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Promising Practice for Building Community through Mixed-Reality Simulation in Teacher Preparation

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Abstract: It is critical that pre-service teachers have exposure to practice in order to be successful in their future classrooms. This article describes a step-by-step process of implementing mixed-reality simulation (real-time interaction with avatars, similar to what one would find in a video game) in teacher preparation courses in order to provide teacher candidates with an almost-real classroom experience. Through using this mixed-reality simulation platform, teacher candidates teach student avatars who are being controlled by a live, behind-the-scenes person, trained to facilitate classroom scenarios. Following an overview of the implementation of this mixed-reality technological tool into their classes, authors share successes and challenges, highlighting some key takeaways for those considering integrating this into their future classes.

Keywords: teacher candidates, mixed-reality simulation, practical experience, inclusive learning community, identity development

Preparing pre-service teachers to be effective and ready to meet the needs of their students is a challenging task. As teacher educators, we are responsible for equipping our students not only with content knowledge but also skills to create a safe space for their students to learn. Given the diversity of the student population and the variation in the student composition across school districts, teachers need to possess ready-to-use tools which will allow them to reach every student and create a supportive and inclusive learning environment welcoming all students. Introducing such tools through coursework does not always provide a critical practical experience to pre-service teachers due to the time constraints in the program and the extent of other rigorous academic expectations dictated by the state for teacher licensure programs. Pre-service teachers need to engage in extensive practical opportunities in which they will have exposure to a classroom of students and can try out the techniques (Ball & Forzani, 2009; Ball et al., 2009).

One innovative tool that allows pre-service teachers to gain exposure to instruction is the mixed-reality classroom. In this type of a classroom, teacher candidates interact with avatar students on a screen. The avatars are virtual graphical representations of students or parents (looking similar to what one sees in a video game) controlled by a live, behind-the-scenes voice actor, trained to facilitate scenarios typical for classroom dynamics and learning situations. This enables teacher-student interactions and opportunities to try out new classroom techniques with real-time student response and feedback provided by the instructor and peers.

Background

The goal of this article is to (1) explain the literature and background on mixed-reality simulation, (2) describe a step-by-step process of implementing this mixed-reality simulation technology in our teacher education courses (3) share the lessons we learned through this experience. Mixed-reality as a pedagogical tool has a limited literature base. The majority of the early work on mixed reality simulation and learning was based on military and medical training (Hughes et al., 2005). In these fields researchers found that mixed-reality and virtual-reality training played an important role in creating safe scenarios for learners to try new skills with minimal repercussions for mistakes made.

The limited research on mixed-reality simulation as a pedagogical tool points to positive outcomes for teacher preparation. These simulated teaching experiences, where participants interact with avatars on a screen, allow teacher candidates to receive feedback, reflect on their teaching and then make changes directly after receiving such feedback, as they are able to pause the simulation in order to discuss. This "pausing" of the simulation is of course not possible in real teaching situations (Pas et al., 2016). Meggs, Greer and Collins (2012) contend that mixed-reality and virtual-reality simulations support teaching and learning within a constructivist framework especially within the context of giving and getting real-time feedback on performance from and to peers and from the instructor.

Mixed-reality training for pre-service teachers has been shown to increase feelings of self-efficacy when teaching science to young learners (Bautista & Boone, 2015). Dawson and Lignugaris/Kraft (2017) found that mixed-reality simulation practice with integrated feedback allowed teachers to improve delivery of foundation teaching skills, such as praise and error correction, which they were able to generalize to real classrooms. Additionally, it was reported that avatar students and scenarios were viewed as realistic by most teachers and the experiences were found beneficial for their teaching. Dieker et al.'s (2017) study supports the idea that teacher candidates' increased exposure to mixed-reality simulated classroom teaching results in improved feedback to students as well as more frequent higher-order questioning, which they were able to transfer into real classroom teaching. While more research into mixed-reality simulation is undoubtedly needed, these preliminary findings suggest the promise that this tool has for allowing teacher candidates to practice their teaching and receive real-time feedback. Skills are developed outside the classroom, leaving teacher candidates better equipped to teach live students when it is time.

Step-by-Step Process

Our process for integrating mixed-reality simulation into teacher preparation includes the following steps.

Technology Set Up

First, teacher educators ensured that their classrooms were technologically equipped to enact the mixed reality simulation. This included having a computer in the classroom that had a video camera and access to Zoom technology (Zoom is the platform used to connect participants with avatars on the screen, controlled in real-time by a facilitator). This Quick Hit article focuses on the pedagogical integration of this technology into teacher preparation classes; for more details about mixed-reality software as well as the technological aspects of set up, contact the authors.

Establishing Rapport and Building Community

In preparing teacher candidates to interact with the avatar students, very little information was intentionally provided to students about what mixed-reality simulation is in order to try to mimic the real-life "night before teaching" experience. Teacher candidates were informed that they were going to meet mixed-reality students and enact a community building/getting-to-know-you activity.

Prior to developing their activities, teacher candidates learned about how to build rapport with their students. They discussed strategies for creating a classroom community that is inclusive, respectful, open-minded and safe for student learning. *Social Justice Standards: The Teaching Tolerance Anti-Biases Framework* (Teaching Tolerance, 2016) was explored with teacher candidates, and used to brainstorm practical ways to foster a supportive and critical community (identity activities, story-telling, collaborative tasks, etc). Next, teacher candidates were put into teaching pairs to collaboratively

prepare a getting-to-know-you activity for a new group of students. Teacher candidates were encouraged to use creative ways to engage students and establish an inclusive learning community by demonstrating curiosity about their students and by capitalizing on their diverse characteristics.

Enacting and Reflecting on Lessons with Mixed-Reality Avatars

Next, our classes of about 20-25 teacher candidates gather together in the classroom to observe the pairs facilitating 7-9 minutes of an activity using the mixed-reality platform. Zoom is used to access the mixed-reality platform and the teacher candidates interact with the avatar students in real-time (they stand facing the screen and enact their lessons with the avatars). There is a behind-the-scenes live facilitator who is controlling the avatar students' responses to the teacher candidates.

Figure 1. Photo of student teaching avatars using mixed-reality classroom technology.

The student observers not engaging in the mixed reality simulation are expected to take notes and generate structured feedback both when the simulation is paused and directly following the activity. They are provided with an observation checklist including components of an effective introductory activity based on the frontloading lesson about establishing community. Following the teaching simulation sessions, candidates are guided to write reflections about their experiences, focusing on their successes and challenges. Our students were asked to evaluate whether they were able to foster an inclusive learning community and share examples of their successes and challenges. Additionally, we asked the candidates to analyze the avatars' identities, whether they were able to learn more about some students than others and if so, why that was the case.

Candidates were also encouraged to reflect on what else they would need to know about the students' identities moving forward and how this information would help them facilitate an inclusive community. During the next class period, in small groups, candidates compare and contrast their written reflections with their classmates. Following the small group interactions, we engage teacher candidates in a whole-class discussion activity generating more ideas and drawing connections to the concepts explored prior to the simulated sessions. Candidates are then asked to delineate action steps that they will take when engaging students in similar activities in their future teaching contexts.

Conclusion

While there is no substitute for teaching live students, this mixed-reality simulation provides a low-stakes opportunity for practice and exposure to an almost-real classroom interaction. Teacher candidates express nervousness prior to doing the simulation, similar to the feelings that novice teachers have before meeting real students for the first time. For many candidates, this was their first experience acting as a teacher in front of students. Many remarked on how this experience allowed them to ease their nerves in a safe environment. Additionally, teacher candidates learned from the real-time feedback that they are able to receive from their professor and fellow students during the sessions. Pausing the simulated session allows candidates to adjust their instruction based on the feedback which creates a meaningful learning experience for teacher candidates.

This experience deepened candidates' understanding of identity development and community building in ways that other classroom activities, such as readings and discussions, did not. Being able to actually practice enacting community building activities with avatars led to some illuminating discussions about how to engage all students in classroom conversations. Many of our candidates are planning to become teachers of English Language Learners (ELLs). Therefore, creating opportunities to scaffold participation in a group dialogue is paramount to effective instruction.

The mixed-reality simulation experience served as a building block in teacher development fostering connections between theory and practice and allowing teacher candidates a low-stakes opportunity to practice and receive feedback on their teaching.

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