Developing Pre-service Teachers' Culturally and Linguistically Sustaining STEM Pedagogies

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Project Overview

- The number of multilingual learners (MLs) in US K-12 schools is rapidly growing.
- Science teachers feel unprepared to teach MLs. MLs have experienced significant marginalization in science learning (Tolbert et al., 2024)
- Mixed-reality simulation have made positive influence on teacher education. (Dieker et al., 2014)
- This project aims to develop pre-service teachers' culturally and linguistically sustaining science pedagogies (CLSSP) through a comprehensive mixed reality simulation experience.

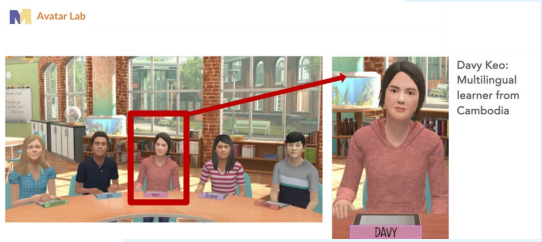
Theoretical Framework

Language-based approach to content instruction (LACI) (de Oliveira, 2023) proposes the six Cs of support for scaffolding content area instruction for MLs: connection, culture, code-breaking, challenge, community and collaboration, and classroom interactions

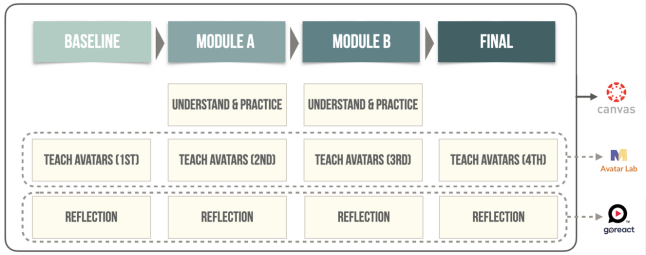
Adapted from de Oliveira (2023)

Mixed-reality Simulation

Mixed-reality simulations provide approximations of practice for pre-service teachers to try out new practices and receive feedback (Grossman et al., 2009). One avatar student is an ML from Cambodia.



Practice-based Learning Cycle



Research Questions

- How are STEM education students' culturally and linguistically sustaining STEM teaching practices improved impacted by online experiential learning opportunities?
- How does the comprehensive mixed reality simulation better assist STEM education students to acquire culturally and linguistically sustaining STEM teaching practices?

Findings & Implications

- Changes from "Just good teaching" practices to more culturally and linguistically sustaining STEM practices
- Beyond checking boxes and increasing number of ML instructional strategies or teaching science vocabulary or facts-based lessons, deeper awareness of disciplinary language use closely integrated with scientific sense-making and practices
- Extended understanding of culturally and linguistically sustaining STEM practices from simply addressing a particular cultural referent for a particular ML's background to communities, social-scientific issues, or different parts of the world.
- Mentor's feedback and refine/reteach opportunities were particularly helpful.
- However, 1) "sustaining" pieces (social justice & equity) and STEM education students' lingering discomfort still need more work. 2) Sustainability issue (e.g., cost and accessibility) & enhancement of authenticity needs more work.

References

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The Avatar Lab used in this project is created by Mursion.