled in the spring of 2021 through emails and conducted via Microsoft Teams and WebEx (except for one organization where an exception necessitated a change to the platform Zoom, see Chapter I, Section D "Limitations To Research").

Table 1. Number of Employees per Company.

Company	Number of Employees
A	195,000
B	141,000
C	114,000
D	97,000
E	48,000
F	22,900
G	11,137
H	6,000
I	622

The authors developed questions based on philosophical considerations and adult learning theory. The authors asked each organization the following questions:

- What challenges have employees experienced in training programs delivered in a virtual environment?
- How did the COVID environment change its virtual training concerning: participation, metrics to determine effectiveness, techniques, processes, and applications/tools?

- What is the percentage of virtual training delivered by the corporate and local office?
- What does the organization require as to critical attributes to achieve practical training?
- May we observe the delivery or receive a training sample to evaluate against the adult learning theory?

As the entirety of this research took place during the height of the pandemic, it is a cross–sectional study—a study that gathers data at a single point in time. All the businesses interviewed were teleworking due to the pandemic, which captured the most current and relevant data. After each interview, the authors synchronized the notes to capture interviewee responses. The authors of this thesis vetted the data collected by AFLCMC that only addressed this research. The findings were then compared to our data to study the similarities and differences. The use of text analytics determined the best practices used by industry and not AFLCMC; but provided the AFLCMC leadership COAs on how they may obtain more effective virtual training in developing a more lethal and agile workforce.

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IV. DATA ANALYSIS

The following chapter presents and discusses the data obtained through the interview and survey processes. The chapter is broken into two sections: one for AFLCMC data and one for the team's data (private industry). Graphs through this chapter illustrate the percentages of common responses. Section A AFLCMC presents questions from the AFLCMC survey, which collected 434 responses out of 1,877 requests for a total return of 22%. Section A presents only four questions from this survey that are pertinent to the aim of this research paper. The answers underwent text analysis searching for common responses; these common responses were tallied into a percentage (e.g., 293 out of 434 AFLCMC respondents reported in-person training as the platform used before COVID-19, thus creating the fraction 293/434, and therefore the percentage of 68%). The team collected the data for each question of the survey and compiled on graphs for visual access. Section B Private Industry follows a similar process; however, the data presents questions from the nine organizations interviewed. The graphs of this section illustrate common responses of all nine organizations produced from the same text analysis and filtering process as the graphs from section A. Section B has an additional "Key Takeaway" subsection in order to summarize the most pertinent findings for the concluding COAs (or suggestions) on current private industry practices which the AFLCMC should incorporate.

A. AFLCMC

a. Which platform or method did you find most effective prior to COVID-19?

Findings

Figure 4 illustrates the 434 responses from the AFLCMC survey question which identified the three prevalent platforms used prior to virtual training. The AFLCMC survey found in-person training, at 68%, to be the most effective method prior to COVID-19. Eighty-nine respondents, 20%, preferred webinars and videos for their training preference.

The least preferred training platform was the use of PowerPoint, with fifty-two respondents resulting in 12%.

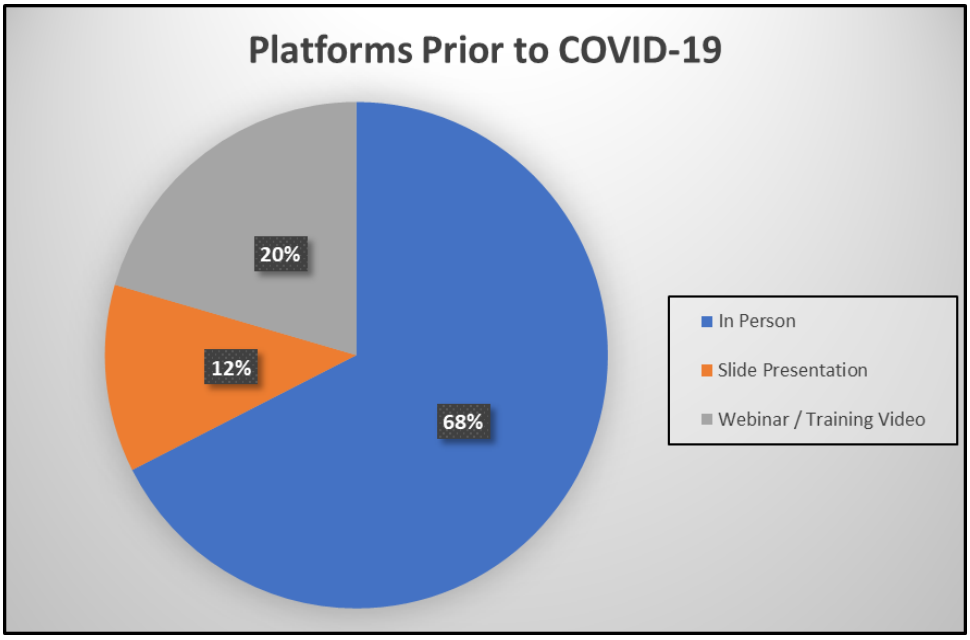

Figure 4. Platforms Used by AFLCMC Prior to COVID-19

b. Which training platform is most effective in the current COVID-19 tele-working environment?

Findings

Figure 5 presents the 434 responses from the AFLCMC survey which identified the five prevalent platforms—and the combinations thereof—used during the COVID-19 pandemic. These four platforms are: CVR (MS. Teams), WebEX, Skype, Zoom, and In-person. The majority these web-based platforms allow for videoconferencing, chat—instant messaging services, and file sharing—the exception to this is Skype which does not allow for file sharing. The graph of Figure 5 first illustrates the respondents who only use one of the identified platforms; the most prevalent in this group is CVR at 122 respondents (28.1%). It should be noted that no respondent claimed to use only the Zoom platform (0%). The graph continues by presenting all of the combinations of these four platforms

and their frequency. Once again, CVR is the most prevalent within these combinations, occurring in thirteen of the nineteen combinations. The government contracted for CVR, thus explaining its prevalence—see Chapter V Conclusion for further information. The remaining four platforms were each identified in ten of the nineteen combinations. It is interesting to note the reports of continued in-person training during this pandemic era.

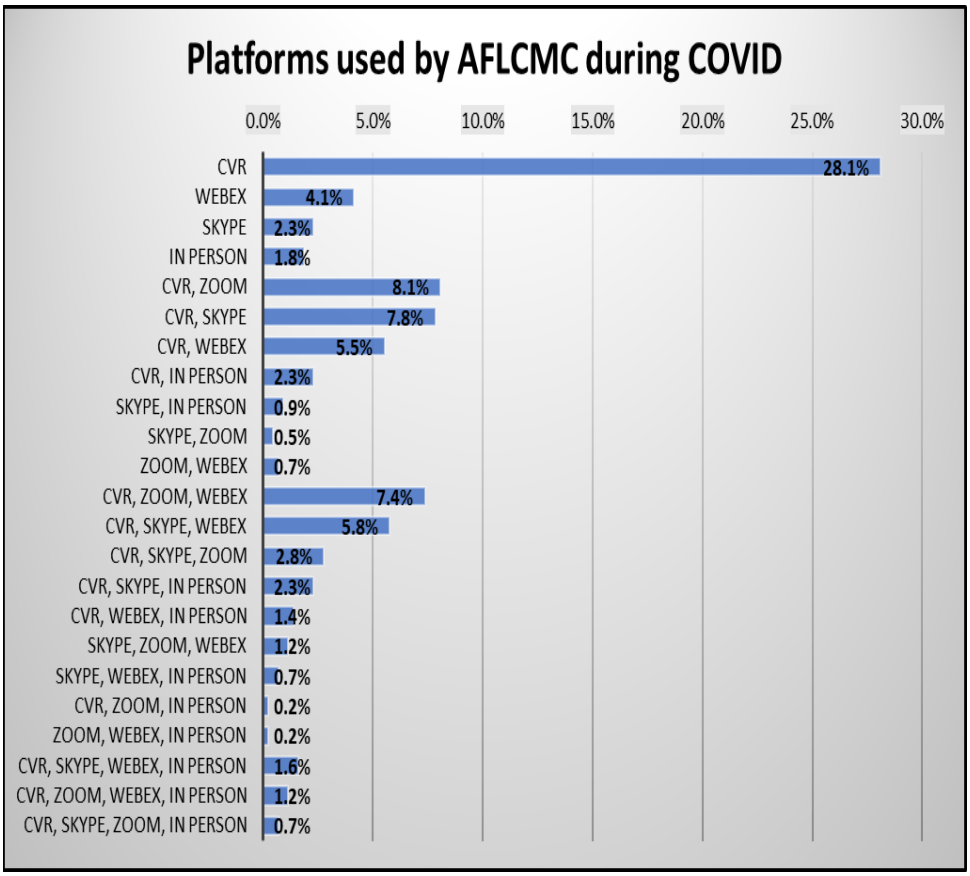

Figure 5. Platforms Used by AFLCMC During COVID-19

c. How has training been accomplished during COVID?

Findings

Figure 6 depicts the 434 responses from the AFLCMC survey which identified the four preferred platforms used during virtual training. The government deployed MS Teams

in March 2020 due to the large number of employees required to work remotely during the current health crisis. The platform allowed for chat, video calls, and the ability to share and collaborate on documents. MS Teams was the preferential platform with 247 respondents due to the ease of accessibility on DOD computers. It was also the only platform authorized by the DOD for Personally Identified Information (PII) and Controlled Unclassified Information (CUI). The DOD did not authorize the use of Zoom or WebEx for the dissemination of CUI/PII and considered those as backup tools and only used in the event MS Teams was unavailable. Zoom and WebEx were still the preferred platforms for 84 and 48 respondents, respectively. Although 55 respondents preferred Skype, the Air Force retired Skype in transition to MS Teams in January 2021.

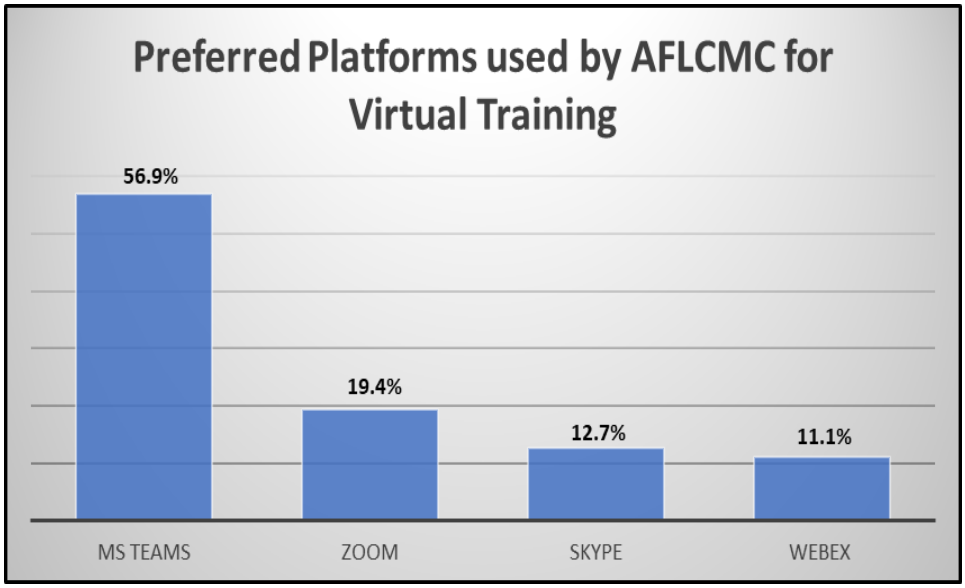

Figure 6. Preferred Platforms During Virtual Training

d. Are there barriers you are experiencing that negatively impact training in a telework environment?

Findings

Figure 7 illustrates the 434 responses from the AFLCMC survey which identified the ten most common barriers experienced during virtual training. Thirty respondents, or

6.9% of the answers, did not apply to the question. The majority, 224 out of the 434, 51.6%, reported that they did not experience any barriers with the training. Communication affected fifty-two or 12% of participants, with the inability to connect with an SME or know whom to turn to for assistance. Fifty respondents, 11.5%, experienced bandwidth limitations and connectivity issues utilizing their internet. Eighteen (4.1%) of individuals experienced problems with their workload competing with their training. Determining which platform to use for training was problematic for seventeen or 3.9% of the respondents. Generational learning theory was a barrier for fifteen participants, which was 3.5%, due to the preferred pedagogical strategies. Thirteen (3%) of the respondents experienced a lack of engagement due to not having a camera or turning it on during training. Another 2.1%, or nine employees, did not have sufficient resources, like microphones, cameras, or strong internet connection, to fully experience training. Four individuals, 0.9%, stated that too much time was spent in the virtual environment during the workday so that additional virtual training became too taxing. Surprisingly, only 0.5% acknowledged a barrier with trying to concentrate on training with numerous distractions. While working in a home setting, not all employees have a private dedicated workspace, which may impact training; distractions came from household members and pets making noises or needing attention.

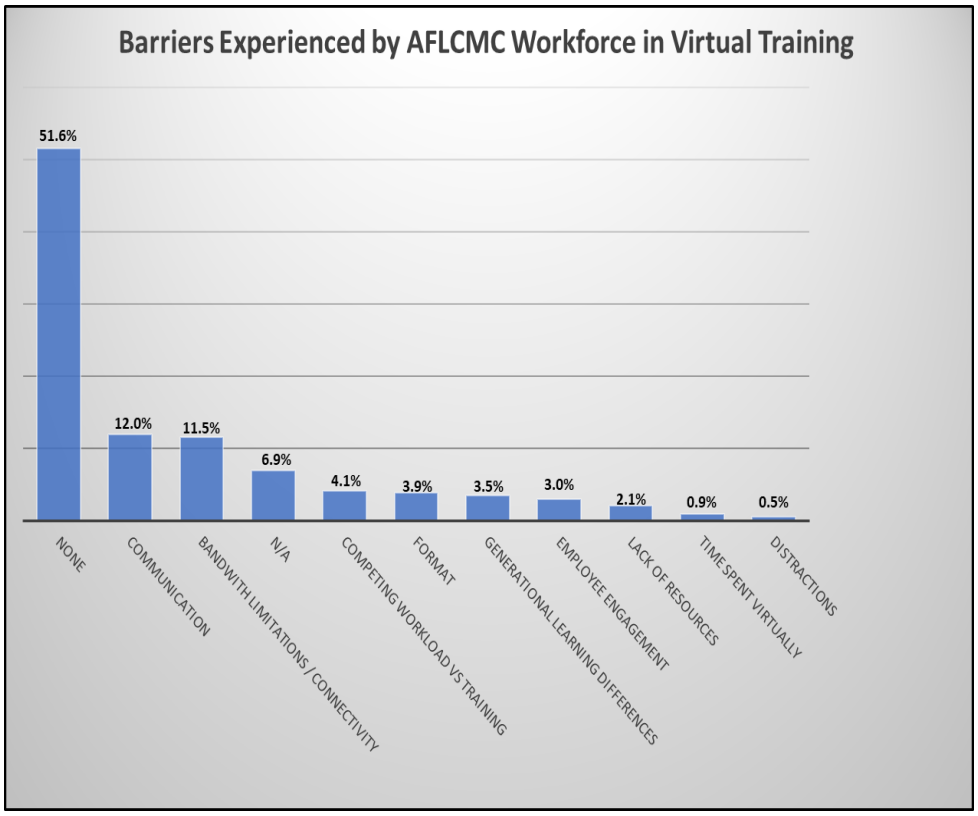

Figure 7. Barriers Experienced by AFLCMC in Virtual Training

B. PRIVATE INDUSTRY

a. What challenges have your employees experienced in training programs delivered in a virtual environment?

Findings

Figure 8 presents the nine interviewed organizations that identified five challenges with virtual training. Seven out of nine organizations (77.8%) identified bandwidth limitations or connectivity issues as the predominant challenge. One factor given was low bandwidth residential connections through local providers. Another factor was wireless fidelity (Wi-Fi) or hard landline connection troubles when accessing virtual private networks (VPNs). At the same time, employees are also competing for bandwidth with other household members. Five of the organizations, representing 55.6%, reported issues learning the nuances of virtual formats. There were challenges learning to use the new

training platforms, such as Zoom, Microsoft Teams, and other collaborative applications. These new formats to access virtual training, versus the prior face-to-face, were an abrupt and significant new environment, causing some employees to struggle at first.

Interestingly, generational learning differences also impacted training. Three organizations (33.3%) reported differences in the training to Millennials and Centennials versus Gen-X and Baby Boomers because they retain information differently. Two, or 22.2%, recognized that a lack of personal equipment such as cameras and microphones made it challenging to engage in the training sessions. Not surprising was the challenge of trying to concentrate on training with numerous distractions. While working in a home setting, not all employees have a private dedicated workspace, which may impact training participation; distractions noted were shared bandwidth issues, household members, and pets making noises or needing attention. Interestingly, only two of the nine organizations, or 22.2%, acknowledged the challenges with shared workspaces.

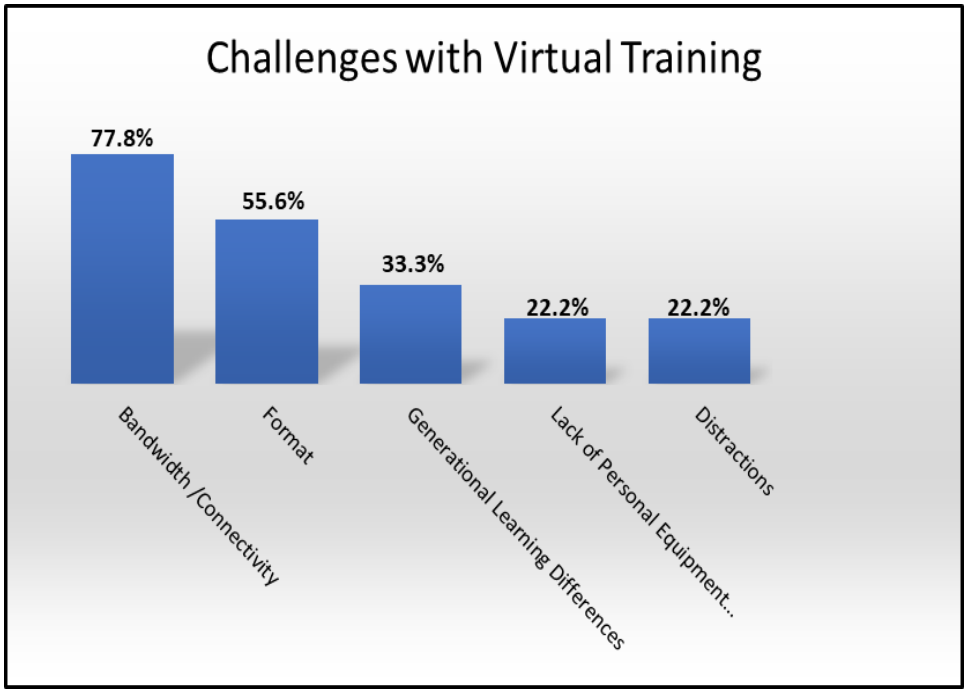

Figure 8. Challenges with Virtual Training

Key Takeaways: Challenges

The organizations responses overall revealed that bandwidth and connectivity were the most significant challenges. Some organizations initially had challenges with employee attendance in virtual training due to a lack of familiarity with the virtual platforms or a lack of equipment. Other organizations provided their employees with cameras and microphones, allowing for more engagement. Three organizations identified a distinction between generational learning preferences, explicitly calling out how Millennials and Centennials train differently than Generation X and Baby Boomers.

b. How did the COVID environment change your company's virtual training?

(Note: Question 2 targeted the following discrete subsections: Participation, Metrics, Techniques, Approaches/Processes, and Application/Tools.)

Findings: Participation

Figure 9 depicts the nine interviewed organizations that identified notable observations in participation during virtual training. Four organizations, or 44.4%, indicated no change in participation, as they were already using a virtual format. Four organizations reported an increase in participation due to an unlimited number of seats in a virtual environment, eliminating the physical in-person or classroom limitations. Unlimited seat capacity within the virtual platform also eliminated numerous travel expenses related to in-person training. Training became more agile, transitioning to all web-based applications and platforms with 24/7 access providing more flexibility, setting time aside at one's convenience. Two organizations highlighted generational age differences as drivers to virtual participation, most notably that Millennials and Gen Y are associated with higher technological knowledge and capabilities.

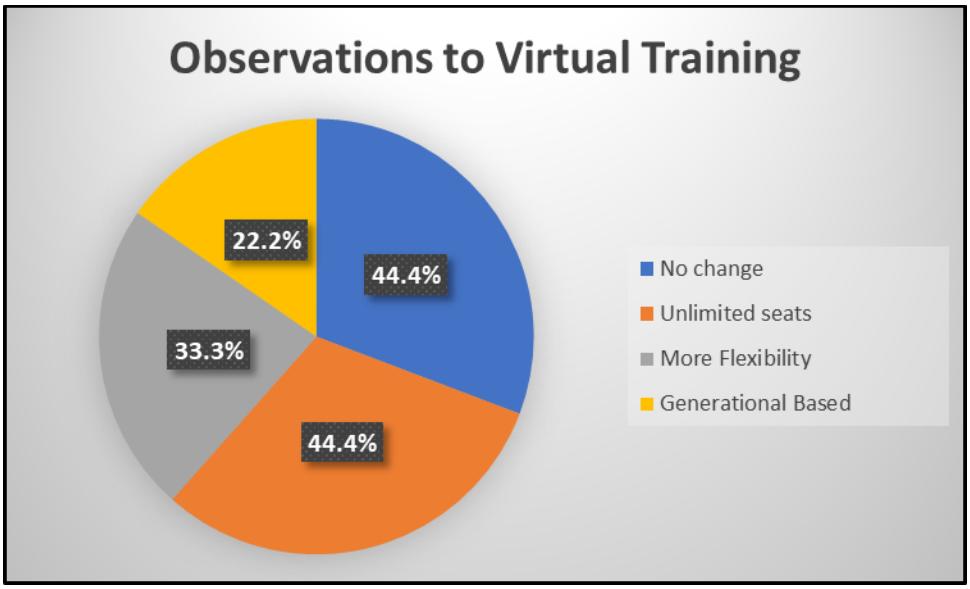

Figure 9. Participation (Changes) to Virtual Training

Key takeaways: Participation

Organizations experienced changes transitioning from in-person to virtual training; most of these changes were positive, including more flexible and inclusive platforms. Interviewed organizations recognize that through the increase in participation in virtual training, there are cost savings by mitigating travel expenses and time away from the job. The younger generations of the workforce prove more adaptive to the online platforms as they have more technical skills and understanding.

Findings: Metrics

Figure 10 illustrates the nine interviewed organizations identified five metrics to determine the effectiveness of virtual training. To substantiate the effectiveness of virtual training, knowledge checks during the training proved to be most successful. Knowledge checks are questions within the training to make sure the learner understands the material. Six of the organizations used knowledge checks, representing 66.7%. Real-time training software allows organizations to track employees' progress during the training. Another metric used by four organizations, 44.4%, to validate the training was to observe the

number of learners enrolling in the session. Organizations were able to see the level of interest in a class, which allowed them to either continue or cancel the training. Understanding the completion and passing rate of the training provided the efficacy, which could also lead to the continuation or cancellation of training. Four of the organizations (44.4%) used this technique. Some organizations administer surveys immediately after training to gain insight into the effectiveness of the class. Three of the organizations, 33.3%, rely on feedback on whether the training was meaningful. One specifically uses Survey Monkey to elicit feedback.

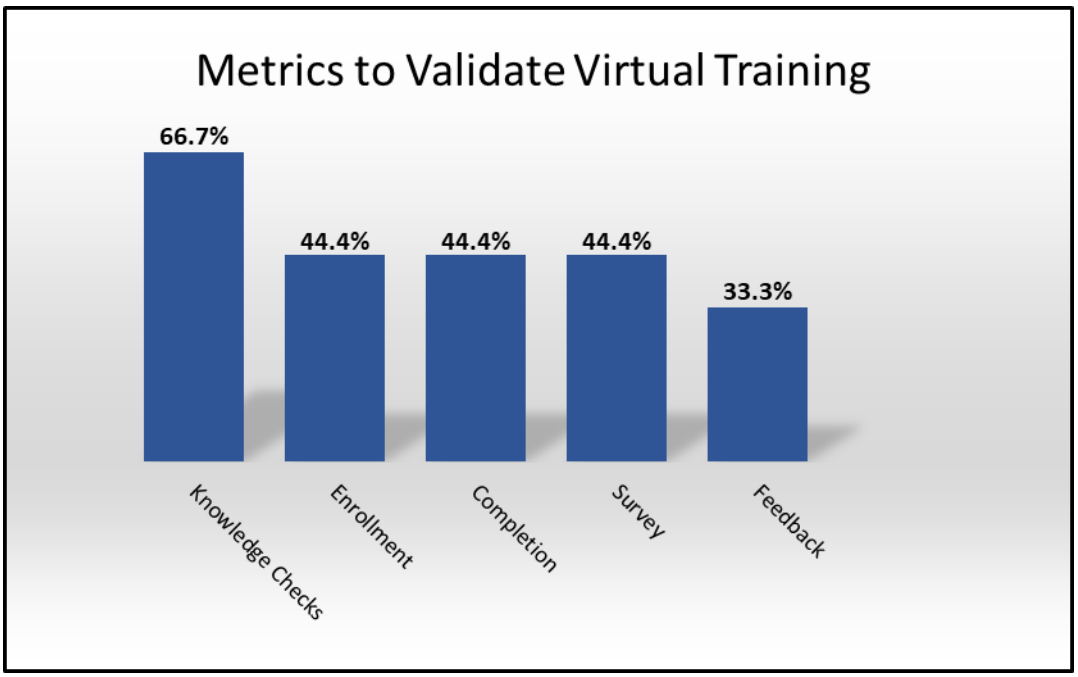

Figure 10. Metrics to Validate Virtual Training

Key takeaways: Metrics

The use of metrics allows the organizations to track the training progress of their employees and the effectiveness of those training. Management can decide which instructions are worth the investment. One organization uses Survey Monkey for feedback

on virtual training programs. Another organization accesses real-time training software to track employees' training.

Findings: Techniques

Figure 11 presents the nine interviewed organizations that identified four techniques to disseminate the material. The most widespread virtual training method is video-based learning—an interactive technique to engage the trainee, such as gamification. Camtasia, a video editing tool, allows organizations to create their training specific to their needs. Six of the organizations (66.7%) use this technique. Two organizations, 22.2%, found decreasing the length of the training session to six minutes or less to be effective for the younger generation workforce. On-Demand training allows two organizations, 22.2%, access to training anywhere, any time, and on any corporate-approved personal device, including mobile or tablet. Two organizations, 22.2%, use breakout rooms on Zoom to provide the classroom with an intimate working group dynamic.

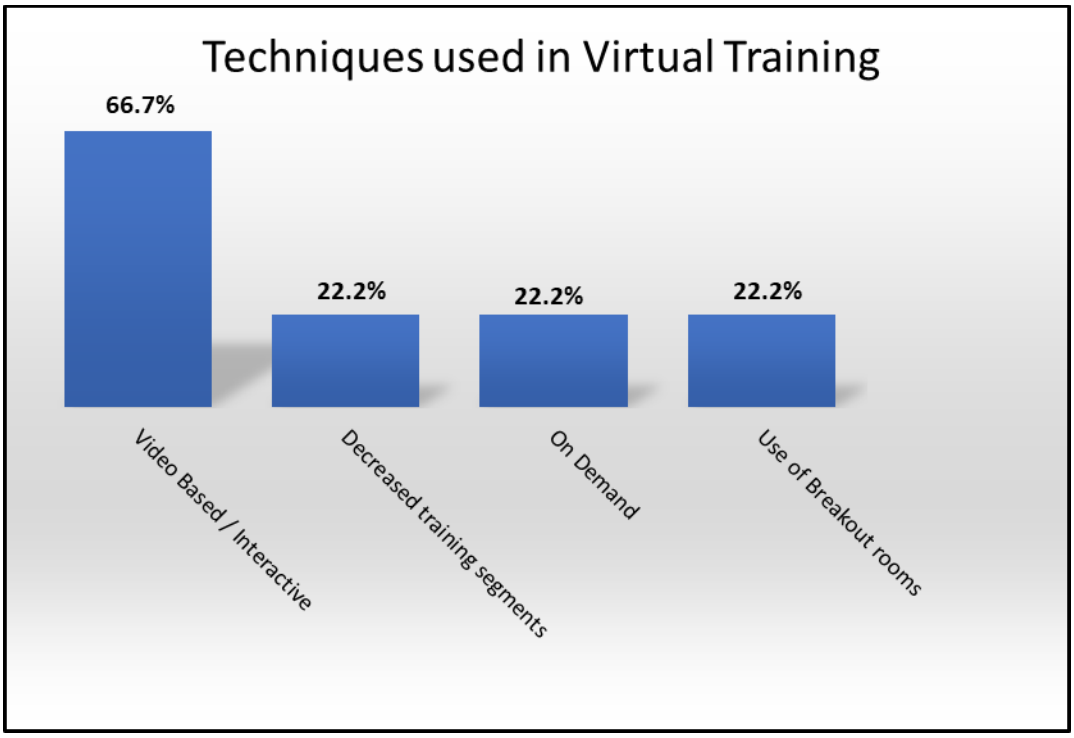

Figure 11. Techniques Used in Virtual Training

Key takeaways: Techniques

Organizations are transitioning from traditional lectures to case study analysis and scenario-based exercises promoting higher engagement and retention. Decreasing the training segments into six minutes or less for knowledge-based and instructional how-to videos are more desirable to the younger-generational workforce, as backed up by data analytics. The workforce can create low-cost instructional training videos using Microsoft PowerPoint or corporate cell phones for capturing the actions in the demonstration, whether on-screen or hands-on. Utilizing all functions of web-based applications, specifically breakout rooms and the chat feature, bridges the gap in communications, social dynamics, and team building.

Findings: Approaches and Processes

Figure 12 depicts the nine interviewed organizations that identified three approaches and processes used in virtual training. Three organizations, 33.3%, noted that their training is available 24/7; this provides flexibility to the workforce. Two organizations, 22.2%, incorporated scenarios in videos to bring realism into the training. Videos created onsite by the employees in a YouTube (online video platform) format allowed access instruction through the organization's SharePoint (a web-based collaborative platform). One approach to help the workforce during virtual training was to assign mentors and subject matter experts (SMEs) to the employees who required additional explanation or more detail to comprehend or apply the content.

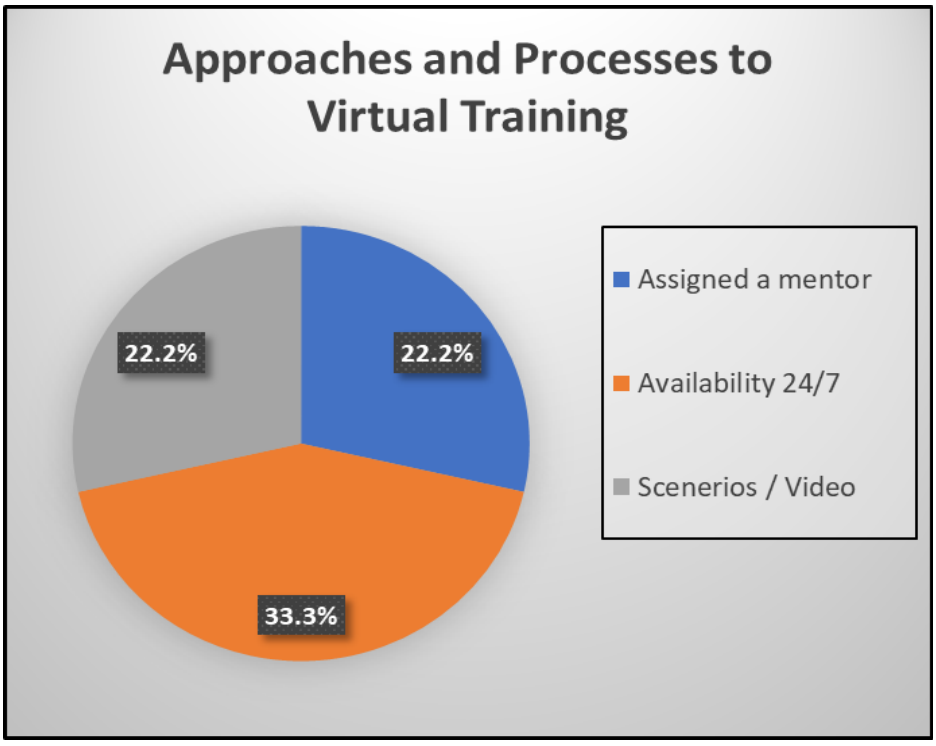

Figure 12. Approaches and Processes to Virtual Training

Key Takeaway: Approaches and Processes

Accessing on-demand, 24/7 training segments and instructional videos proved highly effective. One organization described the use of YouTube Style training platforms on SharePoint organizational sites. Another organization expounded on the use of real-world scenarios to walk the trainee through virtual training situations. The ability to reach out to an assigned SME, even virtually, provided personalized training.

Findings: Applications or Tools

Table 2 illustrates, the nine interviewed organizations that identified the following application or tools used during virtual training. The nine organizations listed twenty different applications used for training; Table 2 represents these in order of preference. The top three applications are Zoom, MS Teams, and Business Skype. The organizations prefer these platforms as they allow all participants to see each other and in effect foster more engagement; in addition, these platforms allow the participants to share screens, which promotes collaboration. The adjustment from in-person to virtual training required the organizations to seek new platforms to deliver training material to their workforce. The organizations referred to the platform Zoom as being the most prevalent. The authors of this thesis also valued the platform Zoom and utilized it during meetings and one of the interviews.

Table 2. Applications or Tools

Virtual Meeting Applications or Tools	Number of Organizations That Utilize the Application or Tool (Out of Nine)
Zoom	3
MS TEAMS	2
Business Skype	2
Power Point	2
Linked-In-Learning	1
Sharepoint	1
CORE LMS	1
Virtual Training Aid	1
WebEx	1
Adobe Meeting	1
Box Cloud	1
Camtasia	1
Cisco Meeting	1
Degreed Skill Certification Platform	1
Google Hang Out	1
Media Suite	1
Slack	1
Workday Work Life Software	1

Key Takeaways: Applications or Tools

There are a variety of platforms that the nine organizations utilize for virtual meetings. The common theme expressed in meeting priority needs was sharing the screen for demonstrating a task or presenting material while seeing the other attendee(s). The three most widespread platforms of the interviewed organizations are Zoom, MS Teams, and Business skype.

c. What is the percentage of Virtual Training delivered (corporate/local)?

Findings

Figure 13 presents the nine organizations interviewed that identified whether training development occurred at the corporate or local level. Corporations develop training for distribution to all organizations for consistency, compliance, and understanding

of the corporate direction. Local training refers to the smaller organizations that develop their training specific to their trade. Five of the organizations, 55.6%, develop training at the corporate level. Three of the organizations, 33.3%, developed training at the local level. One organization uses corporate and local training to provide the overall business direction and specific to the departmental trade.

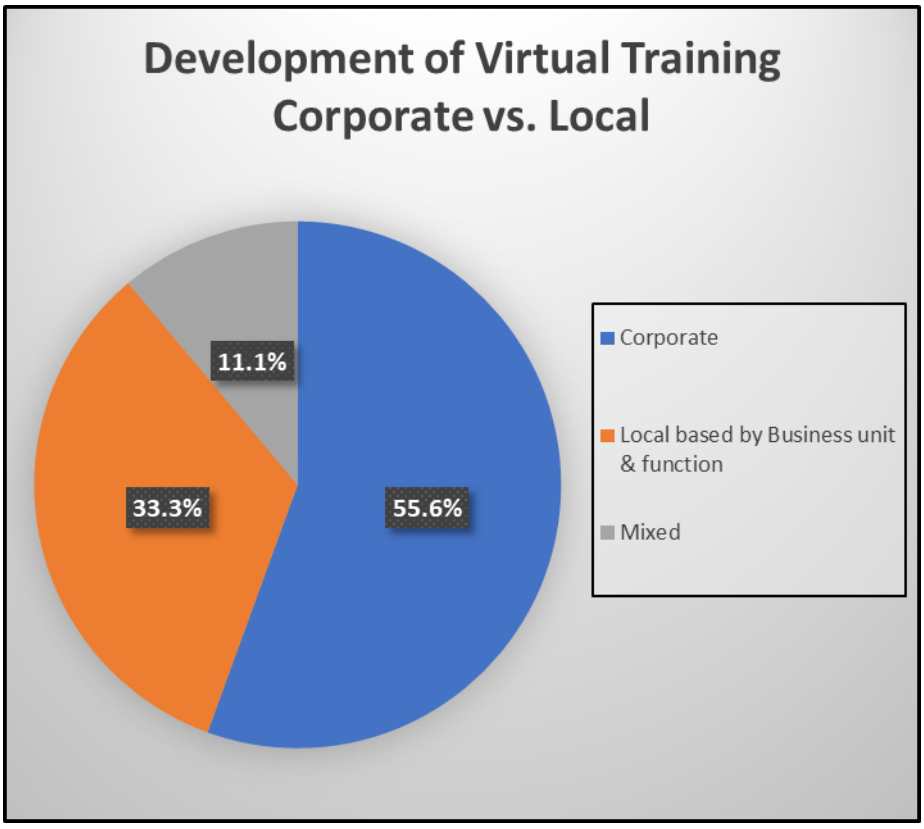

Figure 13. Corporate vs. Local Virtual Training

d. What does your company require as to key attributes to achieve effective training?

Findings

Figure 14 depicts the nine interviewed organizations identified four primary key attributes of effective training. The primary attribute identified at 66.7% of the

organizations interviewed is the Purposeful Category Training. Purposeful Training is described as specific investment/effort and time developing objective-focused training to engage the workforce. Experiential Engagement and Survey Scores categories were equally important (44.4% each). The Experiential Engagement was described in the interview as a more thoughtful, complex design to the training, which often included subject matter experts in delivering the interactive experience. This key attribute described using various techniques of connecting the employee to the training through interactive role-playing, demonstrations, and scenarios. The Survey Scores provided a feedback loop to management if the training objectives were met and how the instruction resonated with the employee, thus allowing for the organization to alter or change accordingly where needed. The last highlighted key attribute, Participation, directly correlates to the challenges of virtual training. As noted in the interviews, Participation is a key attribute to effective training; this is achieved through access, familiarity with the various platforms, and meaningful training provided to the organization. Three organizations (33.3%) noted that the experiences gained by these key attributes allow for more effective rotational assignments and employee development. As the employee continues to learn more, one organization stated they eventually become the SME and train co-workers less familiar, creating a more robust workforce. Industry applies and leverages data analytics to deliver information, increasing employee performance strategically.

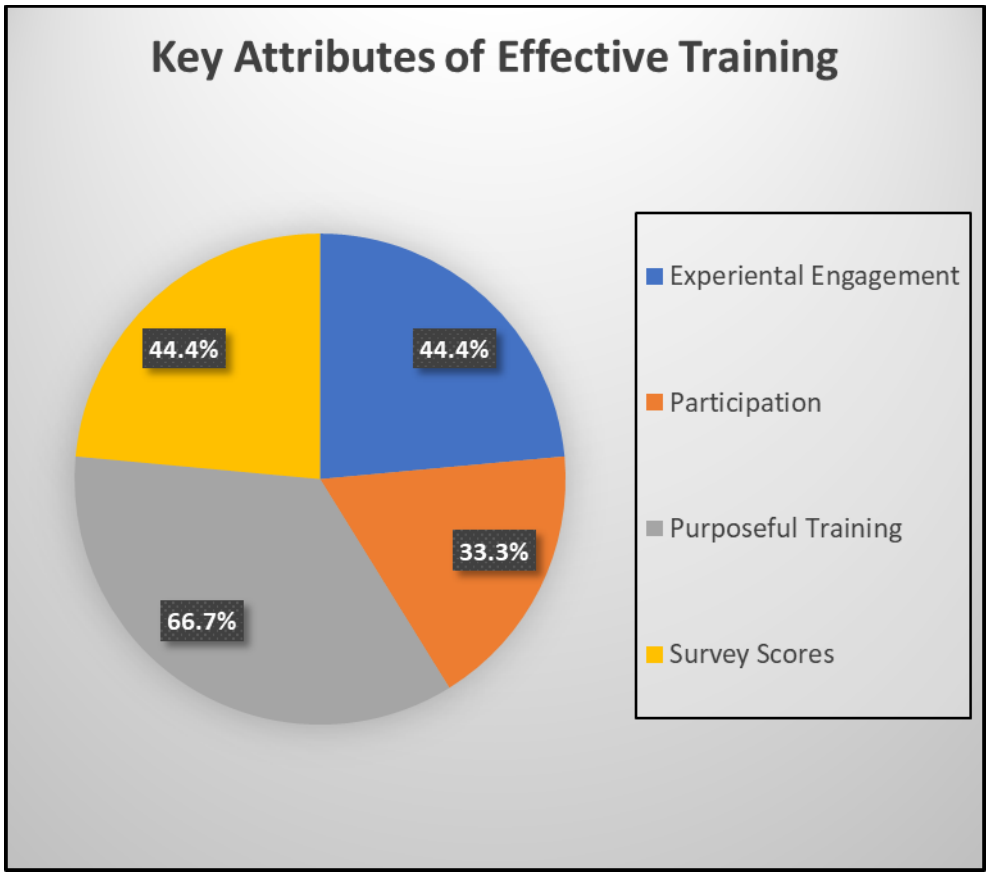

Figure 14. Attributes to Virtual Training

Key Takeaways: Attributes

Purposeful training is characterized as using a rationale lens in training; the design and delivery of training align with skills and tasks required to do the job relative to the organization's goals.

V. CONCLUSION

A. INTRODUCTION

Many questions have arisen during this ongoing pandemic about the new "normal" of life and work. Industry and the DOD made adjustments to the work environment, including training, in order to minimize the pandemic's impact on the workforce. This thesis examined private industry virtual training best practices that AFLCMC can implement in a post-COVID telework environment. As private industry and DOD gradually return to the office, the future hybrid work environment is still undecided. This thesis has found that virtual training has been proven beneficial to both the DOD and private industry during the pandemic and will be a vital tool for AFLCMC's future contracting workforce.

B. SUMMARY OF FINDINGS

The literature review formed the base knowledge and for addressing the research questions in this thesis, allowing us to develop the foundation for the methodology. The literature review focused on current research of virtual learning in private industry. From this initial research, we learned of advancements in technologies that have made such transitions to remote work and training possible. We also learned the most effective e-learning platforms and techniques, such as gamification, to promote teamwork communication and boost collective morale. In addition, the research identified how industry designed instructional training for better retention and overall efficiency. These findings helped formulate the questions about virtual training platforms and best practices, which help shape the methodology design and data collection from AFLCMC and industry.

The foundation of information obtained from AFLCMC and virtual interviews with industry formed the data for analysis. The authors aggregated data which was then subjected it to text analysis. Following are the summaries of the findings from this examination.

1. Pre-COVID: What were the training plans, platforms, and practices for interns/ CopperCaps and journeymen within the 1102 series at AFLCMC?

Pre-COVID, the AFLCMC contracting workforce training was predominantly delivered in the office. Various forms of in-person training consisted of slide presentations or training videos. AFLCMC did not have metrics or a system to measure training outside of formal certifications.

2. How has training changed during the COVID environment?

AFLCMC adapted to virtual training using platforms such as MS Teams, Zoom.Gov, WebEx, and Skype. The DOD deployed MS Teams in March 2020 due to the large number of employees required to work remotely during the pandemic— it was the only platform authorized for Personally Identified Information (PII) and Controlled Unclassified Information (CUI). AFLCMC preferred method of virtual training was through the application MS Teams.

3. What has Private Industry done to accommodate a virtual workforce specific to training?

Private industry increased its bandwidth for better connectivity. In some cases, organizations provided employees with the necessary cameras and microphones for better virtual training engagement. Organizations designed virtual training programs specific to the younger generational workforce need to be more adaptive with online platforms. Organizations provide access to virtual training 24/7 and through personal devices, allowing for flexibility in training schedules. The flexibility in access increases the participation rate. Private industry uses data analytics and instructional design tactics such as knowledge checks, surveys, and feedback to measure the effectiveness and better design virtual training. Instructional design changes include case study analysis and scenario-based exercises to promote higher engagement and retention. Knowledge-based and instructional how-to videos were shortened to six minutes or less training segments for a

more desirable efficacy to the younger-generational workforce, as backed up by data analytics.

4. Which training platforms and best practices from the Private industry can be utilized to benefit the DOD contracting workforce?

Private industry had a common theme of a central access point, i.e., platform, to access virtual training content and courses. The interviewed organizations focused on the applications versus their proprietary platforms. The top five applications identified in order of predominance were Zoom, MS Team, Business Skype, PowerPoint, and Linked-In-Learning. Industry implements a self-directed learning approach with a 24/7 accessible training library from personal and work devices. Some examples within the training platform are DIY video recordings created by employees, PowerPoint presentations, and short how-to videos on performing office tasks. The ease of access and comprehensive training platforms include access to SMEs and tailored to the younger generation.

C. RECOMMENDATIONS

At the conclusion of this research, we are able to present our recommendations for how AFLCMC can learn and leverage from the virtual training methods currently employed by private industries. These recommendations are presented in this section as a COA (Courses of Action); this is a military term which denotes a possible plan as it relates to the accomplishment of a mission. AFLCMC can leverage private industry tactics as potential COAs for leadership consideration in meeting the virtual training needs of working in a hybrid or permanent remote environment.

COA1. Design and develop a 24/7 centralized access training portal with ease of access from personal and work devices.

The ability to have training 24/7 provides flexibility and convenience to the employee. Ease of access has proven to increase employee participation. Driving efficiency in these areas mimics private industry competitive advantage tactics, increasing the workforce's capabilities in achieving organizational goals. The challenge is overcoming

DOD Cybersecurity requirements for employees to access the training platforms from personal devices. As of the writing of this thesis, the AF does not have a mobile learning strategy or mobile learning application app for contracting.

COA2. Create training materials and instructional design with a younger generational mindset. Incorporate gamification, knowledge checks, and short video segments into training materials.

AFLCMC contracting workforce will have higher engagement and participation among a younger workforce when geared to how they learn. There is an opportunity cost when a lack of design is missing for the younger workforce. Standard methods of PowerPoint training presentations are commonly referred to as "death by PowerPoint." Implementing shorter discrete training segments allows the younger workforce instant gratification, increasing their knowledge and creating a competitive workforce consistent with private industry. The decreased time in learning to perform a task increases the time available to meet other mission needs of the organization. The implementation of this COA could start as soon as directed and employed across the enterprise.

COA3. Incorporate and apply data analytics to the training platform strategy; data analytics informs the efficacy of the training, what training is required, and the adjustments in how the training is delivered.

AFLCMC can mimic private industry data analytic tactics to enhance the design and delivery of training, increasing the knowledge and capability of the workforce. Data analytics will assist in developing an instructional design tactic by analyzing knowledge checks, surveys, and feedback to measure the efficacy of virtual training. The challenge is providing dedicated personnel to assess and summarize training-related data and producing timely reports to leadership on the enterprise and local contracting offices to act on the data.

D. AREAS FOR FUTURE ANALYSIS

The scope of this research was limited to the time allowed for the completion of this capstone project, and by the focus on virtual training using data from RAT PK Team 1. The data was collected from nine private organizations, and from the perspectives of executives interviewed. Further research with a wider corpus of data should be performed in order to find more definitive answers and to a larger array of training efficiency questions, such as utilizing mobile devices to complete training, or using cloud storage for wider accessibility. In addition, the data collected and analyzed for this study occurred during the ongoing COVID-19 pandemic; therefore, this research should be followed up during the post-pandemic era in order to confirm or reject the findings of this paper.

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