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Chapter 8

Learning to Teach in Mixed–Reality Simulated Virtual Environments at a Hispanic Serving Institution (HSI)

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ABSTRACT

As a result of the COVID-19 pandemic, faculty at a Hispanic serving institution shifted from face-to-face to totally online teaching. The authors describe two assignments for teacher candidates that required them to design and deliver lessons that focused on practicing two high-leverage practices utilizing Mursion, a mixed-reality simulation (MRS) software and platform. MRS sessions were delivered through Zoom video conferencing and were delivered asynchronously. Benefits, challenges, and limitations of using MRS in conjunction with Zoom in online courses were identified and discussed. Detailed logistics for planning, preparing, and executing MRS effectively were provided. The authors describe implications for remote learning as it related to teaching at an HSI located in one of the poorest areas of the U.S., with one of the most vulnerable populations.

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INTRODUCTION

In mid-March of 2020, the President of The University of Texas Rio Grande Valley (UTRGV), a Hispanic Serving Institution (HSI) where the authors of this chapter work, made an announcement that has had a lasting impact to this day. Due to the spread of COVID-19, with consideration of guidelines from the governor, the university president extended Spring Break for an additional week. He also announced that the university, a government entity, would remain open; essential workers would continue to report to their place of work, and the university was going to transition to a telecommuting workforce, shifting some faculty and staff from current on-campus workplaces to temporarily working from home. Then came the big announcement that caught many faculty members off guard—all courses were to be offered online beginning Monday, March 23, 2020, through the end of the spring semester. He ended this announcement stressing these changes were for the health and safety of the campus community and that “our work does not change; where and how we do it, does change” (UTRGV, 2020b).

Prior to the pandemic, UTRGV offered all faculty members, staff members, and students Blackboard Learn (BBL), an online learning management system (LMS), as well as technical and instructional support from the Center for Online Learning and Teaching Technology (COLTT). Faculty, staff, and students had their own Zoom Pro video conferencing accounts and access to Mursion, a mixed-reality simulation platform (MRS) through the university’s MRS lab. The number of online and hybrid courses increased dramatically as a result of the president’s mandate. Quality Matters (QM, 2020) training was provided for professional development for online teaching, through COLTT. A comparison of the number of on-line courses offered in the fall of 2019 to the fall of 2020 showed exponential growth. UTRGV offered 684 total online courses in the fall of 2019. This increased to 4,076 courses just one year later. Hybrid course offerings also increased from 201 in the fall of 2019 to 660 in the fall of 2020 (UTRGV, 2020a).

When the pandemic broke, department chairs encouraged faculty members to take the extra week of spring break to learn how to post their materials to BBL and to participate in QM training for online learning. Many professors experienced a sense of urgency and pressure to learn how to teach effectively online. There was also an increase in interest in learning how to use MRS, from faculty members who had not considered this technology prior to the pandemic. As a result, the MRS lab was, and continues to be, in high demand.

Context

UTRGV is a Hispanic Serving Institution (HSI) located in the Rio Grande Valley (RGV), a region that includes four counties geographically located along the Texas-Mexico border in deep South Texas. Most of the population in the RGV is comprised of people of Mexican descent including new immigrants and long-standing families whose ancestors who settled in this region when it was still a territory of Spain. The people from the RGV share common values such as a deep commitment to family and education, a strong work ethic, and pride in their cultural and linguistic heritage, and most are bilingual (Alvarez McHatton et al., 2020).

According to the U.S. Census Bureau, in 2019, this four-county region had a population of 1,377,861—91.85% of whom identify as Hispanic/Latino. Historically, it has been identified as one of the poorest areas in the nation, and, sadly, it remains so today. The median income per household, at \$36,170, is almost half the national average of \$62,843 (U.S. Census Bureau, 2020). In this region, 68% of children live in high poverty neighborhoods as compared to the state average of 18% (U.S. Census

Figure 1. Map of four counties that make up The Rio Grande Valley



Bureau, 2020). Many of the most impoverished children live in *colonias*, or unincorporated settlements of land along the Texas-Mexico border that lack the basic necessities, such as water and sewer systems, electricity, paved roads, and safe and sanitary housing (Barton et al., 2015).

The people of the RGV rank low in educational attainment. Only 63.15% of individuals 25 years of age or older have earned a high school diploma, as compared with the national average of 88% (U.S. Census Bureau, 2020). The P-12 population is racially diverse and growing. Hispanic/Latino children make up almost half—49%—of the children who are enrolled in schools. Thirty-two percent are White, 12% are Black, 4% are Asian, and 3% are multiracial (Tingle et al., 2018).

At UTRGV, most students are first-generation college students who reside in this border region in South Texas. During the fall semester of 2019, the university had an enrollment of 29,113 students—89% of whom identify as Hispanic (UTRGV, 2019). UTRGV is a distributed campus that includes two main campuses located within a 60-mile distance of each other, located in the cities of Edinburg and Brownsville in the highly populated Hidalgo and Cameron counties.

Online Teaching Experience

The authors of this chapter are experienced teacher educators who had prior experience teaching virtually and did not experience major challenges in moving from face-to-face (F2F) or blended teaching to totally online teaching during the pandemic. However, they made changes to their courses during the spring semester by integrating pedagogies of practice and modifying some of their existing assignments shortly after they received the president's directive. The authors share a deep interest and investment in *practice-based teacher education* (PBTE), which focuses on applying pedagogies of practice in teacher education program curricula (Ball & Forzani, 2009; Grossman, Compton et al., 2009; Grossman & McDonald, 2008), *culturally responsive teaching* (CRT) (Ladson-Billings, 2014), *reflection* (Dewey, 1997; Zeichner, 1994), and utilizing 21st century *digital tools*, including mixed-reality simulations (MRS) into

the professional education curriculum. In this chapter, they will provide a brief review of the literature, describe their development and modifications of assignments that utilized mixed-reality simulations in their respective courses, discuss issues and challenges regarding the implementation of these assignments, offer solutions and directions for the refinement of these activities, and discuss implications and the need for future research related to this work.

LITERATURE REVIEW

Dewey's Theory of Experience

The significance of providing learners with opportunities to engage in authentic and meaningful experiential learning can be traced back to 1896, with the inception of John Dewey's first lab school at The University of Chicago. He believed that children should be seen as active learners who learn best through purposeful learning experiences that promote exploration, experimentation, and social interaction (Dewey, 1963). Dewey's (1963) philosophy of teaching stressed the importance of teaching the whole child, thus shifting away from the *traditional* way of teaching, which emphasized memorization of content and rote learning. His progressivist philosophy of teaching called for a learner-centered approach that focused on learning by doing. He believed that teachers should be life-long learners and facilitators of knowledge who provide educative experiences and opportunities for experimentation and discovery (Dewey, 1963).

Remarkably, many of Dewey's progressivist ideologies on teaching and teacher education have stood the test of time and have continued to resonate in 21st century learning. He believed that "everything depends on the quality of the experiences which is had" (Dewey, 1963, p. 27). Dewey (1963) assessed quality based on two principles, including the principle of *interaction*, which proposes that students create meaning from their experiences when they interact with their physical and social settings, and the principle of *continuity*, which asserts that the effect of experience is cumulative with each experience, shaped by prior experiences and, in turn, shaping future experiences. He emphasized the social nature of learning in communities, indicating that educative experiences include opportunities to apply new learning and test one's ideas against the experiences of others and one's own experiences (Schmidt, 2010).

Dewey's philosophy of teaching, grounded in his theory of experience, is useful in illumining the challenges that teacher educators have in their attempts to provide teacher candidates with ample opportunities to learn to teach in authentic and meaningful contexts and to help them develop a professional vision in this early stage of teacher development.

The Role of University–School Partnerships and Experiential Learning

More recently, teacher-preparation programs have been working to establish strong, collaborative university–school partnerships that are designed to co-educate preservice teachers, with a mutual goal of providing them rich opportunities for practicing their teaching in P–12 school settings. This move toward providing preservice teachers with multiple teaching experiences prior to the full-time clinical teaching semester is, in part, a response to the ongoing challenge of retention of quality teachers in U.S. schools. Richard Ingersoll (2001, a researcher who has published extensively in this area, describes the teaching retention problem in the U.S. as a "revolving door" that swings shut on beginning teachers. He found that 46% of the teaching workforce leaves the profession by the end of five years. Teachers who leave are

unhappy due to low salaries, discipline problems, lack of support, and lack of opportunities to participate in decision making. Ingersoll argues the need for systemic changes in teacher-entry requirements, teacher preparation, teacher autonomy, teaching rewards, and teacher accountability. These things are needed in order to change the status of the teaching profession and improve teacher retention (Ingersoll, 2001).

UTRGV's education preparation program faculty strive to prepare teacher candidates to be effective teachers from the first day they are employed as P–12 teachers so they are more likely to stay in the profession and make a significant impact on the future of children in the U.S. They have committed to the implementation of a practice-based teacher education approach that is culturally and linguistically sustaining, with an emphasis in 21st century learning.

Practice-Based Teacher Education (PBTE)

Practice-Based Teacher Education (PBTE) requires professional training that is deliberate about making sure that novice teachers can use specific practices of teaching identified as high-leverage practices (HLPs). PBTE programs focus on the work of teaching (Ball & Forzani, 2009; Zeichner, 2012), making practice the core of teachers' professional preparation. Teacher candidates in PBTE programs are provided with multiple opportunities to practice HLPs with close coaching, and they require candidates to pass rigorous performance assessments that show they can carry out each practice competently. Teacher candidates who are prepared through a PBTE approach think deeply about their content knowledge. They learn to unpack their knowledge intentionally and appropriately to diverse students. In addition, they share an ethic of care and have a clear sense of their ethical obligations as part of the work of teaching.

Proponents of PBTE maintain that no amount of “teaching about teaching” can replace actual teaching in an authentic classroom setting. In a practice-based approach, teaching is deconstructed into a set of essential competencies or fundamental skills that can be understood and practiced by novice teachers (Grossman & McDonald, 2008). We refer to these skills as high-leverage practices. (Ball & Forzani, 2009; Grossman, Hammerness et al., 2009). HLPs share the following characteristics. They are practices that occur with high frequency in teaching; practices that novices can enact in classrooms across different curricula or instructional approaches; practices that novices can actually begin to master; practices that allow novices to learn more about students and about teaching; practices that preserve the integrity and complexity of learning; and practices that are research-based and have the potential to improve student achievement (Grossman, Hammerness et al., 2009). One of the best sets of core practices of teaching is from the University of Michigan's teacher education initiative, TeachingWorks, which began as an organizing framework for the teacher education program and moved beyond the university and into the field of education (Grossman et al., 2018) (see Figure 2).

In a PBTE approach, teacher educators provide teacher candidates with opportunities to learn to enact specific HLPs, such as “leading a group discussion” or “eliciting and interpreting individual student thinking” by seeing them modeled, rehearsing them, analyzing them, practicing them again, and doing so as part of teacher-inquiry communities (Zeichner, 2012).

The intent is to scaffold the new learning of the teacher candidates, so they begin to integrate these core practices into their lessons. Grossman and her colleagues developed a framework for the teaching of practice that include representations of practice, decomposition of practice, and approximations of practice (Grossman, 2018; Grossman, Hammerness et al., 2009).

Representations of practice comprise the different ways that practice is visible to novices, such as stories told by practitioners about practice, including narratives; case studies; videos of practice; and

Figure 2. High-leverage teaching practices

1. Leading a group discussion
2. Explaining and modeling content, practices, and strategies
3. Eliciting and interpreting individual students' thinking
4. Diagnosing particular common patterns of student thinking and development in a subject-matter domain
5. Implementing norms and routines for classroom discourse and work
6. Coordinating and adjusting instruction during a lesson
7. Specifying and reinforcing productive student behavior
8. Implementing organizational routines
9. Setting up and managing small group work
10. Building respectful relationships with students
11. Talking about a student with parents or other caregivers
12. Learning about students' cultural, religious, family, intellectual, and personal experiences and resources for use in instruction
13. Setting long- and short-term learning goals for students
14. Designing single lessons and sequences of lessons
15. Checking student understanding during and at the conclusion of lessons
16. Selecting and designing formal assessments of student learning
17. Interpreting the results of student work, including routine assignments, quizzes, tests, projects, and standardized assessments
18. Providing oral and written feedback to students
19. Analyzing instruction for the purpose of improving it

artifacts from practitioners, such as student work, lesson plans, and observations of practice (Grossman, 2018). *Decomposition of practice* involves breaking down practice into its constituent parts for the purposes of teaching and learning. Decompositions make facets of practice visible and help teacher candidates develop a professional vision. The ability to decompose practice necessitates a grammar of practice in order to name the parts and learn how the pieces involved are related to one another. *Approximations of practice* refer to opportunities to engage in practices that are proximal to the practices of a profession. For example, role-play and field experiences are approximations in practice, as they provide opportunities to engage in deliberate practice of particularly challenging components of practice (Grossman, 2018). In a comparison study of professional education of clergy, clinical psychology, and teaching (Grossman, Compton et al., 2009) found that “prospective teachers have fewer opportunities to engage in approximations that focus on contingent, interactive practice than do novices in the two other professions” (p. 2,055).

Mixed-Reality Simulations (MRS)

To provide students with practice teaching in a classroom setting, the authors used Mursion, a mixed-reality simulation (MRS) software that provides a platform that blends artificial intelligence and live human interaction (<https://www.mursion.com>). Mursion is provided by the university. MRS utilizes

both human and technological components to closely approximate the experience of teaching in a real classroom. The technological components include a computer, a camera, and a microphone, which most computers include if they are five years old or newer. Teacher candidates step in front of a television monitor or computer screen that projects a classroom with five student avatars (see Figure 3), a conference room (for parent–teacher conferences or other conference scenarios), or other simulated workplace settings (e.g., doctor’s office, business office, and others).

Mursion is a technology-based software that works in real time. It is considered MRS because it involves a simulation specialist, or interactor, who controls the speech and movements of avatars in a digital puppetry-based virtual environment (Dieker et al., 2014). Prior to a session, the simulation specialist consults with faculty members who determine if they want to use a pre-designed scenario or design their own. Faculty members must also complete a scenario design template in which they specify the time required for the lesson, the learning objectives, content area, scenario, characters, and the intensity of the challenges posed by the avatars (e.g., low, low-medium, medium, medium-high, high).

The student avatars seen on the screen are manipulated by human interactors who are trained simulation specialists and who can see and hear the teacher candidate and interact in a natural manner. The student avatars can do simple hand gestures such as raising their hands and scribbling on paper. The body language of the avatars is designed to provide natural feedback to preservice teachers. For example, if the teacher candidate is not engaging and interesting and does not explicitly address expectations regarding behavior during lessons, the student avatars may begin talking to their neighbors, using their cell phones, or falling asleep (Smith & Klumper, 2018).

In MRS, a simulated classroom that looks like any typical classroom with students, desks, and a whiteboard is projected onto a screen. Like actual students, student avatars each have their own distinct

Figure 3. Upper elementary student avatars in Mursion



personalities, such as talkative, melancholy, shy, or assertive and confident. They talk and behave in a natural manner, such as asking questions for clarification, talking out of turn, or interrupting each other. Teacher candidates can practice HLPs such as introducing new content, asking questions, or establishing rapport with students. However, unlike a real classroom, teachers can pause the simulation to reconsider their approach, ask for additional coaching, and repeat a teaching segment. A coach can provide feedback and suggestions for improvement. MRS is designed to supplement real teaching, not replace it. It provides a safe environment in which teachers in training can work on targeted skills, get immediate feedback, and practice a skill more than once (Dieker et al., 2014).

Research on the use of MRS with teacher candidates is limited but emerging (Bautista & Boone, 2015; Gundel et al., 2019; Piro & O'Callaghan, 2018). The first empirical study that the authors discovered was by Bautista and Boone (2015), who investigated the impact of MRS on 62 early childhood education preservice teachers' self-efficacy beliefs. An analysis of the quantitative (STEBI-b) and qualitative (journals) data indicated that the use of MRS increased their personal science teaching efficacy and science teaching outcome expectancy beliefs after one semester of participation in the MRS simulator. Paired t-tests results indicated a significant increase in science teaching self-efficacy ($p < .01$) and teaching outcome expectancy over the course of one semester. However, qualitative data indicated that self-efficacy decreased after the first MRS session, but then increased in the following two sessions.

The initial drop was attributed to a lack of familiarity with MRS, and a realization of inadequate science content (Bautista & Boone, 2015). Further qualitative data indicated that participants' sense of self-efficacy increased over time, with more exposure to the simulator. They found the modeling provided by the instructor prior to the simulation session to be helpful in reducing their anxiety over using the simulation for the first time, and students appreciated the opportunity to observe peers, though they were initially apprehensive about being observed (Bautista & Boone, 2015). Participants also viewed the simulator as a "safe" environment in which to practice specific teaching skills, which positively affected their affective state.

A study by Gundel et al. (2019) investigated the effects of MRS on teacher candidates' sense of self-efficacy and yielded similar findings that validated the Bautista and Boone (2015) investigation. Results indicated a significant increase in self-efficacy from 30 minutes to 90 minutes of total exposure with MRS. The study also found an increase of growth in exposure from 0 minutes to 30 minutes of MRS in the first semester. Like Bautista and Boone's (2015) study, their teacher candidates also experienced a decrease in self-efficacy after exposure, for a total of 60 minutes through the second semester of MRS experience. Although this was a non-significant finding, the researchers stated this could be attributed to shifting from low-content lessons pertaining to classroom management skills, such as establishing norms and routines and creating rapport with student avatars, to more authentic experiences, such as teaching content with graphic organizers. Moreover, they suggested that teacher candidates were possibly experiencing "reality shock" by trying to teach content while managing behaviors, simultaneously.

Other studies have found that the use of MRS led to an increase in teacher candidates' perceptions of efficacy in classroom management, lesson planning, and delivery skills (Hudson et al., 2019; Ledger & Fischetti, 2019). In another recent qualitative study by Piro and O'Callaghan (2018), researchers found that integrating MRS experiences into initial teacher-preparation core courses facilitated preservice teachers' professional identities as they faced instructional and behavioral challenges.

Culturally Responsive Teaching (CRT)

Providing culturally relevant educational experiences is central to the mission of UTRGV's teacher-preparation program, especially given that most of the students at this HSI are Latinx, of Mexican and Mexican American descent, and first-generation college students. Further, most teacher candidates will likely teach in Latinx schools in the RGV, and they are being prepared to be culturally responsive in their teaching. Culturally responsive teaching (CRT) is not a teaching method, but a lens through which one can view teaching (Ladson-Billings, 1995). The three major principles underlying CRT include the following: (1) Having high academic expectations or standards for all students while providing the necessary scaffolds and supports, (2) Building on students' background knowledge and competence by incorporating their cultural knowledge into the curriculum and making explicit connections between home and school, and (3) fostering critical consciousness within students regarding power relations (Ladson-Billings, 1995). Research indicates that when teachers acknowledge students' linguistic and cultural backgrounds and incorporate them into the curriculum, students experience greater academic success (Bui & Fagan, 2013; Dee & Penner, 2017; Diamond & Moore, 1995).

Culturally relevant pedagogies (CRPs) consist of a set of teaching practices that are responsive to students' cultural/linguistic backgrounds and abilities (Gay, 2002; Ladson-Billings, 2014). CRPs recognize the importance of including students' cultural references in all aspects of learning and seek to make meaningful connections between what students learn in school and their cultures, languages, and life experiences (Ladson-Billings, 2014). In a culturally responsive classroom, teachers identify and nurture the strengths students bring to school to foster student achievement (Hammond, 2015; Ladson-Billings, 1995, 2014; Richards et al., 2006).

LEARNING TO TEACH USING MIXED-REALITY SIMULATIONS (MRSS) IN VIRTUAL ENVIRONMENTS

After participating in two-day professional development workshop conducted by educational specialists from the University of Michigan's TeachingWorks, offered by the College of Education in January 2020, the authors created assignments for teacher candidates, with a PBTE approach. These assignments provided them with opportunities to practice teaching HLPs and develop a culturally responsive lens by using MRS in their online course and field-based, F2F methods courses. In what follows are descriptions of how two assignments were modified to include PBTE pedagogies; students were also required to plan and enact culturally responsive lesson demonstrations using MRS. The authors describe their assignments, learning goal(s), and modifications made in consideration of the many issues created due to the pandemic.

Design of Virtual Experiential Learning Activities

EDUC 3301 The Teaching Profession and Student Learning in Contemporary Schools

Teacher candidates enrolled in this course work towards earning a content-area bachelor's degree that leads to a certification in Secondary (grades 7-12) or All Level (grades P-12) classrooms. These include

degrees in English, history, social studies, health, kinesiology, art, music, dance, communications, theatre, and Spanish. The course is offered 100% online and delivered asynchronously. Prior to the pandemic, students had two major assignments in the course. The first was a multimedia research project, and the second was a mini-lesson activity that focused on enacting the HLP of leading a group discussion to students in a mixed-reality virtual classroom.

When news of the pandemic broke, the first author considered that many of her students relied on the university's broadband since they did not have access to high speed Internet at their homes. Given that *all* the students' courses were shifting to total online delivery and that the four counties in the RGV had "shelter in place" orders, she decided to drop a major multimedia project assignment that required a considerable amount of time for Internet research, and she replaced it with another assignment that would require less time online.

This unusual and extraordinary new context was seen as an opportunity to create a new assignment that utilized PBTE pedagogies, such as observing video exemplars of well- designed and enacted lessons, decomposing the lessons, and reflecting on them. The new assignment was titled "Viewing and Decomposing HLP 'Leading a Group Discussion' Activity." The first author created a lesson packet that included a Leading a Group Discussion Decomposition form and an observation tool provided by TeachingWorks that was slightly modified and used with the consultants' permission. The assignment required teacher candidates to learn from a *representation of practice*; in this case, to observe a teaching video provided at no cost on the TeachingWorks library (<https://library.teachingworks.org/>). The video was conducted by an experienced teacher who led a group discussion in a fifth/sixth grade class to elicit student thinking based on the novel, *The Giver*, by Lois Lowry. The lesson topic in this video is discussing meanings of key terms in the book. The lesson goals for this assignment are to use this video lesson to:

- Identify entry points to the text that teachers offer in enabling and launching a discussion
- Identify ways that teachers facilitate discussions to ensure equitable opportunities to participate
- Identify specific teaching moves for leading a group discussion
- Identify ways that teachers track and synthesize student ideas to close a discussion

Prior to viewing and observing the video lesson, the author met synchronously with the class via Zoom, a reliable cloud platform for video and audio conferencing, chat, and webinars (<https://zoom.us/>).

Teacher candidates were provided instructions on how to access the video; identify key elements in the lesson cycle (see Figure 4); how to decompose a lesson; and how to fill out the observation tool, which involved identifying a minimum of three teacher moves, strategies, and/or techniques, by providing quotes, descriptions, and timestamps, and categorizing them as *discussion enabling* or *discussion leading* (see Figure 5). The class meeting was recorded and uploaded to the module on Blackboard Learn (BBL) (<https://www.blackboard.com/teaching-learning/learning-management/blackboard-learn>), the learning management system (LMS) offered by the university, so that students who could not attend would have access to it. The author made herself available for one-to-one meetings during her office hours and per appointment for those who needed further clarification or assistance.

In previous semesters, teacher candidates did not have an opportunity to engage in a lesson decomposition activity prior to the mini-lesson activity using MRS. Their self-assessments and peer assessments of teaching lacked evidence of higher levels of critical reflection and feedback. The instructor of this course hypothesized that teacher candidates would be able to engage in deeper and more critical reflections of their own teaching and of their peers' teaching by undergoing the "Viewing and Decomposing

Figure 4. Visual representation of leading a class discussion (TeachingWorks, 2020)

Discussion Enabling	Discussion Leading		
<ul style="list-style-type: none"> Selecting a task Anticipating student thinking Setting up the task Monitoring student work 	Framing -Launching	Orchestrating - Eliciting - Probing - Orienting - Making contributions	Framing - Concluding
Recording and representing content			
Maintaining a focus on the instructional point			
Seeing and disrupting patterns that reproduce inequity			

HLP ‘Leading a Group Discussion’ Activity.” The assignment guidelines and observation tool provided teacher candidates with an excellent *representation of a teaching practice* via a TeachingWorks HLP “leading a group discussion” video exemplar, and detailed directions for engaging in a *decomposition of the teaching practice*. These pedagogies of practice were conducted prior to *approximating practice* using the MRS platform. Then, students were provided a self-reflection tool that was based on Kolb’s (1984) experiential learning cycle and a peer-assessment tool by TeachingWorks, which was adapted to include three additional reflection questions.

Course evaluations indicated that teacher candidates perceived the “Viewing and Decomposing HLP ‘Leading a Group Discussion’ Activity” to be beneficial as a pre-assignment to planning and practicing their mini-lesson demonstration activity to be conducted using MRS. The decomposition of practice activity embedded 11 reflection questions associated with each component of the lesson cycle, including enabling/launching the lesson, orchestrating the lesson, and concluding the lesson. Additionally, students were asked to describe how the teacher in the video advanced equity in the classroom. They were also challenged to explain the extent to which she was culturally responsive in her teaching.

Figure 5. Video observation protocol: Adapted from TeachingWorks (2020)

Category	Key teacher moves/actions/strategies	Evidence/Comments
Discussion Enabling or Discussion Leading	(Minimum of three examples)	(Include the timestamp, specific words used by the teacher and/or student(s) during the lesson in quotes, and comments)

EDCI 3332 Designing and Implementing Instruction & Assessment

As part of the course requirements for EDCI 3332, teacher candidates were required to conduct a lesson demonstration using MRS. The scenario was with upper elementary students, in which they introduced the book *Mr. Lincoln's Way*, a story about a beloved high school principal who works hard to reach out to the school bully named "Mean Gene" and helps him change his ways to become a better person. Teacher candidates were asked to listen to the book at <https://www.youtube.com/watch?v=jw1q7uP3q-U&t=9s> and formulate an open-ended question that would help students recall relevant prior knowledge before reading the book, pique their interest in the book, and connect personally to the story. The HLP the participants focused on in this study was HLP 3 - eliciting and interpreting individual students' thinking. Participants were asked to focus on the following learning objectives:

- Give a summary of the book, *Mr. Lincoln's Way*.
- Ask one open-ended question of each of the five students, such as, "Have you ever been bullied, and how did you deal with it?"
- Listen to the students' answers and ask appropriate follow-up questions.

The instructor modeled the task using MRS prior to having participants enact their own lesson demonstrations. The modeled demonstration was conducted F2F in class, in coordination with the simulation specialist who facilitated the use of the program in real time from her office at the simulation lab. Teacher candidates are not privy to how the program works, and they do not see the simulation specialist. This is by design to immerse the teacher candidates into the virtual environment, thus creating a suspension of reality. During the demonstration, students had an opportunity to ask questions and to get a sense of the expectations for their assigned microteach demonstration that was to be conducted asynchronously and online at home or at another location where they had access to reliable broadband.

To ensure that all students had an opportunity to conduct a microteach demonstration in the MRS environment, the simulation coordinator provided a Microsoft Excel spreadsheet that listed available times and dates for a 20-minute MRS session to be conducted during a two-week window. A link to the spreadsheet was provided on BBL. The students signed up at a convenient time and date and were provided a Zoom meeting link on the spreadsheet, to be opened when they scheduled themselves for the demonstration. The MRS was delivered through Zoom. The 20-minute sessions allowed for 10 minutes for active teaching and 10 minutes for debriefing.

During these scheduled sessions, the simulation specialist, the course instructor, and the participant logged into Zoom. The instructor began the session with a brief reminder of how the session would proceed. Once the student was ready, he/she would simply state, "start simulation." At this time, the simulation specialist opened the virtual classroom with five student avatars that were ready for class. If the student needed a minute to think about how to proceed, he/she would say, "pause simulation." The simulation was paused so they could ask for coaching from the instructor and/or consider how they wanted to proceed. To conclude the simulation, students said, "end simulation."

Following the session, the instructor provided feedback regarding each participant's performance, noting positive attributes of a student's performance such as establishing good rapport, asking good follow-up questions, and responding appropriately to students; the instructor also provided suggestions for improvement. Participants were asked to complete a reflection immediately after their session and answer the following questions.

1. What question did you ask of all the students to get them thinking about the book, *Mr. Lincoln's Way*?
2. Reflect on your feelings during the session in general. Were you nervous? Did you have fun? Did you enjoy interacting with the students?
3. What do you feel you did especially well during the session?
4. What do you feel you could improve on?

The instructor took notes during each session, noting the questions students asked, their follow-up questions, and teacher candidates' ability to build on students' thinking. Twenty-one teacher candidates responded to these questions. Most launched their lesson demonstration by asking the same open-ended question the instructor used in the MRS demonstration.

When asked to reflect on their feelings while teaching in the MRS environment, participants indicated they were very anxious before the session, but they were able to relax and enjoy it after they got started.

All participants mentioned how "real" the students felt. One participant said that being able to do the session from home made her feel more comfortable. Most of the teacher candidates felt positive about their teaching experiences and reported they actively listened to the students' answers, responded appropriately, and asked good follow-up questions. Areas of improvement included controlling nerves, pausing too long before asking a follow-up question, and forgetting what they wanted to ask. A few participants mentioned this was the first time they used Zoom and they would have liked to have been more familiar with it prior to the MRS session.

BENEFITS, CHALLENGES, AND FUTURE DIRECTIONS

Accessible Delivery of MRS With Zoom Video Conferencing in Fully Online Courses

Perhaps one of the most significant benefits for teacher educators who teach online courses is that Mursion's MRS can be delivered through Zoom video-conferencing software. This opens several opportunities for teacher candidates to practice teaching HLPs via microteach activities and mini-lessons, as exemplified in the activities that were previously described. When used in conjunction with Zoom, students log into the program through a weblink. Upon logging in, teacher candidates may see an empty classroom, a conference room, or another educational setting. When they are ready to begin teaching, they say, "start simulation," at which point the avatars appear, and the teaching session begins. Teacher candidates may "pause simulation" at any time if they get nervous or flustered, want to request coaching, or if they want to reteach a segment of a teaching scenario in a more effective manner. Finally, they can "end simulation" when they have completed the session.

Offering opportunities for *approximations of practice* through MRS provides several advantages over the F2F classroom. For example, teacher educators can assign them to take place during a designated window of time asynchronously so that *every student* may participate in the experience. This ordinarily would take weeks in a F2F classroom. Teacher candidates may schedule teaching demonstrations at their convenience, and they may teach in a more private setting, such as one's home. Teacher candidates may also receive immediate coaching from their instructors. They can be provided opportunities to reflect on their teaching with their instructor, simulation specialist, or peer(s) following a teaching session.

Finally, they may avoid unnecessary stress associated with having to teach in front of or to their peers in role-play scenarios in F2F classes. Since their teaching is recorded via Zoom, these recordings may be made available for viewing, reflecting, and self-assessing their teaching formatively, making changes, and scheduling a reteach session. Thus, there were many reasons to use MRSs in online professional teaching courses, aside from the obvious benefit of keeping them safe from COVID-19.

Multiple Opportunities for Approximating Practice or Getting Coached

Utilizing the MRS as a tool for approximating practice gives teacher candidates multiple opportunities to teach avatar students in real time without negatively affecting the well-being of “real” students (Ledger & Fischetti, 2019). They remove the “audience,” allowing teacher candidates to focus solely on their teaching, in contrast to the experience of role playing with peers in F2F university classrooms or in early field experiences with school-age students. MRS sessions may be paused so that instructors may provide “just in time” coaching or critical feedback immediately following a teaching session. Coaching teacher candidates has been shown to have a positive impact on instructional practice, regardless of the amount of teaching experience a preservice teacher has (Cohen et al., 2020; Elford et al., 2013; Yost, 2006), and it has a positive impact on students’ reactions to teachers improved instructional practices (Goodman et al., 2008; Scheeler et al., 2006; Scheeler et al., 2004).

Teacher educators may provide feedback regarding the positive aspects of a teaching session, noting areas for improvement and providing alternative, more effective ways of approaching a certain aspect of teaching. In a recent study, “bug-in-ear” coaching in MRS sessions have shown to be effective in teaching teacher candidates how to provide feedback for classroom management (Elford et al., 2013). Teacher candidates were taught a procedure that involved three steps: redirect, re-engage, and reinforce. Instructors first explained and modeled the procedure, and then had teacher candidates practice the procedure in the simulator in four, five-minute sessions (Elford et al., 2013). The rate of positive feedback offered by teacher candidates increased from 20% to 30% across four coaching sessions (Elford et al., 2013).

In another recent empirical study by Cohen et al. (2020), the researchers evaluated whether providing coaching between MRS practice sessions in teacher education courses led to more rapid development of skills and changes in teachers’ beliefs about student behavior. Results indicated that coached candidates had significant improvements in skills relative to those who only reflected on their teaching. Findings suggested that HLPs can improve with coaching, and teacher candidates can be ready to teach effectively on day one.

Planning, Preparation, and Logistics

There are several things to consider when using an MRS in one’s courses. The first thing is to determine whether the learning goals and objectives will be achieved by using an MRS. If they are, then the teacher educator needs to decide whether he/she will model the microteach or mini-lesson and/or have teacher candidates practice teaching in the simulator F2F in their classroom or at the MRS lab as classwork. Teaching F2F has some advantages. For example, a F2F session allows teacher candidates and the teacher educator to pause the simulation in order to receive “just in time” coaching for “do-overs” of these rehearsals in real time.

Meeting at the MRS lab or classroom together provides an instant supportive community of MRS users who can point out strengths in the lesson and specific areas for more practice and improvement.

Moreover, instructors can use this time to model their use of specialized content and pedagogical vocabulary and point out specific teacher moves, strategies, and techniques that work to scaffold the teacher candidates' learning by practicing their teaching of HLPs in a safe practice space. A significant challenge that the authors' have experienced with F2F MRSs is having sufficient time for all of their students (ranging from 20 to 30 per class) to practice teaching in the simulator. One solution to this is to have student groups plan their microteach activities and/or mini-lessons together, and have one person from the group do the teaching while the others assist by providing feedback and support.

The instructors who created the assignments presented in this chapter delivered them asynchronously and totally online, with the MRS platform accessible via a Zoom link and delivered via Zoom. In the secondary/all-level course, EDUC 3301, the instructor was not present in the sessions; however, when students entered the simulator at the scheduled time and date they chose, the instructor arranged for an avatar host (the simulation specialist who is also the interactor) to welcome the teacher candidates, review their microteach/mini-lesson plans, and remind them of the commands for initiating the sessions ("start simulation"), pausing the sessions ("pause simulations"), and concluding the simulations ("end simulation"). In this course, the students entered the MRS environment from their homes or another preferred place, such as a workplace office or conference room, where they had access to dependable broadband. Coaching was not provided; however, the avatar host asked two reflection questions immediately after the simulated lesson: 1) What do you think you did well in this session? and 2) What do you think you could improve on for next time? Every session was recorded, and links were provided by the MRS lab coordinator, who loaded them on a secure, cloud-based share folder in Microsoft Office 365 One Drive that was provided by the instructor, who shared access to the link with her students. The teacher candidates in her course were able to view and self-assess their recorded sessions and provide peer feedback to an assigned peer.

In the course for EC-6 majors, EDCI 3332, the teacher educator joined in every student's session and served as the host, doing what the avatar host did in the EDUC 3301 course. This teacher educator did not pause simulations for coaching either. She took notes and gave critical feedback for every student immediately after their MRS microteach lessons and instructed them to complete their self-assessments, which consisted of four questions. Both teacher educators have considered the limitations of not providing "just in time" coaching in asynchronous MRS sessions and are considering how they may be able to provide it soon. One possibility is offering these courses as hybrid courses with synchronous and asynchronous instructional delivery.

As illustrated in the examples provided, these activities require detailed planning and coordination with the MRS lab coordinator. Teacher educators must consider the following questions:

- How will I prepare the teacher candidates for these lesson demonstrations? Should I model a session? Use a video representation of practice?
- How much time should be allocated to a MRS session?
- How many times will students have to practice teaching in the simulator?
- How should sessions be scheduled?
- Where will the sessions take place?
- How much content can be taught during a session?

In addition to the aforementioned decisions, instructors must provide teacher candidates with a teaching case scenario (Figure 6) and instructional goals and guidelines, as illustrated in Figure 6. The scenario is an adapted scenario from Mursion. However, the objectives and goals are instructor-created.

Figure 6. Mursion student avatars in middle school classroom



Sample Scenario

You are a middle school teacher who is introducing a new instructional unit. Your objectives are to lead a group discussion and elicit student thinking related to one of the following content areas (your choice): English Language Arts: *Romeo and Juliet*; mathematics: variables; social studies: branches of government; and science: photosynthesis.

Goals

The goals for this session are for you to successfully introduce a lesson unit and lead a class discussion by doing the following:

- Introducing the goal of the lesson unit (e.g., to learn about *Romeo and Juliet*, math variables, branches of government, or photosynthesis)
- Activating prior knowledge
- Efficiently engaging students in the discussion
- Conclude the lesson by supporting students to make sense of the content
- Take stock of where the class is in the discussion
- Acknowledge student competence

Objectives

One way to engage students in a new lesson unit is to engage in prior knowledge activation that will arouse interest and curiosity. One of the objectives of this lesson is for you to introduce the lesson unit by activating prior knowledge and arousing curiosity. One way to launch the discussion is to enact the Pre-Reading Plan (PreP) procedure, which includes the following steps:

- 1) Associations with the topic (What do they know?)
- 2) Reflections of their associations with the topic (What made them think of that?)
- 3) Reformulation of new knowledge (at the end of the discussion, summary of what the class has contributed).

You may also choose to bring an object or picture that will arouse curiosity and ask for associations, reflections, and reformulation of new knowledge as you introduce the topic. After engaging in prior knowledge activation, you are now ready to efficiently engage students in a discussion about the topic. Since this is only a simulated mini-lesson, and you will have no more than 15 minutes to launch a discussion, I expect you to at least get through prior knowledge activation successfully and then conclude the simulation by acknowledging the students' contributions and informing them that you will begin the unit the following day.

Expectations

It is important that you understand the PreP procedure and ask the questions listed above. You will need to plan your questions and extend the students' ideas by asking questions that will help your students to reflect on their thinking (metacognition). You will make sure that a minimum of three students have responded completely using the PreP procedure, but it is entirely possible to hear from all five students in the group.

Given that most of you are only a few years older than the students, it is important to distinguish yourself as teachers to the students in this simulation activity. I expect you to look presentable. No caps or super-casual clothes please. I also expect you to engage with the students in a professional manner. No one can go "off script" at any time. Stick to the purpose of the assignment. The students will be seated in their seats always. They can "turn and talk," and they can raise their hands if you'd like them to do that at any point in the lesson.

It is imperative that the teacher educator schedule the dates with the MRS lab coordinator early in the semester or even the semester prior due to high demand. The MRS coordinator needs sufficient time to facilitate the work that needs to be done under his/her purview (e.g., creating and providing registration Zoom links created for each student to the teacher educator and reviewing lesson plans for the simulation specialists/interactors). The simulation specialist must plan for time to download recorded Zoom sessions and upload them to the Microsoft One Drive (in the case of the first instructor) so the teacher educator(s) may view them and provide feedback, and so teacher candidates have access later to view their lessons for their self-assessments, and to view and provide peer feedback to their assigned peer. The authors recommend a synchronous class meeting a week prior to when students will be scheduled to teach their lessons, so they have an opportunity to ask clarifying questions. The author who created

this assignment recorded this meeting and made it available on the BBL course shell for those who could not make that meeting.

DISCUSSION

Latinos are known for belonging to tight-knit families—the cornerstone of Latino culture (Villarreal, 2019a). The most traditional families believe in *familismo*, a principle whereby it is expected that individuals prioritize family members' needs above one's own needs, support each another, and attend important milestones among family members such as birthdays, weddings, baptisms, and funerals. These usually advantageous bonds have been tragically affected by the pandemic (Villarreal, 2019a). As a result of cultural norms and values, Latinos in this area have found it extremely challenging to go against their inclinations to adhere to social distancing, finding it impossible when living in close quarters with numerous family members or visiting their elderly who need assistance during this time.

Most of the teacher candidates at this HSI are Latinx first-generation college graduates who receive financial aid, hold part-time or full-time jobs, and take full-time course loads of 12–18 semester credit hours. They are deeply committed to their families and have a strong work ethic. It is not unusual for students in the RGV to live with their parents, and in some cases, extended families, in order to save money on room and board and to help out with household bills. Many of the teacher candidates in our program are young, married, have started families, and work in minimum-wage jobs in supermarkets, restaurants, and other jobs in the service industry.

In July of 2020, Hidalgo County, where the main campus for UTRGV is located, was identified by the news media as the epicenter of the coronavirus (Villarreal, 2019b). Hidalgo County's health commissioner, who is a practicing doctor, referred to the RGV as “a hotspot of a hotspot of a hotspot” and bluntly labeled its residents as a “poor, fat, diabetic population” (Villarreal, 2019b). According to the Centers for Disease Control and Prevention (2020), Type 2 diabetes and obesity are among the pre-existing risk factors for “severe illness” related to COVID-19. In addition to these health issues, socioeconomic factors have also contributed to this virus, disproportionately affecting minorities in the U.S. The Centers for Disease Control and Prevention (2020) also reports that Latinos are hospitalized four times more than their white American counterparts.

Unfortunately, the number of coronavirus cases has steadily increased in this region, and the death toll has risen substantially since July; however, vaccines have been approved and made available to the public. In a recent article in the *Wall Street Journal*, Secretary of Health and Human Services Alex Azar said there will be enough vaccine doses starting in the second quarter of 2021 so that anyone who wants a vaccine will be able to get it. However, other federal health officials have said this will occur in the spring or summer, and the timeline could change if manufacturing does not go as planned. Despite this uncertainty, the future looks brighter since the approval of two vaccines, with more approvals on the horizon (Loftus & McKay, 2020).

The authors contend that purchasing the Mursion MRS software platform for faculty members, staff members, and students, although costly, has shown to be a wise investment at UTRGV. Given the demographics and bilingual context, two of our full-time simulation specialists are bilingual in English and Spanish; therefore, scenarios have been designed to offer students in education, medical, and business fields opportunities to develop their communication skills in both languages in scenarios such as parent–teacher conferences; parent–principal conferences; Admission, Review, and Dismissal (ARD)

meetings; doctor–patient conferences; and in bilingual education classroom scenarios, Spanish-content scenarios, business meeting scenarios with Spanish clientele, and others. As more faculty members and doctoral students see the value of using MRS, and the flexibility of using it in totally online courses, it is expected that more research will be conducted about the impact of using MRS in various capacities.

A post-pandemic paradigm in higher education at this HSI will likely promote the digital literacy of university faculty members and students; ongoing professional development for quality online teaching; and continued development of online academic programs at the undergraduate, graduate, and doctoral levels. It will also emphasize the need for faculty to learn more about socioemotional learning (SEL) due to the trauma experienced by the university community associated with the virus, including the loss of lives, unemployment, hunger, lack of health insurance, and homelessness. Teaching during this pandemic has emphasized the need for empathy, understanding, patience, flexibility, and responsiveness in PreK-16 (P16) education. It has also inspired these authors to take pedagogical risks by trying out new technologies they had never used before and to be creative. The allocation of funding for innovative technological tools should increase after the pandemic. It is likely that more faculty and students will prefer teaching and learning in online course delivery to meeting F2F due to convenience, flexibility, and more personalized experiences that can be offered through various innovative technological tools such as MRS.

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KEY TERMS AND DEFINITIONS

Culturally Relevant Teaching: A term coined by Gloria Ladson-Billings (1994), culturally relevant teaching refers to a “a pedagogy that empowers students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes.” Geneva Gay (2010) further explains that CRT “uses the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning more relevant and effective.”

High-Leverage Practices: TeachingWorks, a center from the University of Michigan, describe high leverage practices as the basic fundamentals of teaching. These practices are used constantly and are critical to helping students learn important content. High-leverage practices are also central to supporting students’ social and emotional development. They are used across subject areas, grade levels, and contexts. They are “high-leverage” not only because they matter to student learning, but because they are basic for advancing skill in teaching. See <https://www.teachingworks.org/work-of-teaching/high-leverage-practices>.

Hispanic Serving Institution (HSI): The Hispanic Association of Colleges and Universities defines HSIs as colleges, universities, or systems/districts where total Hispanic enrollment constitutes a minimum of 25% of the total enrollment. “Total Enrollment” includes full-time and part-time students at the undergraduate or graduate level (including professional schools) of the institution, or both (i.e., headcount of for-credit students). https://www.hacu.net/hacu/HSI_Definition.asp.

Mixed-Reality Simulation: A mixed reality simulation provides an immersive experience consisting of a combination of virtual and physical elements (Lindgren, Tscholl, & Johnson, 2016). Mixed reality simulations use “digital puppetry” in the form of virtual students or avatars in a virtual classroom controlled by a live interactor who operates the technology behind the scenes to control the avatar students’ behaviors (Bautista & Boone, 2015). Interactors prepare for the simulation much like standardized individuals by becoming well versed in the respective personalities and back stories of the avatars as well as the scenario planned for the simulation (Dieker et al., 2015; Dieker, Straub, Hughes, Hynes, & Hardin, 2014).

Poverty: “Poverty” is an official measure defined by the U.S. Government based on family income. In Texas, a family that consists of 2 adults and 2 children who make a family income of \$24,858 per year is considered poor. In Texas, 1.5 million Texas children live in poverty (20.9 percent of all Texas children). Black and Hispanic Texans are more than twice as likely to live below the poverty line as White and Asian Texans. This information is according to the U.S. Census, 2017.

Practice-Based Teacher Education: According to Francesca Forzani (2014), practice-based teacher education refers to professional training that attempts to focus novices’ learning more directly on the work of teaching rather than on traditional academic or theoretical topics that may have only marginal relevance to the realities of the classroom.

Teacher Candidates: Teacher candidates are preservice teachers who are enrolled in an educator preparation program and are preparing to become teachers.