

The Future of Field Experiences in Distance Education: A Case Study of Co-teaching Practices in a Telepresence-Facilitated Field Placement

Eileen Wertzberger, *Kansas State University*

In an attempt to be more culturally responsive to the needs of its students, universities across the country are leveraging technologies to make their campuses more readily available to a broader student audience. Yet, with the proliferation of online teacher preparation programs, difficulties arise in providing preservice teachers with quality field experiences. This case study examines how telepresence robotic technology was used to facilitate a field experience that would otherwise have been prohibitive in a master of arts in teaching program. While a substantial body of literature examines the use of virtual environments and technologies in educating hard-to-reach populations, little research has been done in how telepresence technologies may effectively bridge the access gap for preservice teachers who are place-bound geographically. The findings from this study suggest that, when coupled with the implementation of effective co-teaching practices, telepresence technology can facilitate meaningful field experiences in real time, for place-bound preservice teachers without local K-12 institutions to host their field experiences.

Keywords: co-teaching, field experiences, telepresence technology, rural education, technology in teaching

For rural communities across the United States, distance teacher- preparation programs address some of the chronic challenges facing rural education: the disproportionately high teacher shortages and lack of access to institutions of higher education (Knapczyk, Chapman, Rodes, & Chung, 2001; Latterman & Steffes, 2017). As more universities across the country offer distance teacher preparation programs, many rural school districts are “operat[ing] under a de facto ‘grow your own’ system in seeking and developing new teacher talent” (Lavalley, 2018, p. 15). Increasingly, distance teacher preparation programs are an instrumental way to recruit and prepare high-quality teachers committed to their communities. Yet, with the proliferation of online teacher preparation programs, difficulties arise in providing preservice teachers with quality field experiences. This case

study examines how telepresence robotic technology was used in conjunction with co-teaching to facilitate a field experience that would otherwise have been prohibitive in a master of arts in teaching program.

Literature Review

Distance Education and Accessibility to Teacher Education Programs

Distance education has been an avenue for broadening access to educational opportunities otherwise not possible (Anderson & Simpson, 2012; Anderson & Dron, 2011; Casey, 2008). According to Casey (2008), the first distance education program, “the Pitman Shorthand training program,” began in 1852, mailing lessons on “cutting edge stenographic practices” to aspiring secretaries, who would in turn mail their completed lessons to the company to

receive their certifications (p. 46). Since then, distance education has continued to evolve, yet with each generation, “correspondence, broadcast, [or] computer mediated” (Anderson & Simpson, 2012, p. 2), the goal has remained relatively the same: leveraging technological advances in an attempt to bridge the geographic and social barriers keeping some individuals from educational institutions.

Indeed, universities across the country are capitalizing on technologies to make their campuses more readily available to a broader student audience. As Gloria Ladson-Billings (2013) notes, the educational experiences of students, and the students themselves, have “change[d] and develop[ed] in remarkable ways” due to the impact of “technology and globalization” (p. 106). While broadband internet access continues to be a challenge globally, the pervasiveness of technology, such as handheld devices, has made it a uniquely powerful mechanism for increasing access to education for students living in remote areas and for decreasing economic disparities globally (Ally, Grimus, & Ebner, 2014; Ally & Samaka, 2013; Inverso, Kobrin, & Hashmi, 2017; Ladson-Billings, 2013). In addition, technologies such as Virtual World and simulators have transformed the power of virtual learning from a one-dimensional transaction between student and teacher to a multidimensional platform that allows for community building and student-centered inquiry, often with the added benefit of reducing the risk of harm to its participants (Dickey, 2011; Johnson & Levine, 2008; Nadolny, Woolfrey, Pierlott, & Kahn, 2013).

Telepresence Technology and the Future of Field Experiences

Integral to teacher preparation programs is the role of field experiences in the overall edification and development of preservice teachers—immersion in authentic teaching environments that require them to learn through direct interaction with students and other professionals. Overwhelmingly, the literature asserts the importance of field experiences in helping preservice teachers develop critical dispositions to their success as future educators, such as merging theoretical frameworks with real-life situations, engaging in reflective

practices, thinking creatively to solve problems, and building relationships with an increasingly diverse student body (Kennedy, Cavanaugh & Dawson, 2013; Phillion, Miller, & Lehman, 2005; Simpson, 2006). The relevance of authentic field experiences is no less significant for preservice teachers in distance teacher-preparation programs serving rural communities (Simpson, 2006).

Telepresence technology is unique in its ability to facilitate field-experience opportunities in real time for place-bound preservice teachers without local K-12 institutions to serve as their hosts. Telepresence technology was originally conceptualized as the refinement of “robotic machines” into “new kinds of versatile, remote-controlled mechanical hands” capable of transforming the work force (Minsky, 1980, n.p.). Since then, the concept of telepresence technology has evolved to include other technological mediums that allow for both physical and social presence so that “a copresent person is . . . cognitively and emotionally involved in the same social space” (Schultze & Brooks, 2018, p. 711). Currently, the use of telepresence technology, although still limited in scope, is expanding in the field of education. Most notable, a growing body of research indicates that telepresence technology is effective in increasing accessibility to educational opportunities for homebound or geographically isolated students (Newhart & Olson, 2017), as well as expanding access to educational specialists for both students and teachers seeking professional development (Han, 2012; Kwon, Koo, Kim, & Kwon, 2010; Mitra, 2009).

The use of telepresence technology in teacher preparation programs is still exploratory, as researchers begin to examine the potential impact of its use. Daley and Murphy’s (2019) pilot study suggests the use of telepresence technology “did not change [preservice teachers’] perceptions of the value of early field experiences,” which primarily consisted of observing the cooperating teacher (CT) in the classroom (p. 68). Further research is needed to gain a more holistic understanding of how telepresence technology should be used in teacher education programs.

In this case study, the telepresence device used was the Double 2 (now in Double 3 production) from Double Robotics, which they note “give[s] you a physical presence at work or school when you can’t be there in person” (Double Robotics, Inc., 2019). The device consists of an iPad port in which the driver’s face is displayed, and the driver is able to see and communicate in real time with others in a remote space. The iPad port is supported by a Segue base that allows the driver to move around the room. Thus, the telepresence device facilitates physical and communicative presence when the driver is unable to physically share the same space as those of the community—professional, educational, or personal.

Co-teaching and the Student Teaching Experience

Whereas traditional face-to-face field experiences may follow a gradual release model, the telepresence-facilitated field experience in this case study began out of necessity as a collaborative venture—one in which the cooperating teacher (CT) and student teacher (ST) co-constructed the parameters of how they would leverage physical and virtual space to best meet the needs of the classroom. The CT’s classroom served as the physical space that housed the telepresence robot; the ST controlled the telepresence robot’s movements virtually from her home computer. Consequently, co-teaching practices became an integral part of the CT-ST relationship.

Co-teaching has its origins in special education, where partnering a general education teacher with a special education teacher allowed for greater “inclusive teaching practices [that] have increased the diversity of general education classrooms” (Gately & Gately, 2001, p. 40). Cook and Friend (1995) noted that students benefit by “bringing the strengths of two teachers with different expertise together,” notably by “reducing the stigma for students with special needs” (pp. 3–4). In addition, co-teaching has been found to be a factor in increasing academic outcomes for all students (Cook & Friend, 1995; Hang & Rabren, 2009).

Soslau, Gallo-Fox, and Scantlebury (2019) define co-teaching in teacher preparation programs as “a model for learning to teach where teacher

candidates and clinical educators work alongside one another and share responsibility for student learning” (p. 265). In this context, co-teaching is more than simply teaching with another teacher—it is the continual, recursive process of co-planning, co-instructing, co-assessing, and co-reflecting that positions both participants as valuable contributors to the classroom environment (Allen, Perl, Goodson, & Sprouse, 2014; Nissim & Naifeld, 2018; Soslau et al., 2019).

Theoretical Framework

Given the multitude of situations that preservice teachers face in their journey to becoming novice teachers, one would assume that the entirety of their experiences is a study in experiential learning; however, as Dewey (1923) notes, “Mere activity does not constitute experience” (p. 163). According to Dewey, “To ‘learn from experience’ is to make a backward and forward connection between what we do to things and what we enjoy or suffer from things in consequence” (p. 164). This definition offers two important premises for understanding experiential learning: it involves recursive action, going “backward and forward” when making connections between action and consequence; and it requires active engagement with their environment in the process of learning. In many respects, teacher development is the art of learning from experience, a craft that requires active engagement, reflection, and awareness as preservice teachers navigate the multifaceted and new interactions that comprise their day.

In keeping with Dewey’s concept of learning from experience, experiential learning theory (ELT) offers a unique framework for analyzing how participants engage in experiential learning, notably in their reflective practices that support their co-teaching practices as they adapt to use of the telepresence technology (Kolb, 2015). ELT posits that learning is “best conceived as a process, not in terms of outcomes,” in which “concepts are derived from and continuously modified by experiences” (p. 37). In this model, learning is described as a “spiral . . . a recursive cycle of experiencing, reflecting, thinking and acting” (Kolb & Kolb, 2009, p. 297). Moreover, learning is experiential when it “develop[s] the students’ personal agency” and

“develop[s] and maintain[s] a community in which students (and staff) share a sense of belonging” as well as “competence . . . in a wide variety of areas” (Carver, 1996, p. 154).

As the first telepresence-facilitated field experience for this university, and with no prior model on which to base this experience, ELT offered a framework for better understanding the unique relational dynamics between the CT and ST via telepresence technology. Specifically, the tenets of ELT illuminated the following aspects of the CT-ST relationship in this field experience: (a) reflective practice for learning (Kolb, 2015; Kolb & Kolb, 2009), (b) engagement with the classroom environment (Dewey, 1923), and (c) sense of belonging (Carver, 1996). What emerged from the case study was the centrality of co-teaching and co-reflective practices in leveraging telepresence technology to make the ST an integral part of the classroom.

Research Rational and Purpose

The Master of Arts in teaching program that serves as the basis for this case study is a prime example of how technology and globalization have spurred innovation to create experiential learning opportunities for preservice teachers while also meeting the needs and demands of an evolving profession. As one of several educational paths to teacher licensure in a Midwestern Division I university, this 12-month online program seeks to recruit and prepare preservice teachers across the country, as well as internationally, for the complexities of an increasingly diverse and evolving world. Central to the success of this program is the way it merges rigorous asynchronous online course work with synchronous field experiences in preservice teachers' respective communities to prepare them for the challenges of the classroom and to foster relationships within their communities.

Yet, as the program continues to grow in geographic scope, difficulties have arisen in providing preservice teachers with quality field experiences. These challenges mirror those of many distance teacher preparation programs, which inevitably have students across a large geographic area, each with its own set of cultural norms and expectations that inform its educational institutions

(Simpson, 2006). In the spring of 2019, the university was unable to reach an affiliation agreement with a school district located in another state, which threatened to leave one geographically place-bound ST without viable options for a preservice teaching field placement. Thus, the program implemented telepresence technology to facilitate a field experience that would otherwise have been prohibitive.

While a substantial body of literature examines the use of virtual environments and technologies in educating hard-to-reach populations (Ally et al., 2014; Bartolome, 2009; Compton & Davis, 2010; Inverso et al., 2017; Nadolny et al., 2013; Nepo, 2016; Saunders, Rutkowski, van Genuchten, Vogel, & Orrego, 2011), little research has been done in how telepresence technologies may effectively bridge the access gap for preservice teachers place-bound geographically. Moreover, the specific factors that influence the CT-ST relationship in telepresence-facilitated field experiences need further exploration. Thus, this study examined how the ST and CT engaged in co-teaching and co-reflective practices in context to the telepresence-facilitated ST field experience.

Methodology

Case study methodology was selected for this research “for what it can reveal about a phenomenon, knowledge we would not otherwise have access to” (Merriam, 1998, p. 33). As the first telepresence-facilitated field experience for this university, case study proved to be “emergent and flexible, responsive to the changing conditions” of the placement (p. 8). This flexibility allowed for data collection processes that were responsive to the needs of the CT, ST, and classroom. Additionally, Florio-Ruane and Clark (1990) note that “the case study, unlike the lived experience, can be held still for the purpose of repeated examination from multiple perspectives” (p. 22). Analysis of data collected in this case study—participant reflections, observations, semi-structured interviews—offered nuance and depth in our understanding of the CT-ST co-teaching experience in telepresence-facilitated field placements.

Participants and Their Local Contexts

The Cooperating Teacher. The CT teaches third grade in a Midwestern rural community of just under 4,000 residents. With 19 years of experience, the CT had mentored numerous preservice teachers throughout her career. She also served as the technology touch point for her school, as her classroom was a hub for piloting new technologies. Thus, the CT's classroom was an ideal setting to host the telepresence robot that the ST would use to facilitate her movements and interactions with students and fellow educators.

The Student Teacher. The ST was a nontraditional student from a Southern state, seeking a master of arts in teaching degree. Due to the university and her local district's inability to reach a mutual affiliation agreement, the ST was left with no local options for a field placement. The ST would drive the telepresence robot from her home computer, manipulating its movements around the room as she worked individually with students and delivered whole-class instruction.

Data Collection and Analysis

Throughout the preservice teaching semester, the researcher gathered and analyzed observations and field notes, three semi-structured interviews, and individual e-mail correspondence between the researcher and the participants. Questions asked during the interview were descriptive and generally followed Spradley's (1979) "grand tour" approach (p. 86). The interview questions and the participants' responses encompassed various topics, including (a) descriptions of their routines, lessons, and interactions with students; (b) their frustrations and successes as they engaged with the technology; (c) their co-planning processes; and (d) their ongoing reflections on their teaching partnership and practices.

One of the limitations of the study was that, due to participant time restraints and different time zones, all interviews were conducted together during their joint planning period. While they were able to elaborate on each other's points, having joint interviews also could have hindered their willingness to express differing opinions on the telepresence-facilitated experience. E-mail

correspondence, while less formal in nature, was a regular part of the field experience process. This mode of communication offered the CT and ST the opportunity to share immediate frustrations or concerns they may have not expressed in their joint interviews.

All data were analyzed using open coding, which allowed for recurring themes to emerge from the data, and subsequently from the CT's and ST's experiences in refining the telepresence-facilitated ST experience (Strauss & Corbin, 1990). Specifically, the researcher engaged in microanalysis of the data, "a form of coding that is open, detailed, and exploratory" (Corbin & Strauss, 2015, p. 70). This method was chosen because "it is designed to focus on certain pieces of data and to explore their meaning in depth" (p. 70). Microanalysis allowed the researcher to select pieces of relevant data as thematic patterns emerged. The data revealed a reliance on co-teaching practices to create meaningful experiences for themselves and the students.

Findings and Discussion

When the CT first told her third grade class they would have a "robot student teacher," the students were both excited and curious—they asked, What will she look like? Will she have arms? Indeed, the word *robot* conjured images more similar to Rosie the robot maid of *The Jetsons* than the Double 2 telepresence robot that would eventually become an integral part of their classroom. For the ST and CT, the initial questions about a telepresence-facilitated student teaching placement were grounded in the unprecedented nature of such an experience: How would it work? Will it work?

The data collected during the semester illuminates how the CT and ST not only made the placement work but also relied on co-teaching practices that maximized the use of telepresence technology. Analysis of the data revealed three key themes in relation to how the CT and ST worked through and with the telepresence technology to create meaningful experiences for themselves and the students: (a) the co-teaching relationship, (b) co-instructional considerations, and (c) co-construction of space. Their experiences offer important insights for future applications of

telepresence technology in education field experiences.

Co-teaching Relationship

Given that a telepresence-facilitated field experience was a new endeavor for the university's Master of Arts in teaching program, the CT, and the ST, the experience was co-constructed by all parties. Both the CT and ST assumed the role of learners, as they adapted to use telepresence technology as the main vehicle for the ST's presence in the classroom. Moreover, the CT and ST worked collaboratively to build a relationship that would support the ST's professional growth, as well as the academic growth of the students. Carver's (1996) framework for conceptualizing experiential learning offers a foundation for understanding the development of the CT-ST relationship as a learning experience. Specifically, Carver notes that experiential learning results in a "share[d] sense of belonging" as learners develop "personal agency" and "competence, which means learning skills, acquiring knowledge, and attaining the ability to apply what is learned" (p. 10).

Developing a shared sense of belonging was a primary goal for the CT as both the CT and ST encountered challenges, some of which were directly connected to the use of the telepresence technology. The CT's guidance was instrumental in ensuring the ST was included in meaningful ways in the daily activities of the classroom. Initially this meant helping the students understand how interacting with the ST via telepresence would be a different experience from a traditional face-to-face field experience. The CT reflected on speaking to the students about listening to the ST: "I emphasize that they need to listen as she is reading and following along in the story because it may cut in and out. . . . It's training their ear to listen to the technology." While CTs typically would expect their students to listen to the ST, the key to including the ST in a telepresence-facilitated experience is not only to listen to the ST but also to listen to the technology, as glitches in the technology may mean the ST is continuing on with a lesson, unaware the students can no longer see her. Thus, to ensure "a sense of belonging" for the ST, the students and CT had to be attuned to both the ST and the technology

that facilitated her presence. Throughout the semester the researcher observed other cases of students' inclusion and engagement with the ST, at the encouragement of the CT: they would tap her screen when it went blank; they would move items out of her way when she was moving from student to student; they would ask her questions about their work and invite her feedback. This, in turn, allowed the ST to continue developing "competencies" in teaching (Carver, 1996, p. 10), despite the challenges the technology presented at times.

In addition to developing a sense of inclusion and belonging, the CT-ST relationship was also strengthened by continual encouragement, even in the face of challenges. One notable challenge entailed the ST's inability to clearly see student work, and her frustrations with feeling like she was getting in the way of the students' learning:

I can't see what they're working on, so I struggle with feeling like a burden. I don't want to keep asking the kids questions when they are working. So that's the struggle. I think structured is great, when we are working on something in a group.

For the ST, the telepresence-facilitated placement positioned her in the classroom in a completely new way, one in which her interactions with students was significantly altered by her lack of physical presence. Her feeling of being "a burden" coincided with her inability to "see what they're working on" and her dependence on having to ask students to share their work with her.

Yet, in that same interview, the CT offered a different perspective on the dynamics between the ST and the students:

Whenever you do ask them questions, I don't think it is bothersome and annoying because, honestly, it keeps most of them on track, in general...To continue encouraging you, it hasn't been by any means a distraction for any of the kids. They enjoy it. I was watching them, and they were excited about you asking them about their stories.

The CT's response to the ST's concerns affirmed her presence in the classroom by highlighting a key role she played in the educative

process of the students (the ST was able to offer proximity control and thus “keep . . . them on track”). In addition, the students welcomed her presence because they enjoyed sharing their stories. The CT’s response aligns with ELT’s second stage of development in experiential learning: reframing, which involves taking “reflective observation” and “examin[ing] assumptions and refram[ing] issues, adopting alternative perspectives that produce a deeper understanding” (Kolb, 2015, p. 58). In this instance, the CT challenged the ST’s initial negative self-ideation and offered an affirming perspective on the ST’s interactions with students.

Throughout the semester, interactions between the CT and ST aligned with Gately and Gately’s (2001) definition of effective interpersonal communication, a communication style that models effective practices whereby co-teachers value each other and their contributions to the classroom environment. During this process, the CT regularly affirmed the ST’s presence:

And they really missed you yesterday. I told them in the morning that you weren’t going to call in, and by the end of the day they were asking “why didn’t she call in?” I told you, she wasn’t calling in! And they were like: “But we missed her! It was really kind of funny! They kept looking over at the Double, like they were waiting for you to come on and start rolling around!”

The CT’s casual mention that the students “missed [her] yesterday” indicated respect and appreciation for the ST’s presence. While this type of communication style is also important in traditional field experiences, it was particularly integral to building a functional co-teaching relationship in a telepresence-facilitated field experience, in which the lack of physical presence meant the ST had to engage with the classroom in new ways.

Co-instructional Considerations

The lack of physical presence also meant the CT and ST had to be strategic in how they incorporated the ST in delivering instruction. Rather than defaulting to one teach, one observe practices as the primary form of engagement, the CT and ST

were intentional in being as actively engaged as possible (Allen et al., 2014; Gately & Gately, 2001). In addition, they had to consider the best ways to fill the ST’s pedagogical gaps in content knowledge, as she learned the material and how to best convey it through telepresence. The ST shared how the students responded to the telepresence-facilitated field experience and their co-teaching during the small-group reading-strategy lessons:

Students have taken to this very well. They say hi. It seems like I’ve always been here. It hasn’t been a huge distraction. The interventions [reading lessons] have been going well. However, I am not able to see students’ work. Sometimes we have feedback issues. For me personally, the struggle is that I don’t know the rules that the CT knows, and she will chime in, thankfully, because I don’t know that stuff. I think that is something that is going to come with the experience of being a teacher.

In this interview excerpt, the ST indicated how the CT would fill pedagogical gaps in knowledge, which the ST attributed to her lack of experience. The CT would offer clarification of content or rephrase content to ensure student learning. During their small-group reading time, the CT and ST continued to refine their practices. They constructed an instructional rhythm in which the CT would pass out manipulatives while the ST would deliver the lesson. The CT would offer follow-up questions to supplement the lesson, as well. More often than not, the CT and ST would engage in the one teach, one assist model of co-teaching, each alternating the lead role as it best suited the lesson and student needs (Allen et al., 2014; Nissim & Naifeld, 2018).

Their instructional rhythm was contingent on continuously reflecting and acting on those reflections, as they built automaticity in their planning and delivery. Tasks that were initially challenging due to navigating the telepresence technology became more intuitive to the CT and ST as the semester progressed. The process of developing automaticity in their teaching practices corresponds with Kolb and Kolb’s (2009) experiential learning cycle, in which learners, as part of a “concrete experience,” proceed to engage in “reflective observation” from which they derive

“abstract concepts” or meaning that leads to “active experimentation,” or action (p. 299). Co-planning presented challenges to the CT and ST that required a degree of trial and error. There was the initial issue of sharing materials and ensuring the ST could access the materials to learn the content and pedagogical expectations. The CT and ST solved this problem by creating a Google Drive folder in which the CT and ST would post the necessary materials for their lessons.

Yet, having access to the materials did not account for the last-minute changes that would often occur as the CT reflected upon their lessons. The CT noted this was harder to do because the ST “wouldn’t have the chance to catch up.” Critical reflection led to “active experimentation,” as they began to incorporate texting into their co-teaching practices to accommodate continuous reflection and shifts in their teaching (Kolb & Kolb, 2009, p. 299). This addition to their in-class communication allowed for immediate changes in the direction of a lesson without causing too much disruption to the classroom setting.

Co-construction of Space

Throughout the ST experience, the CT and ST navigated virtual and physical space to meet the needs of the students. For the CT, navigating these spaces also meant shifting how she positioned herself as a mentor: in addition to addressing the typical concerns in every ST placement, she also had to consider how her teaching practices were being conveyed virtually. When asked how a telepresence-facilitated field experience differed from traditional face-to-face field experiences she had hosted in the past, the CT stated:

I mean, the physical thing is the difference—not having her here. And more, I felt guilty because I was throwing all of this curriculum at her, and I’m trying to explain it through a screen, but not showing it and sitting down, and going through things together. I said to my husband, “I feel like I am ‘on’ all day because I want to be able to do what is best for [the ST], so that she can see.” And he’s like “Aren’t you ‘on’ everyday?” [She laughs] . . . I think of things a little more in depth—she is trying to learn from me, and so I

am trying to think of how do I really convey this lesson without her just seeing it.

To “do what [was] best for” the ST, the CT adapted her practices to ensure the ST could “see” her model content development and delivery. Thus, her modeling took into account the ST’s virtual space. According to Dewey (1938), the essence of an experience is contingent on “the transaction taking place between an individual and what . . . constitutes his environment” (p. 43). For the CT, creating a meaningful learning experience for the ST meant engaging the physical environment (the classroom) in ways that conveyed meaning through the ST’s virtual environment.

The ST also engaged in a “transaction” with “what constitutes [her] environment,” namely, her virtual presence in the classroom (Dewey, 1938, p. 43). The ST’s ability to virtually manipulate the telepresence robot’s movements meant she had a three-dimensional presence in the classroom despite the limited view compared to being physically present. The CT and ST collaborated in making changes to the classroom environment that would prioritize the ST’s presence. The CT described one such change they made in addressing this goal:

The kids really like to be on the floor, but that is one of the things I talked to the kids about, “Like hey, it really is much better for [the ST] to see you and talk to you when you’re up on a table, so that she knows you’re there—or so she doesn’t roll over you.” [CT laughs]

While the telepresence robot allowed the ST to engage in meaningful ways in her field experience, there were limitations in how the ST could engage with others. One notable limitation was that she could not zoom in on objects, and she could not angle her range of vision, which made it difficult for her to help students that were sitting on the floor. Therefore, the CT and ST rearranged the layout of the room to increase not only her mobility but also her access to students.

As the CT and ST adapted to the space together, they developed strategies to communicate more effectively with students. For example, during one lesson, the ST was calling on students to

answer questions pertaining to their reading. In a chair next to her, the CT was texting her the names of students that had their hands raised but the ST may not be able to see. This allowed the ST to call on students that were beyond her peripheral vision. This solution resulted from ongoing reflection and action, as they leveraged their technologies to address spatial concerns. The CT's and ST's consideration for each other's space within the classroom aligns with Kolb's (2015) third stage of experiential learning development: reform, "the process whereby action is reformed by reflection and reflection is reformed and informed by action" (pp. 58–59). In this praxis, the CT was communicating to the students that her co-teacher, the ST, was an integral part of their classroom community (Gately & Gately, 2001; Kolb, 2015).

One of the advantages of the telepresence technology was the CT's and ST's ability to expand the educational space for their students by incorporating the ST's physical space into the classroom. Her hometown became a point of conversation for the students, as they compared their community with hers. The ST was also able to include her family in her ST experience, as noted in her written reflection:

My family and teacher friends were all very interested and curious regarding this experience. It would come up often in conversation regarding how it's being done, etc. My grandfather, who is a Brown University graduate and taught for many years, was very interested. During a spring break trip visiting my grandparents (I was actually in [a different state] . . . and still logged on in [the classroom]) I was able to show my grandfather how the robot works (with the approval from [the CT], of course.) He was fascinated and the students loved meeting him, all saying hello, it was so cute!

In this instance, the telepresence robot facilitated not only the ST's placement but also her ability to share an experience and space with her family and, in turn, an important part of herself with her students. Ultimately, the CT's and ST's manipulation of space reflected their co-teaching relationship, which served as a foundation of the

telepresence-facilitated experience—a foundation built on affirming each other's presence through meaningful inclusion.

Conclusion

Studies in the use of technology in educational settings still tend to focus on asynchronous instruction, which, while increasingly allowing for collaboration and experiential learning, is geared toward simulations rather than synchronous, continuous real-time instruction to real students (Bartolome, 2009; Nadolny et al., 2013; Saunders et al., 2011). As this case study illustrates, telepresence technology can broaden access of distance teacher education programs to place-bound individuals without access to local field experiences. Thus, this study adds to the growing body of research that suggests telepresence technology can have a positive impact on the teaching profession by providing educational opportunities that would otherwise be inaccessible and by supplementing regular classroom teaching (Sharkey, 2016).

However, while telepresence technology can extend opportunities, the strength of the experience is contingent on the partnership built between the cooperating teacher and the pre-service teacher—a partnership that must capitalize on their relational strengths to create meaningful learning opportunities for their students. This study highlighted three key components to the co-teaching partnership between the CT and ST: (a) co-teaching relationship, (b) co-instructional practices and considerations, and (c) co-construction of space. The CT's and ST's engagement in these components required continual co-reflexivity—co-reflection followed by informed co-action. For the CT and ST, this cycle was an intrinsic part of their daily problem solving and collaboration.

For rural schools, such as the one that hosted the ST in this study, welcoming an ST from another community via telepresence can offer new insights and opportunities for their students. As the CT in this study noted, this experience was enriching for her students because it allowed them to see that "someone created a tool to help others, . . . and the world is a bigger place." Furthermore, while the use

of telepresence technology to facilitate field experiences is a relatively new phenomenon, the findings of this research may help inform its use in other areas of education, in particular in addressing the steep teacher shortages facing rural communities.

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About the Author

Eileen Wertzberger taught English language arts at the high school level in Kansas public schools for 13 years and serves as a state officer for the Kansas Association of Teachers of English. She is currently the coordinator of field experiences for the College of Education at Kansas State University, where she is also a Ph.D. student. Her research interests include issues of equity and access in K-12 education, as well as teacher education programs. ejm7777@ksu.edu