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# Augmented Reality in International Pilot Training to Meet Training Demands

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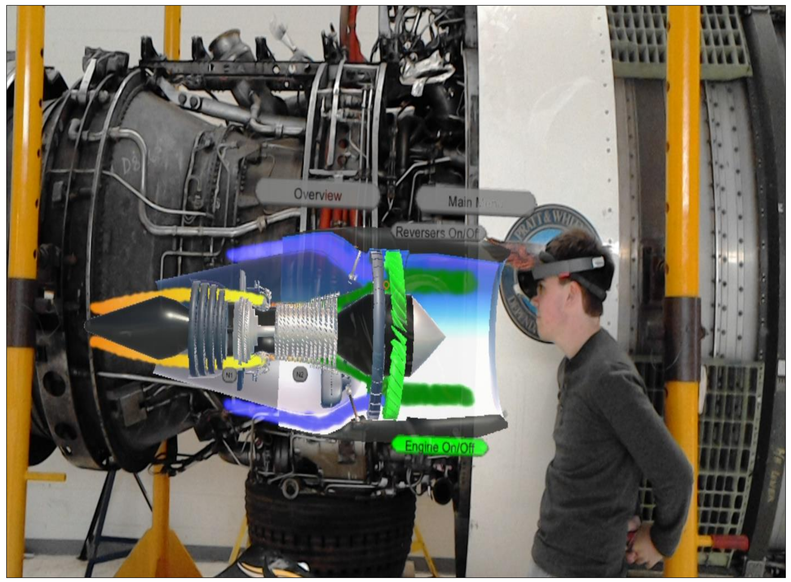
## Next Generation Learners

**In order to meet the needs of a new generation of learners we must consider the training demands and skills required over the next few decades. As new generation aircraft become more prominent in the global front, advances in airplane technology will drive new training demands. According to Boeing (2018): "As airlines continually invest to improve the quality and efficiency of their operations, new training curriculums and methodologies will need to be adopted to keep pace with innovation". We are seeing new trends using technology to break long-held, industrial age training paradigms, which hold promise to change the way we look at training for the future. Methodologies such as mobile and distance learning solutions are becoming increasingly popular as a flexible alternative to traditional classroom instruction, and newer technologies such as virtual reality (VR) augmented reality (AR) and mixed reality (MR) are being tested as a way to improve engagement with a new generation of learners to improve training efficiency and knowledge.**




**WMU Student Exploring Augmented Reality Engine in the Lab.**

**NGAP entering the industry today respond differently to various teaching and learning styles and digital information. In addition, the airlines now have more emphasis on digital content in training and operations. We have also seen an increased use of VR AR Gaming and MR in military training and assessment programs to decrease training footprints while improving efficiency of training (GOA, 2018). The United States Air Force (USAF) developed the Pilot Training Next (PTN) program to reduce their training footprint from 12 months to 6 months and enhance training curriculums to inspire and develop modern airmen (USAF, 2019). The USAF notes: "that since the integration of augmented and virtual reality use in PTN, there have been measurable benefits from the addition of the technology (USAF, 2019)".**

## AR Technologies

**Virtual platforms such as MR are bringing forth a new paradigm of aviation training, where we have the ability to take the analog world and superimpose digital artifacts. AR and MR can safely simulated difficult to replicate scenarios, promote active engagement, evaluate based on performance tasks, virtually create new equipment for training, enhance printed material and allow training anywhere anytime. Unlike other advanced technologies, MR is intuitive and offers a natural means of interaction with AI integration for adaptive learning. This approach has several practical advantages compared to VR. Not only is it much less likely to trigger discomfort associated with VR sickness, but the ability to overlay holographic elements onto real-world environments makes MR particularly suited for training and education NGAP.**

**It can be suggested that MR offers the potential for deeper knowledge retention in aviation training, while actively engaging NGAP. AR Virtual platforms will not fully replace high fidelity simulation in the near future; however, they are a cost effective way to bridge the gap between classroom and simulation, while offering experiential learning opportunities to improve outcomes. Additionally, multiple AR/MR glasses can be used to allow others to view the same 3D perspective train as crews or experience instructor interaction.**

**Technologies are currently widely used in the medical and automotive community and have recently been adapted by aerospace industry companies such as Lockheed Martin, Pratt & Whitney, Bell Helicopter, Air New Zealand, TAE Aerospace, Air France, Japan Airlines, Boeing and Airbus.**

**The Future of Augmented Reality in Transportation.**

**It can be suggested that AR offers the potential for faster and deeper knowledge retention in aviation training, while actively engaging NGAP. another area where MR can impact maintenance engineers is in the field itself, especially from a maintenance perspective where knowing equipment and using publications is an essential component of the job.**

## Technology Solutions to Meet Demand

**The operation and maintenance of modern aircraft requires an understanding of several interrelated human and machine components requiring practice and immersion. The aviation educational experience can be enhanced with serious gaming, augmented, mixed and virtual reality. Researchers Bhagat, et al., (2018) have found that depending on the type of task, various technologies have advantages and disadvantages with the added ability to embed artificial intelligence (AI), provide necessary feedback, and aid in cognitive retention and transfer of skills. improve. Bhagat, et al., (2018) also note that "such technologies can change the way we train and assess, allowing us to accelerate learning and enable students to master knowledge, skills and ability (KSA) with increased situational awareness. Each technology offers its own pros and cons which need to be considered carefully before investing development time for use as a training solution".**

**Lori Brown teaching with Augmented Reality in the Classroom.**

**HoloLens is bringing forth a new medium, a new paradigm of augmented reality, where for the first time in our history, we have the ability to take the analog world and superimpose in it digital artifacts and create this mixed reality. You can be anywhere, from anywhere to bridge the gap between our real and digital world.**
**It is important to consider that many game-based virtual assessments are still only used for formative purposes, providing one summary score as an indicator of a construct (De Klerk and Kato, 2017). With the psychometric models improving (Mislevy, Oranje, Bauer, von Davier, Hao, Corrigan, Hoffman, DiCerbo, & John, (2014), we might see virtual assessment being used for a summative or credentialing purpose in the future. Future research should focus on investigating virtual platforms in higher-stakes assessment. It is critical that efforts to develop game-based assessments be evaluated with high standards of scientific integrity to ensure they are valid and reliable (Kato, 2012).**
**The Internet of Things (IoT), machine learning, and automation will play a key role in improving training for the NGAP workforce for the future. It is possible that MR will become mainstream for the airline industry and offer transformative solutions to existing problems.**