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Using an Augmented Reality App for Flight Training

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Using an Augmented Reality App for Flight Training:

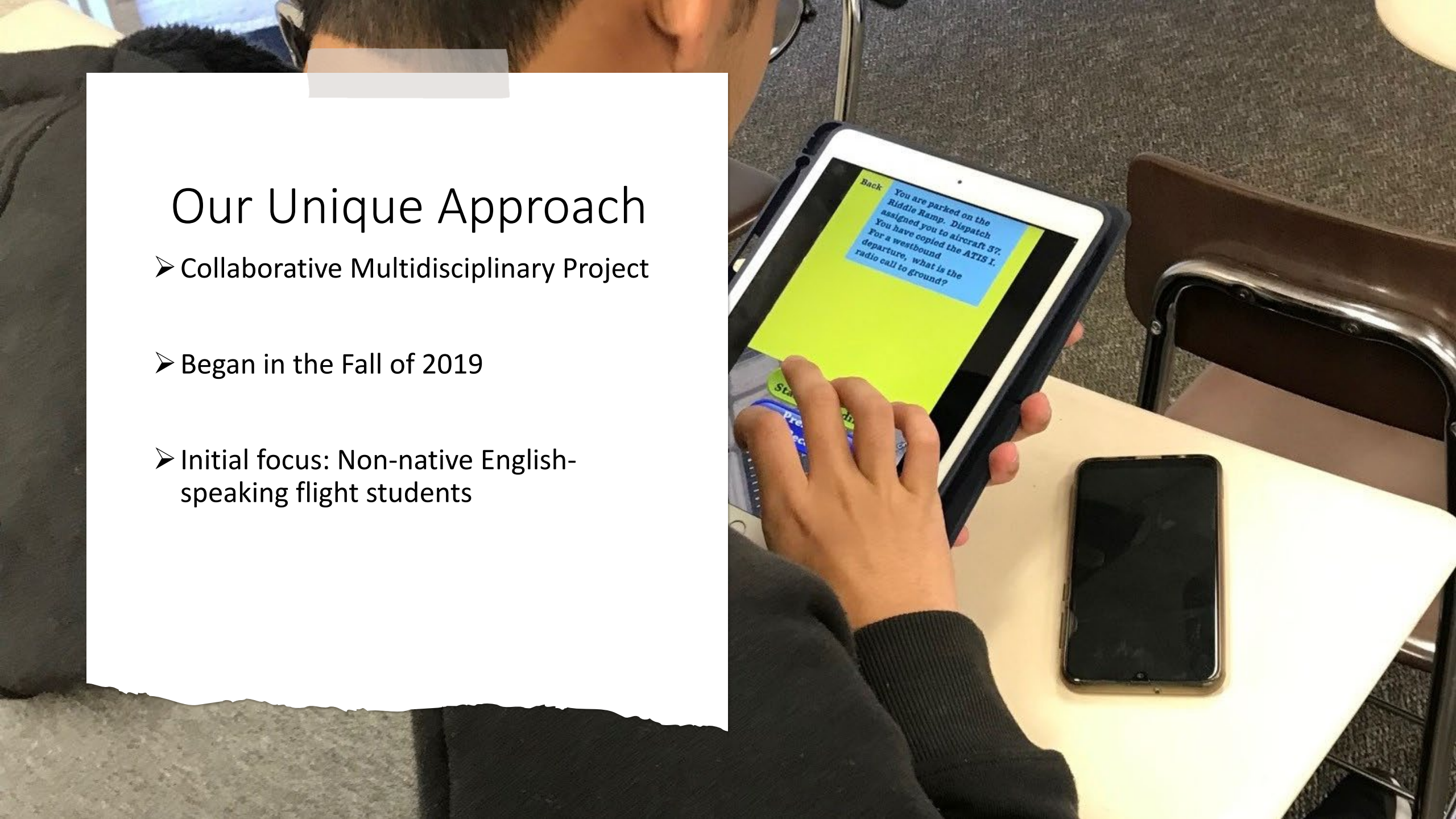
A specific part task training development effort for ATC communications and checklist flow

Parker Northrup, Stacey L. McIntire, Heather Marriott, Hong Zhan

Embry-Riddle Aeronautical University

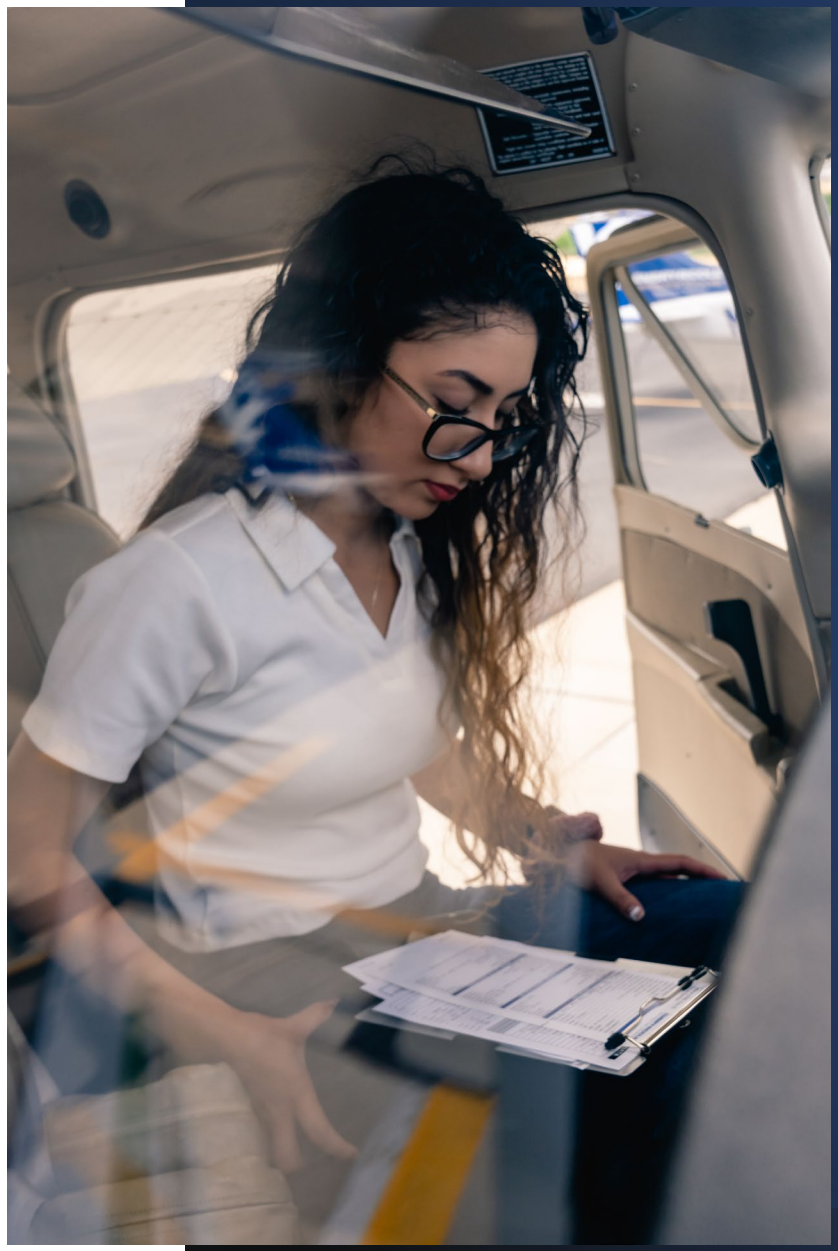
Our Unique Approach

- Collaborative Multidisciplinary Project
- Began in the Fall of 2019
- Initial focus: Non-native English-speaking flight students



Contextual Analysis: Needs of International Student Training

- ERAU provides global aeronautical flight education and training
- International students are required to meet English minimum standards by FAA/ICAO governance
- "Jargon" of flight is a unique subset of English proficiency
- Highest intensity occurs in the first 15 minutes of flight and during practice for takeoff and landing operations
- Established methodology was basic rote memorization or repetition with flight instructors in "live" operations.



Augmented Reality Potentials

- Augmented Reality leverages a sense of live operations at a reduced cost
- Eliminates variability in English tone, pronunciation, and enunciation among native speakers
- Segmented scenarios allow specificity to situational radio usage for students (i.e., Eliminates learning "aviation vocab" outside of contextual clues)

Purpose: Project and Research Questions

- The **purpose** of this research project is to evaluate the **efficacy of adding ARAir,** a mobile App designed by Embry-Riddle Aeronautical University (ERAU) engineer faculty and the ERAU flight department for international pilot students.
- Specifically, does AR help international pilot students interpret English directions from an Airport Tower correctly and give appropriate English responses to “move” a computer-generated airplane to the correct location in the correct manner?

Subjective and Objective Measures:

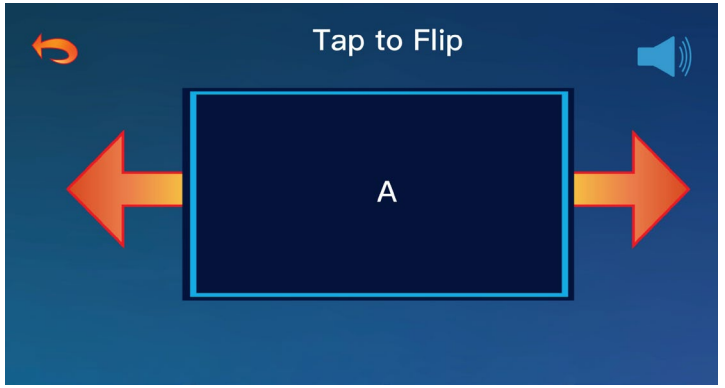
- How do international students use ARAir?
- What are international students’ perspectives on the design of ARAir?
- What are international students’ perspectives on the effectiveness of ARAir in learning radio communication?
- Are there performance changes pre/post use of ARAir?

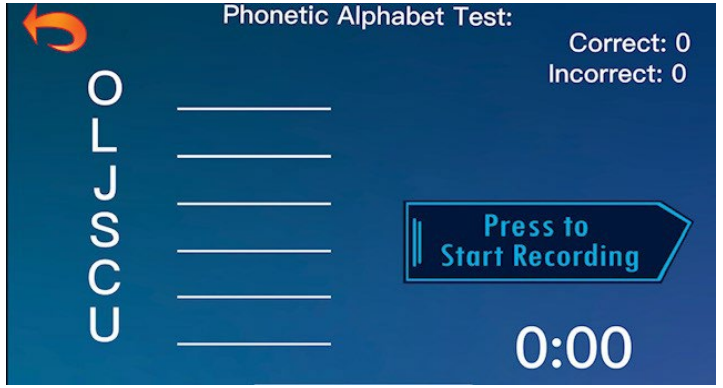
AR Aviation

- Phonetic Alphabet
- ATC Comm Scenarios
- Checklist Flows

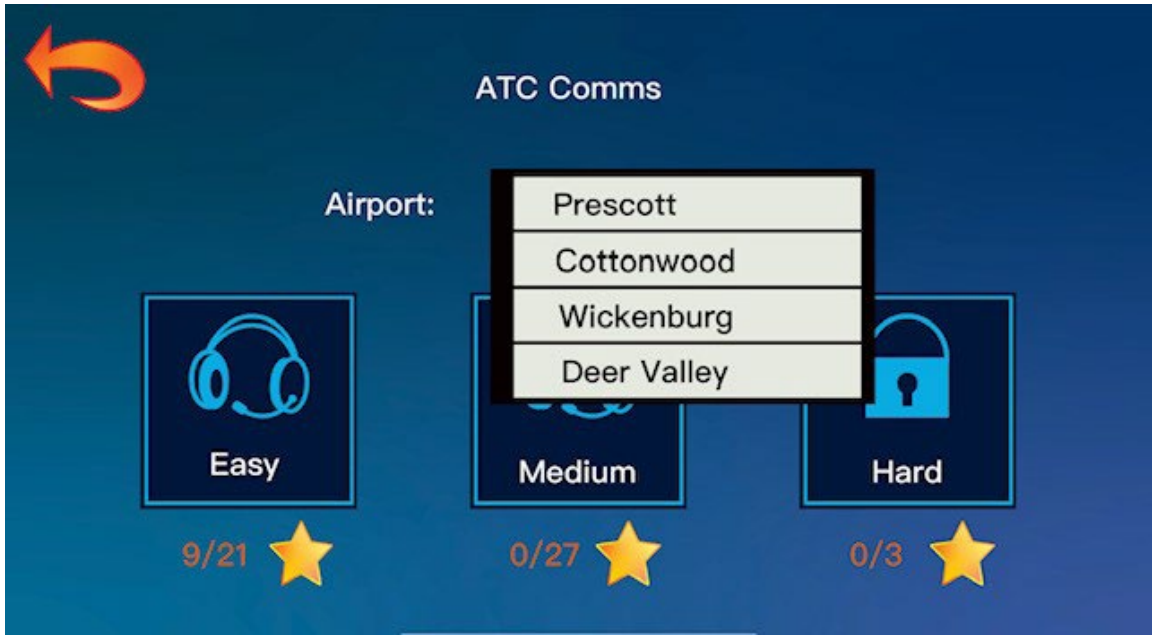
- Gamifying learning
- Scaffolding
- Immediate Corrective Feedback
- Distributed practice improves retention
- Spacing prompts deeper processing

Phonetic Alphabet





ATC Scenarios



You are parked on the Riddle Ramp. Dispatch assigned you to aircraft 76. You have copied the ATIS S. For a westbound departure, what is the radio call to ground?

Press to Start Recording

Press to Stop Recording

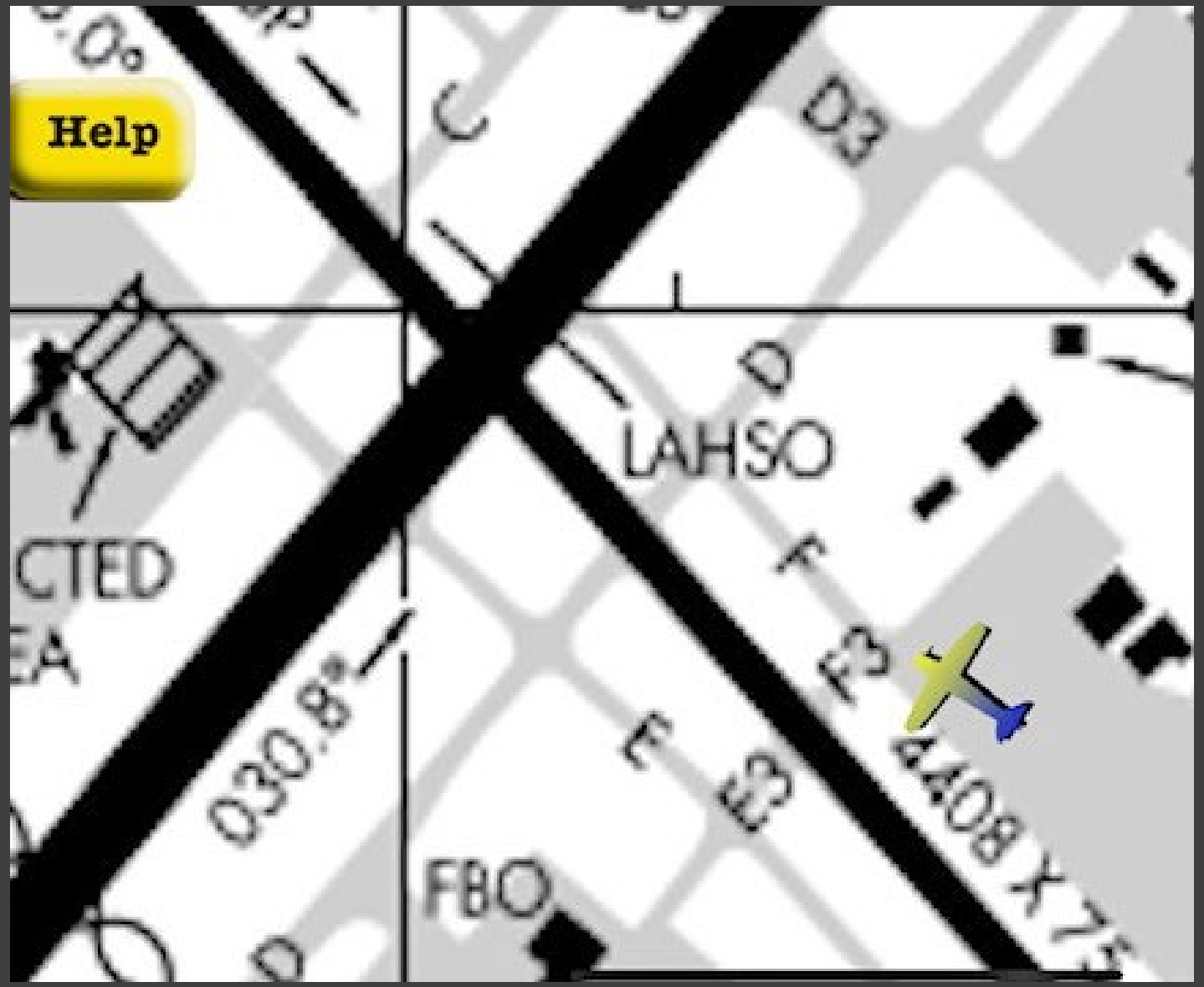
Press Record and Start Speaking

ATC: Riddle 76, Runway 21L, Taxi via F D.

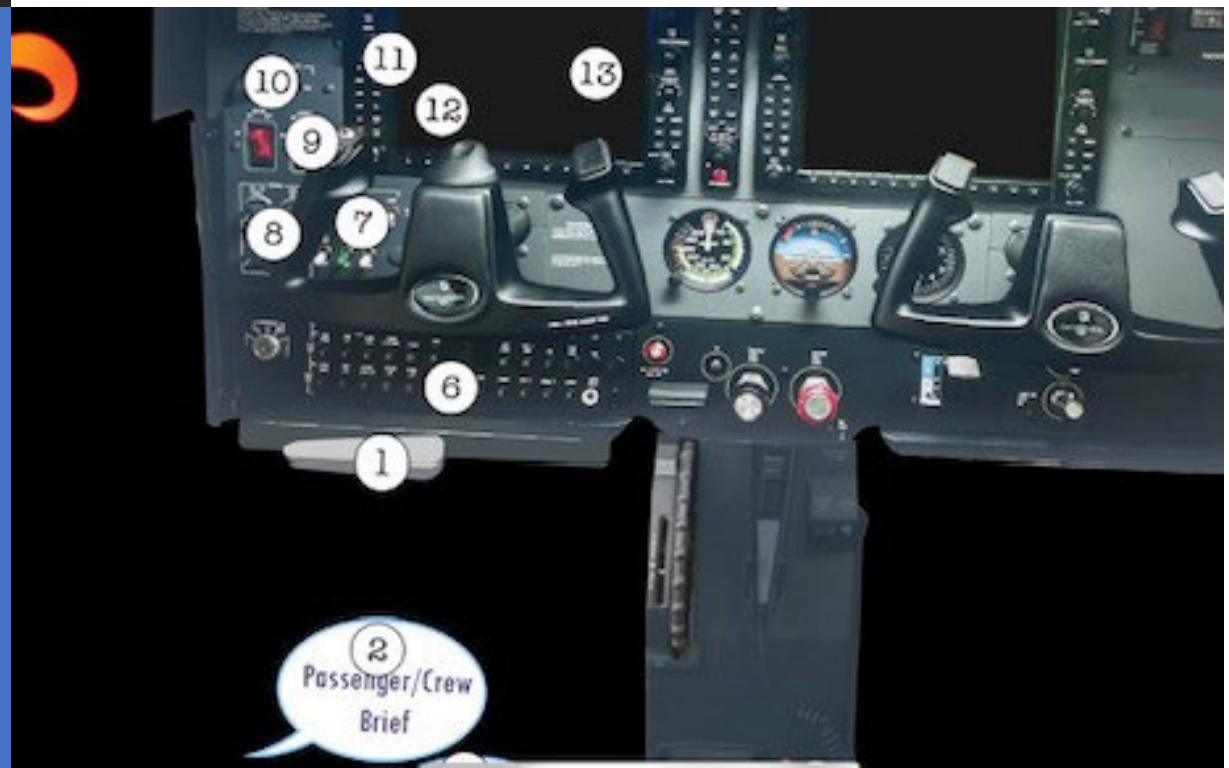
Press to Start Recording

Press to Stop Recording

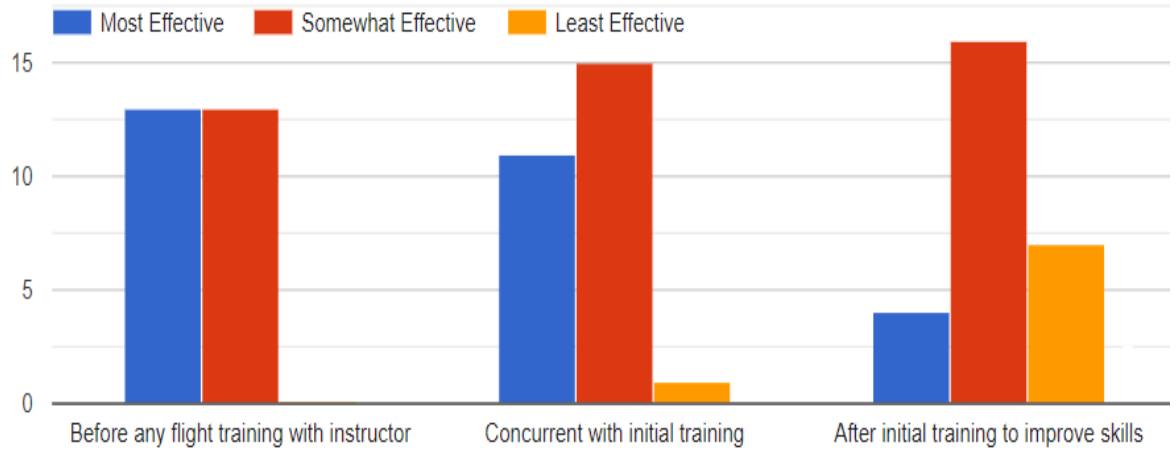
Press Record and Start Speaking



Checklist Flows

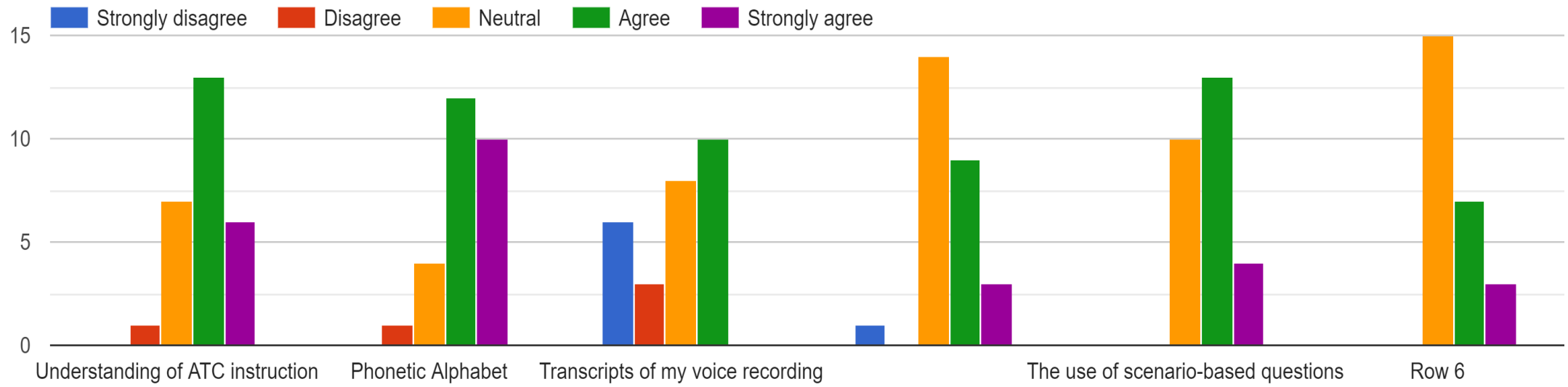


Data Analysis: Findings from the Post-Survey



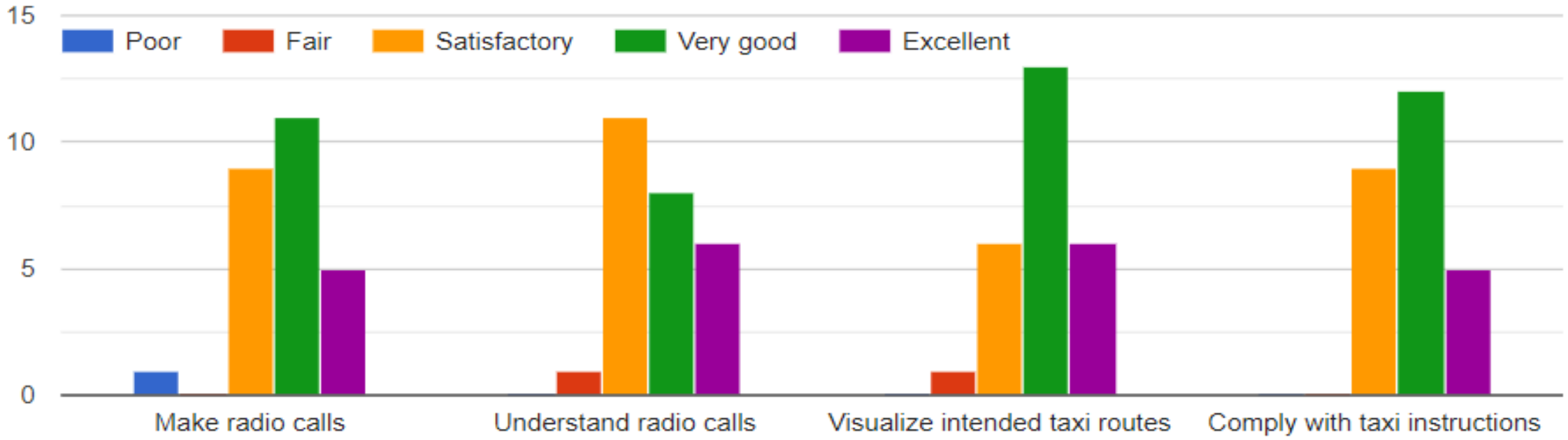
TIMING AND EFFECTIVENESS AS RATED BY PARTICIPANTS

Data Analysis: Findings from the Post-Survey



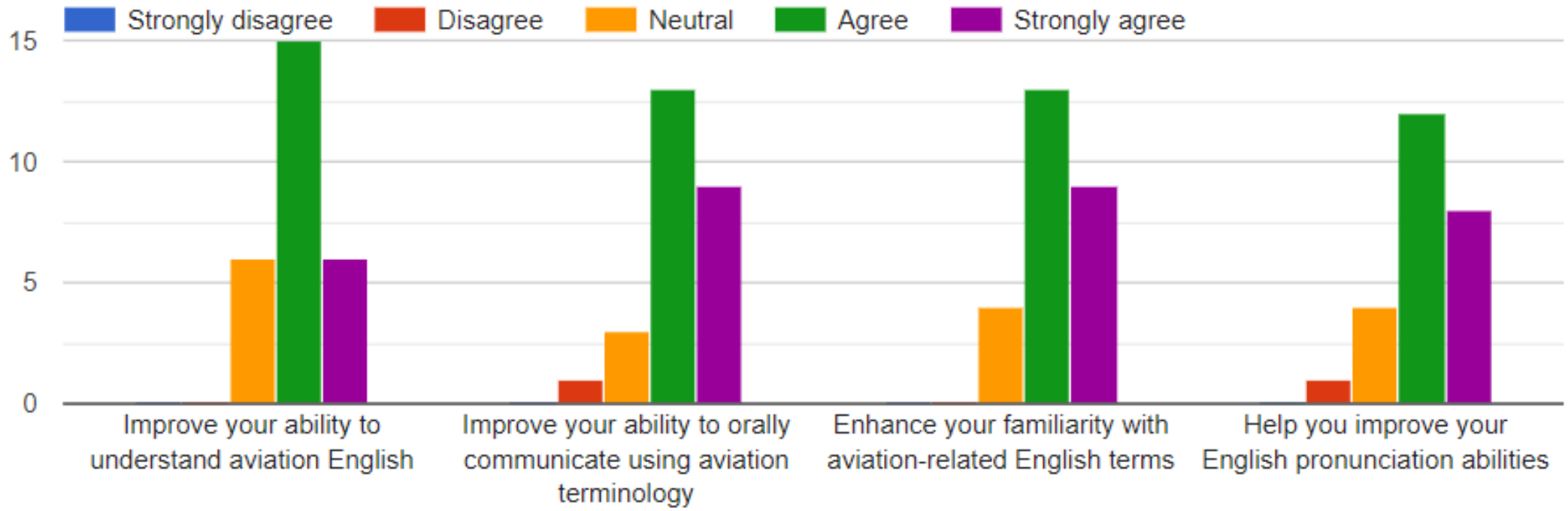
Key Take Away: Learning Phonetic Alphabet

Data Analysis: Findings from the Post-Survey



Key Take Away: Visualization of Taxi Routes

Data Analysis: Findings from the Post-Survey



Key Take Away: "Aviation English" Improvements

Current Focus

Ab-initio flight students

Fall 2022

Mixed-methods approach

Limitations

Continue to collect data

Spring 2023

Data Analysis – Next Iteration

Interactive assessment by instructor pilots

Student progression across multiple year cohorts of students

Correlate participant perception with objective performance

Usage rates and timing against performance indicators

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