Design & Implementation of Immersive Representations of Practice

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BACKGROUND

- Use of video in teacher education is commonplace and has been found to be effective in facilitating preservice teachers' (PSTs) professional noticing (Grossman et al., 2009; Sherin & Star, 2011).
- Despite the usefulness of video, many PSTs continue to show a lack of specificity in content-specific noticing in elementary math scenarios (Gaudin & Chalies, 2015; Huang & Li, 2012 van Es & Sherin, 2002).
- 360 video records scenarios omnidirectionally, facilitating an improved sense of "being there" in the classroom (Ferdig & Kosko, 2020; Walshe & Driver, 2019). Further, PSTs using 360 videos attend to more math-specific facets than those viewing the same scenario with standard video, suggesting a potential interaction with presence in the classroom and professional noticing (Kosko et al., 2021a).

The purpose of this project is to examine how 360 video can facilitate PSTs' professional knowledge and teacher noticing for teaching fractions and multiplication/division.

Lessons Learned Thus Far (Grant Supported Research

- Whether PSTs notice students' mathematics, and the degree of specificity they attend to it in their writing is associated with where and how PSTs focus on students in a 360 video.
    - (Kosko et al., in review-a; Kosko et al., in review-b; Kosko et al., 2020; Zolfaghari et al., 2020; Zolfaghari et al., 2021)

    We conjecture this is evidence of the embodied nature of professional noticing (i.e., embodied cognition). One embodied metaphor emerging is that some PSTs' noticing is "student centered" (i.e., students are centered in their field of view) and student-centered noticing tends to be more math-specific.

Figure 1. Side-by-side comparison of PST not attending to mathematics with the teacher in the center frame (left) and PST who attended to mathematics where the teacher is off-center (right).

- Building from the above lessons, we are integrating technology to record PSTs' field of view (FOV) when watching 360 videos either from a VR headset or laptop. This is being integrated with machine learning to provide reports of what, when, and where PSTs focus – providing a tool for teacher educators to make the more tacit knowledge of professional noticing more explicit (Kosko et al., 2021b; Yang et al., 2021). We are also integrating eye-tracking technology alongside these efforts (Lenart et al., 2021).
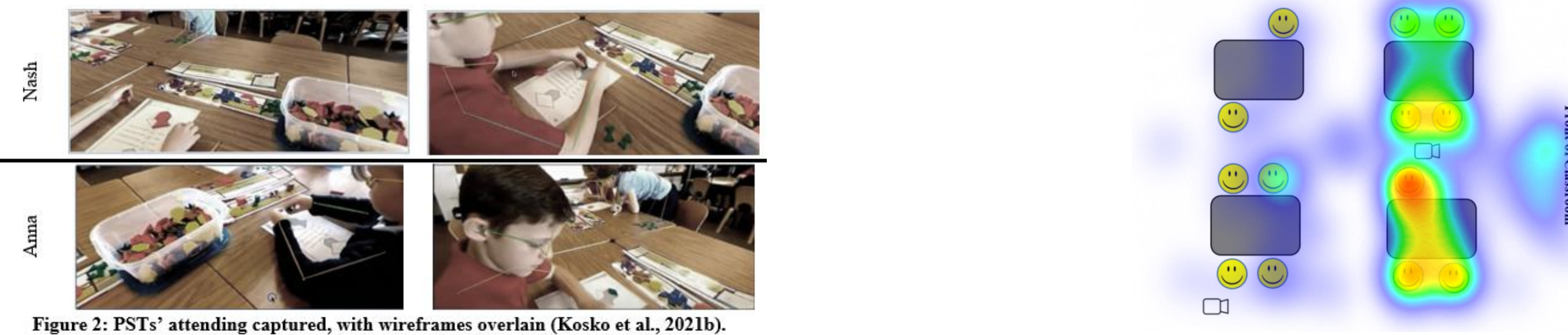

Figure 2: PSTs' attending captured, with wireframes overlain (Kosko et al., 2021b).

What is 360 Video?

360 video records omni-directionally. Below is a stretched image of a recorded scenario (see https://xr.kent.edu for example videos). The image is stretched similar to how the World Map is stretched from the globe (i.e., a sphere), but the person is situated at the center of the sphere.
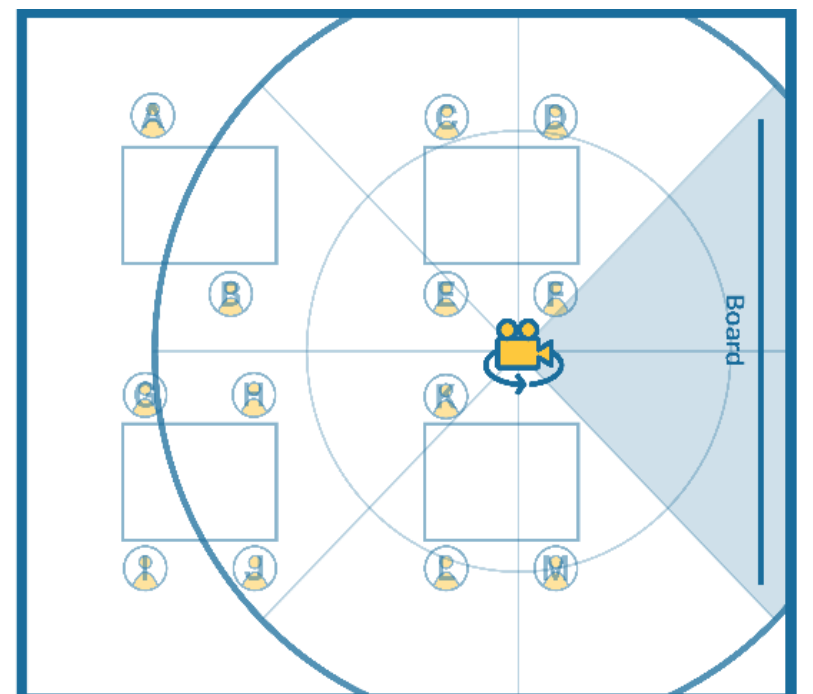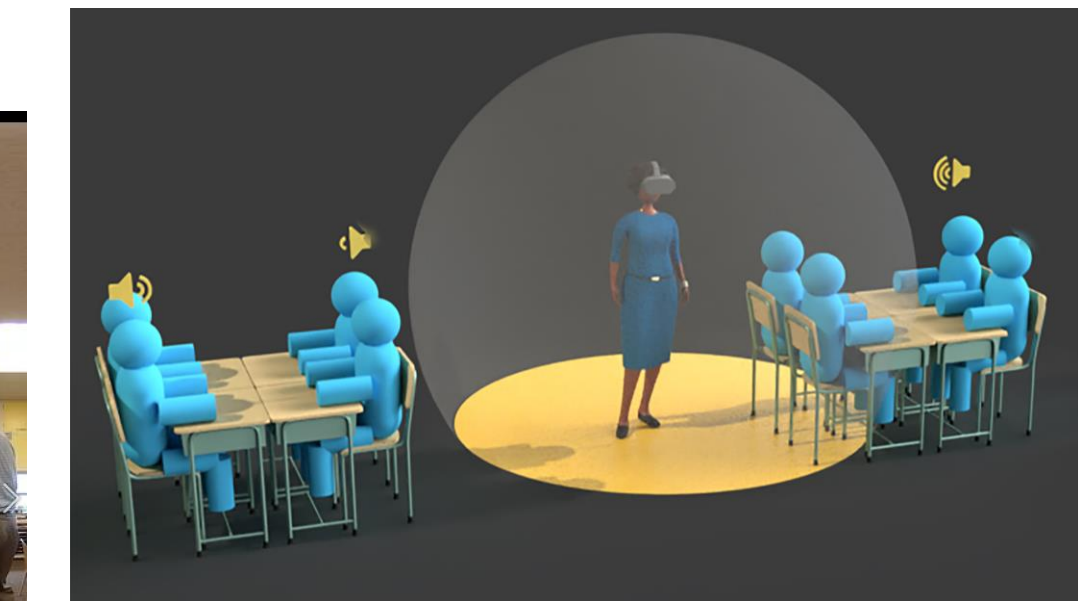
Most 360 videos are single-perspective, allowing PSTs to view in any direction from a fixed point. However, we are also creating & studying multi-perspective 360, which allows a PST to move amongst various fixed points (Kosko et al., 2021c; Miller et al., 2020; Zolfaghari et al., 2020).
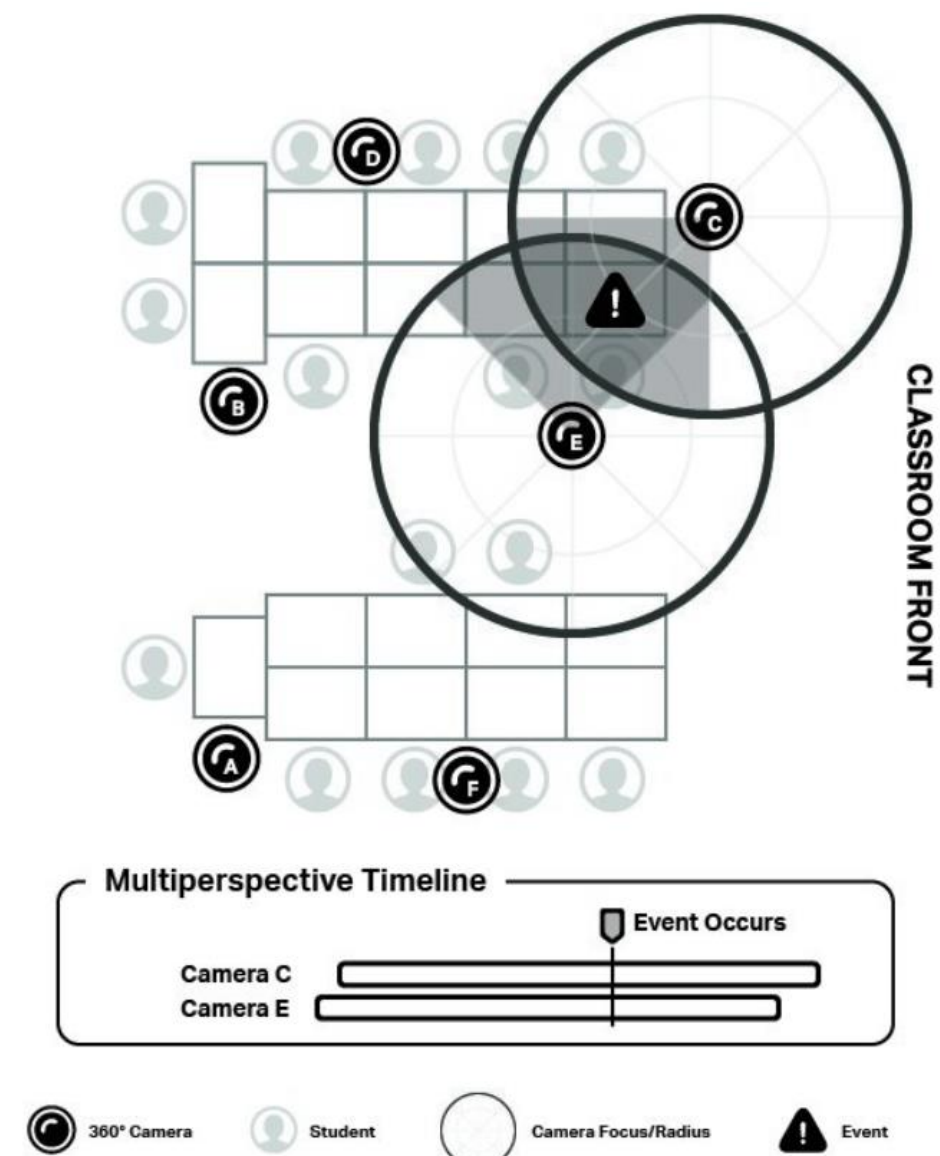
Next Steps

- Expert Math Teachers' eye-tracking in 360 videos
    - We are creating a composite of math coaches & supervisors' teacher noticing in a set of 360 videos we've found to be useful. Coupled with interview data, we seek to create a resource that can be used by PSTs to learn where to attend & why those moments are important.
- Machine Learning Tools
    - Tangential to the above efforts, we are refining machine learning algorithms to create a tool for pedagogical events in a PSTs' FOV to provide timely feedback for their professional noticing.
- Delayed by COVID, we seek to record additional 360 video experiences and continue our research efforts.

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