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Lessons We Learned from Avatars: Cultivating Meaningful Preservice Teacher Online Experiences During COVID-19 and Beyond

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Abstract

Like flight simulators used to train airline pilots prior to flying an actual airplane, mixed reality simulations provide an opportunity to interact with avatars in order to practice newly learned behaviors in an online environment. As teacher educators, we have used mixed reality simulations as a part of our coursework for the past five years. In this article, we discuss implications and lessons learned for teacher education practice and research in the online environment during COVID-19 and beyond based on our experiences using mixed reality.

Keywords

teacher education, mixed reality simulations, educational technology, collaboration, online education, COVID-19

Cover Page Footnote

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Jared stands at the front of the classroom looking wide-eyed at two students having an argument during his science lesson. The other students are also focused on the argument, and no one is engaged with the mini-lesson. Jared doesn't know what to do to resolve the situation and get the class back on track to the discussion about climate change. Frantically he says, "Pause simulation!" The class fades to a blank screen. He looks to the rest of his peers who are also students in a teacher preparation program, also known as preservice teachers, and his professor in tiles across the top of his computer screen for advice and they discuss the pros and cons of various behavior management strategies. After making his decision about which one to go with, he says, "Start simulation!" and the student avatars reappear on the screen as if no time has passed. Jared resumes teaching, implementing the strategies he discussed with his classmates and professor.

This might sound like teacher preparation from the future, but this technology exists now. Mixed reality simulations, or human-in-the-loop digital avatars that learners can interact with, have been used in teacher education for over a decade (Dieker et al., 2014). Mixed reality simulations provide a low-risk environment where preservice teachers can practice newly learned skills with student avatars or interact with an adult avatar that can serve in different roles such as a colleague, parent, or administrator. Simulations provide preservice teachers the unique opportunity to pause and consult, make mistakes and try again, and observe and provide feedback to their peers in a standardized scenario without causing harm to actual students. Mixed reality simulations provide a unique scaffolded online learning experience before or alongside field-based experiences (Murphy et al., 2018).

We have been using mixed reality simulations since 2015 to support our preservice teacher coursework across both general and special education. Embedding this new form of technology-based active practice into our university classrooms has brought its share of teachable and a-ha moments alike, and pushed us to improve our teaching in ways we could not imagine. We have learned some valuable lessons along the way. As we scrambled to convert our in-person courses to remote experiences in a matter of days in March 2020 like educators around the world, we realized that our work with avatars in online teacher education spaces taught us numerous lessons to more broadly inform remote, hybrid, and/or face-to-face teaching and learning during COVID-19 and beyond. In this article, we first provide a brief overview of the literature exploring mixed reality simulations in teacher education. Next, we present the lessons we have learned from mixed reality

for teacher education in the online environment. Finally, we conclude with the implications for future practice and research in teacher education in the online environment.

Background

What are mixed reality simulations? Like flight simulators used to train airline pilots prior to flying an actual airplane, mixed reality simulations provide an active opportunity to interact with avatars, i.e. computer animated characters controlled by humans, in order to practice newly learned behaviors. The avatars, playing the role of students or adults like co-workers or families, appear on a large screen or on a computer screen as a part of a Zoom videoconference meeting in a classroom or school office environment. Learners can interact with them in real time just as you would any actual student or adult in a school community because the technology operates via a human-in-the-loop paradigm. This means that there is a simulation specialist who is actively controlling the voice and movements of the avatar(s) in a simulation, as opposed to pre-programmed and automated responses. The simulation specialist sees the preservice teacher via web camera and can adjust their verbal and nonverbal communication accordingly, while the preservice teacher only sees the avatar(s). The real-life movements and speech are complemented by artificial intelligence. Some of the avatar behaviors at automated, such as students yawning, squirming in their seats, or checking their cell phones, although these can be manually operated by the simulation specialist as well (Dieker et al., 2014). By using a simulation specialist, the learner is able to have authentic conversations that automated technology cannot yet rival (Hayes et al., 2013). Meanwhile, for the mixed simulation that the authors use, the only technology needed in the classroom is a computer with an internet connection as the mixed simulation software currently operates through Zoom.

In a mixed reality simulation space, teacher educators can take the theoretical ideas from course readings and discussion, and provide a safe learning environment for students to engage in active practice in seven to ten minutes scenarios that are centered around one to specific objectives and honing in on one to two discrete objectives. For example, one of the authors had students practice applying the “LAFF don’t CRY” technique to de-escalate simulated conversations with a parent. This technology allows novice learners to engage in scaffolded and targeted learning experiences in a way that cannot be accomplished in a complex and multifaceted field-based experience. Preservice teachers can observe each other trying things out, “pause” the mixed reality simulated classroom if and when the unexpected happens, and teacher educators and peers are able to provide on-the-spot coaching and feedback (Murphy et al., 2018). For preservice teachers who may be struggling to master a specific concept in field-based practice like student

teaching, a mixed reality simulation can hone in on that specific objective and allow them to practice again and again. For example, one of the authors had her preservice teachers practice trying to move a student avatar from a concrete interpretation of a poem to an abstract one. When one student was successful at doing so by asking the student avatar to refer back to the text, the author was able to use that as an example for other students. This technology is never meant to replace field-based experiences, rather it serves as scaffolding before and alongside essential field experiences (Murphy et al., 2018)

Qualitative and quantitative studies alike speak to the utility of mixed reality simulations in preservice teacher education. Hayes et al. (2013) found that there were many aspects of mixed reality simulations environments and interactions that led to the suspension of disbelief among users including the social presence of the avatars, the flow of the conversation, and the surprise factor of certain comments, expressions, and actions of the digital avatars. The immersive environments that mixed reality simulations provide contribute to the transfer of skills to real-life. At ten sites and with 157 middle school math teachers, researchers found that four rounds of 10 minutes of practice of a discrete skill such as wait time increased the use of that skill in teachers' classrooms (Dieker et al., 2014). Use of mixed reality simulations has expanded into special education (Dieker et al., 2016), teaching English Language Learners (Regalla, et al., 2015), educational leadership (Storey & Cox, 2015), and as a tool to practice collaboration with colleagues (Driver et al., 2018) and to practice new research methods (Murphy, 2019). One of the co-authors has also begun exploring its utility as a practice tool for social-emotional learning with children (Murphy & Cook, 2020; Murphy et al. 2021). The developers of the technology were prescient in that they created a way to use it originally with Skype (Dieker et al., 2016) and Zoom even before the proliferation of remote videoconferencing needs due to the pandemic. This allowed us to continue to seamlessly use mixed reality simulations throughout the pandemic.

Lessons Learned to Inform Teacher Education in the Online Environment

Working with avatars can feel disorienting and unusual at first as many of our students reported. We remember the feeling well when we were new users, and we see it again and again when our new classes meet the avatars. However, working in this particular online environment pushed us out of our comfort zones in so many ways, and ultimately, has yielded richer teaching and learning experiences. Just as we acclimated quickly, our students reported that they soon got so used to the mixed reality simulation environment, that they forgot they were not teaching real students. Here are six lessons we have learned from using mixed reality simulations as an online teacher education learning space with implications for our practice as teacher educators during COVID-19 and beyond:

1) Be Human and Honest. Acknowledge When Something is New and Different

Whatever the modality is, chances are that work in teacher education may look and feel a little different than pre-COVID. It helps to acknowledge and name it as such out loud. On the first day of the semester when we introduce our students to the avatars, the room fills with questions, nervous laughter, excitement, and skepticism. We have learned that it is important for us as the professors to acknowledge this is something new and different. Students let out a sigh of relief that it is not just them that feels this way. We have found that this is when students open up and voice questions and concerns.

In the spring of 2020, our students were engaging in mixed reality assignments one week after transitioning to remote online learning due to COVID. We were all nervous, for all kinds of reasons. The best way to break through the anxiety in our Zoom room was simply to pause the simulation and talk about how weird the situation felt. They were about to hold a parent-teacher conference on Zoom with avatars while we were all adjusting to an incredibly new and scary learning modality and world together. This opened a space for the students to echo these feelings and express the concerns on their mind, and a gentler and more human entryway into the scenario.

2) Give Ample Opportunities to "Play with" and "Learn" New Platforms Before Using Them for Anything High Stakes

When using new technological tools and activities as part of assignments and experiences, give students ample time to simply play with, learn, practice, and become familiar with the platform in ways that are not attached to a grade. When we tell students on the first day of class about assignments involving mixed reality, we often get blank stares and confusion back in return. When we first started using the technology, the first time students would engage in mixed reality would also be the time they were using it as part of an assignment. However, students spent so much time either marveling at the technology, asking questions about the technology, or simply feeling nervous about how to use this new technology, the focus became on the tool itself, rather than the objectives we were hoping to achieve.

As a result, we started to offer an orientation to meet the avatars early in the semester. The orientation has no grade attached to it; it is simply a time for students to meet the avatars and get acquainted with the technology. Students are then able to ask better questions and better prepare for the actual assignment, rather than dwelling on confusion about the platform we are using to achieve an objective. That

way, when we assess students, we are assessing them on the learning objectives, not on their ability to quickly familiarize themselves with a new technology tool.

3) Solicit Feedback Regularly

Ask your students through varied modalities what they think about platforms, methods, activities, etc. We engage in verbal and written debriefs after each simulation experience with students and also at the end of the semester. We also engage in informal debriefs when we see our students during office hours, or during small talk just before or after class ends to get their feedback.

Discussing what went well or did not, and why, and what could have been done differently to improve student learning has been essential to improve our inclusion and implementation of simulations in teacher education courses, and has also been invaluable across online learning as we constantly reassess the use of technology tools and course design and delivery. Reflections can also reveal student misconceptions and push their thinking further. For example, one student realized that what he perceived as banter with a student avatar was actually received as flirting. Debriefing results in a richer experience for everyone.

4) Based on Feedback, Be Willing to Adapt and Revise

With the feedback we receive, we continually fine-tune how we structure and deliver mixed reality simulation sessions as a part of our coursework. Based on student feedback, we began offering an orientation session early in the semester to introduce mixed reality technology prior to experiences attached to grades. We also adjusted the actual design and structure of sessions, including how many students actually observe a simulation session at once. Students reported being observed by all of their classmates at once while they participated in a parent-teacher conference was nerve-wracking. Additionally, it was not a necessary element to include in order to achieve the desired objective of the activity. So, we redesigned the experience to include small groups instead of a full class. The smaller group of peer observers reported feeling more engaged and comfortable, resulting in richer feedback. Finally, it also eliminated something else we were getting feedback about: simulation fatigue. Instead of watching thirty classmates participate in parent-teacher conferences, students could focus on observing and providing feedback to six of their classmates, and then participate in asynchronous or team-based extension activities.

The importance of soliciting feedback and following through with revisions and adaptations has been true for us as we have engaged in new teaching modalities during COVID-19. For example, students informed one of us that when the professor jumped into their Zoom breakout sessions, it sometimes felt jarring and

intrusive. As a result, we broadcast communications to breakout rooms to inform students ahead of time to let them know when we will be visiting the rooms, and instruct them to use the help feature if they require immediate support.

There are so many ways to solicit feedback in the online environment. Students can quickly utilize emojis or participate in polls on Zoom, but it does not need to be public. Using Google forms or other means to have students submit exit tickets at the end of each class session is an easy and private way to check in on student progress.

5) Embrace the Pause Button

One of our favorite features of mixed reality simulations is what we have referred to as remote control teaching (Murphy et al., 2018). We remind students of an invisible remote control in their hand, and during a simulation experience, they can "pause" the simulation if they become unsure of how to proceed. During the pause, the preservice teacher can consult with their peers and the professor, and plan for what to do next. They can also decide if they would like to "rewind" the scenario and start from the beginning, or pick up from where they left off.

In our first years using mixed reality, we would often comment about how we wished we could have a remote control with a pause button for real life. What we have realized though, is that we do. Now more than ever, as we experience challenges and new experiences arising from the pandemic in our professional and personal lives, we have learned that we have a remote control and if we are unsure of what to do next, we can and should hit the pause button and ask for support or feedback.

6) Collaborate, Collaborate, Collaborate!

The foundations of work in special education rest on team-based collaboration and decision-making. General educators are discovering the benefits of collaboration with common planning time and the team model in middle schools. We carried these lessons into our work with mixed reality simulations. As we have gone through our mixed reality journey together, we have constantly collaborated to share what works and what does not and swapped ideas for different scenarios and methods of teaching. One of us learned about the idea of "remote control teaching", i.e. allowing students to pause and rewind simulations, from the other. One of us finally came around to using small groups for mixed reality simulations instead of as a whole class activity after hearing the other one discuss its virtues repeatedly. Having each other not only made our teaching more fruitful, but also gave us the confidence to take more risks in our teaching with mixed reality simulations and beyond in the online environment.

It can be easy to feel alone right now as we continue to navigate teaching and learning during COVID-19. Whether you are teaching from your home or back on campus or somewhere in the middle, we are all embracing new tools and strategies in the online environment to facilitate our work as teacher educators making collaboration more important than ever. Working together with colleagues to build, share, and revise resources and asking for support when you need it and offer it in return is invaluable in education. Teacher educators not only need to teach and model collaboration skills, we argue it is essential for our well-being and success.

Implications for Future Practice and Research in the Teacher Education Online Environment

When reflecting on the experiences of teacher educators during COVID-19 and implications for future practice and research in online environments, the terms that come to mind are *implementation fidelity* and *adaptation.* We recommend that research continues to explore the delicate balance of implementation fidelity and adaptation in teaching online. Implementation fidelity refers to the degree to which an intervention or innovation is implemented as intended or prescribed (Gersten et al., 2005). When a doctor prescribes a course of medication for a patient, if you do not follow the plan as prescribed, you cannot expect the anticipated results. We can all recall examples of newly introduced teaching methods or interventions that have not been carried out with fidelity and then, unfortunately, a school community may deem them wrongfully ineffective. *Adaptation* refers to "…deliberate or accidental modification of the program, including (a) deletions or additions (enhancements) of program components, (b) modifications in the nature of the components that are included, (c) changes in the manner or intensity of administration of program components called for in the program manual, curriculum, or core components analysis, or (d) cultural and other modifications required by local circumstances" (Backer, 2001, p. 4). The balance between *fidelity* and *adaptation* lies in being true to the core principles of the practice while tweaking other aspects as needed to respond to the needs of the students and the situation.

In our work with avatars, we have engaged with ongoing adaptations over the past five years as we have become better acquainted with the technology and how best to incorporate it into our coursework with students. Research indicates that when making decisions to adapt, changing the core components of a program can compromise the effectiveness. However, adapting peripheral components as needed based on your specific context and population may increase the effectiveness (Fixsen et al., 2005). During the pandemic, we have all had to make decisions pertaining to the delicate balance of implementation fidelity and adaptation as everything about our instructional delivery has changed and changed

again, and as the unique needs of our preservice teachers continue to evolve during the COVID-19 era while asking ourselves, "What is gained and what is lost when maintaining fidelity or choosing to adapt?" Exploring how teacher educators have engaged in adaptation in online environments during COVID-19 and what lessons have been learned is an area ripe for research. There is much to be gleaned from the instructional decisions made, and the results of those decisions, during the COVID-19 era.

Conclusion

All of the lessons we have discussed: being honest, playing and exploring, seeking feedback, adapting, and collaborating, are all about taking an experimental approach to teaching and learning. Just like mixed reality simulations provide preservice teachers with opportunities to experiment with teaching students, the COVID-19 era has forced many of us to experiment with new teaching tools, new modalities of teaching, and new or dormant aspects of our teaching identities as we explore teacher education in the online environment in ways many of us have never done before. One thing we can confidently say is that our experiences in teaching and learning during COVID-19 will fundamentally change teaching and learning in online and face-to-face modalities. Being able to learn new skills and adapt to new situations is already a fundamental aspect of teacher education. Based on our experiences and lessons learned so far in online teacher education environments, we believe that taking a playful and experimental approach and being willing to continue to learn and make mistakes alongside your students and colleagues will be essential for preservice teachers and teacher educators alike during COVID-19 and beyond.

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