Integration of Virtual Reality Procedural Training in a Flight Training Curriculum

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Overview

- Discuss the previous way of training (focus on Private Pilot Student)
- Development of the VR Procedural Trainer
- Testing
- Final Integration
  - Canvas
  - Future updates

Previous Training

- FAA approved 14 CFR 141 Training Course
  - Oral/Sim/Flight Activities
- Preflight and Checklists were integrating into those lessons
- “Dry-Time” – not always resources/aircraft available

How to use VR?

- Worked with Cole Engineering Solutions
  - Commercial Aviation Augmented Reality Toolkit (CAART)
- Created an accurate 3-D Model of Cessna 172S
- Used CAART framework and developed a series of lessons
  - Aircraft Familiarization and Preflight
  - Normal and Emergency Checklists

How to use VR?

- CAART – Different Modes

1. Group Classroom
2. Software Guided Mode
3. Free-play Mode
4. Testing Mode

PILOT: New Private Pilot Training Program

- Purpose: To increase the capacity, efficiency, and effectiveness of private pilot training through the utilization of VR software and flight simulation applications.

- Expected Results:
  1. Increase in student preparation for private pilot training
  2. A reduction in student training time
     - flight hours and calendar days
  3. A reduction in student training cost

PILOT: New Private Pilot Training Program

- Program Outline
  - Stage 1:
    - Students spend four weeks participating in oral, simulation, and virtual reality training.
    - No Flight hours
  - Stage 2:
    - Students are paired with a flight partner and scheduled to fly 5-6 days per week for four weeks minimum in a 5 hour flight block.
  - Stage 3:
    - Students complete solo cross-country requirements and prepare for the practical exam.

PILOT – Stage 1

- Duration – 4 weeks
- Scheduling – Weekdays (M-F) with course makeup during weekends
- 5 activities in 4 labs per day (4.2 hours of training)
- Homework: Pre-Activity Computer Exercises (PACE)

ORAL

Flight Sim

VR Flight Sim

VR Procedure/ATC Trainer

PILOT–Stage 1 (VR Procedure Trainer)

- 0.5 hours per day - Asynchronous training
- Practice and evaluation of preflight processes and checklist procedures.
- Occurs in a laboratory environment with a graduate assistant present for assistance

Current Uses

- Only using the software guided and free play modes
- Majority of lessons are using software guided mode to walk student through the checklist step-by-step
- Still building testing modes
  - Find fault during preflight
  - Also test checklist done in proper order

Canvas (LMS) Integration

- Worked with Cole to test Canvas Learning Tool Interoperability (LTI) integration
  - Allows student to launch CAART from Canvas
  - Now able to track grades and student progress in canvas gradebook

- Gives students access to CAART at home for studying or more practice on their own time

Updates

- Checklist updates
  - Adapts to changing SOPs
- We can develop new modules or edit old ones
  - Uploaded in the background
  - Each time a student starts a lesson, it downloads the latest version
  - Rapid updating possible

Results

- Comparing 2 years of private pilot student data (pre-pandemic) (n=451)
  - 2018-2020
- PILOT Program (n=266)
  - Starting August 2021

	Difference
Hours to Solo	23% less hours
Days to Solo	27.7% less days
Days to Complete	34% less days

Conclusion

- The PILOT program is a new way to train private pilot students that aims to increase the capacity, efficiency, and effectiveness of private pilot training.
- The PILOT program is an evidence-based approach to flight training that leverages VR technology in training.

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