

Article

Learning to Teach: How a Simulated Learning Environment Can Connect Theory to Practice in General and Special Education Educator Preparation Programs

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Abstract: Educator preparation programs have moved away from offering interest-based courses that prepare a teacher candidate on a more surface level and have opted to integrate more authentic experiences with technology that are infused into coursework. This research study focused on redesigning key courses in both the general and special education graduate-level educator preparation programs (EPPs) to infuse learning experiences through a simulated learning environment (Mursion) to help bridge teacher candidates' coursework and field experiences, offering them robust experience with high leverage practices and technology that increases their own competency. Data from this study demonstrated that preservice teacher candidate work within the Mursion simulated learning environment increased use of high leverage practices related to strategic teaching, collaboration, differentiation, and providing feedback. Implications for instructional coaching, microteaching, repeated practice, and closing the research to practice gap are discussed.

Keywords: simulated learning environment; instructional coaching; self-efficacy; inclusion; high leverage practices; general education; special education; teacher preparation

1. Introduction

Calls to enhance technology initiatives in teacher education programs have increased exponentially. Today's schools, both K12 and above, require students to have advanced digital skills as they continue to integrate technology into their curriculum. Thus, it is imperative that teacher candidates are prepared to work with students in this modality. Educator preparation programs work at a unique crossroads in this task [1]. Many educator preparation program faculty often fall under the "digital immigrant" category while working with teacher candidates designated as "digital natives" who are placed in schools that serve students who live in a technologically advanced world, but in environments whose technology offerings may differ significantly from one zip code to the next [2,3]. These complexities must be acknowledged in designing Educator Preparation Programs (EPPs).

As a result, EPPs continue to make ongoing adjustments in technology courses offered, as the options for technology in schools grow exponentially. Most educator preparation programs have moved away from offering interest-based courses that prepare a teacher candidate on a more surface level and have opted to integrate more authentic experiences with that are infused into coursework to provide a dispositional model for students of curiosity and confidence [4]. Though beneficial, the shift

from technology courses added into a program versus infusing programs with rich technological offerings, expertise, and dispositions has precipitated a change, first, in the way we prepare ourselves as teacher educators and second, in the way we design our courses to authentically integrate technological experiences for our teacher candidates [5].

This research study focused on redesigning key courses in both the general and special education graduate level EPPs to infuse learning experiences through a technologically rich simulated learning environment, Mursion. Our goal was to provide a platform for teacher candidates to apply learning from their coursework in research, theory, and evidence-based practices with an immediate opportunity to apply what they were learning in the Mursion-simulated learning environment. This redesign allowed students to experience technology integration in their coursework and to witness the benefits of using key technologies for their development as teachers. Further, the redesign of the courses provided a model in the general and special education EPPs that demonstrated the benefits of the intentional infusion of technology in courses that were not traditionally designated as technologically robust.

Based on the push for authentic integration of technology in EPPs alongside the gaps identified in the following literature review on the disconnect between coursework and field experiences, this study was designed to explore the following research questions:

1. How can Mursion support teacher candidates in improving their teaching skills?
2. How can Mursion support EPPs in practicing specific pedagogical teaching skills/strategies that can be disconnected from practicum experiences?

2. Literature Review

Educator preparation programs are tasked with two big outcomes: (1) helping teacher candidates prepare to be effective teachers through coursework that emphasizes their growth in understanding theory, content, and the context of the teaching profession, and (2) providing teacher candidates with field experiences that allow them to apply what they are learning in their coursework with students. Unfortunately, research in teacher education has acknowledged a disconnect between teachers' knowledge and their application of essential instruction and management skills gained through coursework in preparation programs [6]. Programs have consistently attempted to refine preparation programs to close this gap, but it is a problem of practice that remains [7,8]. Thus, many teacher educators are disconnected from the practicum experience because coursework and field experiences are often siloed, with coursework delivered by faculty who are no longer working in K-12 classrooms, and fieldwork overseen by supervisors who have affiliations with the school community but may not know the coursework of the educator preparation program (EPPs) [9].

Field placements are beneficial because they give preservice teachers an opportunity to interact with students, colleagues, and administrators and provide teacher candidates opportunities to apply academic and behavioral skills in actual classrooms [10,11]. Research exists to document the impact of field experiences on beginning teachers' beliefs about teaching and learning, yet there is little research on how field experiences affect instructional practice [11,12]. One reason for this is that it is often difficult for teacher educators to align the conceptual understandings of practice with the range of complex situations that arise in actual classrooms [12]. Further, candidate readiness for the complexity of what they encounter in field placements may limit the benefits they gain from that setting [13]. Girod, M. and Girod, G.R. [14,15] explained that the complexities of real classrooms often require teachers to pick and choose what to focus on, which can be difficult considering their newness at coordinating multiple instruction and classroom management skills.

2.1. Research to Practice Gaps

Though attempts have been made to fill these gaps, educator preparation programs face a continual challenge to sufficiently prepare high-quality teachers to work effectively with students of all ability levels while simultaneously raising student achievement and ensuring their success in a multitude of classroom experiences [16]. Inadequate emphasis on providing preservice training

on complex pedagogical and classroom management practices beyond traditional coursework and field activities may cause teacher candidates to complete EPPs without sufficient implementation knowledge of effective instructional practices and with limited classroom-ready skills [17]. Further, with their beginning knowledge of concepts from their coursework and short timeframes dedicated to field experiences, teacher candidates may not receive enough opportunities to practice and refine their teaching skills in a way that builds efficacy. Often, they will teach a lesson once without the opportunity to revisit, refine, and improve their practice upon reflection. They must move on to the next lesson, so they may never get the repeated practice that leads to advanced skills.

Importantly, while research documents a positive connection between teachers' subject matter knowledge and their performance in the classroom, it has also been established that teachers with advanced preparation (in addition to typical coursework and fieldwork experiences) in teaching methods and strategies have a greater chance of successful longevity in the classroom [18]. Consequently, it is crucial that EPPs provide teacher candidates with early and intentional opportunities to practice teaching methods, implement strategies, receive focused feedback on teaching practices, and refine their teaching, with repeated practice built on this feedback. When teachers are well-prepared in both content and pedagogy, it makes an enormous difference not only to their effectiveness in the classroom but also whether they are likely to enter and stay in teaching [19].

2.2. *Aligning Coursework and Field Experiences*

In efforts to improve the alignment of coursework and field experiences, Thomassen and Rive [20] suggested that it may be necessary to create simplified contexts where novice teachers can initially gain proficiency with target skills. Some common approaches used in EPPs to simplify the initial acquisition of target skills include case-based methods of instruction (e.g., [21–24]), video analysis (e.g., [25]) and role-playing/microteaching (e.g., [26–28]). These approaches augment traditional didactic instruction by exposing teachers to typical classroom scenarios and teaching strategies but are limited in authenticity and complexity because they do not require teachers to realistically respond to the range of behavior and academic challenges they will face in a typical classroom.

Importantly, transfer from these simplified situations to actual classrooms depends on the extent to which practice opportunities match the authentic situation in which the learner applies the information [29]. As the effort to improve EPPs continues and evidence of field experience effectiveness increases, so does the need for innovative ways to incorporate these experiences into program coursework [30]. Therefore, EPPs must examine a variety of outcome variables associated with effective teacher performance and assess preservice teachers' knowledge and instructional experiences in order to broaden and enhance their teaching skills [31].

One response to this need is the innovative use of multimedia platforms such as simulated learning environments within EPPs. A simulated learning environment allows for combined learning in content knowledge, teaching pedagogy, and problem-solving strategies [32,33]. According to the theory of situated learning [29], training in this type of environment should readily transfer to actual classrooms. A simulation is a person, device, or set of conditions that attempt to present an authentic problem, which must be responded to as you would under natural circumstances [34–36]. Simulations allow individuals to have repeated trials involving high stakes situations without risk or loss of valuable resources [37]. The capacity for a simulation to be an effective learning approach is based largely on the ability of the simulation to represent the targeted scenarios in a manner that allows the transference of learning to real-time practice [38,39].

2.3. *Historical Context of Simulated Learning Environments*

In the early 1990s, studies of learning and cognition in the field of educational psychology became heavily influenced by examining the effects of the social and its context on the learner and their learning [29,40]. As educators built on these concepts in the early 2000s, the idea of 'situated learning' and explorations of the implications of the social environment became prominent in the field of teacher

education [41]. Central to the intersection of learning theory and its application in a classroom setting is the notion of apprenticeship learning [42] and legitimate peripheral participation [43]. As a novice teacher is apprenticed to an expert through observations or in practice through apprenticeship activities, their learning is scaffolded into increasingly more central professional activities.

How the apprenticeship of teaching occurs for teacher candidates has been the subject of much debate and revision. Models of apprenticeship vary. On one side, candidates can be involved in observations over time before ever teaching. While on the other side, candidates are placed full time in classrooms while teaching on emergency licenses without a mentor before ever entering an educator preparation program on the other side. There are models in between these two sides, as well. Despite this variation, the majority of teacher education programs align around two major components: coursework and field experiences. Coursework is where preservice educators are exposed to the basic theories of teaching and learning, and field placements are where they apply related strategies [44]. Field placements are beneficial because they give preservice teachers an opportunity to interact with students, colleagues, and administrators. These field experiences help preservice educators understand how factors such as school culture, district policies, and state legislation influence daily classroom functions. Further, field placements give preservice teachers opportunities to balance academic, differentiation, theoretical, and managerial opportunities in actual classrooms. Techniques for concurrently managing these many teaching opportunities in the classroom cannot be represented with adequate complexity through didactic instruction alone.

In spite of the many benefits of field experiences, there are limitations that must be considered as well. It is difficult for teacher educators to align field experience with the intended purposes of the placement because many classrooms and school factors cannot be controlled (e.g., curriculum, diversity of the students, school culture, quality of administration [45]). In addition, it is nearly impossible for teacher educators to match the many variables encountered in field placements with the performance levels of the teacher. For many teacher candidates, placement in the field can be a harrowing experience that has them rely on survival instincts more often than the application of concepts they are learning in their coursework. For example, teachers may be so overwhelmed with keeping students on the task that they are unable to differentiate instruction to adapt to individual student needs.

Despite these difficulties, Grossman [46] maintains that a crucial element of EPPs is the opportunity to practice complex teaching skills in classroom situations that successively resemble actual practice. Traditional field placements may be too complicated for beginning teachers to learn new skills. Thus, novice educators may need additional simplified contexts for practicing essential teaching skills. The complexities of the knowledge and skills candidates are expected to learn can be daunting, and many faculty seek better ways to provide opportunities for their students to practice and receive feedback prior to stepping into a classroom. Teacher educators also desire timely experiences that allow for student failure, reflection on this failure, and a chance to try again.

In response, teacher educators often utilize strategies that simulate real classroom scenarios. Historically, simulated teaching experiences involved either roleplaying with colleagues, watching films, playing card games, or engaging in case-based problems presented via print. Early years of simulation favored film- and print-based content mixed with role-playing. In the mid-1970s, technology-based simulations emerged in EPPs [45], allowing teachers to interact with virtual students and solve problems presented via computers. As computers became more accessible to the general population, technology-based simulations have become increasingly accessible in EPPs. Most virtual classrooms, including game-like environments and Second Life simulations, are accessed from a personal computer. The Sim School, TeachME (Teaching in a Mixed Reality Environment) and Cook School District simulation are examples of using virtual reality for the development of teaching skills [14,47,48]. Game-like simulators allow teachers to instruct students and make ongoing instructional decisions [49], usually by selecting from a menu of options, which triggers a range of preprogrammed student responses. Probably the most sophisticated type of virtual classroom available is a full-immersion simulation (e.g., TeachLivE and Mursion). Interactions during full-immersion simulations differ from

game-like classrooms and Second Life environments because preservice teachers enter a physical classroom with student avatars projected on a screen and can instruct in a realistic classroom setting, physically moving and interacting with students as the “human-in-the-loop” produces authentic student responses in real-time which is more like real teaching.

2.4. Benefits of Simulated Learning Environments

Simulated learning environments have the opportunity to provide preservice teacher candidates opportunities to improve pedagogical and conversational skills (e.g., academic strategies, behavior management strategies, parent meetings, etc.) through rehearsal and reflection. Additionally, experiences in simulated learning environments enable teacher candidates to transfer knowledge learned from college coursework and apply it in the context of the simulated learning environment, thereby deepening understanding of skills and providing early, contextualized professional development [50]. Within simulated learning environments, repeated teaching trials can alleviate high stake situations without risking the loss of resources (e.g., money, time, and people). Experiences like these can create early opportunities for teacher candidates to construct and solidify evidence-based practices that are grounded in authentic and constructive teaching experiences.

A simulated learning environment can be defined as the combination of real and virtual worlds that provide users with a sense of presence. The Mursion simulated learning environment, specifically discussed in this manuscript, is powered by a blend of artificial and human intelligence driven by simulation specialists (“interactors”), trained professionals who orchestrate the interactions between avatar-based characters and trainees. This approach provides a realistic experience that involves intense human-to-human interactions that can become increasingly impactful. The simulation also allows learners to fully immerse themselves in a simulation that has the capacity to produce significant and lasting changes in practice [51].

The Mursion simulated learning environments use avatars that embody specific characteristics typified by personalities that would exist within any classroom environment and represent an array of demographics and personalities [50]. During a simulation, the avatars and participants engage in interactions to practice various strategies by providing real-time verbalization of teaching or other practice-based interactions (e.g., parent discussions, etc.) in a classroom or other appropriate setting with proportionally sized avatars that provide immediate responses [37,52]. Figures 1–3 show examples of some of the avatars that can be utilized within the Mursion simulated environment.



Figure 1. Mursion Middle School Classroom. © 2020 Mursion, Inc.



Figure 2. Mursion Upper Elementary Classroom. © 2020 Mursion, Inc.



Figure 3. Mursion Adult Avatars. © 2020 Mursion, Inc.

For the purpose of educator preparation, various levels of complexity can be controlled depending on the year of the educator preparation program that the teacher candidate is in allowing for the levels of behavior, and response rates. Additionally, the way in which an avatar responds can also be modified [53]. This variability affords EPPs the flexibility needed to individualize practice teaching opportunities specific to the specific needs of teacher candidates, thus the premise of this study.

3. Methodology

3.1. Participants

The researchers studied one class of graduate-level initial licensure special education teacher candidates ($n = 19$) and one class of graduate-level initial licensure general education secondary level candidates ($n = 17$), both completing their respective programs required ‘reading instruction’ course. Thirteen (nine general education, four special education) of the total participants identified as male and twenty-three (ten general education, thirteen special education) identified as female. The age of participants ranged from 22–55, and all participants were in their first year of a two-year educator preparation program.

Three of the general education teacher candidates had prior experience in working in a general education classroom (e.g., instruction assistant) and fourteen of the special education teacher candidates had prior experience working in a special education classroom (e.g., hired on an emergency-teaching license or as an instructional assistant). Sixteen of the general education teacher candidates had no prior teaching experience in any classroom setting, whereas four of the special education teacher candidates had no prior teaching experience in any classroom setting.

3.2. Procedures

The researchers coordinated their term of class lectures and assignments to disseminate information specific to instruction and taken from general and special education high-leverage practices (e.g., [54,55]). This sought to build a foundation for students across general and special education programs in an effort to bridge the gap between knowledge and practices for teaching in an inclusive classroom (see Table 1). These high leverage practices (HLPs) complimented one another and could be used by both general and special education teacher candidates.

Table 1. High leverage practices utilized, specific to instruction.

General Education High Leverage Practices	General Education High Leverage Practices
HLP 2—Explaining and modeling content, practices, and strategies.	HLP 16—Use explicit instruction.
HLP 6—Coordinating and adjusting instruction during a lesson.	HLP 13—Adapt curriculum tasks and materials for specific learning goals.
HLP 15—Checking student understanding during and at the conclusion of a lesson.	HLP 22—Provide positive and constructive feedback to guide students’ learning and behavior.

Prior to beginning sessions in the Mursion simulated learning environment, all participants were administered the Teacher Self Efficacy Scale (TSES) (long-form) [56], to gather pre-study perceived self-efficacy of their teaching practices. The TSES long form includes a 24-item questionnaire that includes common question stems known to be difficult for teachers in school settings and/or activities. Specifically, the ‘instructional strategies’ related question stems as determined by Tschannen-Moran and Woolfolk Hoy [56] were of interest to the researchers for the purpose of this study and included those found in Table 2 below. Participants rated each question on a scale from 1 (Nothing) to 9 (A Great Deal). This allowed the researchers to gain insight into teacher candidates’ current perceptions and self-efficacy of their teaching.

Table 2. Teacher Self Efficacy Scale (TSES) instructional strategy question stems.

Q7. How well can you respond to difficult questions from your students?
Q10. How much can you gauge student comprehension of what you have taught?
Q11. To what extent can you craft good questions for your students?
Q17. How much can you do to adjust your lessons to the proper level for individual students?
Q18. How much can you use a variety of assessment strategies?
Q20. To what extent can you provide an alternative explanation or example when students are confused?
Q23. How well can you implement alternative strategies in your classroom?
Q24. How well can you provide appropriate challenges for very capable students?

Five Mursion sessions were scheduled for each group of general and special education teacher candidates across the fall and winter terms. Participants in each respective class were assigned a teaching partner so that they could co-teach a lesson in the simulated learning environment with a middle school class of avatars with diverse learning abilities, one of which specifically has characteristics of a student with a reading learning disability. The co-teaching partners planned instruction for the middle school avatars on how to use informational texts and content-specific vocabulary. Participants taught the same lesson across all Mursion sessions and started the lesson at the beginning each time. The researchers decided to do this because recommendations for teaching with technology maintain that teacher educators should ensure sufficient repetition during coaching-centered learning [57].

Teacher candidates in this study worked with a small group of five, diverse, middle-school-aged avatars (see Figure 1) who displayed a variety of learning strengths and needs that teacher candidates could ascertain through conversation and interaction. Coaching guidance during each Mursion session was provided for the special education students by the general education professor and coaching for the general education students provided by the special education professor. Each respective professor observed each of the simulations and took anecdotal notes on each of the participants specifically on their use of high-leverage practices, including explaining and modeling content, practices, and strategies; coordinating and adjusting instruction during a lesson; and checking student understanding during and at the conclusion of lessons. High leverage practices were a focus in observations, as well as in planning for the class sessions attended by the students when they were not teaching Mursion. High leverage practices demonstrate the potential of bridging the research to practice gap and create shared understandings of effective teaching across programs [54]. Following each Mursion session, all participants completed an open-ended self-reflection and responded individually to the following questions: (1) What do you think went well during your session today, (2) What would you change for your next session, and (3) What goals do you have for you and your teaching partner for your next session?

After the final Mursion session, all participants completed the TSES scale again to gather post-study perceived self-efficacy of their individual teaching practices so that the researchers could determine changes in perceived self-efficacy between pre- and post-administrations.

3.3. Data Analysis

The researchers used a qualitative phenomenological approach to analyze the data collected, aiming to develop a clear and articulate description of participants' experiences in the Mursion simulated learning environment. As part of the procedures for phenomenological analysis, the researchers did not have any preconceived ideas or themes when coding the data. The researchers looked at participant responses both individually and as a whole group to horizontally derive specific topics and/or themes of meaning through a scaffolded approach [58].

The pre- and post- self-efficacy responses and open-ended self-reflection responses were entered into an Excel spreadsheet. Pre- and post-TSES [56], participant open-ended self-reflections, and researcher's anecdotal observation notes from each Mursion session were analyzed, noting when specific behaviors or interactions occurred [59]. Participants' self-reflection responses were qualitatively coded using the constant comparison method noting for specific keywords and phrases, including

strategies, self-efficacy, collaboration, explicit instruction, high leverage practices, and coaching [60]. After all pre- and post-self-reflection responses were coded by theme, the researchers collectively reviewed all of the reflections and double-coded the responses to determine and establish inter-rater reliability. Inter-rater reliability was calculated by counting the total number of ratings in agreement and the total number of ratings. The total was divided by the number in agreement and converted to a percentage indicating inter-rater reliability of 95%.

Pre- and post-TSES scores were analyzed through descriptive analysis which supported the phenomenological methodology in that it assists in the recognition of a socially meaningful phenomenon through the identification of salient features, relevant constructs, and available measures. Descriptive data also noted when patterns in the data are observed and subsequently communicated in a format that is well suited to depict the phenomenon [61].

4. Results

4.1. Research Question 1

The first research question investigated was how can Mursion support teacher candidates in improving their teaching skills? Data from the open-ended student reflections indicated that across all participants ($n = 37$), a majority increased their perceived self-efficacy in explicitly explaining and modeling content between initial and final sessions. Half of all participants demonstrated improvement in integrating strategies for teaching a concept, and 60% of all participants became more mindful of individual student participation in their lessons, checking in with greater frequency on student understanding and engagement. However, 100% of participants increased their efficacy in coordinating and adjusting instruction during a lesson. Participant self-reflection data aligned with the high leverage practices noted in the professors' observations: explaining and modeling content, practices, and strategies; coordinating and adjusting instruction during a lesson; and checking student understanding during and at the conclusion of lessons.

4.2. Descriptive Statistics

4.2.1. Special Education Preservice Teachers

Descriptive statistics from the TSES pre-assessment special education preservice teachers resulted in an overall mean of 6.21 and a standard deviation (SD) of 1.74 across all TSES instructional strategy questions. Post- assessment results indicated an overall mean of 7.29 and an SD of 1.35. When investigating the TSES instructional strategy question responses individually, the largest difference in means (1.79) between pre-/post- was found in question 23: How well can you implement alternative strategies in your classroom? The smallest difference in means (0.69) between pre-/post- was found in question 20: To what extent can you provide an alternative explanation and/or an example when students are confused? (see Table 3).

Table 3. Preservice special education teacher pre-/post-TSES instructional strategy descriptive statistics.

n = 19	Pre-Test	SD	Post-Test	SD	Difference in Means
Q7	6.15	1.74	7.21	1.35	1.06
Q10	6.42		7.47		1.05
Q11	6.21		7.21		1.00
Q17	6.21		7.36		1.15
Q18	5.63		6.78		1.15
Q20	6.73		7.42		0.69
Q23	5.73		7.52		1.79
Q24	6.63		7.36		0.73

4.2.2. General Education Preservice Teachers

Descriptive statistics from the TSES pre-assessment general education preservice teachers resulted in an overall mean of 5.98 and a standard deviation (SD) of 1.36 across all TSES instructional strategy questions. Post- assessment results indicated an overall mean of 6.85 and an SD of 1.34. When investigating the TSES instructional strategy question responses individually, the largest difference in means (1.41) between pre-/post- was found in question 10: How much can you gauge student comprehension on what you have taught? The smallest difference in means (0.53) between pre-/post- was found in question 7: How well can you respond to difficult questions from your students? (see Table 4).

Table 4. Preservice general education teacher pre-/post-TSES instructional strategy descriptive statistics.

n = 17	Pre-Test	SD	Post-Test	SD	<i>Difference in Means</i>
Q7	6.35	1.36	6.88	1.34	0.53
Q10	5.64		7.05		1.41
Q11	5.94		6.94		1.00
Q17	5.64		6.41		0.77
Q18	6.23		6.94		0.71
Q20	6.64		7.29		0.65
Q23	5.41		6.58		1.17
Q24	6.00		6.70		0.70

This descriptive data indicates growth across both groups (general and special education) of teacher candidates perceived self-efficacy in instructional strategy related questions. Differences between groups can be explained by aligning self-efficacy measures with both topics and timing in the students' coursework. Both course syllabus calendars highlighted specific instruction related to high leverage practices as topics for class sessions and these aligned with the dates of students' Mursion sessions and their teaching reflections. This allowed the researchers to triangulate growth not only in the pre- and post-test TSES measure and post-Mursion self-reflection responses, but also by what was covered in class.

The special education preservice teachers were in their first year (first term) of a two-year program and were taking their first reading course. This reading course provided them with new strategies for teaching reading specifically to students with disabilities each week. The data indicated that their repertoire of strategies grew, offering them many alternative strategies for teaching vocabulary and reading, as indicated by the large difference in means in TSES Question 23. However, because they were at the beginning of their program, their knowledge of differentiating ways to explain concepts and strategies had not yet been fully covered, as indicated by the smallest difference in means in TSES Question 20.

The general education students' scores indicated similar insights. This study occurred during a degree required content literacy course, which focused heavily on reading comprehension. Class time was split between the content for the course and participation in Mursion sessions. Consequently, the largest difference in means for their self-efficacy scores appears in TSES Question 10 reflecting on their ability to measure reading comprehension. Relatedly, the lower difference in mean scores for TSES Question 7, as they reflected on their efficacy in responding to difficult questions, indicated a disconnect between the teaching they were doing for Mursion—vocabulary and reading comprehension, and a major focus of their other coursework, which was advanced pedagogy in their respective content areas (e.g., social studies, math, science). Many of their comments in class implied an assumption that teaching reading was still very much a basic skill and higher-order teaching occurred in their content areas. Changing this perception was a major focus of the class, and final exam scores indicated it had been met, but the focus area of vocabulary instruction in the Mursion sessions limited their conception of growth in their response to Question 7.

Importantly, measures of growth across all TSES instructional strategy questions from pre- to post-measures demonstrate the impact of integrating Mursion sessions into their coursework. Immediate application of research (strategies learned in class) to practice (repeated teaching in Mursion to practice learned strategies) afforded an increase in the teacher candidates' perceptions of their self-efficacy in using high leverage practices in their teaching as outlined in Table 1. It is apparent that this growth was facilitated by both the Mursion technology and the purposeful alignment and adjustment of the courses to integrate technology for learning.

4.3. Qualitative Data Analysis

Qualitative data was taken from the students' reflections after each session. Student statements lend strength to the patterns indicated in the descriptive statistics included above. Qualitative data is organized below with headings of the high leverage practices that were used for coaching and observations. These are followed subheadings organized by themes from the coding of open-ended responses to the reflection questions to demonstrate their connection to the HLPs (see Table 1).

4.3.1. Strategies

For each of the five sessions, student pairs submitted new lesson plans, refining them each time. Over time, we noticed that lessons were refined to include more explicit descriptions of modeling content and strategies. One participant stated, "I want to make sure that I use various modalities and strategies to help the students make connections with the text through pictures, games, keywords, and using their own words." Other student reflections demonstrated attention to key strategies that had been emphasized in class the week before. For example, after learning about being explicit about expectations, one student wrote, "Add a target to the agenda so students know what is expected of them; Begin quicker as not to waste time." After a class session focused on visual aids and other scaffolds for supporting learning, one pair incorporated more visual aids in their teaching. One partner reflected, "The visual aids really added more interaction with the students this time and gave us a chance to go into expressions that are familiar to them by using emojis." All student lesson reflections demonstrated their growing understanding of class concepts and increased efforts to apply them in their teaching. The immediate time they were given to adjust their lessons and then try to teach the same lesson again with their planned adjustments demonstrated increased specificity in their reflections on strategies and their benefits for learning. These themes were directly correlated to the following HLPs: Explaining and modeling content, practices, and strategies (#2) and Using explicit instruction (#16) (see Table 1).

4.3.2. Self-Efficacy

Self-efficacy was demonstrated by the application of their classroom learning into their lesson plans each time, as well as through statements indicating their increased self-efficacy toward teaching content using high-leverage practices. Their statements demonstrated a marked shift from more abstract and general statements in the beginning, such as "I brought a positive attitude to my teaching" to statements that were more specific about how they would teach the next time, such as the Gen Ed student who said, "I will decrease the intro/relationship-building process in the beginning and focus on building relationships through the lesson activities; I will give students more time to practice using the words and definitions." A special education preservice teacher recounted after their fourth session, "I am improving by having a good base and options for lessons and activities; an understanding it does not have to be perfect. I make sure that I utilize people and resources that are available through my program and I'm realizing it's okay to practice."

4.4. Collaboration

Students in both groups demonstrated an increased awareness of partner interactions in teaching in their reflections. One special education/preservice teaching pair reflected, "We collaborated very

well today. We made adjustments quickly and effectively and our teaching plan was effective. We used explicit instruction and had great student engagement.” When reflecting on areas of improvement, they stated, “I would try to talk less and give my teaching partner more space to speak spontaneously; I would attempt to be more time conscious and I would stick to the lesson plan better.” One general education preservice teacher wrote, “My partner and I problem solved our pattern of flaws and identified a solution to change our co-teaching method.”

4.5. Action Based Goals for Future Teaching

In each reflection, students were encouraged to set goals for their future teaching. Over time, reflections demonstrated an increased specificity in action toward goals for future teaching. One participant reflected, “I was very proud of this lesson. We got straight to the point of the lesson which was vocabulary and had equal amounts of input and control as teachers; we were also able to incorporate a visual activity which was a goal from the last session.” Another participant wrote, “Our last lesson felt streamlined and focused; The goal was to review vocabulary words from the article, practice strategies for understanding, and make connections to the text; I feel like we accomplished that tonight.” Student goals also demonstrated increased efficacy by suggesting actions aligned with the goal. A general education preservice teacher wrote, “We should not spend as much time in the warmup. Time management is something I would change for next time; I would wear a watch so I can manage time better.” Rather than writing a goal and reflecting that they weren’t sure how to improve as appeared in many beginning reflections, later reflections continued to indicate a better sense of not only what to improve, but how, such as this reflection from a special education/preservice teaching pair, “Today’s sessions did not flow as well as I hoped; Since we attempted a new approach, maybe we could have done more prep and troubleshooting; I want to discuss making a more meaningful connection with both vocab and pictures.” These two themes correlated directly with the following HLPs: Coordinating and adjusting instruction during a lesson (#6) and Adapt curriculum tasks and materials for specific learning goals (#13) (see Table 1).

4.6. Differentiation

Student reflections exhibited growth in authentic understandings of individual student needs. Reflecting on attention to individual student needs, participants set goals to increase their attention and teaching toward student needs. From example reflections, “Next time, we would encourage students to make more personal connections with the vocabulary words; see if students can come up with their own definitions and more creative sentences”, “We could use a visual; Harrison had a hard time finding the word assess and it may have been easier if he could have seen it”, and, “In our next lesson, we could integrate activities students can do independently or with a partner to practice the skills; integrate more differentiation specific to Harrison.” These insights that focused specifically on Harrison (a Mursion avatar who exhibits characteristics of a learning disability) demonstrated student attention to differentiation, an inclusive classroom that provides personalized instruction for a student who may have a learning disability, and increased attention to student needs rather than teacher needs. This theme correlated directly with the following HLPs: Checking Student Understanding During and at the Conclusion of Lessons (#15) and Provide positive and constructive feedback to guide students’ learning and behavior (#22) (see Table 1).

4.7. Instructional Coaching

Data from this study suggest that sessions in the Mursion simulated learning environment, in addition to instructional coaching, were effective tools that allowed for increased reflection and improved teacher efficacy. Continued Mursion sessions that combined instructional coaching with self-reflection offered teacher candidates the opportunity to continue to make changes that increase their self-efficacy in teaching, heighten their ability to work with students who have differing learning

needs, structure their instruction to be more direct, explicit, and strategic, and practice intentional improvement aligned with their self-identified teaching goals.

4.8. Research Question 2

The second research question investigated: How can Mursion support EPPs in practicing specific pedagogical teaching skills/strategies that can be disconnected from practicum experiences? This study provided a cross-programmatic impact. As students were able to experience microteaching and repeated practice through their participation in the five Mursion sessions, other professors who were not part of this study noted the students' improved attention to applying specific strategies in their planning in pragmatic and effective ways, especially while teaching vocabulary which was the focus of these sessions. One example of this was from a science content pedagogy instructor stating that the student was "speaking up with more confidence about how to teach vocabulary in peer planning sessions in class". This evidence of transfer between the Mursion experience and other coursework is a positive development across content strands.

Finally, as these researchers continued to collaborate, it became evident that there was much about our students' field experiences that we did not know. As we shared coaching observations after the sessions and discussed the teaching we were witnessing from our preservice teachers, we acknowledged the disconnect we had from their development as teachers by not supervising them in the field. We realized that there were many changes we could make within our own programs that would help us to align our coursework more closely with the field experiences of our preservice teachers. Knowing that teacher candidates are more likely to be effective and to stay in the profession when their preparation experiences are connected to classroom practice [62], we have built-in more experiences where our students participate in case studies, video analysis, role-playing, and ultimately, Mursion. Consequently, finding methods for bridging the gap between siloed areas of study, such as special education and general education, can lead to an increased shared understanding of both disciplines, the importance of collaboration, and more authentic integration of high leverage practices for inclusive classrooms.

5. Limitations

Limitations to this study include data sampling from one institution of higher education as well as the convenience sampling of the students enrolled in the researcher's respective reading courses in the general and special education preparation programs. Additionally, the researchers had access to Mursion and funding that supported the hourly costs associated to run the simulated sessions. Mursion is not accessible unless a site has a contractual agreement and funding to pay for the related sessions and services.

6. Directions for Future Research

Educator preparation programs need to provide early opportunities for preservice teacher candidates to repeatedly perform the same or similar teaching tasks designed with their current pedagogical skills and content knowledge in mind. During repeated practice, preservice teachers should strive for incremental improvement by closely monitoring performance, looking for clues, examining performance data, and asking questions that prompt reflection. Simulated learning environments hold immense potential for fieldwork in EPPs which can be facilitated through the combined use of instructional coaching. Additional studies examining the combined constructs of using a simulated learning environment in combination with instructional coaching with preservice teachers would continue to verify the impact of their increased use in EPPs.

7. Conclusions

Learning how to effectively teach to the diverse needs of students is an art and takes a variety of opportunities for teacher candidates to understand the multifaceted aspects associated with

the daily functions of a classroom. “With increased expectations for inclusive models of K-12 education for students with disabilities, there has been an emphasis on effective collaboration among general and special education teachers” [63]. EPPs need to consider the importance of training teacher candidates to work with typically and atypically developing students both academically and behaviorally. “Specifically, when working with students with disabilities, collaboration is more than just working together and takes effort, diligence, and training” [64] (p.84). Further, research has long recommended the integration of technology for improved outcomes in educating preservice teacher candidates, demonstrating strong benefits. Dieker, Straub, Hughes, Hynes and Hardin [37] discussed the benefits of a simulated learning environment, stating, “We’ve found that just four 10-min simulator sessions on specific teaching practice—such as how to give targeted feedback or how to ask open-ended questions—can change at least one crucial teaching behavior” (p. 56). Our research affirms this conclusion.

With the landscape of today’s K-12 classrooms changing, preparing all teachers to effectively support and teach a diverse group of students with and without disabilities is imperative for today’s inclusive classrooms. “Collaboration should take into account that all team members should demonstrate strong pedagogical and communication skills, the ability to share knowledge, and willingness to find the time to support teamwork where all members are responsible and accountable” [65] (p. 105). Increased opportunities for early professional collaboration in EPPs will allow teacher candidates to model and be coached on effective academic and behavioral pedagogical strategies to best support the differentiated needs of learners in the classroom.

As efforts to improve EPPs continue and evidence of the benefits of experiential learning effectiveness grows, so does the need for innovative ways to incorporate such aspects into higher education courses. The need for the use of such environments in EPPs is growing because of the changing demographics of both students and teachers in today’s schools. Therefore, virtual simulations have the opportunity to potentially change the way in which preservice educators are trained. These environments also benefit the teacher educators working with preservice candidates who may not have the opportunity to observe them in their fieldwork. By working with candidates in this environment, coursework is refined to better match the reality of the field experiences.

First, teacher candidates often lack the readiness to learn the difficult and complex skills they are to master. Rather than being eager to learn about instructional design, many students are more interested in classroom management and discipline when they first begin education course work. They are simply too new to be prepared to discuss differentiation, alignment, and adaptations to their planning and instruction. Second, teacher educators need to provide instructional settings that are authentic in their emphasis on candidate learning. Often, traditional field placements are high stakes settings that don’t allow our candidates to experiment and grow with ongoing feedback. These settings don’t allow them to try out their ideas because candidates are immediately put on stage with no chance for rehearsal. They can quickly fail by losing control of the class, losing face in front of their more knowledgeable mentor teacher, or only teach a lesson once and not be able to adjust before moving on to the next lesson. Simulated learning environments remedy these issues while offering EPPs robust options for integrating high leverage practices into authentic teaching experiences that connect coursework and fieldwork.

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