



Integrating Mixed-Reality Simulations in TESOL Teacher Preparation Programs: Principles, Benefits, and Challenges

Although the Master of Arts in Teaching English to Speakers of Other Languages (MA TESOL) practicum course is meant to initiate preservice teachers (PSTs) into the TESOL profession, it is not uncommon for PSTs to feel a high level of stress as they prepare to teach their first solo lesson. This article proposes the implementation of mixed-reality simulations, in which PSTs teach student avatars- computer-generated 3D representations of real-life students displayed on a computer or large screen—as a precursor of the first solo lesson. In contrast to other fields, in which mixed-reality simulations have been used for some time, their use in MA TESOL teacher preparation is more recent (Kamhi-Stein et al., 2020). This article describes Mursion, a mixed-reality simulation platform, identifies the principles supporting the integration of mixed-reality simulations in MA TESOL teacher preparation, and discusses the benefits and challenges arising from their implementation.

Keywords: mixed-reality simulations, Mursion, TESOL teacher preparation, preservice teachers, avatars

Introduction

Traditionally, the culminating experience in Master of Arts in Teaching English to Speakers of Other Languages (MA TESOL) teacher preparation programs is the practicum course, in which preservice teachers (PSTs) have the opportunity to be placed in a classroom, observe a mentor teacher’s instructional practices, and spend the term teaching and receiving feedback from their mentor teacher and a university supervisor. Prior to the practicum course, PSTs take a variety of courses, including but not limited to methods of teaching second languages, pedagogical grammar, educational sociolinguistics, and language assessment, for example. They also spend time volunteering to tutor or teach small community-based ESL classes or other language-related classes (see Kamhi-Stein et al., 2020-2021). Although all these opportunities contribute to initiating MA TESOL students into the profession, it is not uncommon for PSTs to feel a high level of stress as they prepare to teach their first solo lesson in the practicum course. Technology tools like mixed-reality simulations, in which PSTs teach student avatars—that is, computer-generated representations of students controlled by human interactors—have recently emerged as having the potential to help bridge the gap between MA TESOL coursework and the practicum course. Drawing on the literature on mixed-reality simulations, as well as my experience with this tool, in this article I describe the principles that support the integration of mixed-reality-simulations into TESOL

teacher preparation courses and identify the benefits and challenges arising from their integration in TESOL teacher preparation programs.

Mixed-reality Simulations

Mixed-reality simulations, in which individuals interact with computer-generated 3D representations of real-life environments, have become widely used in the training of pilots, nurses, and other professionals in a variety of businesses, including those focusing on soft skills (Hayes et al., 2013; Mursion, 2019-2020; Mursion & Future Workplace, 2020). In recent years, mixed-reality simulations have begun to be infused into preservice teacher preparation programs as a means to bridge coursework and field experience (Bondie et al., 2021; Dawson & Lignugaris/Kraft, 2017; Landon-Hays et al., 2020; Ledger et al., 2019). However, it was in the early months of the COVID-19 pandemic when, due to the lack of access to face-to-face (F2F) field experience opportunities, mixed-reality simulations began to be more widely used in the United States. The growth in the implementation of simulations was the result of a collaboration between the American Association for Teacher Education (2020), consisting of 800 higher education institutions, and Mursion, a mixed reality platform (Hudson et al., 2018, 2019). Currently, Mursion is used to strengthen the preparation of PSTs by supplementing their F2F teaching experience with mixed-reality simulations. The question that remains is: How do mixed-reality simulations work?

Mixed-reality Simulations: Principles and Practices

In mixed-reality simulations, PSTs teach lessons to a group of Mursion platform student avatars—digital models of actual students who are manipulated by human interactors who wear exoskeleton suits—wearable, hard suits controlled by computer boards that allow users to enact human performance. Figure 1 presents a screen capture of a Mursion classroom.

Figure 1. Screen Capture of a Mursion Classroom



As can be seen in Figure 1, the Mursion classroom presents a teacher-fronted seating arrangement. The number of students in the classroom is five, therefore, it does not reflect the reality of typical English as an additional language classroom. One of the characteristics of the Mursion classroom is that its student avatars are assigned different personalities (shy, extroverted, etc.) and, in the lessons, they can behave in four different ways, which Mursion calls “levels of intensity,” that range from low to high (Landon-Hays et al., 2020; Virtual Avatar Lab, n. d.). In the low-level intensity, student avatars are well-behaved and exhibit minimal, if any, distraction from the lesson. In the medium intensity, student avatars act somewhat distracted in that they may engage in some side conversation or look at their phones. However, after being redirected by their teachers twice, students comply. In the medium-high level of intensity, student avatars act consistently distracted (e.g., they constantly use their phones, engage in side talk, etc.) and follow their teachers’ commands only after being redirected several times. In the high-level intensity, which is hardly used, student avatars act aggressively. They are off task throughout the lesson, may curse, bully their peers, and hardly ever comply with their teachers’ commands (Virtual Avatar Lab, n.d.).

Central to the simulation experience are three facts. First, PSTs are not made aware of the lesson’s level of intensity; therefore, they have the opportunity to react to classroom scenarios in which the student avatars display the behaviors already agreed upon between the teacher educator and the human interactor. Second, PSTs can pause their lesson at any time during the session. Due to the intensity of the mixed-reality experience, it is not uncommon for PSTs to teach for short periods ranging from 4 to 7 minutes and, immediately after the lesson, debrief and reflect on the lesson with their peers and the teacher educator (Kamhi-Stein et al., 2020).

The final fact that characterizes the mixed-reality experience is that its success is dependent on the PSTs’ willingness to suspend their disbelief and become physically and cognitively immersed in the simulation as they would in a real classroom (Dieker et al., 2014; Lew et al., 2020). As Dieker and colleagues explain, a practical example of the importance of suspension of disbelief comes from people’s experiences in theme parks, where the real world turns into one in which characters in costumes are seen as “real.” PSTs participating in mixed-reality environments, much like theme park attendees, have to suspend their disbelief since failing to do so will negatively affect their ability to focus on and become fully immersed in the mixed-reality simulation. In turn, this will result in the failure of the mixed-reality experience.

Mixed-reality Simulations: First-Hand Observations and Reflections

I now turn to the literature focusing on mixed-reality simulations and my own experience as a teacher educator responsible for the practicum course to explore the benefits and challenges that Mursion affords to TESOL teacher preparation. In 2018, in collaboration with colleagues, I set out to conduct a pilot study with novice and experienced PSTs (Kamhi-Stein et al., 2020). This pilot study has been followed by the regular implementation of Mursion sessions, which, for the most part, have been done on Zoom.

In implementing Mursion, my objective is to provide PSTs enrolled in my MA in TESOL Program more opportunities to practice their teaching in a controlled environment. I am interested in providing teaching opportunities to PSTs with limited teaching experience, before they get to teach in their field experience.

To get my PSTs to teach a Mursion lesson, I follow the steps below:

1. I work with my college Mursion coordinator to set a date for the Mursion lesson. I share the mini-lesson that the PSTs will be teaching (see Appendix A for a sample lesson used by my PSTs), and direct them to prepare to behave with a low or medium level of intensity.
2. I share the lesson plan with my PSTs a week in advance of the Mursion session so that they can review and prepare for the lesson.
3. On the day of the lesson, which is taught on Zoom:
 - A. I meet with PSTs, show them a screen capture of the Mursion lesson (see Figure 1), and prepare PSTs for their teaching. This preparation involves making PSTs aware of the small classroom size of the Mursion lesson and discussing the importance of suspending one's disbelief. This means that, as they teach, PSTs will have to treat their student avatars in the same way they would treat students in an actual classroom. As I discuss elsewhere in this section, when PSTs do not suspend their disbelief, the Mursion experience fails.
 - B. I explain that I will be the first person to teach a mini lesson. In doing this, my objective is to obtain PST feedback on my teaching and, at the same time, put myself on equal footing with my PSTs.
 - C. As a class, we discuss the importance of giving one another honest and constructive feedback.
 - D. I explain the technical aspects of the Mursion lesson: PSTs will need to use the words "start" and "stop" to start and pause the PSTs' lesson. I further explain that PSTs can stop at any point in their lesson. I also explain that student avatars can't engage in group activities in which they will be interacting concurrently. Therefore, much of the lesson will be teacher fronted.
 - E. Finally, I invite the Mursion classroom to "join" the Zoom classroom and I teach for 4-6 minutes. After my mini lesson is over, PSTs and I debrief on my teaching. This step is repeated several times with different PSTs.

[view Appendix A]

As can be seen in Appendix A, the sample mini-lesson that I have used in my work includes three phases of a language lesson-- the warm-up, the presentation, and a practice activity. The decision to have a truncated lesson plan is based on three rationales. First, due to time constraints, it would not be possible for PSTs to teach all the phases of a lesson in one session. Therefore, I decided that having PSTs prepare to teach a full lesson and, at the same time, deal with the newness of the Mursion experience would increase the cognitive load of my PSTs which, in turn, may contribute to their frustration in the Mursion lesson. Second, PSTs are often challenged by the presentation stage of the lesson, which requires extensive use of language modification strategies. Therefore, providing opportunities to present new content is of utmost importance for PSTs with whom I work. Finally, because the student avatars are controlled by *one* human interactor, they can't engage in group activities in which several or all of them interact concurrently. Therefore, the decision to mainly focus on teacher-fronted activities is a practical one.

The implementation of Mursion has confirmed the potential that mixed-reality simulations have for the preparation of MA TESOL PSTs. One of the affordances of mixed-reality simulations identified in the literature and observed first-hand with my MA TESOL students is that it provides a risk-free environment. This is because the role of students is played by avatars who are controlled by a human interactor (Dieker et al., 2014; Hudson et al., 2018; Kamhi-Stein et al., 2020). In fact, by working with student avatars rather than real students, PSTs can experiment with a variety of instructional techniques

without risking their students' well-being. At the same time, the mixed-reality setting provides a risk-free environment for the PSTs. The fact that the human interactors can modify the level of intensity with which the student avatars act contributes to the well-being of the PSTs since, in contrast to what happens in a real classroom, they will not lose face if their teaching fails or if they lose control of student avatar behavior. In my work with PSTs who are classroom novices, I usually keep a low or medium level of intensity since I want to ensure that PSTs develop a sense of comfort as they experiment with a variety of instructional strategies they may not have implemented before.

Another affordance of the mixed-reality simulation is the fact that PSTs can experiment with delivering the same lesson multiple times (Hartle & Kaczorowski, 2019; Hudson et al., 2019). This repeated practice has been found to contribute to higher confidence and self-efficacy (Hartle & Kaczorowski, 2019). Reteaching the same lesson multiple times is not an option in a real classroom since students are expected to follow an established curriculum and reteaching a lesson to the same group of students would not be ethical. In my work with PSTs, the teaching and reteaching of a lesson is done as part of the *one* mixed-reality simulation in which PSTs participate during the term. Although the mixed-reality simulation literature reports higher levels of teaching comfort and improvement when PSTs participate in *a series of* simulation sessions (Hudson et al., 2019), the reality is that time limitations and the high cost of the Mursion technology prevent me from engaging PSTs in more than one mixed-reality session over a term. Despite this limitation, the PSTs with whom I work still report developing increased confidence in their instructional practices and awareness about classroom realities (Kamhi-Stein et al., 2020). This is what happened in a Mursion session, in which my PSTs engaged in the teaching of mini-lessons focusing on the various items in a first-aid kit. After each round of mini lessons, which lasted no more than five minutes each, the PSTs, their peers, and I debriefed on the PSTs' experience. One of the PSTs reflected on how repeated practice, in the form of teaching the same mini lesson twice, helped her realize the importance of being prepared for "the unexpected." The PST stated: "This experience made me realize that I had an idea of how to teach in my mind, but the lesson went in a completely different direction. It appears that having an idea of how to deliver a lesson is not enough. As a novice teacher, now I see that being prepared to teach a lesson involves studying my lesson plan and, at the same time, predicting questions students may ask and being ready with possible answers."

A further benefit of mixed-reality simulations involves the PSTs' opportunities to engage in a process of debriefing and reflection on their teaching. This affordance contrasts with what happens in the real classroom, where PSTs receive feedback from their mentor teacher and, during specific times over the term, from their university supervisor. Instead, in the mixed-reality environment, after delivering their lessons, PSTs can receive immediate feedback from their teacher educator and their peer PSTs (Bondie et al., 2021). This collaboration results in growth opportunities for the PST delivering the lesson *and* for the other PSTs participating in the mixed-reality simulation. However, my experience working with mixed-reality simulations has shown me that in giving and receiving feedback, there needs to be a sense of trust among those participating in the mixed-reality simulation since the simulation provokes anxiety for first-time participants (Ferguson & Sutphin, 2022). To achieve this feeling of trust, at the beginning of every mixed-reality simulation session, my PSTs and I usually participate in a discussion meant to establish ground rules for creating an open and respectful environment. The literature on mixed-reality simulations reports on the importance of offering an orientation designed to prepare PSTs for the mixed-reality

experience (Bondie et al., 2021). In addition to this orientation, teacher educators must create an atmosphere that will contribute to the PSTs not feeling threatened by the fact that they will be teaching in front of their peers and that these peers, together with the teacher educator, will offer feedback on their instructional strategies. I should note that, as I explained in this section, to create an atmosphere of trust and, at the same time, lower the PSTs' anxiety about the mixed-reality experience, usually, I am the first one to teach a mini-lesson and encourage my PSTs to give me honest feedback about my teaching. For example, after teaching a mini lesson focusing on politeness strategies and the use of modal verbs, my PSTs suggested that I avoid responding to the various comments made by a student since doing this prevented the lesson from flowing the way it should have. In response to my question, "What could I have done differently?" one of my PSTs suggested the following, "You could have redirected the students' attention to the board. Also, you could have told the student to look at the board rather than at the phone." Getting PSTs to give me feedback on my teaching helps them understand that "we are all in this together" and that, regardless of one's teaching experience, we can all learn something from the mixed-reality experience. In addition, showing PSTs that teacher educators are vulnerable helps PSTs lower their anxiety and foster empathy and honesty.

Although the mixed-reality experience can benefit all PSTs, it is particularly helpful for PSTs with limited teaching experience since they are usually very nervous about having to face real students in a real classroom (Ferguson & Sutphin, 2022). These novice PSTs find the mixed-reality teaching experience to be extremely beneficial as they prepare to teach their first lesson in their practicum course (Ferguson & Sutphin, 2022; Kamhi-Stein et al., 2020). For example, Haruaki, a novice PST from Japan, stated, "But this technology will help me since I can practice teaching and feel more comfortable before I get to teach real students. This is very important for a novice teacher like me" (Kamhi-Stein et al., 2020, p. 8). However, PSTs with classroom teaching experience also report gains from mixed-reality simulations, though these gains come from the meaningful debriefing opportunities that follow the PSTs' lessons (Kamhi-Stein et al., 2020). It is these debriefings and opportunities to reflect on their peers and their teaching that contribute to the experienced PSTs' understanding of how to improve their teaching. I should note that my work with Mursion classrooms has afforded me, a very experienced teacher in different settings, growth opportunities. It is the debriefing phase of the Mursion lesson that has allowed me to see how to enhance my teaching. More importantly, my Mursion experience has shown my PSTs that they should not put themselves under pressure "to perform" since learning how to teach is a life-long endeavor.

Despite the benefits afforded by mixed-reality simulations, they also pose several challenges. One of these is the cartoony look of the student avatars (Dalinger et al., 2020; Kamhi-Stein et al., 2020) (see Figure 1). This look, combined with the student avatars' lack of mobility (Hudson et al., 2018; Kamhi-Stein et al., 2020), may lead PSTs to be initially skeptical about the mixed-reality experience since student avatars are perceived as being somewhat contrived and non-authentic (Dalinger et al., 2020; Kamhi-Stein et al., 2020). For example, some of my PSTs have reacted to the student avatars with statements like "They look so weird" or "They don't look like real people." This lack of authenticity can be problematic since, as already explained, unless PSTs "buy into" the notion of suspension of disbelief, they will not be able to engage with the student avatars in the same way they would with real students in a real classroom. I learned about the importance of suspension of disbelief in my first experience with Mursion, when the session was almost derailed by a PST who kept questioning the authenticity of the student avatars and,

ultimately, the simulation experience. Upon reflecting on the factors that negatively affected the PST's attitudes towards the experience, I realized that the initial orientation to the mixed-reality environment needs to emphasize the importance of focusing on the *teaching* aspect of the simulation rather than on the *technology* that supports the mixed-reality environment.

Another weakness of the simulation experience is that, in contrast to real classrooms, where PSTs teach large numbers of students, the Mursion environment only has a handful of students who are sitting in a teacher-fronted classroom; therefore, the classroom management demands on PSTs teaching student avatars are different from those of the real classroom. In addition to this, a major limitation for TESOL professionals is associated with human interactors since they are not authentic ELLs. Although Mursion has an ELL avatar (see Lew et. al., 2020 for information on this avatar), this avatar is not available in all of Mursion's scenarios. More importantly, even if the ELL student avatar is available, the extent to which it is authentic can be questioned since most, if not all, human interactors are not actual language learners, and pretending to be one would be unethical and unrealistic.

The final, though no smaller challenge posed by mixed-reality simulations is the high license fee to platforms like Mursion. Added to this cost are the salary and the training of the human interactor (Hartle & Kaczorowski, 2019). A way to reduce costs is to purchase sessions and work with human interactors from colleges or universities that have full licenses (Bondie et al., 2021). This practice is often implemented by colleges that are in the initial stages of implementing the use of mixed-reality simulations or colleges that do not have high numbers of mixed-reality simulation users.

Conclusion

Mixed-reality simulations are a new tool available to TESOL teacher preparation programs. As discussed in this article, their implementation has been found to contribute to PSTs' increased confidence and self-efficacy. On the other hand, the high licensing fees associated with mixed-reality platforms like Mursion often make them inaccessible unless there is a university system-wide (CSU, UC, or other) concerted effort to implement mixed-reality simulations across various colleges or universities within the same system. Alternatively, small departments or colleges could purchase mixed-reality simulation sessions from universities with full licenses. Regardless of the model selected, their implementation can greatly contribute to advancing the preparation of PSTs enrolled in MA TESOL preparation programs and, at the same time, introducing innovative practices into MA TESOL teacher preparation.

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**Context:**

The student avatars in this lesson are enrolled in an ESL/EFL class at the B1-B2 CEFR (Common European Framework of Reference) level (Council of Europe, 2001).

In this lesson, PSTs will teach how to ask for a favor by implementing politeness strategies. PSTs will teach for 4-5 minutes. After the lesson is over, PSTs will participate in the debriefing activity.

Information on the Lesson:

The lesson will start with a warm-up designed to ask and answer questions like: Have you ever borrowed anything from a friend or family member? Students will be encouraged to share ideas with the class.

Then, PSTs will teach how to ask for a favor. PSTs should consider how demanding the favors below are. They should decide how they will teach how to phrase the requests depending on the cost of the imposition and the power of the interlocutor (adapted from Richards et al., 2005).

- Can I borrow your book?
- Is it OK if I use your cell phone?
- Do you mind if I use your AirPods?
- Would you mind letting me use your new laptop?
- Would it be OK if turned in my homework late?
- I wonder if I could borrow \$ 200 dollars.
- I was wondering if you'd mind letting me drive your new Tesla.

Next, PSTs will ask their student avatars to phrase the following requests. Student avatars should decide how formal their requests need to be depending on how big the favor is and who they are requesting the favor from.

1. You want to use your sibling's computer.
2. Your brother's friend has a car. You need the car to take your driving test.
3. You want a friend to help you with the math homework.
4. You want to borrow your cousin's video game.
5. You would like a second serving of your aunt's carne asada.

6. You want to borrow your teacher's iPhone to text your friend.

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