Chapter 6
Simulated Teaching: An Exploration of Virtual Classroom Simulation for Pre-service Teachers During the COVID-19 Pandemic

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Abstract The COVID-19 pandemic complicated the field experience component of teacher preparation because of K-12 school closures. To address these challenges, South Mountain University adopted a virtual classroom simulation, simSchool, in which students take on the role of teachers and interact with virtual students. The purpose of this self-study was to explore both the teacher and student perspectives in the initial implementation of simSchool in a secondary education methods course. Data collected for the study include simSchool performance reports, professor and student journals, student reflections, and student focus groups. Findings indicated that students required a more comprehensive introduction to and rationale for the use of the virtual simulation, more chunking of the training materials, and additional debriefing time after each of the modules. Students needed perseverance and resilience to make the sim work meaningful and had to be open to receiving feedback. Technology was initially a barrier but became less so as students spent more time in the sim. Ultimately the students perceived the sim as beneficial to their growth and development as teachers.

1 Problem Statement

The COVID-19 pandemic caused the largest education system disruption in history, impacting 1.6 billion learners in more than 200 countries (Pokhrel & Chhetri, 2021) resulting in school closures or shifts to remote learning. This complicated the traditional face-to-face (f2f) field experience components of teacher preparation. Many K-12 schools refused to accept pre-service teachers due to the increased risk of exposure to COVID-19. Other schools rejected requests to accept student teachers

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because their faculty did not feel comfortable coaching new teachers in an environment that they themselves were still learning. Schools also raised concerns about K-12 student privacy and security as well as the supervision of pre-service teachers in the online environment. This left the university unable to provide student teachers with traditional field experience placements.

This problem was compounded by the current teacher shortage (Sutcher et al., 2016) which made delaying students' graduation an undesirable and unrealistic option. Sutcher et al. (2016) have linked the shortage to a decline in teacher preparation enrollments, increasing K-12 student enrollment, and, most influentially, high rates of teacher attrition. Teachers are exiting the field at an unsustainable rate with 40–50% leaving the profession within the first 5 years. (Ingersoll et al., 2018). Greiner and Smith (2019) found that teacher attrition is often tied to a lack of self-efficacy. Increases in pre-service teacher self-efficacy have been tied to effective field experiences (Brown et al., 2015). Therefore, it is imperative that teacher education programs adequately prepare pre-service teachers to develop instructional strategies to guide and direct student behavior and learning through effective field experiences. (Darling-Hammond, 2008). Field experiences are also required by the state for certification. Therefore, it was imperative that we find an alternative to the traditional f2f field experiences that would adequately support pre-service teacher growth and self-efficacy while keeping them on track toward graduation and certification.

2   Elaboration of Context

This study was conducted at a regional state university in the Northeastern United States. The university serves approximately 5000 undergraduate students and 1000 graduate students. Participants included 18 students who were enrolled in the secondary education methods course in the fall of 2020. Four were graduate students and 14 were undergraduates. Ten of the students were male and 8 were female. Content areas included English, math, science, and social studies. Course outcomes were focused on meeting the needs of diverse learners and classroom management. This course required 40 h of field work which is typically done in a f2f placement.

3   Systematic Approach

There were few options available for alternative field experiences. The most widely used alternatives to traditional field experience, such as working with Upward Bound or summer camps, were also not viable options because of the pandemic. We thought about having the students create videos of their teaching, teaching one another, and we investigated teaching simulations. Ultimately, we decided to use a virtual classroom simulation called simSchool.

simSchool is a virtual classroom program with simulated students that uses an intricate computational model based on the learning sciences and teacher education literature to represent the dynamic aspects of real students in a live classroom setting (Gibson, 2011). Sessions within the simulation offer the teacher the chance to teach a lesson and the opportunity to practice and develop important elements of teaching such as reading student profiles, developing individualized instruction strategies, and understanding classroom management. Interactions with the simulated students provide immediate feedback from the students themselves in the form of shifting posture, raised hands, or speech bubbles. These interfaces change depending on the approach taken by the teacher which allows the teacher to see in real time how their chosen approach is received by the students. Multiple data points are collected while the sim is in progress such as *regularly assesses individual and group performance* and *uses information of differing student strengths and needs to further each learner's development*, and are available after every lesson for review by the student. Additionally, teachers are provided with the academic and emotional gains made by the simulated students after each lesson. Teachers teach the same lesson 4 times per module and have the ability to replay modules multiple times providing the opportunity to try out various methods for teaching the same lesson and class with immediate results to compare with previous attempts.

Several factors influenced our decision to move forward with simSchool. The first was the extensive body of literature on the successful use of simulations in education. Virtual simulations provide pre-service teachers with opportunities for skill-building (Hopper, 2018; Sawchuk, 2011) which they can then apply to the face-to-face classroom (Office of Postsecondary Education, 2005). Computer simulations provide students the opportunity to (a) practice decision-making; (b) engage in repetition for mastery; (c) receive feedback and make improvements; (d) increase self-efficacy; and (e) promote peer collaboration and social interaction (Badiee & Kaufman, 2014). Research conducted on simSchool, specifically, found a variety of benefits including a positive correlation between the use of simSchool and teacher self-efficacy (Christensen et al., 2011; Deale & Pastore, 2014; McPherson et al., 2011) and an increase in their locus of control (Christensen et al., 2011), both of which have been linked to effective teaching. (Brophy & Evertson, 1976; Rose & Medway, 1981; Tshannan-Moran et al., 1998). Additionally, both self-efficacy and locus of control have been linked to increased teacher retention (Ingersoll et al., 2018).

Other considerations included a tight timeline, the responsiveness of the simSchool organization, their willingness to provide training to our students at no additional cost, and the reasonable price point ($25.00 per student per year). Also, a variety of modules specifically aligned to our course and program outcomes such as *Cultural Intelligence, Inclusion* and *Classroom Management*. simSchool also provided a faculty dashboard to view student progress and performance as well as an equity index that tracked pre-service teacher interactions with students of different genders and skin colors. Students completed each lesson four times, receiving feedback for improvement after each teaching session. Faculty viewed the focus on continuous improvement as consistent with our philosophy.

There were some downsides associated with the use of simSchool that we viewed as trade-offs. The virtual simulation was not a true replacement of the f2f field experience. Additionally, students did not create the lessons delivered in the simulation. Students focused on implementing pre-designed lessons.[1] Finally, there was an awkwardness to implementing action in the simulation. Rather than speak directly to the class, for example, you had to choose from a drop-down menu of choices or type in your own response.

The purpose of this self-study (Loughran & Northfield, 1998) was to explore both the teacher and student perspectives in the initial implementation of simSchool in a secondary education methods course. The aim of self-study research, also known as self-study of teacher education, or S-STEP, is to "understand teaching from the inside out rather than the outside in and to simultaneously put what we learn into practice" (Bullough Jr. & Pinnegar, 2004, p. 314). S-STEP methodology is self-initiated and self-oriented, improvement aimed, uses multiple data sources, and is interactive (LaBoskey, 2004). The interactivity is crucial (Bullough Jr. & Pinnegar, 2001; Pinnegar & Hamilton, 2009) because it allows for the incorporation of multiple perspectives on our practice and "helps to challenge our assumptions and bias, reveal our inconsistencies, expand our potential interpretations, and triangulate our findings" (LaBoskey, 2004, p. 849).

Frequently in S-STEP designs, this interactivity is operationalized as a two-way process that involves the voice of a teacher educator whose practice is the focus of the inquiry and one "other" type of voice. Fletcher et al. (2016) argued that the "other" voice is often a critical friend who is another teacher educator and, while these types of studies have added to the knowledge base of teacher education, their scope may be limited because the problem of teacher education practice is framed only through the lens of teacher educators. Fletcher et al. (2016) recommended that when S-STEP research is related to the enactment of pedagogical practices, the research questions might be more comprehensively answered by including students as critical voices in the process. "The richness that student perspectives can add to our understandings of teacher education practices may assist us in becoming co-inquirers of practice with our students" (Fletcher et al., 2016, p. 20). Teaching students S-STEP processes and engaging them as co-inquirers of practice also supports their ability to use self-study as a means of promoting their own professional practice as educators.

This study employed a multi-dimensional approach to interactivity in which the teacher educator consulted with another departmental faculty member and a student bi-weekly during the process of simSchool implementation. These discussions helped to understand the complexity of the teaching and learning environment and to improve practice because they promoted a dialectic encounter about the work that afforded insights about the work while doing it and reflecting upon it. Teacher

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[1] (Note: simSchool did indicate that they can create modules in which students do design and deliver their own lessons, but this was not an option given our time and budget constraints).

knowledge generation depends on teachers finding ways to share critical experiences (Loughran & Northfield, 1998).

4 Findings

This section presents the results of the simSchool implementation. The summation represents the analysis of a multitude of thick data including journals, discussion notes, student reflections, and simSchool data and reports. These data were analyzed using an inductive "ground up" approach (Charmaz, 2000). Three themes emerged from the data analysis including preparation, classroom management, and feedback and re-teaching. Each theme is presented from two different perspectives: the perspectives of the teacher educator and the student who participated in the S-STEP process in order to capture two distinct voices.

4.1 Preparation: Professor

One of the biggest challenges I had as the faculty member responsible for implementing the simulation was a lack of preparation time as a result of the crisis situation. I was learning along with the students which prevented me from framing the experience effectively. Focus groups revealed that some of the students envisioned a 3-D virtual immersive experience and were disappointed. One student wrote in their reflection, "At first, I thought I would get to talk to the students and that they would talk back. I didn't realize everything would have to be typed." In focus groups students noted frustration with some of the functionality and the limitations of the simulation, such as not being able to reassign students' seats or walk around the room. These frustrations may have been lessened by providing a better introduction to the simulation. I also learned that it required a certain amount of grit and perseverance to master the simulation. In the beginning, students reported via focus groups and written reflections that the simulation was "tedious, monotonous and frustrating." Once I reframed this for the students and explained that there are lots of things that require this type of grit in teaching, several of them rededicated themselves to the task.

4.2 Preparation: Student

I felt overwhelmed when initially navigating simSchool, not knowing exactly what to expect. A review of my journal indicated that the sim did not align with my preconceived notions. I initially tried to dive right into teaching the modules but then found I needed more information. I then learned that each student had a profile that

detailed their characteristics and performance in various academic areas. This information was very helpful to me in determining which accommodations to make when trying to create a plan for the class, as well as to assist diverse learners. The feedback from the sim and lessons learned in the methods course encouraged me to change my approach. Utilizing the student information allowed me to plan ahead for which accommodations would be best utilized for each student. As I spent more time with simSchool, I realized that preparation prior to teaching was important to student success in the simulation.

4.3   Classroom Management: Professor

The focus group data and student reflections indicated that students learned the most about classroom management practices. One student commented, "One thing I feel I improved the most on and may now be considered a strength is classroom management and responding to disruptive behavior." As a faculty member, I was able to teach classroom management philosophies and strategies and know that students could apply them in situations in the simulation where I knew some students would misbehave. Students appreciated the opportunity they had to try out different things without fear of failure or harming students. They also had the unique opportunity to press "rewind" on a class and teach it differently the second time through after receiving feedback. This process of repetition combined with the feedback loop, moved them toward mastery of these skills and allowed them to apply course learnings in a structured and safe environment.

4.4   Classroom Management: Student

Classroom management is one of the things I worry about most as a future teacher. My skills were tested in the first simSchool lesson when all of the students put their hands up at one time, which was very stressful. At first, I tried to call on each student individually to determine how best to help them. The most common response I got from the sim students included "Why are we doing this?" and "This is stupid." Eventually, I came to realize that the specific comments of the students were not explicitly helpful, instead, they were indicators that I needed to assess my teaching style and try new methods for reaching the students. Also, I began to notice that if my focus was too much on individuals or the class as a whole, the feedback suggested improving classroom management skills. One realization was that it would be helpful to regroup students to different locations about the room, which is not a current option in the sim. Ultimately, this experience within simSchool was valuable to push me to try and consider different techniques which will be helpful in f2f teaching.

4.5 Feedback and Reteaching: Professor

I received more comprehensive and specific data on student performance than I had ever received from f2f Recommendations for future research include a more formal investigation of the impact of simSchool on pre-service teachers' self-efficacy using pre and post tests with a validated instrument, comparing the student teaching evaluations of students who used simSchool with those who did not, and further examination of the extent to which the simulated environment in simSchool replicates the face to face teaching environment.

teacher mentors. For example, the following are some of the behaviors that were evaluated: designing, adapting, and delivering instructions to address each students' diverse learning strengths and needs, making appropriate and timely provisions for individual students with particular learning differences and needs, and pacing to maintain student involvement and engagement. Student effectiveness on all of these elements was rated by the sim. This allowed me to individually coach students, to adjust some of my lessons to try to address areas where there were weaknesses across the board, and to provide more specific information about their strengths and weaknesses to prospective employers.

4.6 Feedback and Reteaching: Student

When I first began using simSchool, the feedback made me feel as though I was doing a poor job of being a teacher because it seemed to be mostly negative. However, as I gained more experience with simSchool, I began to try new approaches based on the feedback. Some of the feedback I received included suggestions to move around the classroom, to try different instructional strategies, and to give breaks in between tasks. When I implemented these suggestions, students showed increased academic and emotional gains. Additionally, the positive feedback generated increased personal confidence with future attempts. As I gained more confidence, I made more changes, further improving student performance. Using feedback for reteaching was an important lesson to learn as a preservice teacher, and is a skill I know will benefit me throughout my teaching career.

5 Conclusion

While simSchool is not a complete replacement for f2f field experiences, it did offer several benefits. The simulation provided students and faculty unbiased feedback based on student teaching behaviors and the algorithm. This resulted in students being better able to identify their strengths and challenges as pre-service teachers and to set reasonable goals for their continued professional learning and growth. Additionally, the simulation provided students with opportunities to engage with a

class of students through a scripted lesson, reflect on the feedback received, and repeat the lesson, adjusting strategies to enhance success (Badiee & Kaufman, 2014). Consequently, students could try unfamiliar strategies in a risk-free environment and, through repetition of the lesson, gaining mastery in classroom competencies and routinization of classroom management strategies. Students perceived an increase in self-efficacy, with classroom management perceived as the greatest area of growth.

The simulation feedback and reports also allowed the faculty member to more specifically identify pre-service teachers' strengths and challenges in their teaching development resulting in individualized coaching, a more tailored instructional experience, and more detailed letters of recommendation for prospective employers. Additionally, the faculty member was able to structure discussions around the specific modules being taught, which was not possible in the f2f field experiences in the same way since they were all doing different things at different times. The simulation afforded the ability to work on reflection on practice and model the metacognitive processes with respect to reflecting on a particular module.

Therefore, we recommend continued use of the simulation in conjunction with f2f field experience opportunities. We acknowledge the importance of training for both faculty and students as well as the appropriate framing of the simulation. Rather than completing the intensity of 8 modules in one course, we suggest starting the simulation early in the teacher education program and completing 2–3 modules per course so that students have time to develop their skills and reflective practices prior to their culminating field experience. Recommendations for future research include a more formal investigation of the impact of simSchool on pre-service teachers' self-efficacy using pre and posttests with a validated instrument, comparing the student teaching evaluations of students who used simSchool with those who did not, and further examination of the extent to which the simulated environment in simSchool replicates the face to face teaching environment.

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