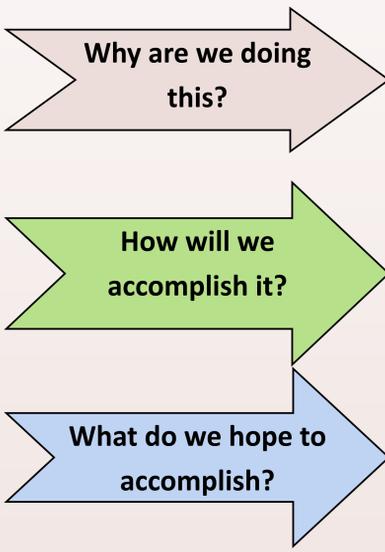


Best Practices and Best Methods of Virtual Training Delivery for Air Traffic Controllers

Project Investigator: Lulu Sun, Ph.D. Engineering Fundamentals Department
 Undergraduate student researcher: Haley Dennis, Air Traffic Management Department
 Embry-Riddle Aeronautical University, Daytona Beach, FL



Why are we doing this?

- The Federal Aviation Administration (FAA) faces great challenges training millennial controllers to **effectively** and **efficiently** meet the requirements of the challenging job
- FAA training delivery methods such as instructor led-courses, and PowerPoint with no accompanying assessment, have not kept pace with advances in **simulation** and **gaming** technologies
- Millennial controllers** have expertise in media, tools, and technology than the Boomers, who are current trainers. The FAA must change its traditional means of training since the new hires grew up in a digital world and prefer digital technologies to the more static teaching methods used to train their predecessors

How will we accomplish it?

- Study **training courses**, **end-of-course evaluation reports** offered by the FAA Academy and Air Traffic-Collegiate Training Initiative (AT-CTI) schools
- Study **best practices** and **methods** in healthcare, military, and STEM
- Conduct **surveys** and face-to-face **interviews** to examine the current controller's training experience and expectation
- Collaborate with **industry partners** to research training curricula, delivery improvements and identify potential impacts

What do we hope to accomplish?

- Best practices** and **methods** will be identified and presented to the FAA
- Research **findings** from training courses offered by the FAA Academy, AT-CTI schools, in-field facilities, healthcare, military, and STEM will be presented
- Develop **recommendations** for changes to the FAA training process
- Identify potential **impacts** on training for both current and future training delivery systems
- Communicate** with FAA administrators and **collaborate** with course developers to improve training course delivery

Impact

- It will benefit students, instructors, and managers at the FAA Academy
- It will benefit students, instructors, and administrators at AT-CTI schools
- It will benefit administrators at the FAA headquarters
- It will benefit controllers, and managers at facilities
- It will benefit people who are interested in being in air traffic control /management field

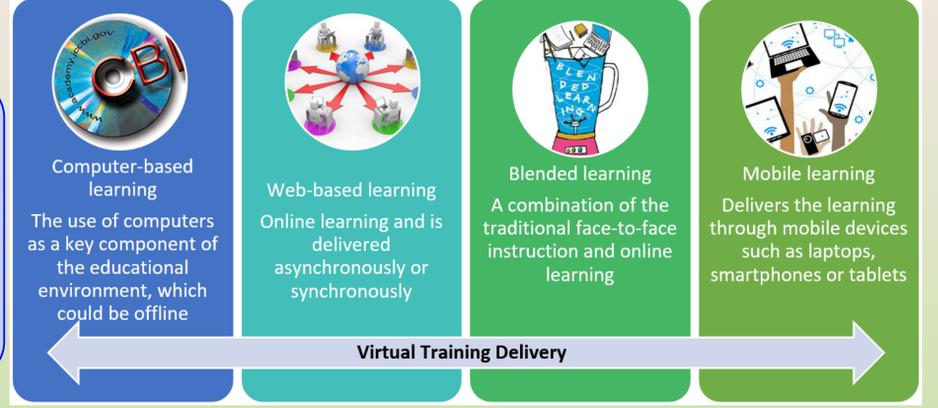


Figure 1. Virtual training modalities

Why virtual training

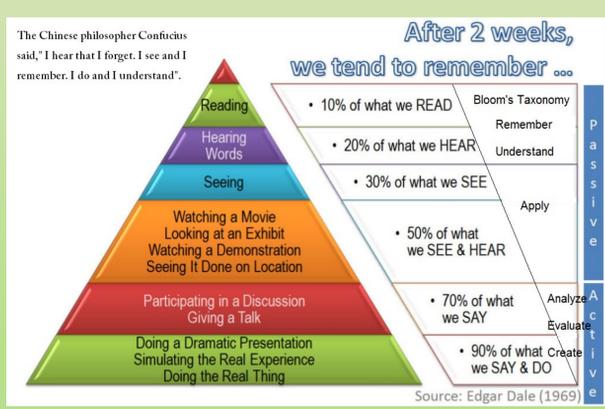


Figure 2. Cone of Learning by Edgar Dale and Bloom's taxonomy

Virtual training observations and course

The FAA Academy classroom report summary

- Traditional classrooms without learning management system (LMS)
- Video quality is **outdated**
- No **pre-tests** and **post-tests** to understand their knowledge level
- Lack of **simulation** practice time after class
- No interactive **animation/simulation/gaming** involved in the student study
- Some lesson **pace** was not appropriate

Online surveys and face-to-face interviews at the FAA Academy (students and instructors) and at the facilities (instructors, managers at DCA, and MCO towers)

- More **time** in the simulation labs
- Current videos are **outdated**
- Pre-tests** and **post-tests** are needed
- Good instructor's style should be shared **virtually**
- More **teamwork** in class
- Millennials** can teach themselves virtually
- Blended learning** is preferred
 - Do not take the **instructor** away completely, but just add additional effective resources
 - Start with something like a learning management system (LMS)
 - Sharing senior controllers' experiences in a **virtual** format is desirable
 - Team** building activities are important for controller success
 - Additional **resources** should be available to passionate students
 - Stories such as the US Airways Hudson River landing need to be compiled and shared **virtually** with all, not in a single one or two classes
 - Interactive** training materials should be accessible to the students
 - Interactive and scenario driven **videos/animations** are needed

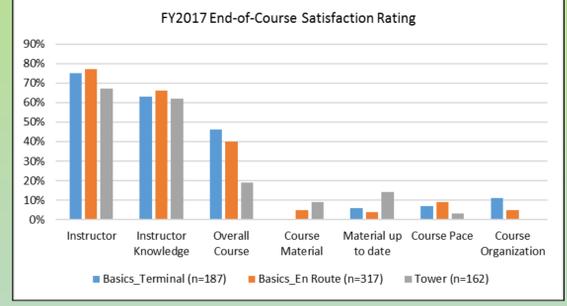


Figure 3. The AT Basics, and the Tower End-of-Course Satisfaction Rating collected

Online survey participants		
Location	Type	Participants
FAA Academy	Instructors	12
	Students	6
AT-CTI Schools	Faculty	15
	Students	24

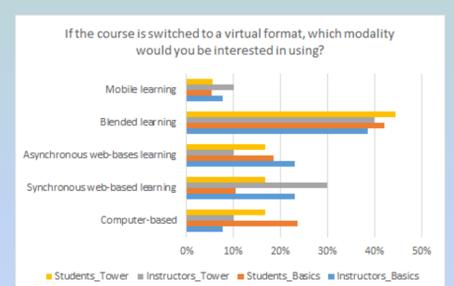


Figure 4. The preference of virtual training modalities identified by instructors and students at the Academy and AT-CTI schools

Recommended Solutions

- ⇒ Learning management system (LMS)
- ⇒ **Blended learning**
- ⇒ **Team-based learning (TBL)** with individual Readiness Assessment Test (iRAT) and team Readiness Assurance Test (tRAT) is preferred and a community learning can allow millennial controllers help each other and support each other
- ⇒ Emphasize **active learning** such as teamwork and discussion in class time with the facilitation of the instructor
- ⇒ **Pretest** and **posttest** should be implemented as a formative assessment
- ⇒ **Animation/simulation/gamification** should be included in the interactive multimedia instruction
- ⇒ **Virtual reality (VR)** and **augmented reality (AR)** can be incorporated into virtual learning to improve student engagement and retention
- ⇒ An **Intelligent Tutoring System (ITS)**, which empathize the personalized learning should be applied so that based on the test performance students can have the options to either repeat or move on to the next topic of study
- ⇒ A **virtual community** with disciplinary **repository** should be available to Millennials
- ⇒ **Mobile learning** can be a supplemental portable study tool to enable more personalized training

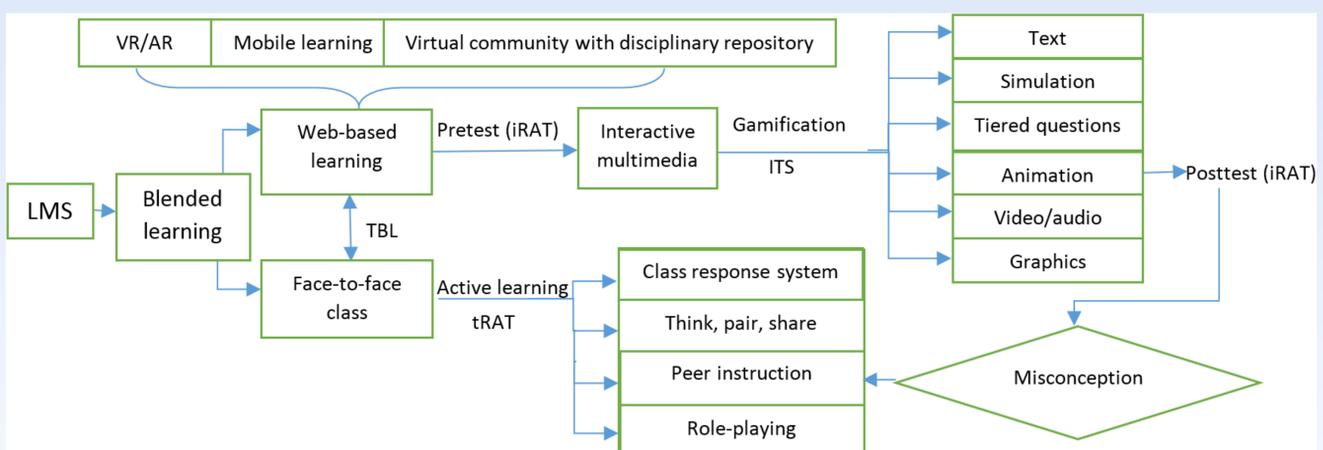


Figure 5. Virtual training course redesign map