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Improving Instructional Practices of Special Education Teachers through Virtual Simulation and Video Coding: A Demonstration

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The purpose of this multi-phase study was to connect pre-service teachers with emerging technologies to measure changes in providing reflective feedback and improving instructional practices. 120 participants engaged in technology-aided teaching experiences using the TLE TeachLivE™ program to provide students with a low-stakes teaching environment to practice research-based and culturally responsive teaching strategies. A video (https://youtu.be/xqfpMBaZj2g) presents student reflections of their learning via the use of this technology.

Introduction

Teachers play a vital role in children's lives. Without question, teachers must be well prepared to handle challenges our schools face in the 21st century. Being enrolled in a strong teacher preparation program is the start of the journey to becoming an effective teacher. Strong teacher preparation programs provide teachers with opportunities to reflect on their performance and improve practice based on feedback from a variety of sources (e.g., faculty, peers, external clinical educators).

Feedback is essential to improved practice among teacher education students (Copland, 2010; Ferguson, 2013). These researchers also credit feedback as being the most influential factor on learning and achievement. Feedback is defined as "information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding" (Hattie & Timperley, 2007, p.81). According to Hattie and Timperley (2007), the type of feedback provided and the manner it is delivered is what determines its effectiveness.The purpose of this research was to understand what graduate students gained from their experiences developing and conducting assessment/research outside of the structured curriculum and how the out-of-class research experience contributed to and/or enhanced their learning within a graduate program. This research is significant and makes a unique contribution to the SoTL literature because little is known about how graduate students involved on research teams with a faculty member learn from the process of conducting research.

Well-prepared teachers and high-quality teaching support successful outcomes for students. Self-reflection is also known to improve teaching practices. Often times, students' perception of their instruction is relied upon when they reflect; however, modern technology opens new possibilities for enhancing reflective practices. Both TLE TeachLivE™ and Studiocode™ have an emerging research base which uses these tools with potential for improving instruction (e.g., Falloon & Khoo, 2014; Straub, Dieker, Hynes, & Hughes, 2015). The TLE TeachLivE™ is a lab that provides students a safe and authentic teaching space in which to practice with virtual avatar students and Studiocode™ allows instructors and teacher candidates to measure the use of specific instructional practices (e.g., opportunities to respond, wait time, types of questions, and use of specific feedback). The purpose of this multi-phase study was to connect these powerful technologies to enhance teacher candidates' reflective feedback and instructional practices.

Organization/Logistics

Participants were 120 students enrolled across seven sections of SED 368: Math Methods for Learners with Disabilities. Participants wrote a lesson plan as a group that consisted of three to four members and taught a portion of it, one at a time, within the TeachLivETM virtual simulation lab using a Japanese Lesson Study format. This format, also referred to as a research lesson, consists of five key elements (i.e., observed by colleagues, collaboratively planned, centered on a particular goal/vision, recorded, and discussed; Lewis, 2000). Specifically, the first person in the group taught for approximately 10 minutes while the other three or four people observed him/her. For the next 10 minutes, the group met and reflected on the first person's teaching. The observing group members provided feedback and offered suggestions for improvement. The second person in the group then taught for 10 minutes while the others observed. The reflective process repeated until all students had the opportunity to teach and receive feedback from their group members. This process is outlined in the video demonstration attached to this paper along with Table 1 below for a visual representation of the timeline for this process.

Table 1: Sample Teaching Schedule for the Lesson Study Groups of Four

Time	Focus Student	Group Members
10 min	Student 1 Teaches	Students 2-4 Observe
10 min	All students meet and reflect on lesson	
10 min	Student 2 Teaches	Students 1, 3, & 4 Observe
10 min	All students meet and reflect on lesson	
10 min	Student 3 Teaches	Students 1, 2, & 4 Observe
10 min	All students meet and reflect on lesson	
10 min	Student 4 Teaches	Students 1-3 Observe
10 min	Students meet for final reflection	

Participants were video recorded when teaching in the TLE TeachLivE™ lab for later analysis using Studiocode™ Software where we looked evidence of the aforementioned teaching practices. While we observed the videos, we also documented specific affordances and challenges teacher candidates had using the TLE TeachLivE™ lab to practice their lessons.

Discussion

The current research was a multi-phase study to examine, understand, and improve the instructional practices of special education teacher candidates. Specifically, we measured students' use of evidence-based practices (e.g., explicit instruction, specific immediate feedback, increased opportunities to respond) and culturally responsive strategies using video coding software (e.g., Studiocode™), observation, and student self-reports/surveys. Students taught lessons in TLE TeachLivE™ lab and used various reflective practices (e.g., video feedback, lesson study) to improve their teaching. The attached video shows a demonstration of this and provides a summary of our findings, relative to student perceptions of their own learning after participating in this experience. Data related to analysis of instructional practices is not reported here at this time.

Implications

The TLE TeachLivE™ lab provided students with a low-stakes teaching environment to practice research-based and culturally responsive teaching strategies. Specifically, participants were able to practice providing explicit instruction, corrective and affirmative feedback, classroom management, and making connections with students. Additionally, participants were able to practice higher-level questioning (e.g., Bloom's Taxonomy). Instructors were able to tag specific teacher behaviors (e.g., wait time, praise,) and provide students with feedback on their performance.

Additionally, researchers were able to gain insight about the social validity of this technological tool (i.e., TLE TeachLivE™) and student perceptions of its helpfulness in terms of their teacher preparation programs. As reported in the accompanying video, participants' feedback regarding their time in the simulation lab was extremely positive. Specifically, a participant stated that "it felt like I was teaching a real classroom." Another participant felt like it "boosted confidence" before teaching for a traditional school site. There were many other comments along those same lines that spoke to the potential of the TLE TeachLivE™ program as an impactful pedagogy.

Limitations

While there were many positive experiences using the virtual lab, there are a few things to consider. First, participants were unable to utilize grouping strategies as the avatar students could not physically get up and move around the classroom. This made it difficult for instructors to assess teacher candidates understanding of those practices. Students were able to write about grouping decisions in their lesson plans, but were unable to actually execute them during the

live session. Next, avatar student response type was limited to individual verbal responses only. Avatar students were unable to respond in unison or use response cards thus limiting questioning techniques participants could use. These are practices instructors would need to assess in a different way. In addition, time required to conduct a lesson study exceeds typical course session length, so instructors need to schedule this outside regular class time. Lastly, participants were limited in technology implementation. Specifically, resources like virtual manipulatives could not be used by the avatar students. On a positive note, as mentioned in the video, Illinois State University now has a site license with the company Musion to create its own virtual simulation lab where it will be possible to customize various scenarios for a variety of professions (e.g., healthcare, business, hospitality) across the university to practice new skills.

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