Immersive Technology:

The Future of Air Force JAG Corps Training

BY MAJOR DANIELLE H. CROWDER

> Immersive technologies, such as virtual reality, 360-degree video, and avatar simulation, are successfully being used to train professionals across a wide range of disciplines.

Video: Airman Magazine: How Virtual Reality is Changing U.S. Air Force Training

INTRODUCTION

General Charles Q. Brown, Jr. became the Air Force's 22nd Chief of Staff in 2020. Shortly thereafter he released "Accelerate Change or Lose", where he calls on Airmen to boldly and proactively shape our future to avoid unacceptable risk and mission failure.[1] The United States has enjoyed air dominance for decades; however, we are relying on capabilities developed long ago that need to be updated to maintain our edge. This extends beyond the battlefield and to the Air Force Judge Advocate General's Corps (AFJAGC). The purpose of this paper is to start a conversation about how we can follow Gen Brown's guidance in regards to modernizing our training methods in the AFJAGC.

While the legal profession is not known for keeping pace with changing times, the AFJAGC has made recent strides to modernize. Enterprise level examples of this include the efforts to upgrade our case management software and the new public filing system for court documents. At the base level, some offices are even abandoning paper in the courtroom and presenting evidence to the members on tablets and other electronic media.[2] Such progress is welcome, but our community can do more to accelerate change consistent with General Brown's vision. One such field of technology that we should consider incorporating is **immersive technology**.

Military service member wearing virtual reality goggles
(Photo by Air Force Staff Sgt. Keith James)

IMMERSIVE TECHNOLOGY

As its name would suggest, immersive technology "blurs the lines between the physical and virtual worlds, creating a sense of immersion and enhancing the realism of virtual experiences."[3] The level of immersion experienced depends on the type of technology and method of its use. Three common technologies existing on different parts of the immersion continuum are **virtual reality (VR)**, **360-degree video**, and **mixed reality**.[4] VR is a simulated reality built with computer systems that create a sense of "presence" in another environment.[5] It is considered the pinnacle of immersive technology because it engulfs the senses, seemingly transporting users to alternate worlds. VR is best experienced via head-mounted devices (HMDs), which are worn like goggles over a person's eyes and ears,[6] and create a fully enveloping aural and visual experience. They also typically include hand-held controllers that allow for motion-tracking so the user can reach out and physically engage with the virtual environment. A high-quality VR HMD that could be used anywhere with wireless internet access would cost a few hundred dollars in 2021.[7]

U.S. Air Force MSgt Rory Menard, 380th Expeditionary Security Forces Squadron logistics and supply superintendent, calibrates a virtual reality (VR) system. (U.S. Air Force photo by Senior Airman Bryan Guthrie)

One way that VR content can be produced is via 360-degree video. Such cameras can capture the entire environment around them, which allows users to watch content in a full sphere rather than from one fixed point.[8] This can be viewed on a computer, a smart phone, or an HMD, with varying degrees of immersion. By watching with an HMD, the viewer is transported into the video and must move his or her real body around to look in every direction to watch the video unfold.

While VR is easily described, mixed reality encompasses a wider range of technology with varying levels of immersion, making it more difficult to define. One way to conceptualize it is to say it includes everything on the continuum from the virtual world (i.e. VR) to the real world, without including the purely virtual or purely real environments.[9] One technology within this spectrum is **avatar simulation**. This is the use of virtual representations of people (avatars) controlled by human actors in a computer-mediated environment.[10] It is the blending of real people with virtual avatars that make this a "mixed reality" medium. These avatars can interact with people in real-time conversations, including lifelike body gestures, that are based on the movements of the human actor. No special equipment is necessary to utilize this technology other than a computer and an internet connection.

> Practical applications are still being developed, but it is undisputed that immersive technologies offer tremendous possibilities for teaching and training.

IMMERSIVE TECHNOLOGIES AS LEARNING TOOLS

The technologies referenced above offer the potential to modernize training and teaching in the AFJAGC. In fact, the roots of today's immersive technology actually began almost a century ago with the first flight simulator used to train pilots, called the Link trainer.[11] As technology improved, it spread to other risky or dangerous jobs like

surgeons, astronauts, and soldiers.[12] Practical applications are still being developed, but it is undisputed that immersive technologies offer tremendous possibilities for teaching and training.[13]

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The **Experiential Learning Theory (ELT)** gives one account of the success of this technology as a training tool. ELT holds that knowledge occurs through the "transformation of experience."[14] Those who are trying to learn must first "grasp" an experience and then "transform" it.[15] Each of us has a preferred learning style.[16] Instructors can maximize students' gains by figuring out their style and tailoring their teaching methods accordingly. Some of these teaching methods include written papers, group projects, videos, presentations, and experiments. Immersive technologies now represent another tool that can be effectively used for students whose preferred learning style is more hands-on. Many studies have been done using VR as a teaching tool, and professions such as soldiers, surgeons, nurses, dentists, and professional athletes, have incorporated it into their training.[17] The best example of this in the military is in the flying community. Recently, rather than use traditional flight simulators that are almost like fully-built cockpits — and carry a hefty price tag of $4.5 million — the AF has begun training pilots using VR stations that cost $15,000 each.[18] The program, called **Pilot Training Next** (PTN), not only saves money, but is also able to produce pilots from Undergraduate Pilot Training with the appropriate skill level in half the amount of time.[19] One of the key elements of the PTN program is that students have individual VR training stations in the classroom and stations shared with their roommate in their dorm rooms.[20] The amount of time they can spend in that immersive environment practicing their skills far surpasses what they would have received in a traditional cockpit flight simulator that is shared amongst all

of the students during class. The savings in time, manpower, and money through this use of VR technology is extraordinary, and the improvements in its accessibility represent the next phase in the evolution of pilot training.

IMMERSIVE TECHNOLOGIES IN THE LEGAL FIELD

While pilots have been using flight training simulation technology for decades, the legal profession is just beginning to see its value. The legal field does not prioritize the acquisition and acceptance of new technology, practices, or training, though,[21] which makes it challenging to incorporate these new tools.

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Second Life

There are some law schools, however, that began to experiment with VR in the classroom in the past decade. A popular platform that was initially used by three Australian universities to create virtual content for students is the program **"Second Life."** This program creates a virtual world where users operate avatars in scenarios that mimic everyday life.[22] In 2009, a criminal law class at the University of Southern Queensland gave its students the option of using Second Life to deliver an oral argument.[23] This allowed distance-learning students, who made up 70% of the student body, the opportunity to have a more realistic advocacy environ-

ment than they would have had if they were only allowed to submit their argument via video.[24] Participants took a survey after completing their advocacy training, the results of which confirmed the educational benefits of using Second Life in distance learning for advocacy skills development.[25] Specifically, the students all agreed that they were engaged, the virtual environment was beneficial to their training, and they were better able to understand course concepts.[26]

In 2010, another Australian university conducted a small pilot study in Second Life in which its International Humanitarian Law moot court team practiced its moot arguments.[27] The students provided feedback on the experience, stating that they were able to concentrate more on their speaking and vocal delivery than in real life.[28] They also believed it would be beneficial for introverted students to build confidence and control nerves.[29]

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Finally, in 2012, the Queensland University of Technology School of Law built a scenario in Second Life for a Trust and Negotiation class which combined virtual content and in-person activities.[30] First, the students were virtually introduced to various family members who were dealing with a situation involving a trust. Then students had to provide legal advice to one of the family members in the scenario, as well as construct a negotiation plan with other class members in a small group. They had to role-play the negotiation in the real world and self-reflect on how it progressed.[31] Feedback from the participants in this virtual scenario led to the conclusion that this simulated learning environment "created an authentic learning experience leading to greater engagement and improved learning outcomes."[32]

Gamification and 360-Degree Video

Outside of Second Life, other law schools have more recently included virtual technology in the classroom. At Westminster University in the United Kingdom in 2016, a learning game was developed for the Criminal Law class in which students explored a crime scene in VR and determined, based on the evidence and interactions with non-player characters, whether or not all the elements of murder were present.[33] This was the first step in a series of proposed experiments to determine the viability of these games at the University. The participants felt that the VR system was easy to use and reliable, with further study recommended into the learning impacts of this system, as compared with traditional book-learning methods.[34] Also in 2016, the University of Missouri Kansas City (UMKC) used 360-degree video to record law school students in a trial advocacy class as a self-assessment measure for their in-court performance.[35] While the students were impressed with the recordings, the length of time it took to process the 360-degree videos into a watchable format using the camera they chose was a hindrance to receiving immediate feedback. [36]

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Other law schools have used 360-degree video to create virtual crime scenes and to show law students previously inaccessible places, such as a water reclamation site.[37] Additionally, Harvard Law's Access to Justice Lab is studying the use of 360-degree video to familiarize new attorneys with courtrooms.[38] Their study tests whether potential pro bono attorneys are more likely to commit to pro bono representation after receiving training via HMDs versus regular training.[39] The VR training consists of 360-degree videos with a courtroom introduction and a walk-through of what they will actually be doing during the pro bono case.[40] The hope is that attorneys with little courtroom

experience will feel more confident in their litigation abilities after the VR training and will want to volunteer to help in common pro bono situations, such as debt-collection, landlord-tenant, and divorce proceedings.[41]

Advantages of VR include increased effectiveness and reduced costs as compared with hiring actors to create realistic scenarios.

Finally, in addition to law schools, organizations like the International Committee of the Red Cross (ICRC) recognize the increased opportunities that VR provides to teach and influence. The ICRC has a unit dedicated to producing VR content to train its own personnel who must visit sites in war-torn locations to view potential human rights violations, as well as to teach International Humanitarian Law to military members in dozens of countries.[42] They utilize gaming software to create realistic VR environments based on real-life situations the ICRC has encountered in order to train individuals to conduct investigations and determine whether human rights' violations occurred.[43] Since new employees only had two weeks of intensive training time, the ICRC chose to use VR because it increased effectiveness and reduced costs as compared with hiring actors to create realistic scenarios.[44]

BENEFITS OF IMMERSIVE TECHNOLOGY IN MILITARY LEGAL TRAINING

Law schools and civilian organizations have demonstrated how immersive technology can be effectively used, and the benefits are even greater for the AFJAGC. This is primarily due to the unique deployed environments and military courtrooms in which JAGs practice to support our national security. When commanders need to target legal objectives during an airstrike or lock-up Airmen to ensure good order and discipline, they depend on mission-ready JAGs.

As the Pilot Training Next program has shown, mission-ready officers can be produced in far shorter timeframes than previously thought possible due to the inclusion of immersive technology in the curriculum. This technology can also be used to cut down on the amount of time it takes to train a fully-competent JAG, offering a more agile and capable fighting force for commanders. Specifically, immersive technology can be used to provide an environment where students can consistently repeat training activities without the risks inherent in real-life. Using litigation as the prime example, prosecuting and defending cases in military courts-martial is an incredibly stressful and high-stakes endeavor. A poor performance by a JAG could result in a mistrial, future appellate issues, time delays, or the erroneous acquittal or conviction of a service member. Mishandlings of cases involving high-profile crimes, often result in negative publicity, to include Congressional attention on the military justice system as a whole.[45]

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Repetition of training activities and familiarization with environments via immersive means can also decrease anxiety and increase confidence in the courtroom. Studies have shown that increased anxiety can lead to worse working-memory performance.[46] This could have important manifestations in court, such as failing to object to inadmissible evidence

at appropriate times, or lacking persuasiveness in closing arguments. Spectators may also develop a negative view of the military justice process if JAGs lack confidence in advocating for their clients.

Repetitive training with immersive technology can also free up brainpower. According to the **Cognitive Load Theory** (CLT), the brain has a limit to the amount of material that can be processed at any given time. To overcome this limitation, the brain forms common schemas,[47] which some people may experience as being on "autopilot." Experienced litigators, do not waste processing capabilities on information contained within these schemas, while novices must continue to use that brainpower on those tasks.[48] For example, a Circuit Counsel would not spend time thinking about how to read a script or where to stand in the courtroom, while a new JAG may dedicate excessive brainpower to such routing functions. Focusing on minor details that are unlikely to affect the outcome can result in insufficient attention to more important matters, such as like how the members are reacting to the evidence or the argument presented. Immersive technology allows for the type of repetitive training necessary for new JAGs to form these schemas and free up brainpower for more complex tasks.

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CURRENT TRAINING LIMITATIONS
Judge Advocate General's School
Currently, training for JAGs occurs in a few distinct ways, all of which have limitations. First are the formal training classes offered by the Air Force Judge Advocate General's School (AFJAGS). New attorneys must successfully complete the nine-week Judge Advocate Staff Officer Course (JASOC), which includes litigation of an abbreviated mock sexual assault court-martial. Students are taught everything from direct examination to closing argument via large group

instruction and smaller seminar sessions. Due to the amount of material that needs to be covered in the set timeframe, there is no time in the curriculum to incorporate repeated practice of skills. This makes it difficult for students to make significant improvements. Other formal litigation classes are offered at later points in a JAG's career; however, they are not for brand new JAGs. This means that we are sending JAGs to their bases to litigate real trials after only having completed one abbreviated mock trial.

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Murder Boards
Outside of AFJAGS, less formal training options also exist at base level legal offices. Two common ways they occur are in "murder boards" or at general, periodic office training sessions. Murder boards typically help with overall case strategy and theme or theory issues, but they generally do not provide the repetition or skill training needed to get comfortable in the courtroom. Likewise, office trainings seldom occur for long enough time periods to enhance or provide familiarity with courtroom litigation skills.

On-The-Job Training
The remaining option is on-the-job training (OJT), which essentially consists of watching other JAGs litigate. It has been shown that watching others perform a task can facilitate learning, especially in physical tasks like weaving or knot tying.[49] However, research has also shown that observers cannot transfer what they have learned to a slightly different problem due to lack of knowledge of the reasoning behind the actions.[50] In addition, there are significant logistical issues with observing judicial proceedings, such as their diminishing frequency and lost productivity of JAGs sitting in court. Also, there are no guarantees that the JAGs who are litigating are doing it exactly by the book to provide an effective model for observers.[51]

IMMERSIVE TECHNOLOGIES AS TEACHING TOOLS IN THE AFJAGC

360-Degree Video

Immersive technologies offer many tools to enhance training options within the AFJAGC, especially when the goals are familiarization with new environments and skill practice. One realistic, simple, and highly beneficial way to incorporate this technology would be to record mock trial proceedings with 360-degree video cameras. The actors should be AFJAGS faculty or experienced military litigators to ensure the correct procedures are modeled. This video could then be viewed by JASOC students either prior to or during JASOC to familiarize themselves with courtroom appearance, practice, and rules, just as the pro bono attorneys did in Harvard Law's Access to Justice Lab study. JAGs could choose to watch an entire proceeding, or just pick specific events such as cross examination, voir dire, or evidence introduction. Many new JAGs have never participated in a court-martial, so viewing this video would offer a great opportunity for familiarization with the basics of script-reading all the way to the complexities of character evidence.

> Recording the proceedings in 360-degree video allows students to see the entire courtroom at any time, so they can choose which person to watch based on what they are trying to learn.

Recording the proceedings in 360-degree video allows students to see the entire courtroom at any time, so they can choose which person to watch (e.g., judge, members, defense counsel) based on what they are trying to learn. The most immersive viewing experience for these videos would occur in a VR HMD, however they could also be viewed on a smart phone. This allows for access to these training tools outside of the classroom, which was one factor in the PTN experiment that likely contributed to the ability to produce trained pilots in half the amount of time.[52]

Avatar Simulations

Another way to utilize this technology is to increase the use of avatar simulations. This medium works well for the development of soft-skills, such as leadership, counseling, and communication.[53] It is currently being used to some degree by every school around Air University, from Air War College to Squadron Officer School to the Chaplain Corps College. AFJAGS has used it successfully in a seminar at a leadership course for majors when a student played the role of a Deputy in a legal office and was asked to deliver bad news to a subordinate about a deployment. Student feedback was very positive for this seminar and emphasized the potential that avatar simulation has for practicing voir dire, witness interviews, and legal assistance. There is no special equipment needed to access avatar simulation technology except an internet connection; however there is an hourly fee for the service.

> The Army JAG School has created a successful virtual coloring book game for their special victims' counsel to use for interactions with child victims

Gamification

Immersive technology can also enhance training and learning by incorporating it into gamification – the process of extracting motivating and engaging elements from games and applying them to educational activities.[54] This is a popular way to try to make learning fun, and it can be taken to the next level by adding immersive technology. There are many ways to do this, as shown in the Westminster University murder crime scene and the ICRC's creation of virtual environments to train its personnel and military officers to recognize human rights' violations. The Army JAG School has also created games focused on courtroom objections and advising commanders.[55] Additionally, they created a successful virtual coloring book game for their special victims' counsel to use for interactions with child victims.[56]

If the interest and funding was present, the AFJAGC could utilize gamification to create any number of scenarios in an immersive environment to better prepare JAGs for real-world situations. The greatest benefit for gamification may be found in operational law, including targeting and air operations. Most JAGs do not experience these situations outside of deployed environments, which makes any amount of advanced training all the more valuable. As shown through the other examples above though, these games can enhance learning in almost any area of the law.

> They could practice litigation skills with real people located **anywhere** in the world.

VIRTUAL COURTROOM TRAINING

In addition to 360-degree video, avatar simulation, and gamification, training options abound within a virtual courtroom environment. JAGs could choose to record themselves practicing courtroom skills individually, such as giving an opening statement or closing argument. This enables self-assessments, like those done by the law school students at UMKC.[57] Or, they could practice litigation skills with real people located anywhere in the world. This could be an effective way of utilizing the Air Reserve Component members of the AFJAGC, since they may have vast litigation experience in their civilian employment to provide valuable advice and critiques for new JAGs. Using this virtual environment allows them to put in man-hours when it fits into their busy schedules and without the cost and inconvenience of traveling, which became even more burdensome during the COVID-19 pandemic.

Using a virtual courtroom for these training options presents the greatest potential benefit but also the most significant challenges of all the immersive options presented, though. First, from a practical standpoint, the technology does not yet exist for computer-avatars to interact with people using real-time communication in a virtual environment. Since communication and instant reactions are key to many courtroom skills, such as witness examination, voir dire, and making objections, the lack of this capability limits the ways VR can be used by individual JAGs to practice. Advances are being made in this technology, though, as shown in 2019 by an artificial intelligence bot named "Charlie" who was able to participate as an independent panel member at a conference by listening and communicating her own creative responses in real-time.[58] Besides technology, other challenges to utilizing a virtual courtroom environment would be the cost of building and maintaining the virtual space, as well as purchasing the VR HMDs that would be necessary to interact effectively.

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CONCLUSION

As VR technology becomes more commonplace, its usefulness for training new JAGs will increase exponentially. It is already at that level for other professions, such as pilots, and they can attest there is no better environment to train in than one which allows endless repetitions with no real-life risk. Designs for these legal training environments in VR already exist[59] and it is incumbent upon the AFJAGC to stay apprised of the latest developments in immersive technology to ensure JAGs are getting the best training possible.

While it is certainly true that there is nothing wrong with the way we educate and train our JAGs, one of the main points in Gen Brown's strategic approach is "good enough today will fail tomorrow."[60] If we wait for something to be actually broken in order to modernize, we have already lost. Can we produce a fully trained JAG in half the time we currently do? It is clear that we cannot if everything stays the same, however we may even surprise ourselves if we proactively integrate technology and accelerate change.

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