5-2017

A Descriptive Case Study of Writing Standards-Based Individualized Education Plan Goals Via Problem-Based Learning in a Virtual World

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A DESCRIPTIVE CASE STUDY OF WRITING STANDARDS-BASED INDIVIDUALIZED EDUCATION PLAN GOALS VIA PROBLEM-BASED LEARNING IN A VIRTUAL WORLD

by

Peter J. Blair

A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Instructional Technology & Learning Sciences

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UTAH STATE UNIVERSITY
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2017

ABSTRACT

A Descriptive Case Study of Writing Standards-Based
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Via Problem-Based Learning
in a Virtual World

By

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The goal of this study was to examine the professional development experiences of two contrastive participants while they were creating standards-based individualized education plan (IEP) goals using a virtual world called TeacherSim. Two specific focuses of the study were on how special educators engaged with the task of creating standards-based IEP goals using TeacherSim and how TeacherSim supported or hindered this process. TeacherSim enabled new social considerations impacting participation and engagement during the professional development activities. This research used a descriptive case study selecting two participants who demonstrated different intensities of the user experience from the larger data set of seven participants. The data was analyzed using qualitative coding which compared the observed experiences with the case

propositions. Both participants' actions in their groups were similar in that they both contributed to their teams as they reflected on and attempted to utilize the Utah Core Standards in their goal creation. These two participants were also similar in their rating on items in Lombard, Ditton, and Weinstein's (2009) Temple Presence Inventory (TPI), a measure of physical and social presence, but different in how these feelings impacted their participation and engagement in TeacherSim. This case study also demonstrated that special education professionals can work at a distance to learn the process of creating standards-based IEP goals while using the technology of a virtual world. Similarly, the use of virtual world technology appeared to facilitate feelings of physical and social presence, which aided in online collaborative activities.

Keywords: case study, standards-based IEP goals, Utah Core Standards, problem-based learning, virtual worlds, physical and social presence

(147 Pages)

PUBLIC ABSTRACT

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The goal of this study was to examine the professional development experiences of two participants while they were creating standards-based individualized education plan (IEP) goals using a virtual world called TeacherSim. The focuses of the study were how did special educators engage with the task of creating standards-based IEP goals using TeacherSim and how did TeacherSim support or hinder this? This research used a descriptive case study selecting two participants from the larger data set of seven participants. The data was analyzed using qualitative coding which compared the observed experiences with the case propositions. This case study demonstrated that special education professionals can work at a distance to learn the process of creating standards-based IEP goals while using the technology of a virtual world. Similarly, the use of virtual world technology appeared to facilitate feelings of physical and social presence, which aided in online collaborative activities.

DEDICATION

I dedicate this dissertation to my dad Dr. James Carson Blair. My dad spent countless hours discussing ideas with me and showed me the importance of research and how it can impact practice. He helped to make my education possible. While my dad died before I completed this degree, he would be happy to know I used the information to improve online education. My mom has been a constant support during the whole process. Thank you both for your encouragement, persistence, and love.

My wonderful wife Leslie and my two amazing boys Owen and Ian have sacrificed the most. Leslie and the boys have given up time together on weeknights and weekends to help me finish. Thank you for your support and faith. Your persistence and dedication have shown me we can accomplish great things.

ACKNOWLEDGMENTS

I would like to express my appreciation to the many individuals who have made this dissertation possible. I would like to thank Dr. Brett Shelton for his encouragement in the program and introducing me to the concept of presence. When he left the university, I was happy that Dr. Mimi Recker and Dr. Nancy Glomb agreed to be cochairs for this dissertation. Dr. Recker has been a source of great insight into the process and has patiently pushed me along to the completion of this work. Dr. Glomb has been a great listening ear and guide to me through the process of this dissertation, and it was through her research grant that I was able to have the financial support that made my whole graduate program possible. It was also through her grant that I was able to develop TeacherSim and have the idea for this study. Dr. Dave Forbush helped craft the problem scenarios and granted permission to work with special education professionals in his district. Dr. Andrew Walker introduced me to problem-based learning and exposed me to a variety of different kinds of research. Dr. Victor Lee introduced me to game-based research and my first attempt at transcribing video, and I appreciated his support on this dissertation. Dr. Jared Schultz gave me opportunities to use TeacherSim and PBL in his counseling theories class and was free with his time as we discussed research ideas. I would like to thank my wife Leslie for sacrificing weekends, evenings, and her time for me to do the work needed. Leslie served as my editor and friendly critic through this whole process.

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CHAPTER 1

INTRODUCTION

In 2002, the No Child Left Behind Act (NCLB) was signed into law, mandating that states develop standards and report outcomes for all students in the key areas of math and reading. In 2004, the reauthorized Individuals with Disabilities Educational Improvement Act (IDEIA) came into effect calling for accountability and "assessments of how students with disabilities progress within the general curriculum," (Lynch & Adams, 2008). However, many special educators see a conflict between the goals of NCLB and IDEIA. Essentially, these professionals must design educational programs that align to the general curriculum while at the same time meeting the specific individualized needs of their students. Some states have addressed this issue by providing alternative "limited" standards for students with disabilities tied to the general state standards (Flowers, Ahlgrim-Delzell, Browder, & Spooner, 2005). Another recent approach by states (including Utah) is the development of a standardized "common-core," for language arts and mathematics used by all teachers to assess all students in a grade level (Samuels, 2011). For special education teachers and speech-language pathologists (SLP), hereafter called special education professionals, writing standards-based IEP goals using the Utah Core Standards is critical because goals in writing are mandated by the law.

To address this issue of tying a student's IEP to the state standards, many special education professionals have attempted to develop standards-based IEP goals. The creation of standards-based IEP goals is a new development with researchers calling for their use beginning in 2008 (Lynch & Adams, 2008; Samuels, 2011). Training and application of standards-based IEP goals is especially important to Utah special education

professionals since the Utah State Office of Education (USOE) is encouraging their use (USOE, 2011). Because many of Utah school districts are rural, training teachers in creating standards-based IEP goals requires travel time and may not provide the training opportunities needed to learn these critical skills.

Under the revised NCLB Act, students with disabilities are to be included in the regular public school classroom as much as possible. Special education professionals, who provide services to children with disabilities, need to write IEP goals that are consistent with the Utah Core Standards. Typically, professional development delivered by districts use traditional/direct instructional methods and focus on the end result of adjusting students goals to include a reference to a Utah Core Standard. However, this kind of professional development does not include enough time to allow for the long-term retention of information through researching and locating material.

In order to encourage long-term retention of information, an alternative to traditional methods could be used. Typically, traditional professional development for special educators does not include collaboration and does not support the application of new knowledge (Leko & Brownell, 2009). Strobel and van Barneveld's (2009) metasynthesis compared the effectiveness of problem-based learning to traditional methods of instruction. They found that effect sizes for traditional methods of instruction were better for short-term retention and when using multiple-choice questions. In contrast, problem-based learning effect sizes were better for long-term retention and application of knowledge. If districts want their teachers to retain knowledge from professional development activities and be actively involved in participating in these

activities then they might pursue less traditional methods of instruction (Dede, Ketelhut, Whitehouse, Breit, and McCloskey, 2009). Inquiry-based methods of instruction have been shown to be significantly "more effective than traditional instruction…[when] promot[ing] long-term retention of knowledge and skills acquired during the learning experience…" (Strobel & van Barneveld, 2009).

Inquiry-based methods of instruction, like problem-based learning (PBL), are instructional models that place the student at the center of the instructional experience. PBL began in medical schools as a way to engage students in applying content knowledge to real-world problems. In PBL, individuals interact in small groups to solve an "ill-structured authentic problem," for which there are many possible solutions (Barrows, 1986). Usually individuals work in teams of 4-6 to determine their current understanding of the problem, to identify their knowledge deficiencies, and to set their learning goals. Learners work to locate helpful information to build toward a workable solution (Savery, 2006). In order to help special education professionals learn to write standards-based IEP goals using the Utah Core Standards, PBL may be an effective learning model (Strobel & van Barneveld, 2009).

Currently, IEP goals are used in IEP meetings where aspects of the goals are discussed and negotiated with other meeting participants including parents, administrators, teachers, and other special education professionals. Thus, in order for professional development to be of greatest value, goals should be created with a team of participants rather than individually. The negotiation and teamwork present in PBL align with the ways special education professionals work in IEP meetings.

However, Troen and Boles (2011) point out that "while team members may demonstrate a desire to collaborate, the fact remains that "team members typically lack the skills, tools, and support structures that would allow them to orchestrate…the collaborative work of the team" (as cited in Hernandez, 2013). Because traditional methods of professional development do not support collaboration between special education professionals, an inquiry-based approach like PBL may be effective.

When professionals are separated by geography, collaborative activities can be difficult. While most special education professionals in an urban district could more easily gather to participate in collaborative activities, professionals in rural districts have a harder time participating because of distance. Distance technologies (like asynchronous communication) can be used as a means to connect with fellow special education professionals from across a rural district. However, a common issue with distance education is that "students in such programs...describe a sense of isolation and frustration…" (Palloff, & Pratt, 2013, p. 22).

While feelings of isolation can be present in distance training and education, there are technologies that may provide greater connection among learners. Biocca, Harms, and Burgoon (2003) differentiated between the kinds of connection people feel when using technology. Specifically, they defined the feeling of being in a different virtual place as physical presence and the feeling of being with another person as social presence. Virtual worlds may help users experience a sense of physical and social presence (Gamage, Tretiakov, & Crump, 2011) or connection. Physical presence can be created through the use of a 3D digital environment that is responsive to actions. Social presence can be

created through the use of avatars and interaction with others (Biocca et al., 2003). It is also important to explore how feelings of physical and social presence impact collaborative activities for special education professionals.

While numerous researchers have described the potential of virtual worlds as an educational and collaborative tool (Dickey, 2011; Warren, Donlinger, & Barab, 2008; Lim, Nonis & Hedberg, 2006), there are few researchers who describe the use of them for professional development activities for special education professionals. As such, the purpose of this dissertation study is to examine the potential of using PBL in a virtual world for the development of standards-based IEP goals.

Problem Statement

Special education law in the state of Utah mandates creating standards-based IEP goals. When special education professionals in rural districts have difficulty attending profession development activities that allow collaboration because of distance, alternatives to traditional methods of face-to-face instruction should be explored. There are technologies available that allow collaboration on the Utah Core Standards and teamwork for professionals at a distance that warrant a closer look.

Because the creation of standards-based IEP goals in a virtual world using PBL methods for professional development is a new approach for special education professionals, a descriptive case study was selected as an appropriate method of describing the experiences of participating professionals. This case study will help other researchers considering similar interventions for special educator professional development. Yin (2013) suggests “case studies are pertinent when your research

addresses…a descriptive question…" and the researcher wants to explore an intervention "…within its real-world context…" (p. 5). Because these professional development activities are meant to help special education professionals practice skills directly applicable to their work, this descriptive case study is relevant to discovering the strengths and weaknesses of this technology.

Objectives

The first objective of this study is to combine an active learning method (PBL) and virtual world technology in a system called TeacherSim. TeacherSim provides support for synchronous collaboration and to help special education professionals at a distance learn to collaboratively write standards-based IEP goals. The second objective is to observer to what extent the technology supports connections between participants and fosters a sense of physical and social presence.

Research Questions

In accordance with these objectives, two research questions guide this study: *How did special educators engage with the task of creating standards-based IEP goals using TeacherSim? How did TeacherSim support or hinder this?*

CHAPTER 2

LITERATURE REVIEW

The literature review for this study uses a variety of sources. I searched the ERIC, ProQuest, EBSCOHost, and Google Scholar databases to locate articles and books relevant to this study. Within these databases, I used the following search terms to identify applicable research: online teacher professional development, professional development for special education, problem-based learning, virtual worlds, and physical and social presence. In addition to these sources, related journals, dissertations, and references from seminal articles were also reviewed.

This literature review focuses on the key areas explored in this case study. The first section outlines studies offering guidelines for effective online professional development and professional development (PD) for special educators. The literature then shifts to focus on PBL definitions and its use as a professional development intervention for special education professionals. This section also explores the ways PBL has been put online and how these attempts impacted the format for activities in TeacherSim and the guidelines used for facilitators. The PBL literature also helped me to determine the staged delivery of the problem to participants in this case study. The literature review then defines physical and social presence and the experiences individuals have in virtual worlds like TeacherSim. Within this section, existing ways of measuring presence are outlined. This section also includes an overview of the instrument used in this study to measure presence.

Teacher Professional Development Online

One of the most cited researchers in the field of teacher professional development, Borko (2004), suggests that research of professional development can be described in three phases. During phase one, "research activities focus on an individual professional development program at a single site. Researchers typically study the professional development program, teachers as learners, and the relationships between these two elements of the system" (p. 4). The current case study of TeacherSim is phase one research; and, as such, considers the professional development program and teachers as learners. Borko describes using a "situative tradition [that] allows for multiple conceptual perspective[s] and multiple units of analysis" (p.4). She describes that teacher learning "occurs in many different aspects of practice, including their classrooms, their school communities, and professional development courses or workshops…" (p.4). For Borko, researchers should approach teacher learning with the intent to "…study it in…multiple contexts, taking into account both the teacher-learners and the social systems in which they are participants" (p. 4). The units of analysis in the "situative tradition" are teacher knowledge and practice, group interaction in learning communities, and records of teachers practice (Borko, 2004). Within the context of this case study, only individual knowledge and group interactions are used for analysis. Borko suggests that the goal of phase one research is "to create an existence proof; that is, to provide evidence that a professional development program can have a positive impact on teacher learning" (p. 5). Since this case study is phase one research and focuses on individual teachers and their interaction with the Utah Core Standards, the research existence proof is how these

teachers reflected on and described using the standards as a tool to their goal writing. For their group interaction, the "existence proof" is feelings of physical and social presence as they interacted in TeacherSim.

Moving from Borko's theoretical assumptions of how to study teacher professional development, Garet, Porter, Desimone, Birman, and Yoon (2001) used a national sample of teachers to determine the effects of different professional development types on teacher learning. Garet et al. conducted a large-scale (n=1,027) empirical study comparing the effects of different professional development types on teacher learning. These authors found that effective professional development "…focuses on academic subject matter (content), gives teachers opportunities for 'hands-on' work (active learning), and is integrated into the daily life of the school (coherence), is more likely to produce enhanced knowledge and skills" (p. 935). Accordingly, the TeacherSim professional development activities were created to focus on the content areas of creating standards-based IEP goals, incorporating active learning through the use of the PBL instructional strategy, and using the "daily life of the school" by using the virtual space of TeacherSim.

One of the most common concerns with online professional development is that it is less effective for teacher learning than traditional face-to-face professional development. To explore this issue, Fishman, Konstantopoulos, Kubitskey, Vath, Park, Johnson, and Edelson (2013) compared the impact of both online and face-to-face professional development outcomes focusing on "classroom practice and student learning as outcomes of PD" and "…found no difference in outcomes as a function of PD

modality" (p. 427). Fishman et al. praised the convenience of online professional development but wondered, "[i]s there a loss in terms of building trust and local collegiality, or providing teachers with hands-on experiences?" (p. 428). One of the areas of the present case study is the desire to determine if "trust and local collegiality" can be shared in the form of physical and social presence in the virtual space of TeacherSim, thus addressing this common concern with online professional development.

Work by Moon, Passmore, Reiser, and Michael (2014) responded to Fishman et al. (2013) and highlighted some "generally agreed upon PD tenets..." (p. 173). Specifically, online professional development needs to "be embedded in subject matter," "involve active sense making and problem solving" and "be connected to issues of [the] teacher's own practice" (p. 173). Moon et al. also suggested the need for the field to move beyond media comparison studies to determining "…how these web-enabled and social media capacities interact with teacher learning and whether or how they are in line with established ideas about professional learning in general" (p. 175). As a descriptive case study, this research seeks to determine how a "web-enabled" space for professional development activities impacts teacher learning as they interact with the Utah Core Standards.

Lawless and Pellegrino (2007) reviewed the literature on what constitutes quality professional development and found that effective interventions "are longer in duration (contact hours plus follow up), provide access to new technologies for teaching and learning, actively engage teachers in meaningful and relevant activities for their individual contexts, [and] promote peer collaboration..."(p. 579). These authors provide a

useful model for evaluating technology used in professional development for teachers. Key areas in their model include: "type of professional development (delivery mechanism, content, and duration), unit of analysis (program outcomes, teacher change, student achievement), and designs and methods (descriptive, case studies, and experimental studies)" (see Figure 1 in their article p. 583). These authors suggest, like Borko (2004), that professional development program research should progress through three phases with the first phase focusing on the intervention and specifically defining the delivery mechanism, the content, duration, and teacher learning. Usually, this first phase is a case study or a descriptive exploration. In line with these principles, this case study defines the delivery mechanism as the TeacherSim environment, the content as the PBL format for learning about standards-based goal creation, the duration as several meetings and teacher learning as reflection, and the interaction with the Utah Core Standards as a tool for goal writing.

To summarize, this descriptive case study fits within the initial phase of professional development research that Borko (2004) and Lawless and Pellegrino (2007) suggest need to occur when exploring the effectiveness of professional development for teachers. The creation of the professional development activities using PBL methods within TeacherSim also attempt to follow the "generally agreed upon PD tenets" (p. 173) as outlined in Moon et al. (2014). Based on Moon et al.'s described tenets, the TeacherSim activities focused on creating a standards-based IEP goal which is "embedded in [the] subject matter," for these professionals. As the participants interacted with the Utah Core Standards, they engaged in "active sense making and problem

solving." Because creating a standards-based IEP goal was relevant to each of the professionals, the TeacherSim activities were a part of their practice (p. 173).

Shifting from the theoretical basis of effective professional development in online settings, I now summarize relevant literature for professional development activities of special educators.

Professional Development for Special Educators

When searching for articles relevant to professional development for special educators, the majority of the results between the years 1997 and 2015 focused on preservice education rather than professional development for inservice teachers. Searching with the terms professional development, special educator, and problem-based learning resulted in four studies since 1997 with three of the studies including the same author (Leko & Brownell, 2009; McLinden, McCall, Hinton & Weston, 2007; McLinden, McCall, Hinton, Weston, & Douglas, 2006; McLinden, McCall, Hinton, & Weston, 2010). Searches on the ProQuest database returned similar results since most of the studies focused on preservice teachers (students) rather than inservice professionals. However, several studies were found that were relevant to this case study.

Leko and Brownell (2009) suggest that many special education teachers "believe that school-wide…PD efforts have failed to meet their specific needs" (p. 64). These authors reported reviewing the literature from the last thirty years; and, based on their review, suggested four guidelines for effective professional development for special educators. These guidelines include making the training "coherent," "content-focused," "active and situated in classroom settings," and that any professional development should

be collaborative and "include student data" (p. 67). For Leko and Brownell "coherent" means matching teacher needs with national standards and district-wide curricula (p. 67). Professional development interventions that include instruction on how to use standards-based IEP goals align well with this recommendation. Therefore, the TeacherSim case study followed this recommendation by including the Utah Core Standards as a tool for developing standards-based IEP goals.

Leko and Brownell's second suggestion that professional development be "content-focused" means that interventions should center on and elaborate how to apply content area information to students with disabilities. Considering the needs of students with disabilities and how to help them using different strategies in the content area was outside of the scope of this study. However, content area interventions (individualized instruction results for the two child scenarios) were described in the material available to participants as part of the TeacherSim intervention.

Leko and Brownell's third suggestion for professional development is for the activities to be "active and situated in classroom settings" (p. 68). Since the TeacherSim intervention mimicked a traditional classroom where professionals could actively learn about writing standards-based IEP goals, this suggestion was also used in the creation of the TeacherSim intervention.

The fourth and final element of effective professional development for special educators that Leko and Brownell suggest is that it needs to be "collaborative and use student data" (p. 68). As described next, PBL is structured in such a way that collaboration is integral to the process. Similarly, the TeacherSim intervention was

created to provide the "student data" needed to help special education professionals learn to create standards-based IEP goals. Leko and Brownell's four research-based recommendations for professional development for special educators informed the creation of the TeacherSim intervention. These sources defined the components of effective professional development for special educators. By adding PBL to my research, I was able to identify an instructional method for the activities in TeacherSim for this case study.

Definitions of PBL

PBL is a curricular and instructional method developed by Barrows and Tamblyn (1980) as a way of engaging medical students in the learning process. These researchers noticed that medical students could learn vast amounts of knowledge but not apply that information effectively to patient cases. PBL was developed as a way to help students apply their knowledge to meet the needs of their patients. According to Hmelo-Silver and Barrows (2006), PBL is characterized by the use of "[i]ll-structured problems...that cannot be solved by a simple algorithm," (p.24). Students work in groups to identify what they know about the problem, to identify learning gaps, and to create possible solutions to the problem. Students answer their questions through self-directed learning with instructors helping to facilitate the process. One of the central questions of the PBL literature has asked what constitutes PBL and how is it implemented in a school (Boud and Feletti, 1991; Barrows, 1986). Barrows has contended that PBL cannot be properly implemented unless it is at the school or curriculum-level. Savin-Badin (2007) explains that the literature has suggested:

> there are two types: the pure model and the hybrid model. The argument here is that either the whole curriculum is problem-based and is modeled on the McMaster version of problem-based learning whereby students meet in small teams and do not receive lectures or tutorials, or it is the hybrid model, which is usually defined by the inclusion of fixed resource sessions such as lectures and tutorials which are designed to support students. (p. 10)

The downside of this dichotomy is that, according to Savin-Badin, most implementations of PBL would be classed as hybrid models. Accordingly, I follow Savin-Badin's (2007) definition of PBL, which states that:

> Problem-based learning is thus an approach to learning that is characterized by flexibility and diversity in the sense that it can be implemented in a variety of ways in and across different subjects and disciplines in diverse contexts. As such it can therefore look very different to different people at different moments of time depending on the staff and students involved in the programmes utilizing it. However, what will be similar will be the focus of learning around problem scenarios rather than discrete objects. (as cited in Savin-Baden, 2007 p. 10)

I would add to Savin-Badin's definition Hmelo-Silver and Barrows (2006) directions for a facilitator in PBL. According to Hmelo-Silver and Barrows (2006), the facilitator does not provide direction for areas to research or solutions. Students determine the learning goals and identify appropriate research areas themselves that may help to provide a solution to the problem. After student teams have independently conducted their research, they regroup to reassess their knowledge in relation to the problem with the facilitator and make any new learning goals and research plans (Hmelo-Silver & Barrows, 2006). At the end of the PBL segment, student teams describe their proposed solution from their research results to either their peers or the course instructor for discussion. After solution presentations are given, the facilitator holds a debrief session with the students to help them reflect on the process and the lessons learned from the segment (Barrows, 1986). The benefit of this combined definition, specifically the use

of a problem as the centerpiece of instructional interaction and the role of a facilitator in the learning, is that it is more inclusive of the kinds of PBL activities done across a variety of disciplines. This definition of PBL impacted the development of the TeacherSim instructional activities by determining the format of the activities as well as the guidelines for the facilitators.

PBL as a Professional Development Intervention for Special Educators

While several studies were found that related to the use of PBL in special education, the majority of them focused on preservice teachers (Gerber, English, & Singer, 1999; Levin, Hibbard, & Rock, 2002; Ochoa & Robinson, 2005). However, the study by McLinden, McCall, Hinton, and Weston (2010) related to professional development for special educators and described the creation of an online PBL intervention used for the professional development in the United Kingdom. McLinden et al. created a series of role-play scenarios where the teachers collaborated with their PBL team to draft a plan to meet the needs of a hypothetical student with visual impairments. These authors designed several scenarios to be delivered through the WebCT learning management system (LMS) "with partial information released to the students on a 'drip-feed' basis and, as such, … designed to reflect the way in which problems are tackled in real settings where full information may not be available…" (p. 31). These authors reported that of the participants (n=26) who responded to a nine-question survey, "all participants (98%) agreed or strongly agreed that the format of the case scenarios was well planned..." (p. 37). This finding informed the TeacherSim intervention by the use of district professionals when creating the scenarios used in the PBL activities as described

in the Methods chapter. McLinden et al. did not use a facilitator for their groups and recommended "they…provide participants with access to a group facilitator, possibly in the role of an online mentor…" as part of the next iteration of their design (p. 38). This finding, as well as the one in Hmelo-Silver and Barrows (2006), suggested the use of a group facilitator in the TeacherSim activities. McLinden et al. reported, "92% strongly agreed that the case scenarios were 'authentic' and 'plausible'" (p. 38). This finding also informed the creation of the scenarios used in the TeacherSim intervention so that they were based on actual cases special education professionals would see in their responsibilities. Like McLinden et al.'s suggestion that information about the problem be provided gradually, Amador, Miles, and Peters (2006), who use PBL in the classroom, observed that students new to PBL may need more structure to the problem through scaffolding of the PBL process. This scaffolding can come in the form of constraining some elements of the problem or using a phased delivery of some segments of the problem. These findings impacted the design of activities in TeacherSim where information about the scenario was provided through a phased delivery. The review of literature now turns to exploring efforts to put the PBL process online.

PBL and Virtual Worlds

PBL has historically been conducted in face-to-face settings in the medical education field, but recently, researchers have become interested in putting some or all of the PBL process online or in virtual worlds. While Barrows (2002) needed further convincing that online PBL was possible, he did offer some features that seem to mesh with virtual worlds. Specifically, he noted that that a problem should be presented

verbally or in video format, allow for both synchronous and asynchronous discussion, and "include a whiteboard operated by group members to record group progress, data gathered, and issues to pursue" (p. 122).

Warren, Dondlinger, and Barab (2008) used PBL to explore self-directed learning for middle school-aged students in a journalism class. These researchers embedded both robotic grammar helpers and objects students could discover in a virtual world. Warren et al. (2008) found "statistically significant decreases in teacher time spent answering procedural and directional questions, increased voluntary student writing, and improved standardized achievement scores on writing tasks" (p. 113). These authors found that students in an online virtual environment using PBL were able to achieve their self-directed learning outcome. The positive findings of Warren et al. (2008) impacted the current case study by suggesting that a virtual world could be an effective venue to deliver PBL activities. While PBL has been used in virtual worlds before, this technology has not been studied widely in the field of special education.

Special Education, Virtual Worlds, and Professional Development

When using the following terms *special education*, *virtual worlds*, and *professional development* to explore recent research, the combination of these terms resulted in 43 articles from the years 2010 to 2016. However, after reviewing the article abstracts, only two of the articles were relevant to this study. The first article by Tyler-Wood, Estes, Christensen, Knezek, and Gibson (2015) described the use of SimSchool, a web-based tool that allows individual teachers to practice teaching simulated students with disabilities. Within the tool, preservice teachers could adjust various aspects of their

teaching to see how these changes impacted the programmed student. Tyler-Wood et al. reported that individuals who used SimSchool "in online professional development gained knowledge, increased personal capacity to apply research based practices, and implemented research-based transition practices within their classrooms" (p. 18). SimSchool was an accessible solution to many rural districts because it relied on web-based technology and preprogrammed activities. This tool, while beneficial, did not allow special education professionals the opportunity to collaborate and interact with others.

The second article by Dieker, Hynes, Hughes, Hardin, and Becht (2015) describes a similar effort with a different system of technology named TeachLivE. TeachLivE is a virtual reality system that uses artificial intelligence avatars to help preservice teachers better prepare for a variety of teaching situations. Like SimSchool, individuals could interact with several coded avatars to develop teaching skills. Dieker et al. suggest that TeachLivE can be used for professional development because it allows teachers to interact with other simulated teachers, students, administrators, and parents. A possible drawback with a heavily coded tool is the large amount of time required both to coordinate a session and to program the artificial intelligence responses. Like SimSchool, TeachLivE does not allow for real collaboration with other special educators; rather, it requires a team of facilitators at TeachLivE to setup and control the situations as teachers practice their skills. Both of these articles reflect a similar problem to the one that TeacherSim is attempting to address—namely how to help special education professionals in rural settings develop skills through use of distance technology.

In addition to their potential for PBL learning situations, proponents of virtual

worlds claim that distance technologies can help users experience a sense of physical and social presence (Gamage, Tretiakov, & Crump, 2011). Because physical and social presence is part of the experience for participants in virtual worlds, I researched information on this topic as well. The literature review now focuses on presence and the instrument used in this study, the Temple Presence Inventory (TPI).

Physical and Social Presence in Virtual Worlds

The phenomena of individuals feeling that they are really in a virtual environment while being physically situated in another location (Insko, 2003) has interested researchers using a variety of technologies for the last two decades. The use of different virtual settings may help learners experience a feeling of "being in" a virtual world (Insko, 2003). In describing some of the unique affordances of virtual worlds, Dalgarno and Lee (2010) cite two models. The first model comes from Hedberg and Alexander (1994) and the second model comes from Whitelock, Brna and Holland (1996). Dalgarno and Lee compared these two models and found that one of the characteristics that both of these models share is an idea of "presence" or "immersion." While these terms are frequently conflated in the literature, Dalgarno and Lee untangle them and suggest that both physical and social presence arise from the construct of "…fidelity or realism of the environments within which the shared sensory experiences occur and the facilities that are available…" (p. 14). Dalgarno and Lee suggest that physical presence and social presence stem from the increased "representational fidelity" and "learner interaction" possible in a virtual world.

Aligned with Delgarno and Lee's model of "representational fidelity" and

"learner interaction," the ability for users to customize an avatar's appearance. Customization of avatars allows individuals to feel like their avatars are extensions of themselves (Messinger et al., 2008) and to consider the appearance and actions of their avatars important. The appropriate appearance of an avatar may help students "suspend their disbelief," (Herrington, Oliver, Reeves, 2003), and consequently, the fidelity of the simulated experience will be improved (Good, Howland, & Thackray, 2008). Conversely, the use of an avatar in some high-risk role-play settings may put some psychological distance between participating individuals, thereby allowing them to focus more closely on skill development (Walker, 2009). From these references, this case study derived the case proposition that the use of avatars would improve the experience of physical and social presence in TeacherSim.

Measuring Physical and Social Presence

According to Insko (2003), the most common way to measure presence is through the use of a postactivity, self-report survey. The three most popular methods for measuring physical presence include the Witmer and Singer Presence Questionnaire (Witmer & Singer, 1998), the Slater-Usoh-Steed questionnaire (Slater, Usoh, & Steed, 1994), and the ITC-Sense of Presence Inventory (ITC-SOPI) (Lessiter, Freeman, Keogh, & Davidoff, 2001). All of these questionnaires have been shown by their research teams to be reliable and have face validity (Insko, 2003, p. 7). Unfortunately, none of the most popular questionnaires used to measure presence have studied social presence but instead have focused on physical presence. This is understandable since the articulation of social presence has been fairly recent with the publication of Biocca et al.'s call (2003) for the

study of social presence to be included in presence research. Nunez (2007) defines the criteria for selecting a measure of presence as (a) determining the author's model of presence, (b) the empirical status of the measure, (c) and the setting for which it was developed. Each of the criteria mentioned by Nunez was considered when selecting an instrument to measure physical and social presence in TeacherSim.

Model of Presence used in the Temple Presence Inventory

Slater et al. (1994) and Whitmer and Singer (1998) define presence as a binary phenomenon. In contrast, Lombard, Ditton, and Weinstein (2009) suggest that presence is a multidimensional construct and can be experienced at varying levels. Lombard et al. (2009) "conducted a set of studies to develop a standardized, cross-media measure of presence based on a wide literature that extends beyond the study of virtual environments and relatively narrow conceptualizations of presence" (p. 5). In contrast, the Slater et al. (1994) and Whitmer and Singer (1998) models of presence were derived from virtual reality experiments conducted by the military and focused solely on physical presence. Lombard et al. (2009) explain that unlike other popular questionnaires that have been used widely, the TPI includes all relevant constructs and a measure of social presence.

Empirical Status of the TPI

Lombard et al. (2009) reported that:

> a standardized measure of presence that allows for comparisons across media, stimuli, subject groups, contexts, and studies must demonstrate evidence of meeting several criteria. First, a presence questionnaire must be reliable, both externally and internally and internally consistent (internal consistency is typically assessed by computing Cronbach's alpha). Second, a presence questionnaire must demonstrate evidence of validity. Establishing validity of a measurement instrument is an ongoing process of accumulating evidence to provide a sound scientific basis for the proposed score interpretations'. Validation

> can be viewed as developing a scientifically sound validation argument to support the intended interpretation of test scores. (p. 3)

Lombard et al. (2009) examined the TPI for both reliability and validity and compared the TPI to six other questionnaires used to measure physical and social presence. Because all the other questionnaires focused mostly on physical presence with very little attention to social presence, Lombard et al. found that an alternative measure was necessary. However, based on known concepts of social presence, Lombard et al. were able to identify eight indices of social presence and then determine that the TPI correlated well with these other measures. They reported that the eight areas of presence measured by the test were reliable in terms of internal consistency. Lombard et al. reported "…the resulting Alphas were high for each presence measure. Cronbach's alpha was lowest for Presence as Social Realism (α =.75), and highest for Presence as Social Richness (α =.93)" (p. 7). These researchers further explain that, "all of the indices are intended to measure a common 'umbrella concept', a single overall factor was created from all the items. Cronbach's alpha for the overall index was .87, indicating the measure's high reliability" (p. 10). Lombard et al. (2009) proceed to provide evidence that the TPI is valid through examining internal validity, correlation with other known presence measures, and examination of the construct of presence by exploring variables that are theoretically related to presence. They also contend that sensitivity is another source of validity in that the questionnaire must be able to detect any change in the construct being measured. After revising the TPI based on an initial factor analysis, the TPI was edited to 42 questions based on 8 constructs. These constructs are further explained in the Methods section.

Settings used to Test the TPI

The TPI was developed and tested in a variety of media settings including I-MAX theaters, television, and game-based environments. In the context of virtual worlds, Vrellis, Papachristos, Natsis, and Mikropoulos, (2012) used the TPI to measure physical and social presence in their science learning activities. Since the TPI has eight constructs with several subquestions, the TeacherSim case study used the same format of reporting the TPI results as Vrellis et al. As described above, Nunez's (2007) criteria for selecting a measure of physical and social presence was used when selecting the TPI.

Triangulating Physical and Social Presence

However, even with a valid and reliable self-report measure, Slater et al. (1999) contends that presence should be tracked using a variety of means. Observations either through language used or screen captures can triangulate the experience of physical and social presence. This additional way of confirming the experience of physical and social presence is described further in the Methods chapter.

Other Considerations

In a study related to the feeling of presence, Steed, Spante, Heldal, Axelsson, and Schroeder (2003) conducted research to determine if there was any difference in the kinds of collaboration between friends and strangers in virtual reality systems. This study used several different environments with head mounted displays and gloves where six pairs of individuals collaborated on five different kinds of tasks. While these virtual reality environments were more immersive than virtual worlds because of the headgear and glove, these spaces created an avatar in the system similar to the ones made in

TeacherSim. Also, because of the collaborative nature of the activities, comparisons from this study can be made. Steed et al. compared three elements: how friends vs. stranger pairs collaborated in a virtual environment (n=5 pairs), how individuals collaborated in virtual environments for an extended time (210 minutes), and collaboration on different kinds of tasks (p 51). The authors found that overall "there was little difference between the two types of pairs" collaborating (p. 53) except for strangers finding some "negotiating tasks harder because of the absence of facial expressions" (p. 53). The authors found that "the subjects were not exceptionally tired at the end of the day, and at the same time they found it difficult to stop themselves from continuing with the tasks" (p. 53). These results from Steed et al. suggest that pairs can collaborate on tasks and that strangers and friends essentially collaborate in the same way except for understanding intentions. This lack of understanding is likely due to not being able to see facial expressions on avatars.

Case Propositions and Theory

An important aspect of any case study is the literature helping to form the case propositions. For Yin, case propositions "direct attention to something that should be examined within the scope of the study" (p. 21) and is based on "important theoretical issue[s]…" (p. 21). There are two case propositions examined in this research. The first is that virtual environments can be an adequate space (comparable to face-to-face instruction) for professional learning. The second is that virtual environments allow for interactions (physical and social presence) beyond just information delivery. The literature supporting the first proposition is Tyler-Wood et al. (2015) and Dieker et al.

(2015) where both used distance technologies to support professional learning. While neither of the technologies described in their studies used a virtual world, the principle of using technology for professional training is the same. The literature supporting the second proposition is Gamage, Tretiakov, & Crump, 2011 who found that both experienced users and new users of virtual worlds felt "…that shy students are likely to be more actively involved…than in the traditional classroom" because of their avatars (p. 2411) Similarly, Dalgarno and Lee's (2010) suggestion that virtual worlds promote feelings of physical and social presence supported this proposition. Both of these propositions reflect the key theoretical elements explored in this study.

Conclusion

This literature review has positioned this descriptive case study as phase one research according to Borko's (2004) definition. As such, this case study explores both the teaching-learning aspects and the group interactions of special education teachers, within their PBL groups. As these teachers reflect on and attempt to use the Utah Core Standards to create standards-based IEP goals, PBL is employed as an integral component of the instructional method and materials used for the PD. PBL was selected as an instructional method because it aligns well with many of the accepted principles of effective PD. The experience of two of the professionals in the TeacherSim study are examined more closely to explore the ways physical and social presence in a virtual world may help to address some of the common concerns with teacher PD online: specifically the lack of trust and connection. The strategies for exploring these ideas are outlined in the chapter on methods.

CHAPTER 3

VIRTUAL WORLDS AS A GENRE OF TECHNOLOGY

Virtual worlds, specifically those like Second Life and OpenSim, can be classified as a kind of social space for interacting with others. According to Dickey (2011) virtual worlds "...provide core features such as the illusion of 3D space, avatars that serve as visual representations of users, and an interactive chat environment." (p. 3). Within the literature for virtual worlds, several different kinds of uses seem to be dominant. These uses involve exploring the affordances of the space, using the space for a simulated, role-play, or practice activity, and using the space for technological skill development coupled with alternative learning strategies.

Uses of Virtual Worlds

In the virtual world literature, Messinger, Ge, Stroulia, Lyons, Smirnov, & Bone (2008) explored the connection between avatars and participants as well as the communication between participants. Foster (2007) explored the use of virtual worlds as an orientation area and a way to replicate a physical locale. Activities in a virtual world can be either fantastic or lifelike (Warren, Stein, Dondlinger, & Barab, 2009) to build a larger narrative for learning. The appropriate appearance of an avatar may help students "suspend their disbelief," (White et al., 2010) and, consequently, the fidelity of the simulated experience will be improved (Good et al., 2008). The use of an avatar in some high-risk role-play settings may put some psychological distance between participating individuals thereby allowing them to focus more closely on skill development (Walker, 2009). Another affordance of virtual worlds is the ability to recreate locations to be either

replicas of a physical site (Foster, 2007; Warren, et al., 2009, Walker, 2009; Mahon et al., 2010) or completely new settings for the development of a narrative storyline (Good, 2008). The re-creation of space can allow participants to visit environments not normally possible like space stations or inside computer circuitry (Good, 2008). Avatars and the communication that occurs between individuals in a virtual world promote feelings of physical and social presence and these feelings of presence aid in the collaborative activities used in more active methods of learning.

PBL and Virtual Worlds

In her study exploring the pragmatics of virtual worlds for educators, Dickey (2011) found that a problem with using virtual worlds was that they "were created as social environments and not [uniquely] as educational environments" (p. 17). The teachers in her study felt that "…tools [needed to be] developed to meet the needs of teachers..." (p. 17). While Dickey's study focused on educators creating and using virtual worlds as educational tools in their classrooms, she did not explore the use of virtual worlds as a tool for professional development. If an active instructional method like PBL is coupled with the preexisting collaborative elements of the technology, virtual worlds can be a possible venue to meet professional development needs of teachers at a distance from one another.

Creation of TeacherSim

The development of TeacherSim arose out of a need to create ways for distance education students to practice school-based learning skills such as IEP development for students in the special education program at Utah State University. This program has a

large group of distance students around the state. Unfortunately, a common issue with much of distance education is that "students in such programs...describe a sense of isolation and frustration…" (Palloff, & Pratt, 2013, p. 22). With the collaborative elements of the technology, the ability to provide role-play activities at a distance, and the resulting feelings of physical and social presence, the Special Education Program wanted to explore virtual worlds as a tool for some of its courses.

The TeacherSim project started in Second Life, but moved from that public space to allow the USU team more management and control of the virtual world. While the project was moved from Second Life, one constant need was the development of an effective user experience when accessing TeacherSim, utilizing audio, and using the environment for effective activities. All of these elements were used to help different groups of students achieve learning objectives relative to their degree. The objectives included learning how to collaborate and conduct IEP meetings, applying special education law, and learning how to develop skills in counseling clients. To give the rich description of using TeacherSim as a virtual world, the process and its component parts are described next.

Getting Into TeacherSim

Using the OpenSimulator server on departmental machines allowed me to completely manage TeacherSim as well as the students' experience within the environment. Once a group of students were identified as wanting to use TeacherSim for a class activity, I created usernames and passwords in the Robust.exe program of OpenSimulator. Students would then download and install the Imprudence client viewer

onto their machines. Once installed, the students access TeacherSim by starting Imprudence and inputting TeacherSim's IP address and port into the grid settings. Figure 1. shows the Imprudence viewer with the grid settings open. One of the main reasons for selecting the Imprudence viewer was because of its popularity in the OpenSimulator community. The Imprudence viewer project has now been renamed as the Kokua viewer (Kokua.org, 2015).

After adding TeacherSim's IP address and port into the grid settings, students select the TeacherSim grid in the Grid Manager dropdown list, input their username and password, and click the "Log In" button. Once they entered the environment, an avatar was generated representing each student and would appear in the orientation area. A picture of the orientation area called the Orientation Walkway within TeacherSim is shown in Figure 2. This walkway provided instructions on how to move, fly, sit, chat, and use the camera controls.

Because all the avatars of new accounts in OpenSimulator appear as a female yoga instructor (named Ruth by the OpenSimulator community), I created an avatar modification station. This area of the walkway shown in Figure 3. provided some premade sets of avatars for students to choose from. Once the student clicked on the picture of a new avatar set, the clothing and settings for that avatar were put into a folder in the student's avatar inventory. To wear a new avatar set, the student dragged the folder from their inventory over the top of their avatar. This action then updated the appearance of the student's avatar. To customize an avatar further than the appearance rendered by the avatar set, students right clicked on their avatar and adjusted elements of their face,

height, hair, body proportions, and clothing. Students who did customize their avatar become very interested in their avatar's appearance. However, no direct instruction was provided on the Orientation Walkway for students to customize their avatar.

One limitation of using existing avatar materials in OpenSimulator is that they lack some degree of photorealism. I found that by using Photoshop to modify an avatar's appearance, I was able to improve facial features, skin, and clothing. Also, using sculpted primitives (prims), a digital building block, for avatar hair was much more realistic in appearance than the built-in blocky hair that OpenSimulator natively provided.

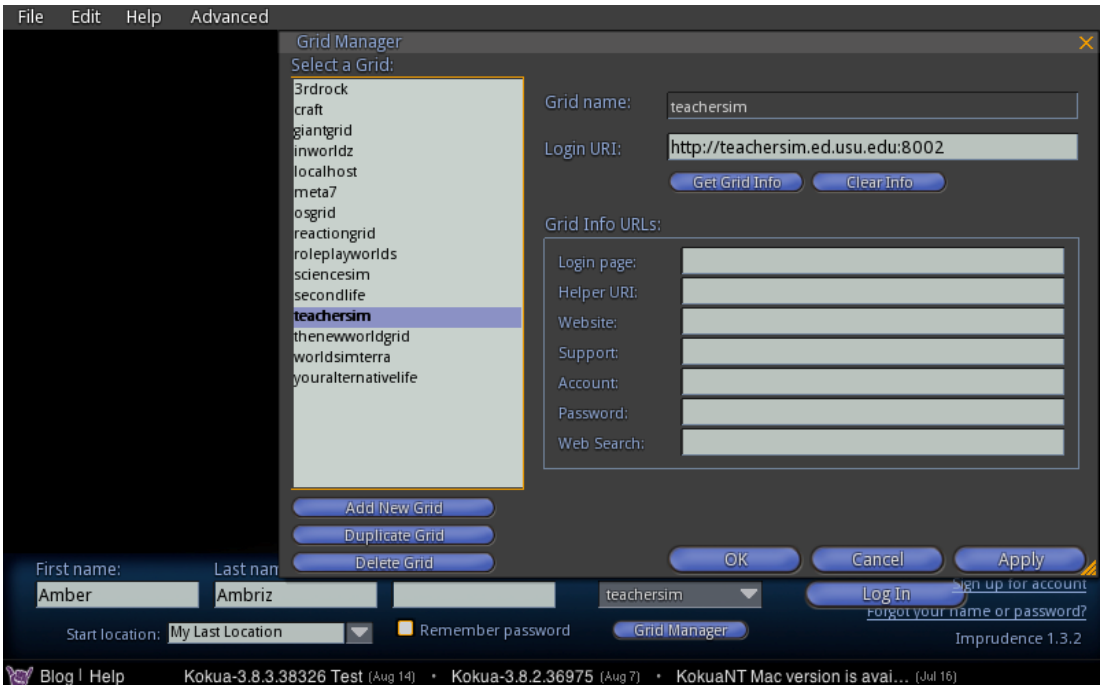


Figure 1. Imprudence Client Viewer with Grid Setting.

Figure 2. Orientation Area in TeacherSim.

Figure 3. Avatar Modification Station.

Orientation Pathway, Changing Avatars, and Finding the Group Meeting Area

For this study, a new "region" or digital island was created to house the study's Orientation Pathway, Avatar Modification Station, and Group Meeting areas. To create the buildings and region where the study occurred in TeacherSim, I created a new region on the server running OpenSimulator and added a school building created by Linda Kellie of OpenSim Creations under a Creative Commons license. Figure 4 shows Kellie's school as well as her prefabricated light posts and pavement.

Once the school was on the new region, an orientation pathway was created using the resources from TeacherSim just described. This walkway is shown in Figure 5. The walkway included descriptions of how to move, how to chat, how to create note cards, and how to modify avatars. When a participant logged into TeacherSim for the first time, their avatar would appear on the Orientation Pathway. They would then navigate down the pathway learning about how to use the movement controls, chat functions, create note cards, and modify their avatar.

At the end of the Orientation Pathway, participants could enter the doors of the school, which contained the Group Meeting Areas. Inside the school, two rooms contained a picture that, when clicked, gave participants information about the child scenario in the form of a note card. Also, a clickable PowerPoint board explained the PBL process and steps participants were to follow during their meetings. A whiteboard and drop box were also available for participants to use when taking notes and sharing note cards. The drop box allowed participants to share the note cards they created with the researcher. Additionally, a link to the Utah Core Standards was available by clicking

on a web board. Figure 6 shows from left to right a drop box, the white board, the picture used for the child scenario, a web board, and the PowerPoint board.

Figure 4. Linda Kellie's school.

Figure 5. Orientation Pathway for Study.

Figure 6. Group Meeting Area.

Using Teamspeak Audio in TeacherSim

While some research suggests that users of virtual environments prefer text-chat to audio for communication (Leong et al., 2010), students who have used TeacherSim in the past have expressed that audio was more immersive than typing. Since the use of integrated audio within the OpenSimulator platform is still in development, I used Teamspeak for audio communication. Participants would first plug in their Califone headset (with microphone) to their computers. The Teamspeak client was then downloaded and installed on each computer. After the client was installed, I used the setup wizard to help configure sound input and output. I connected client software to the server by entering the server URL, username, and password and then clicking the "Connect" button. The Teamspeak server could be configured to have multiple "rooms" in which participants could use audio. This meant that multiple groups could use the

software without disturbing each other as long as they were in different “rooms”. Figure 7 shows the Teamspeak client software connected to the TeacherSim server. This figure also shows the available rooms for additional group meetings. After connecting, participants could communicate using the Voice Over IP (VOIP) protocol. The voice quality was very good with little feedback from participants’ headsets.

Using TeacherSim

Once participants entered TeacherSim, they needed to know several key functions such as how to move, sit, chat, view information, and change the appearance of their avatar. All of these topics were available on signs next to the Orientation Pathway.

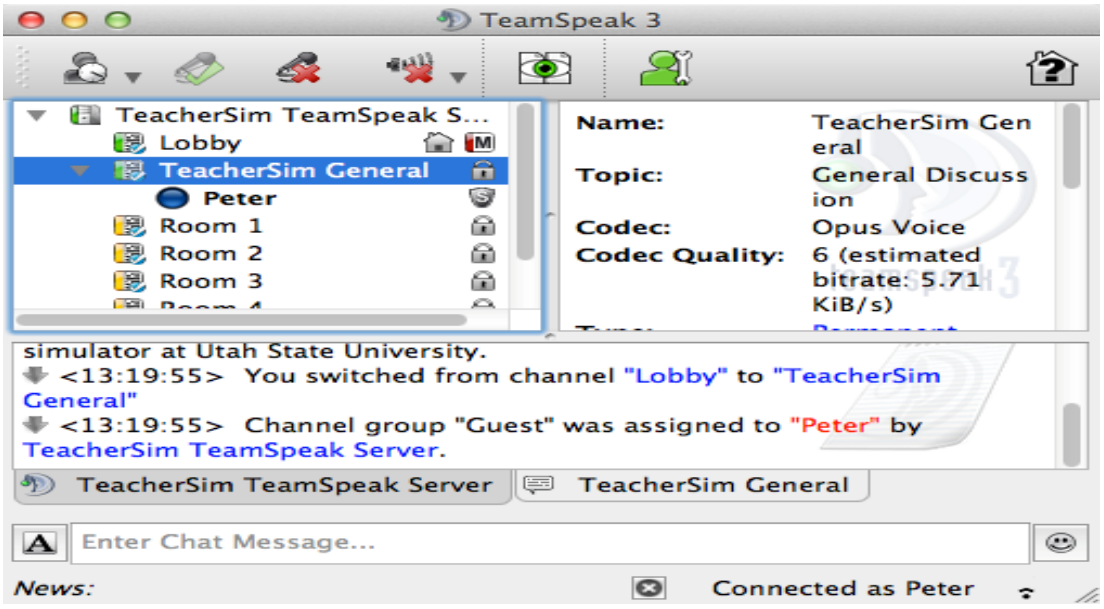


Figure 7. Teamspeak Client.

Movement and Sitting

Participants used the arrow keys on their keyboard to walk and move in the direction they wanted their avatars to go. The keys moved an avatar forward, backward, left, and right. The "up" arrow moved an avatar forward, the "down" arrow moved an avatar backward, and the "left/right" arrows rotated the avatar left or right. Flying is a faster way of moving an avatar in TeacherSim and is done by clicking on the "fly" button in the Imprudence viewer. An avatar could also fly if the participant pushed and held the "page up" button. "Page up" increases altitude and "page down" decreases altitude. Once airborne, participants moved their avatars using the arrow keys. Participants stopped flying by clicking the "stop flying" button in Imprudence or by pressing "e" key to land.

Once a participant moved her avatar to a virtual chair, right clicked on the chair, and selected "Sit Here" from the radial menu, the avatar would then move to a sitting position on the chair. Figure 8 shows the open "sit menu" as my avatar is getting ready to sit. Figure 9 shows the chat text field.

Using the Whiteboard

Inside the school on the wall of each Group Meeting Area, a white board was available for participants to take notes. The whiteboard was used by typing "Say /46" into the chat field and then typing a message. These instructions for how to use the whiteboard were constantly available for participants because they appeared as green text hovering above the board. Figure 10 shows the whiteboard with notes from the first goal-writing meeting.

Figure 8. The Sitting Menu.

Figure 9. Chat Text Field.

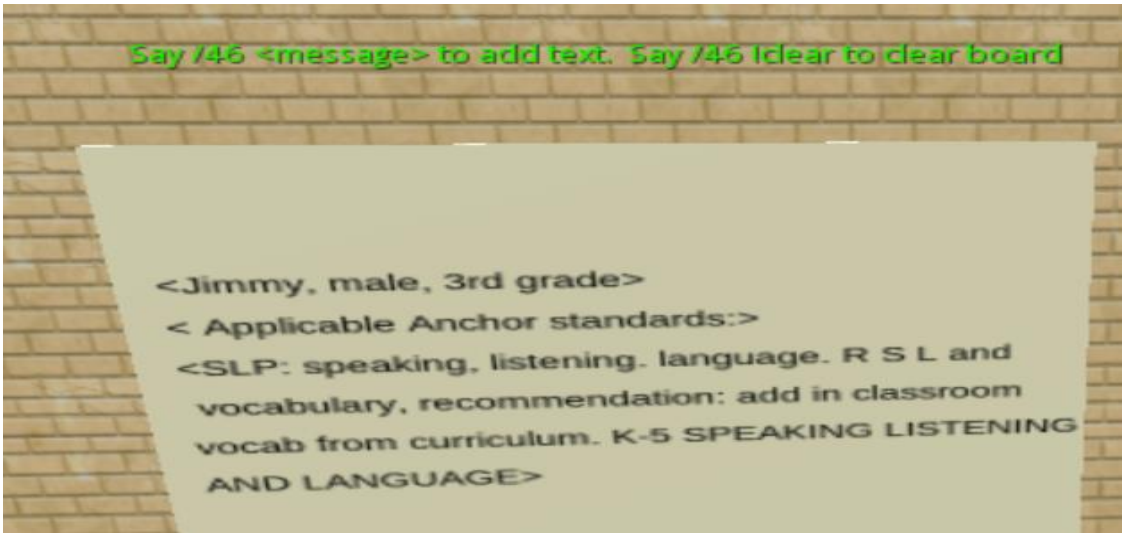


Figure 10. Whiteboard with Instructions.

Accessing the Utah Core Standards and PowerPoints from Meetings

Participants could access the Utah Core Standards in TeacherSim by clicking on the web board, which opened up a web browser with the Utah Core Standards web page. The web board allowed participants to review the standards in TeacherSim as needed but also provided a URL for them to use in a regular web browser if they preferred. Directions for how to use the web board were available to participants constantly as they appeared as blue text floating over the image of a page of the Utah Education Network website. Next to the web board was the PowerPoint board that allowed participants to click through slides of materials to be covered during each Group Meeting. Participants used this board by clicking on the image. Figure 11 shows the PowerPoint board and the web board.

Creating Note Cards

Participants could use note cards to write goals and share information with each other. Participants created note cards by clicking the "Inventory" button in Imprudence. Once in the Inventory menu, participants clicked "Create" and selected "New Note" from the Create Menu. A new blank note would appear, and then the participant could change the name of the note in the description field. Participants could enter a new description in the text field and then click the "Save" button. The new note would then appear in the note cards folder in the participant's inventory. Note cards could be shared by dragging the note from the inventory over the top of another avatar.

Accessing Information About the Child Scenario

Information about the child scenario was linked to a picture next to the whiteboard in the Group Meeting Area. Participants accessed the information about the Child Scenario by using their mouse to click on the picture. Instructions for clicking on the picture were always available to participants because they appeared as blue text hovering over the picture. Figure 12 shows the open Child Scenario information after a participant clicked on the picture.

Using Camera Controls

Participants were able to zoom in and out on pictures, the whiteboard, and PowerPoints by using camera controls. Clicking the left mouse button and the ALT key at the same time changed the perspective of a participant's avatar. Using this key and moving the mouse allowed participants to zoom in and out on different boards. If participants did not use their camera controls, some the images would seem pixelated.

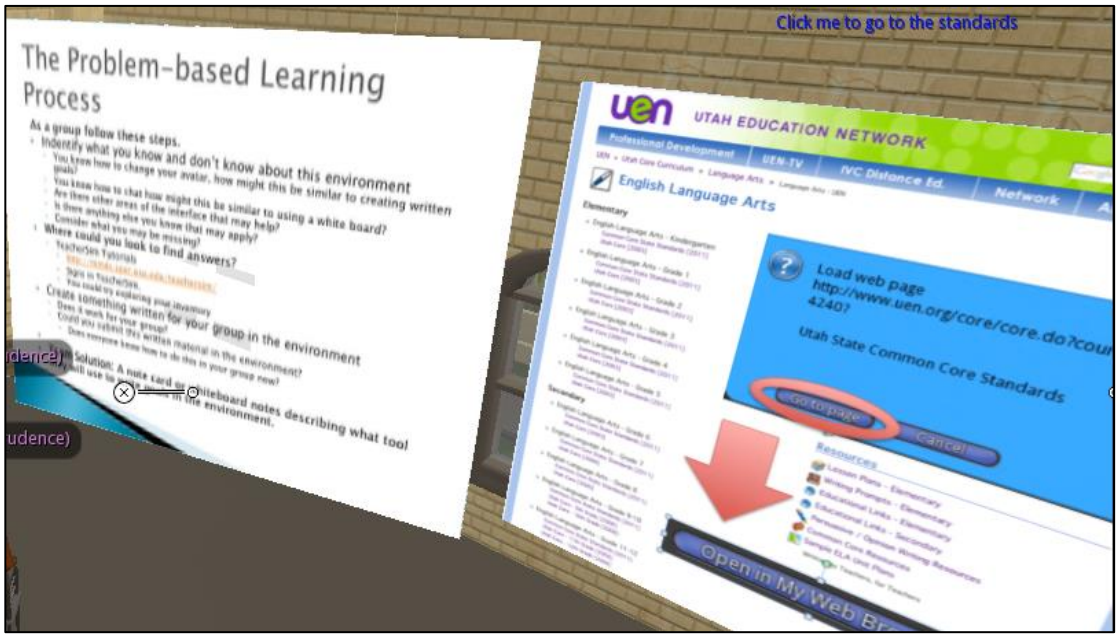


Figure 11. PowerPoint Board and Web Board.

Figure 12. The Child Scenario Information.

TeacherSim and Professional Development

As a combination of virtual world technology with an active instructional method, TeacherSim and PBL allow geographically dispersed teachers to participate in professional development activities. The use of avatars and a virtual school setting promote feelings of physical and social presence, which improve the collaborative experience. Participants in this study followed the same steps described above for getting students into TeacherSim. I installed the software (Imprudence and TeamSpeak) on their classroom machines and helped participants login to TeacherSim for the first time. However, the process of selecting an avatar set and getting oriented to TeacherSim was handled during the formal study meetings described in the next chapter.

CHAPTER 4

METHODS

Helping students with disabilities master Utah Core Standards is challenging for many special education professionals (Lynch & Adams, 2008; Samuels, 2011). Special education professionals are required by law to develop IEP goals based on the Utah Core Standards, and providing the professional development for these individuals in rural areas can be particularly challenging. Because rural districts are often large, it is difficult to bring professionals together for training. For individuals in this study, TeacherSim was used as a professional development tool for a rural school district in Utah.

TeacherSim provides opportunities for special education professionals who are geographically dispersed to participate in collaborative activities in which they could not otherwise engage without traveling. The purpose of this study was to determine the extent to which special education professionals were able to learn how to write standards-based IEP goals within the TeacherSim environment. To reiterate, the two research questions guiding this study are (a) how did special educators engage with the task of creating standards-based IEP goals using TeacherSim? and (b) how did TeacherSim support or hinder this?

In order to effectively answer these questions, the study's methodology is explained next. Specifically, this chapter discusses the case study design, case boundaries, the cases, participants and setting, rationale for selecting the cases, materials, procedures, data analysis, and methods for ensuring trustworthiness.

Case Study Design

As a descriptive case study, this research seeks "to describe an intervention or phenomenon and the real-life context in which it occurred" (Yin, 2013). Yin (2003) suggests that one of the rationales for a single case study is the "…unique case" (p. 39). The unique elements being described in this case study are the experiences of special educators using TeacherSim as a professional development environment to create standards-based IEP goals. This information is helpful for other researchers wishing to create similar solutions as a venue for professional development. Yin (1994) suggests "case study design must have five components: "a study's questions, its propositions…its unit of analysis, the logic linking the data to the propositions, [and] criteria for interpreting the findings" (p. 20). The corresponding aspects to these components are described next.

Case Questions

Following this suggested pattern, the research questions guiding this study are (a) how did special educators engage with the task of creating standards-based IEP goals using TeacherSim? (b) how did TeacherSim support or hinder this?

Case Propositions

Case propositions are drawn from the literature and help to determine the units of analysis described in the case study. Case propositions are also used for the analysis described later in this chapter. The specific case propositions are that (a) virtual environments can be an adequate space for professional learning, and (b) virtual environments allow for interactions beyond just information delivery. The first

proposition assumes that participants will reflect on how they plan to use a standard in their goal creation process in TeacherSim just like they do in face-to-face settings. The second proposition assumes that participants will feel physical and social presence and that these feelings will impact their participation and engagement in the professional development activities. These case propositions were also used in the analysis narrative to describe the actions of the participants within the case.

Units of Analysis

The overall unit of analysis for this study was the use of TeacherSim as a professional development intervention. The focus of the analysis was the selection and description of two participants who demonstrated different intensities of the user experience. This was evident in differing levels of participation and the differing use of avatars by each participant. According to Gall, Gall, and Borg (2007) intensity sampling allows researchers to select participants who demonstrate "the phenomenon of interest intensely but not extremely" (p.181). The two participants were: ST, a special education teacher from Group 1; and PK, a special education teacher in Group 2. The TeacherSim professional development experience is bounded by the activities of these cases. ST's and PK's interactions with their groups during the study constitute what was analyzed. In order to understand how these cases were selected, it is necessary to describe the creation of the participant groups and setting used in this study. This will be described later in this chapter.

Logic Linking Data to Propositions and Criteria for Interpreting Findings

Yin (1994) explains that the logic linking data to propositions "have been the least

well developed in case studies…and represent the data analysis steps in case study research…" (p. 25). Since these steps have not been formalized in the case study literature, I took a general qualitative approach to analyzing the data similar to the coding cycles outlined in Saldaña (2013). This process is described fully in the data analysis section of this chapter.

Case Boundaries

According to Baxter and Jack (2008), case "boundaries indicate what will and will not be studied in the scope of the research project…boundaries also indicate the breadth and depth of the study and not simply the sample to be included," (p. 547). Many areas could have been explored within this study. One area of exploration might have been a comparison and contrast of individual teachers' experiences in both a face-to-face and online setting. While an understanding of each teacher's experience could have been explored, I chose to focus only on the efficacy of the virtual space as a venue for professional development through two participants. This boundary helped to limit what was considered for analysis and what was left open for further study. Similarly, each teacher's perspective in each group could have been explored, but because of the group format of the PBL activities, I chose to select one intense participant from each group to describe the experience with more in-depth analysis. Another possible avenue of exploration could have been the use of TeacherSim across several rural districts, but I felt a smaller case across a single district would show a plausible use of the tool.

Participants and Setting Background

Creswell (1998) states that sampling "selects individuals and sites for study

because they can purposefully inform our understanding of the research problem" (p. 156). The population of interest for this research was special education professionals in a large, rural, western school district who work with children with mild/moderate disabilities (n=100), specifically, 67 special education teachers and 33 speech/language pathologists (SLPs). The sample was selected in several stages. The initial step was to develop a survey to collect information about the special education teachers and SLPs. This survey was created in coordination with the district special education director, secondary and elementary resource coordinators, and the district SLP coordinator. The survey specifically asked, (1) how many years they had been teaching in the district, (2) their gender, (3) their proficiency in using technology, (4) their feelings about the educational value of technology, (5) their feelings about the educational value of video games, and (6) the location of their school in the rural district. The complete survey is available in Appendix B. This survey was created as a Google Web Form, and a link to the survey as well as information about the study was emailed to all special education professionals in the district through the district's central office. The rural school district where the study was conducted has 16 elementary schools, six middle schools, and four high schools, which are located between three to eighteen miles from the district office where professional development activities take place.

The email from the district office with the survey link invited interested special education professionals to complete the survey and informed them that that I would follow up with them to arrange the next steps. The email explained that participants would receive a 75-dollar honorarium for their participation in the study. A follow up

email was sent two weeks later. Of the 100 participants that were emailed, 8 individuals responded (4 special education teachers and 4 SLPs). Of those 8 respondents, one decided to withdraw prior to the beginning of the study. Table 1 lists pseudonyms for the 7 participants, their job type, experience level, and school location in the district. All participants were female professionals with varying levels of work experience ranging from three to 24 years as special education professionals. Identifying the location of these professionals in the school district was important to ensure that no participant was in the same school as their group members. This was important so that the participants would have an authentic distance experience. The experience level, job type, and location in the district influenced the case selection.

Selection of Cases

Of the seven participants, ST and PK were selected because both shared the same job type, experience level, and were in different locations in the district. Both participants were similar in their user experience in creating standards-based IEP goals in TeacherSim. Both participants' actions were similar in that both reflected with their team and attempted to utilize the Utah Core Standards in their goal creation. These two participants were also similar in their rating on the Temple Presence Inventory (described later in this chapter under Data Sources). These participants were unique in how their feelings impacted their participation and engagement in TeacherSim. These unique differences relating to the case propositions were used to identify these two participants as the most instructive cases.

Table 1

Participant Grouping.

Grouping	Participant	Job	Experience	Location
Group 1	RC	Teacher	24 years	North
Group 1	ST	Teacher	5 years	Central
Group 1	CP	Teacher	10 years	Mid-South
Group 1	ML	SLP	8 years	South
Group 2	ER	SLP	3 years	Mid-North
Group 2	PS	SLP	18 years	South
Group 2	PK	Teacher	8 years	South

Materials

The materials used in this study included several items. Specifically, each participant had an office or classroom computer with Internet access. All computers had at least a cable or DSL connection with Vista, Windows 7, Windows 8, or Mac OS 10.5 installed as the operating system. All computers had at least Intel Pentium 4, Pentium M, Core or Atom, AMD Athlon 64 central processing units and computer memory of at least 1GB or more. All monitors could be set at screen resolutions of at least 1024x768 pixels with graphics cards like NVIDIA GeForce 6600 or ATI Radeon 9500 or better. These were the basic technical specifications to allow the software to run on participants' machines.

For the duration of the study, each participant was furnished with a Califone 4100 USB headset to use when communicating with others via the software. Before the study began, I installed the Imprudence client viewer software and Teamspeak 3 client software on the participants' school computers. Permission to install this software on school computers was granted by the school district network administrator.

In addition to the hardware and software used to participate in the study, I provided participants with several websites to be utilized during the study activities, including the TeacherSim Activities portion of the Mild Moderate Distance Community website: http://mmdc.sper.usu.edu/teachersim-activities/. On this website, participants could access several articles on writing standards-based IEPs, instructions for navigating and using the Utah State Office of Education Core Standards, training videos explaining the PBL process, and an example of how to create a standards-based IEP goal for the meeting. Figure 13 shows a screenshot of the TeacherSim Activities portion of the Mild Moderate website.

Figure 13. Mild Moderate Distance Community Website.

The two main articles explaining the rationale for and process of writing standards-based IEP goals that were available on the Mild Moderate Distance Community website were Holbrook's (2007) *A Seven Step Process to Creating Standards-based IEPs* and Samuel's (2011) article titled *Special Educators Look to Align IEPS to Common-Core Standards*. In addition to these two models, specific steps for creating standards-based IEP goals were outlined for the professional development activities within *TeacherSim*. Appendix A lists these sources and their steps.

Study activities occurred in two locations within *TeacherSim*: the Orientation Pathway and the Group Meeting Area. The Orientation Pathway included signs with directions for communicating information through chat, walking, flying, creating note cards, sitting, getting an avatar set, and wearing an avatar set. The Group Meeting area included a whiteboard, a drop box, picture of the child with attached case note card, a web board, a PowerPoint board explaining the PBL process, a board with a graphical organizer for the Utah Core Standards, and seats for the avatars of group members. Table 2 shows screenshots of the Orientation Pathway and Group Meeting Areas.

Special Education Student Scenarios

Special education student scenarios were created for the PBL learning activities. These scenarios were developed with the help of the district special education director, secondary and elementary resource coordinators, and the district SLP coordinator in the target district. I worked together with the district team to create three realistic scenarios of fictional students from different grade levels and with different disabilities. "Jimmy" was a hypothetical third grade student while "Holly" was a hypothetical tenth grade

student. Both of these scenarios included a description of the special education classification, specific information about academic performance and grade level, current services provided and the specific area that professionals would need to address in an IEP. A scenario for “Camille”, another hypothetical student, was used in a training video describing the PBL process and was available to participants on the TeacherSim Activities section of the Mild/Moderate Distance Community website. The “Jimmy” and “Holly” scenarios were assigned to each of the two groups, respectively, and accessed in the Group Meeting Areas in TeacherSim. The text of the scenarios is available in Appendix C.

Table 2

Two locations in TeacherSim for Study Activities.

Orientation Pathway	**Group Meeting Area**
	

Graphic Organizer for English Language Arts

A graphic organizer (Figure 14) was used to help participants navigate the English Language Arts Standards within the Utah Core Standards. I developed this graphic organizer with the district team and then uploaded it into TeacherSim on an interactive presentation board. Participants could use this graphic organizer to locate Strands and Anchor Standards within in the Utah Core Standards that they thought would be helpful for addressing the needs of scenario. The graphic organizer was intended to help participants get a holistic understanding of the Utah Core Standards and explore these areas for their assignments outside of their group meeting time. Participants could return to this graphic organizer between meetings to see the relationships between the standards in the Utah Core Standards.

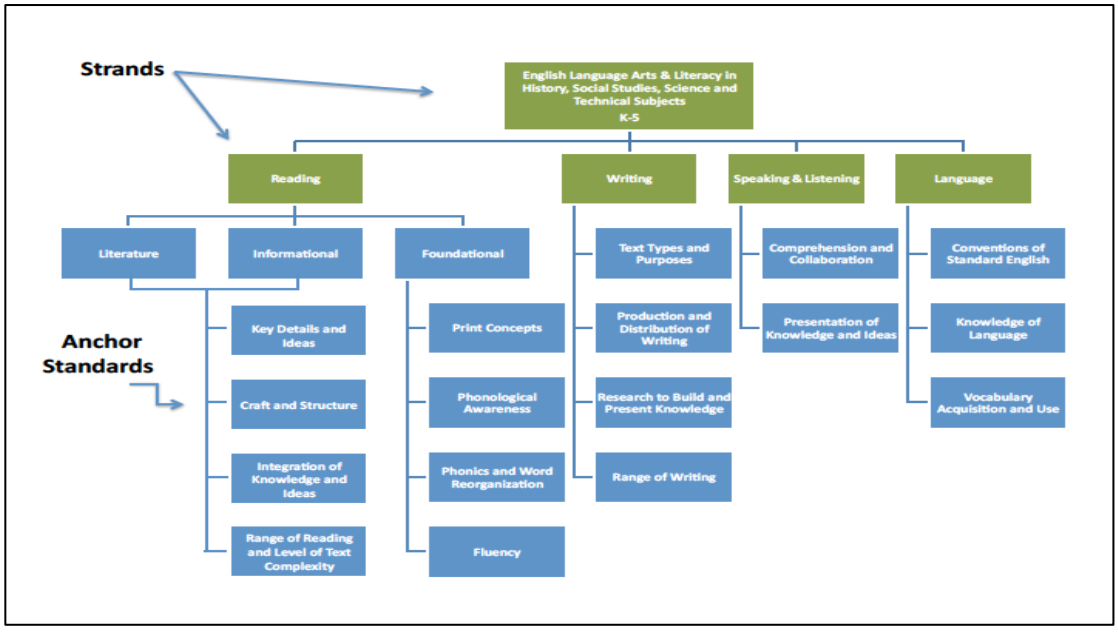


Figure 14. Graphic Organizer for English Language Arts Standards Grade K-5.

Scenario Picture and Note Card

After the scenarios were developed with the district team, the text of the scenario was put on note cards and attached to clickable pictures of the hypothetical students in TeacherSim. Figure 15 shows the scenario and image for the fictional student named Holly in the Group Meeting Area.

Procedures

As explained above, this is a descriptive case study with two contrastive cases selected for in-depth analysis. However, to understand the context for this analysis, an overview of professional development activities that all seven professionals participated in is provided next. ST and PK were part of the two groups of professionals participating in these activities.

Figure 15. Scenario and Clickable Picture with Note Card.

Step 1: Assignment of Participants to Groups.

As described above, participants were assigned to groups based on experience level and location in the district. Groups were constituted to maintain a balance between novice and experienced teachers and SLPs. No two group members were at the same school in the district and all participants were between three to eighteen miles apart. ST was in Group A while PK was in Group B.

Step 2: Facilitator Selection and Training

Two teachers who had prior experience in TeacherSim were recruited to serve as facilitators. During the initial selection process for facilitators, one of the facilitators needed to withdraw from participation because of family issues. To address this setback, I assumed the role of the facilitator for Group 2. Table 3 shows the group facilitators, their experience level with teaching, and their location outside of the district. SC was the facilitator for ST's group while I (PB) was the facilitator for PK's group.

The facilitator for Group A, SC, was a teacher of preschoolers with special needs as well as a student mentor for a distance education program through the university. SC was located outside of the district and had used TeacherSim in the past to work with students in the mild/moderate distance education program at the university. SC's time spent on the study activities were counted toward her normal work hours. I was the facilitator for Group B, and my work on the study was counted as work on a grant project. I had three years of experience teaching both face-to-face and online students involved in the mild/moderate distance education program through the university. Both facilitators had experience using TeacherSim and interacting with others at a distance.

Because the role of the facilitator is critical in PBL, I created facilitation training for SC. The facilitation training was based on Hmelo-Silver and Barrows (2007) article on the role and goals of a PBL facilitator. For the training, SC was asked to read Hmelo-Silver and Barrows article and attend a meeting in TeacherSim. During the meeting, I reviewed the logistics of the study activities, reminded SC of the TeacherSim controls, and provided an overview of SC's group. We reviewed Hmelo-Silver and Barrows facilitator goals and strategies, the PBL process, and outlined one way of writing a standards-based IEP.

Contact information for group members was also shared with SC. Figure 16 shows SC at the facilitator training in TeacherSim. Table 4 shows two slides from the facilitator training, specifically the facilitator goals and strategies from Hmelo-Silver and Barrows. The full list of slides used in the facilitator training is available in Appendix D.

Table 3

Group Facilitators.

Grouping	**Facilitator**	**Job**	**Experience**	**School**	**Location**
Group 1	SC	Teacher	7 years	University/ Distance mentor	Out of district at university
Group 2	PB	Researcher	3 years	University	Out of district at university

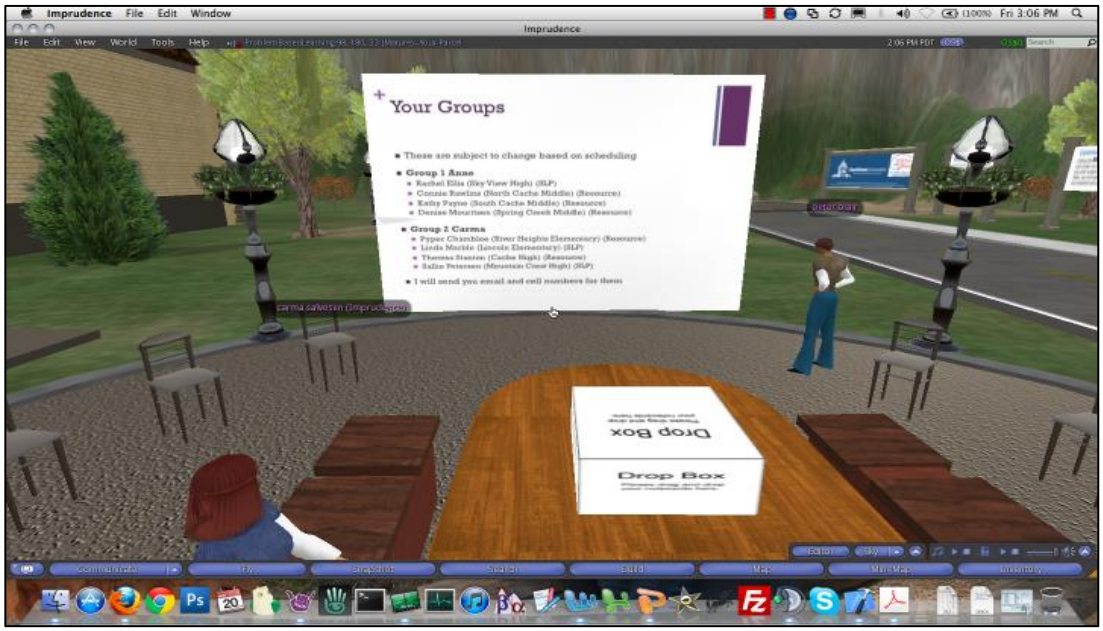


Figure 16. Facilitator Training Area.

Table 4

Facilitator Slides on Goals and Strategies.

Facilitator Goals	Facilitator Strategies
PBL Facilitator Goals for Role ■ Keep all students active in the learning process ■ Keep the learning process on track ■ Make teachers thoughts and depth of understanding apparent (through creating note cards/whiteboards) ■ Encourage students to become self-reliant for direction and information. ■ You are a resource to help them in the discovery process. It would be great if you read the articles they will read.	PBL Facilitator Strategies ■ Use open-ended questioning and the PBL document ■ Ask teachers to explain what they mean ■ Re-voice/re-state what the teachers say for clarity ■ Ask quieter learners to summarize what the decisions and direction are so far. ▪ Then follow-up with other group members to see if they agree. ■ Encourage teachers to develop hypotheses to become aware of what they don't know. What should they be focusing on? ■ Help teachers create note-cards to write down their process.

Step 3: Participant Orientation.

Once facilitators had been trained, participants were asked to join their group in TeacherSim for an orientation meeting where they learned about the environment through PBL techniques. Participants' avatars could appear in either the Group Meeting Area or the Orientation Pathway; therefore, my avatar was at both group orientation meetings to help direct participants to the Orientation Pathway. As explained above, the Orientation Pathway included signs with directions for communicating through chat, walking, flying, creating note cards, sitting, getting an avatar set, and wearing an avatar set. In order to customize an avatar, participants needed to right click on their avatar to access a menu that would allow them to make changes to all the different components of the avatar. During the orientation meeting, groups identified what they knew and did not know about the environment, listed resources they could explore to find answers, and wrote a team note card explaining the tools they would use to write their goals in the follow-up meetings.

Figure 17 shows Group A at their orientation meeting. During the meeting, all participants were given an avatar set to wear. Participants were told they could adjust their avatar if desired but that it was not required for the study. The material provided for both Group A's and Group B's orientation meetings was identical. At the end of the meetings, dates and times for the Goal Writing Meetings were established.

Figure 17. Group A on the Orientation Pathway.

Step 4: Group Goal Writing Meeting One

During Goal Writing Meeting One, participants logged into TeacherSim from their school computers and went to their Group Meeting Area. The Group Meeting Area was located inside the digital school in TeacherSim. When they arrived at their meeting location, the facilitator provided an overview of the purpose of the gathering and directed participants to click on the scenario picture in their Group Meeting Area. Clicking on the scenario picture would bring up a note card with the scenario information (see Figure 15). The scenarios used in the study are available in Appendix C.

After participants read the section on the note card that explained the hypothetical child's background, the facilitator asked participants to identify as a team (a) what they

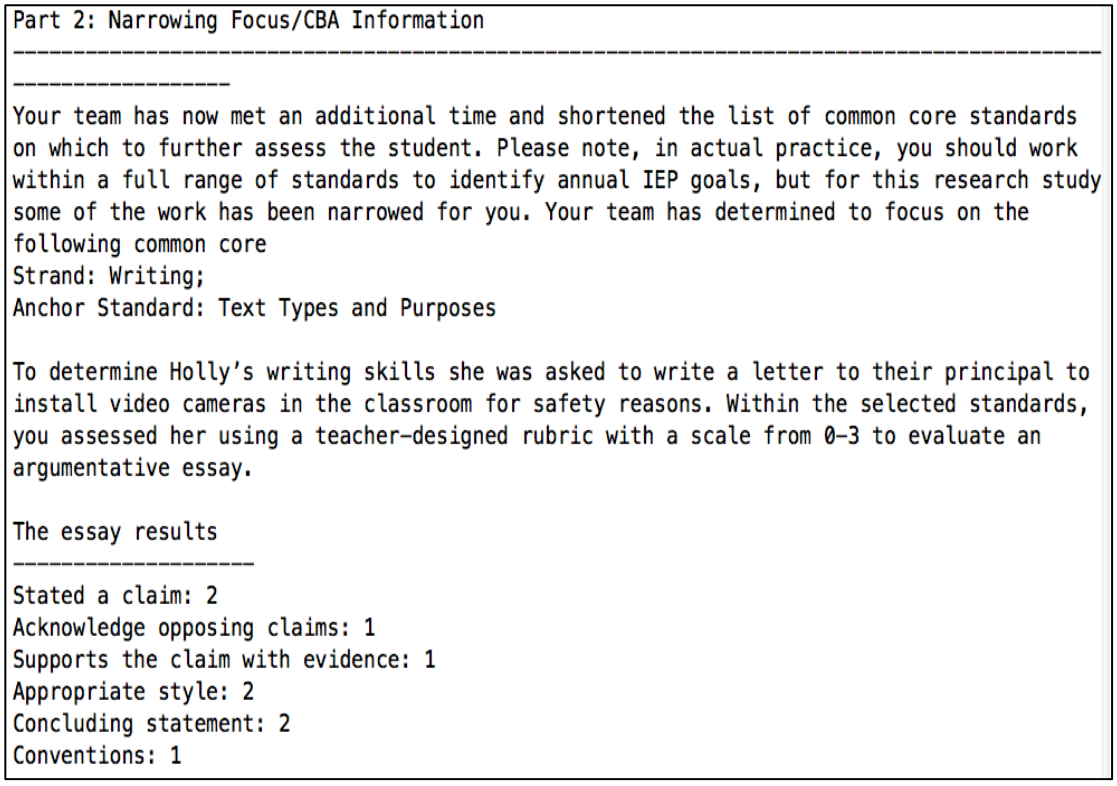
knew about the child, (b) what seemed to be problematic for the child, and (c) how that related to the Utah Core Standards. Within the Utah Core Standards, participants needed to identify applicable standards by looking at the strand, anchor standard, and grade level (see Figure 14). Participants navigated the Utah Core Standards with the help of the following graphic organizer that showed an example of the English Language Arts Standards for the K-5 grade level.

Once participants negotiated about the child's main issues, they next decided the areas of the Utah Core Standards they wanted to research individually that could address these areas. The purpose of Goal Writing Meeting One was for participants to determine the area of the Utah Core Standards they wanted to research as well as to identify information they could use to learn more about writing a standards-based IEP. A key objective was for participants to determine the areas they wanted to research and make assignments for reporting their findings in the next meeting. Before the end of the session, the time and place for the next meeting was arranged. After the meeting, the facilitators for Groups A and B instructed participants to access the TPI through a Google Form and complete the survey prior to the next meeting. I checked for completion of the TPI between meetings and all participants completed this task.

Step 5: Group Goal Meeting Two.

Like the first Goal Writing Meeting, in Goal Writing Meeting Two, participants logged into TeacherSim from their school computers and returned to their Group Meeting Area. At the beginning of the meeting, the facilitator set up times for the individual semistructured interviews. After the times of the interviews were arranged, the

participants discussed what they found in their research. Participants also received and discussed additional information about the child scenario, took time writing a Present Levels of Academic and Functional Performance (PLAAFP), and wrote a standards-based goal for the child (part of an IEP). The additional information about the child was meant to reduce the possible variety of goals participants could create. This information also provided additional assessment information about the child. Figure 18 shows additional information about one of the scenarios. This information helped the participants construct a standards-based IEP goal.



Part 2: Narrowing Focus/CBA Information

Your team has now met an additional time and shortened the list of common core standards on which to further assess the student. Please note, in actual practice, you should work within a full range of standards to identify annual IEP goals, but for this research study some of the work has been narrowed for you. Your team has determined to focus on the following common core
Strand: Writing;
Anchor Standard: Text Types and Purposes

To determine Holly's writing skills she was asked to write a letter to their principal to install video cameras in the classroom for safety reasons. Within the selected standards, you assessed her using a teacher-designed rubric with a scale from 0-3 to evaluate an argumentative essay.

The essay results

Stated a claim: 2
Acknowledge opposing claims: 1
Supports the claim with evidence: 1
Appropriate style: 2
Concluding statement: 2
Conventions: 1

Figure 18. Additional Information about the Scenario.

Data Sources

In this study, four data sources were used:

1. Temple Presence Inventory (TPI)
2. meeting observations (screen captures)
3. meeting transcripts (from Goal Writing Meeting One and Two)
4. meeting transcripts (from semistructured interviews)

Temple Presence Inventory

Part of the material used in the study included a Google Form version of the Temple Presence Inventory (TPI) (Lombard et al. 2009). The validity and reliability of the TPI has been described in the literature review, and the TPI is available in Appendix C. The TPI includes eight research-based constructs. Each of the constructs has several questions on different items related to the construct. Each question is on a seven-point scale with one being weak agreement with the question and seven being strong agreement with the question. Summaries of each of the constructs follow:

- **Spatial Presence:** Spatial Presence corresponds with physical presence and is the feeling of "being physically" in another place.
- **Social Presence (Parasocial Interaction):** The Social Presence (Parasocial Interaction) construct includes six questions focusing on (a) how often participants had the sensation that others could see and hear them, (b) that they could interact with others, (c) that they were both in a new place, (d) whether

the participants were in the same place, (e) if they were directly talking to others, and (f) that they wanted to make eye contact.

- **Social Presence (Passive Interpersonal):** The Social Presence (Passive Interpersonal) construct includes five questions focusing on (a) how well participants could control the interaction they were having, (b) observing facial expressions, (c) changes in tone of voice, (d) style of dress of others, and (e) the body language of others. These five questions are interesting in the context of TeacherSim and Teamspeak because avatars can be customized, and the audio quality was good enough to provide for changes in tone of voice. However, in terms of body language and facial expressions, the avatars are not advanced enough to show facial expressions or corresponding body language.
- **Social Presence (Active Interpersonal):** The Social Presence (Active Interpersonal) construct includes three questions involving participants (a) making a sound in response to something they heard in the environment, (b) smiling in response to something that was heard, and (c) wanting to respond to a person in the environment.
- **Engagement:** The Engagement construct consists of five questions focusing on (a) feeling mentally immersed in the experience, (b) involved in the experience, (c) sensory engagement, (d) experiencing a sensation of reality, and (e) determining how relaxing or exciting the experience was.

- **Social Richness:** The Social Richness construct includes five questions rating the experience in terms of (a) responsiveness, (b) liveliness, (c) personality, (d) sensitivity, and (e) sociability.
- **Social Realism:** The Social Realism construct consists of three questions focusing on asking participants (a) if the things they saw would occur in the real world (b) if the things they heard would and could occur in the real world, and (c) if the activities were like the way things would occur in the real world.
- **Perceptual Realism:** The Perceptual Realism construct consists of six questions. These questions focus on asking how feelings in the environment match their perceptions in terms of (a) seeing, (b) hearing, (c) temperature, (d) smell, (e) resemblance, and (f) sound.

The purpose for using the TPI as a data source was to establish that participants in the case study experienced physical and social presence during their activities in TeacherSim. The feeling of physical and social presence helped to reduce feelings of isolation felt by geographically dispersed participants. These feelings also helped to improve collaboration. The experiences of physical and social presence were further explored through the transcripts of the orientation, goal writing meetings, and interviews.

Transcripts of Orientation, Goal Writing Meetings, and Interviews

During all meetings, audio from participants was recorded through the audio capture functionality of the Teamspeak server. After each meeting, the audio files were saved as wav files. These wav files were edited for length and then sent to a transcription company to transcribe the audio. Once completed transcriptions were received from the

transcription company, I compared the transcripts to the audio files to verify accuracy. This comparison involved listening to the audio recording of each meeting at double speed using the Quicktime player while reading the corresponding Word transcription file. All transcription files accurately reflected each participant's name and words spoken during the meetings. I chose to use transcripts as a primary data source because text was easier to annotate, search, and compare than audio files.

Screen Captures

Screen captures of the orientation and goal writing meetings were made from my computer using the Camtasia software. Screen captures were used to supplement and confirm the data identified in the transcripts. Screen captures were also used as a supporting data source in identifying instances of physical and social presence. The actions of avatars were compared with words spoken in transcripts and used to triangulate feelings of physical and social presence.

Individual Interviews

For the individual interviews, I asked each participant to log onto the Teamspeak server so that the audio of the interview could be captured. Once the participant and I were both on the Teamspeak server, I asked the participant a series of semistructured questions. These questions covered the topics of the PBL process, learning interaction, environmental fidelity, the process of creating a standards-based IEP goal, and their scores on the TPI. A complete list of these questions is available in Appendix E. Table 5 shows the research questions matched to data sources and the analysis technique used to address the research questions.

Table 5

Research Question, Data Sources, and Analysis Techniques.

Research and Sub Questions	**Data Sources**	**Analysis Technique**
A. How did special educators engage with the task of creating standards-based IEP goals using TeacherSim?	• Meeting transcripts (Goal Writing Meeting One and Two) • Meeting transcripts (Interviews)	Qualitative Coding
B. How did TeacherSim support or hinder this?	• Meeting observations (screen captures) • Meeting transcripts (Goal Writing Meeting One and Two) • Meeting transcripts (Interviews) • TPI descriptive statistics	Qualitative Coding

Data Analysis

Once the transcripts were verified to accurately reflect participant names and words spoken, all transcripts were put into an Excel spreadsheet to better annotate and mark up the data. Qualitative analysis involved two stages of coding and inspection of the data. The first cycle of coding borrowed steps from Gee (2011) and was used to help identify patterns. Specifically, this technique included language analysis that put words into their smallest meaning units or what Gee calls a "line". Linguistically, lines are "idea units;" they are a single thought spoken by a participant. Gee then groups several lines on a topic into stanzas. Like in poetry, stanzas represent several related lines. I used these numbered lines and stanzas to help closely examine the data. Once all transcript data was put into lines and stanzas, a process similar to what Saldaña (2013) describes as

descriptive coding was used to "assign basic labels to data to provide an inventory of their topics." (p 83). Because, I had participated in all the meetings, I had assumptions about what I would find in the data. My assumptions were that participants had used the Utah Core Standards, that they had experienced physical and social presence, and that they had also experienced challenges while using TeacherSim. The following table provides an example of what the processes of the first round of coding involved. Table 6 shows an excerpt broken up into lines numbered A1-A8 that are all part of a group of lines on the same topic (Stanza A.) The content of this interaction is then labeled with a descriptive code—in this case, *Uncertainty About Benchmarks*. This method was helpful because it provided a topical index of information discussed during the TeacherSim professional development activities. This round of coding resulted in seventy-one descriptive codes.

Table 6

First Round Qualitative Coding Techniques.

Data Source: Group A: Goal Meeting Two
Descriptive Code: Uncertainty About Benchmarks
Stanza A.
A1. SK: All right, CP, take it away.
A2. CP: I don't know where to take it.
A3. SK: Just tell us a little bit about what you researched about phonics and word recognition.
A4. CP: Well I look at the core under Foundational Skills,
A5. CP: and looked and saw that Jimmy is not at grade three level.
A6. CP: So I backed up and went to two, and I don't think he has grade two.
A7. CP: and I'm not sure about grade one, all those little benchmarks under there.
A8. CP: So I'm not sure what you want to know.

During the second cycle of coding, the seventy-one descriptive codes were reexamined and categorized into five groups to provide a picture of recurring ideas in the data. The initial codes were consolidated down to five larger, overarching codes; specifically: *Goal Writing, Physical and Social Presence, Challenges with Technology, Roles in PBL, and Researching the Core*. The descriptive code, *Uncertainty about Benchmarks*, fits under the *Researching the Core* category. A full list of the descriptive codes and their categories is available in Appendix F.

Once the second round of coding was completed, I wrote narrative descriptions of ST's and PK's experiences using TeacherSim for professional development. These narrative descriptions included excerpts from the transcripts with their descriptive codes as well as my interpretation of what the excerpts meant for the participants. These narrative descriptions were then shared with ST and PK during the member checking process and then included in the Findings chapter.

Methods for Ensuring Trustworthiness

There are several methods used in this study to ensure the trustworthiness of the claims made through the data analysis. These include triangulation of claims, member checking, and rich, thick description.

Triangulation

All claims in this study originated from the data analysis, which began with coding of the meeting transcripts. I used descriptive coding on both the goal writing meeting transcripts and the interview transcripts to allow for comparison between the meetings and interviews. Statements from the goal writing meetings were matched with

similar statements found in the interviews. To determine participants' experience of physical and social presence, I used the TPI for verification. Descriptive statements from goal writing meetings and interviews, as well as screen capture images, were also used to confirm the experiences of participants.

Member Checking and Rich, Thick Description

I emailed written narratives to ST and PK for agreement or revisions. Participants reviewed these narratives and confirmed that they accurately represented their experiences by responding back with an email. I was ready to make revisions if necessary. These narratives were incorporated into the Findings chapter. In addition to member checking, a thick, rich description of the cases and findings are provided so as to make the experiences and the perspectives of the participants become clear to readers. After I completed coding and shared narrative descriptions with ST and PK, this material was used to build the case study report described in the Findings chapter. This report was based on recurring patterns in the data and reflects the experience of ST and PK as they used TeacherSim as a professional development tool.

CHAPTER 5

FINDINGS

This dissertation examines the use of TeacherSim as a professional development tool for special education professionals. This environment is a possible approach to help them collaborate on creating standards-based IEP goals from a distance. To examine this, I present two participant cases from the larger set of data of the seven participants. The two teachers I focus on are ST, a special education teacher from Group A, and PK, another special education teacher from Group B. The rationale for selecting these two cases is described in the Methods chapter, but to reiterate, both participants had representative experiences collaborating in TeacherSim and both teachers were able to accomplish the professional development tasks. These cases serve to illustrate the above through examining (a) how did special educators engage with the task of creating standards-based IEP goals using TeacherSim? and (b) how did TeacherSim support or hinder this?

Engaging with the Task of Creating Standards-Based IEP Goals in TeacherSim

ST's experience

During Group Meeting One all participants gathered in TeacherSim and communicated via headsets or microphones to discuss the needs of a hypothetical child scenario. ST's group received background information about Jimmy, a hypothetical third grade student, who had been receiving special education services since the second grade. He had a classification of speech language impairment. For a full description of the Jimmy scenario please see Appendix C. Like Group A, Group B received a scenario for

a different child named Holly also available in Appendix C. The objectives for Group Meeting One was for participants to identify (a) what they knew about the child, (b) what seemed to be problematic for the child, and (c) how that related to the Utah Core Standards. Once participants negotiated about what the child's main issues were, they next decided the areas of the Utah Core Standards they wanted to research individually that could address these areas. A key part of the meeting was for participants to determine the areas they wanted to research and make assignments for reporting their findings in Group Meeting Two.

In the following extended excerpts from Group Meeting Two, participants are referring to and talking about the Utah Core Standards. These participants are making critiques and voicing some concerns about using the Utah Core Standards. The group members are finding ways to strategically integrate or apply the Utah Core Standards to their larger task of writing a standards-based IEP goal. In the following segments from Group Meeting Two, the teachers are returning from researching information in the Utah Core Standards that they explored in an attempt to find applicable material to use in creating a goal for Jimmy. Conversations from multiple teachers in the meeting are excerpted, but the focal teacher of this case was ST. As I will show, ST was important here as a summarizer of many of the points that others in Group A raised. For the following segment, SK as the facilitator asks CP to begin sharing what she found in the Utah Core Standards. In Table 7, CP had some initial uncertainty of what to say (A2). After some prompting, CP then talked specifically about using the Utah Core Standards "under Foundational Skills" and saw "that Jimmy is not at grade three level" (A4-A5).

Following that observation, she also began to discuss how the Utah Core Standards and its sequential structure established a set of precursor skills for her to consider. She eventually went further and further back to look at earlier benchmarks (A6-A7). In all, this short excerpt shows that CP uses the Utah Core Standards immediately as a resource. This excerpt is significant because it illustrates that participants are able to discuss their thinking about the Utah Core Standards within TeacherSim as they would have done in a face-to-face meeting. This episode continued for a few more minutes that have been cut for brevity. As shown below and as many practicing teachers know, the use of the Utah Core Standards in creating a standards-based IEP goal is not self-explanatory. ST was asked to summarize what CP had said. Table 8 shows ST summarizing CP's comments to the other group members.

Table 7

Meeting Excerpt Showing Uncertainty about the Benchmarks.

Data Source: Group A: Goal Meeting Two
Descriptive Code: Uncertainty about Benchmarks **Stanza A.** A1. SK: All right, CP, take it away. A2. CP: I don't know where to take it. A3. SK: Just tell us a little bit about what you researched about phonics and word recognition. A4. CP: Well I look at the core under Foundational Skills, A5. CP: and looked and saw that Jimmy is not at grade three level. A6. CP: So I backed up and went to two, and I don't think he has grade two. A7. CP: and I'm not sure about grade one, all those little benchmarks under there. A8. CP: So I'm not sure what you want to know.

Table 8

Meeting Excerpt Showing ST's summary of CP.

Data Source: Group A: Goal Meeting Two
Descriptive Code: ST's Summary of CP
Stanza B.
B1. ST: CP, you were phonics and word recognition.
B2. ST: You looked at the core under Foundational Skills.
B3. ST: Jimmy's not third grade or second grade;
B4. ST: he might have some grade one skills.
B5. ST: The benchmarks aren't clear.
B6. CP: Yeah.

ST reiterated what CP explained; and, importantly, she states "the benchmarks aren't clear". This is not just ST's sentiment, as CP immediately adds "Yeah", confirming what she had said (B5-B6). For these participants, the benchmarks for the Utah Core Standards are not clear; there are difficulties that have to be resolved by the teachers. This is accepted knowledge as reflected in CP's "Yeah." This is a compelling example because it illustrates that special educators must negotiate how to apply the standards when creating a standards-based IEP goal. TeacherSim helped this real-time negotiation because all of the participants were in the same place at the same time using the same resources.

These excerpts show that teachers are wrestling with the standards and that the actual practice of applying the Utah Core Standards can be difficult. Determining which element to use in goal writing can be problematic. Teachers like ST want to apply the Utah Core Standards to what they are doing but find that "the benchmarks aren't clear" (B5). During the first meeting and continuing throughout the second meeting, ST took notes for her group and attempted to summarize scenario details and other team member

perspectives. Table 9 shows an example of ST summarizing scenario details taken from Group A's Goal Meeting One.

In this excerpt, ST is helping her team members by explaining the key parts of the scenario that they should be considering during their first group meeting (C1-C6). RC (another special educator) agrees that ST summed up the scenario (C7) and the team used this information to help them determine the next steps they should take. Shifting from the first group meeting to the second group meeting, ST continued to play the role of summarizer, but she also provided a possible solution of how to use the Utah Core Standards in goal writing (see Table 10). This episode is taken from Goal Meeting Two.

ST describes where resources were in the Utah Core Standards (D1-D4). She also talks about the practical concerns and approaches the teachers want to take (adjusting, scaffolding) (D5) to meet Jimmy's needs. She is then putting forward the next direction which is doing grade one in parallel with grade two and building on the areas where Jimmy is capable (D7-D9). Still, even with an approach in mind, the Utah Core Standards and their benchmarks were subject to revisiting and discussion for participants.

The next segment continues this conversation with CP asking her group follow-up questions about the strategies they were planning on using to apply the Utah Core Standards to goal writing. In this episode, CP is asking the group a question, and SK (the facilitator) and RC (another special education teacher) respond to her question. Table 11 shows this conversation. This episode shows that CP was still uncertain about determining which part of the Utah Core Standards the team should be focusing on (E3-E4) even after ST's suggestion of trying to use material from two grades in parallel. RC

responds to CP's question by offering her own opinion on what the benchmarks mean. RC uses the verb "interpret" as a way of signaling that she is uncertain, but in her opinion, the group should focus on reading comprehension. Also, even though Jimmy is not real, CP expresses concern for him, suggesting that she and the other teachers were experiencing social presence in this virtual task involving avatars and a hypothetical student when she says "poor Jimmy" (E10). The discussion continued, but the challenges of using the Utah Core Standards remained. To close off this episode, the following excerpt summarizes what the teachers realized they needed to do with the Utah Core Standards. Table 12 shows ST offering the group another strategy for how to use the Utah Core Standards.

ST explains that they need to "make the core so it applies," in other words, find applicable statements their group can use as they create goals using the Utah Core Standards. ST means that teachers must pick what they find useful from the standards and use that material when developing goals.

These episodes from Group A highlighted that the Utah Core Standards were used in spite of the difficulty. The Utah Core Standards have some features such as grade sequencing that helped teachers to look at earlier skills needed by the child in their scenario. However, even with these features, the participants identified ambiguity in several places during their discussions. TeacherSim, as a virtual space with a set of scenarios, enabled this kind of interrogation and interaction with the Utah Core Standards as participants discussed and negotiated which elements from the Core they would use in the creation of their standards-based IEP goals. The conferencing technology of

TeacherSim enabled these professionals to engage in a level of collaboration not normally possible because of geography. This kind of activity was what many teachers would do in a face-to-face meeting: find a way to use the Utah Core Standards but make necessary adaptations as they formulate standards-based IEP goals.

Table 9

ST Summarizing Scenario Details.

Data Source: Group A, Goal Meeting One
Descriptive Code: ST Summarizing Scenario Details
Stanza C.
C1. ST: Oral reading fluency: Jimmy reads first grade at 26 words per minute
C2. 88 percent accuracy, high-frequency vocab at articulation of R,S, and O.
C3. So that's what I narrowed it down to...
C4. So that's like the second part of the note card
C5. but that's the part that I think officially applies directly to Jimmy.
C6. ST: So it's like just a slight summary of what you did.
C7. RC: Sounds like you summed up Jimmy.

Table 10

ST's Possible Solution to Using the Utah Core Standards.

Data Source: Group A, Goal Meeting Two
Descriptive Code: ST Summarizing CP Offering a Solution
Stanza D.
D1. ST: Jimmy needs to identify purpose, connection and integrate prior knowledge with new material.
D2. ST: All kids in – like all his peer group (not just him),
D3. ST: there's increasing range of reading and a level of text complexity.
D4. ST: By grade two, they want scaffolding between two and three.
D5. ST: Grade one seems to fit for Jimmy, but it needs to be adjusted each year.
D6. ST: CP wants to know if Jimmy has splinter skills, since all the grades are cumulative.
D7. ST: So they're doing the stuff in grade one as they are in grade two,
D8. ST: and then grade three we wanna push where he's the most capable,
D9. ST: or he's more capable.

Table 11

CP Questioning Whether Standards Fit as Listening or Reading.

Data Source: Group A: Goal Meeting Two
Descriptive Code: Interpreting the Core
Stanza E.
E1. CP: Yeah I have a question.
E2. SK: Go ahead, CP.
E3. CP: These benchmarks or sub-skills or whatever they're called
E4. CP: are they listening comprehension, or are they actually his reading comprehension?
E5. RC: CP, I interpret it as reading comprehension,
E6. RC: because most of it had to do with him interacting with the text.
E7. CP: Okay. He is gonna have a hard time interacting with the text…
E8. CP: because of his lack of – his decoding issues and –
E9: CP: anyway that sounds pretty negative.
E10: CP: I'm sorry. Poor Jimmy.

Table 12

ST Offering Another Strategy for Using the Utah Core Standards.

Data Source: Group A: Goal Meeting Two
Descriptive Code: Strategy for Using the Core
Stanza F.
F1. SK: 'Cause it's – I hate to see following directions
F2. SK: drop off because we're not finding something specific about it in the core.
F3. ST: Well I think we need to make the core –
F4. ST: like, not like twist the core, but make the core so it applies,
F5: ST: because we know this kid needs following directions.

PK's experience

The kinds of transactions that took place in Group A that ST had summarized and synthesized also occurred in Group B. Group B also referenced the Utah Core Standards and questioned some of its applicability. They tried to make sense of what different benchmarks meant and translated them in terms of practice. In Group A, ST was the most involved of all the participants as measured by number of utterances, so her case was

especially helpful for showing her group experience in detail. PK was less involved as measured by her number of turns; however, she raised important points about how to relate to the Utah Core Standards despite some of the challenges that both Group A and Group B noted in their professional development experience. In this episode taken from Group B's Goal Meeting Two, PK explained to her team members how to deal with a difference between the student and a requirement with the Utah Core Standards.

Table 13 shows this statement. PK references Holbrook's (2007) *A Seven-Step Process to Creating Standards-based IEPs* and says that it is okay to accept misalignments between the standards and written goals. PK uses the larger objective of getting Holly (Group B's student scenario also included in Appendix C) to grade level, and she determines that it is okay to deviate from benchmarks based on the child's performance. Still, the Utah Core Standards served as a productive resource for getting the teachers to reflect its use for creating standards-based IEP goals. The next episode occurred a few minutes later in the meeting as PK and her team member ER (a speech-language pathologist) are discussing the applicability of parts of the Utah Core Standards to Camille's current abilities. Table 14 shows PK and ER's interaction.

In this interaction, PK is reevaluating what is in the Utah Core Standards and finding things that were "usable" for writing goals (H11-H15). Without going into the detail of other excerpts that would show similar transactions that happened in Group B and Group A, I instead focus on PK's impressions of the experience. During a postinterview, when asking her about her goal writing process, PK explained her feelings

about the process. Table 15 displays PK's dialogue as she summarizes her feelings about the professional development experience.

This excerpt from PK's postinterview indicated that, while she already had some ideas about how to create a standards-based IEP goal, the professional development in TeacherSim helped her to "understand it" (I12) and that she thought it was "pretty easy…now" (I11). It is unclear which specific aspects of the professional development activities helped PK to "understand" the process of creating a standards-based IEP goal. Since the professional development was a combination of instructional model, the collaborative TeacherSim software, and group discussion, it is difficult to parse out the one element that impacted her perceived learning. However, the combined effect of all of these elements helped PK to feel she could better grasp the process of creating a standards-based IEP goal.

Table 13

PK Addressing Differences Between Student and the Utah Core Standards.

Data Source: Group B: Goal Meeting Two
Descriptive Code: Addressing differences between student and the Core Stanza G. G1. PK: and the article that I read addressed that G2. PK: and it said not all of our goals are going to be hitting these standards, G3. PK: but we've got to find some that will so that we are working towards getting them up to grade level.

Table 14

PK's Understanding of What Applies from the Utah Core Standards.

Data Source: Group B: Goal Meeting Two
Descriptive Code: What Can I Apply From the Core
Stanza H.
H1. ER: What areas did you find interesting in your
H2. ER: when you were going through the standards?
H3. PK: The key ideas and details have a goal
H4: PK: that said the student will demonstrate the meaning of words
H5: PK: and phrases as they're used in the text.
H6: PK: So that's something that I know I could use, too.
H7: PK: It talked about, along with that – excuse me –
H8: PK: that they would use figurative and connotative meanings, analyze the content.
H9: PK: I mean there's a lot more to it, but when it comes right down to it –
H10: ER: That was all in the vocabulary also.
H11: PK: Yeah, when it comes right down to it, you know
H12: PK: determining the meaning of words,
H13: PK: it's very basic in what we do in teaching multisyllabic words.
H14: PK: We're doing decoding and then talking about the meanings of the words.
H15: PK: So I could see these being very usable at the grade level that she's working at.

Table 15

PK's Statement About the Professional Development Experience.

Data Source: PK's Postinterview
Descriptive Code: Experience of Writing a Standard-based IEP Goal
Stanza I.
I1. Um, after looking at the students' needs,
I2. the areas that they need, um,
I3. going to the standards for their grade level,
I4. we tried to match up, um, what
I5. what their needs are with what,
I6. the standards are in certain areas to find
I7. the specific, um, strands that we can pull information on
I8. to write those goals.
I9. And then using the grade level information to write up goals
I10. that would be at their instructional level was
I11. it's really a pretty easy process now that
I12. I understand it.

How TeacherSim Supports Special Educator Engagement

Being in a virtual space always introduces a range of social considerations. How does a participant present themselves to others? How do participants interact? How should individuals interpret others given the absence of face-to-face cues that we are more accustomed to? One of the potential benefits of an environment like TeacherSim is that being in a virtual space allows more consideration and exploration of these issues. The main elements considered during these professional development activities in TeacherSim are feelings of physical and social presence, the presentation of the self, the virtual orientation of avatars, the rationale for making choices digitally to increase comfort, and the challenges associated with the tool. Table 16 shows all participants' (n=7) mean and standard deviation on the TPI. This table also highlights ST's and PK's scores compared to the other participants. Each question of the TPI uses a range from one to seven with one being low and seven being high, except for one item on a nominal scale. The scale stems for each question are listed in Table 16 and include: "not at all" to "very much", "never" to "always", and "not well" to "very well".

Because of the small number of participants completing the TPI in this case study, limited claims can be made about whether all individuals participating in similar professional development activities will experience physical and social presence. However, because both ST and PK's scores were consistently higher than the group mean on most scores and higher than the scale midpoint on many questions; these two participants clearly reported experiencing physical and social presence using TeacherSim.

Comparing ST to PK, PK chose three low responses (3 and lower) to the TPI questions. On the question of *How often did you want to or did you make eye-contact with someone you saw/heard? (1=Never, 7=Always)* PK chose never wanting to or making eye contact. PK may not have wanted to make eye contact because of the role her avatar seemed to play for her in providing some psychological distance, which is explained in the next section. Another factor influencing this low score could have been the fact that PK could not control facial expressions or body language in TeacherSim. PK's low response to the two questions of *During the media experience how well were you able to observe the facial expressions [and body language] of the people you saw/heard? (1 = Not well 7 = Very well)* may have been the result of avatars in TeacherSim not displaying facial expressions or body language but could also be linked to PK's feelings about her avatar. Appendix C lists the TPI scores for all participants. These feelings of physical and social presence likely impacted each team's ability to effectively collaborate. Another key social component of interacting in a virtual space is the presentation of a digital self.

Presentation of the Self

When interacting with others in a virtual space like TeacherSim, individuals have a choice as to how to present their avatar or virtual body to others. Unlike two of her team members, ST changed her avatar to look like herself. ST's avatar is shown in Figure 19. ST adjusted the avatar's height, pants color, undershirt color, shoe color, and hair color. When discussing her avatar in a post interview, ST explained why she changed her avatar the way she did. Table 17 shows this dialogue.

ST's excerpt suggests two affordances of avatars seen in the study. Specifically, these affordances were the ability to represent the user's physical self or an alternative to the user's physical self (J1-J2). ST's comments reveal she chose to represent her physical self to others to help them recognize her on the team (J9-J10). This suggestion by ST indicates she saw her avatar as a way of relating to others in TeacherSim. Later in the interview, ST expressed that she felt annoyed with those team members who did not customize their avatar. It seemed that for ST, members of the team who did not customize their avatar were somehow less committed to being recognizable to others. Of four participants on ST's team, one other participant customized her avatar while two others did not. Similarly, of the three participants on PK's team, two of the three participants customized their avatar but PK did not. The characteristics ST customized in her avatar correspond to those listed in her excerpt above (J5-J8). Table 18 shows ST and PK's avatars.

Avatars, Psychological Distance, and Comfort Level

Another special consideration of using avatars in a digital space is determining how the avatars impact an individual's comfort level. For some individuals like ST, the avatar served as a way for others to recognize her in the virtual space. For others, avatars can help to reduce social anxiety by providing some psychological distance from team members. PK did not customize her avatar from the default choice selected during the orientation meeting. While she changed her avatar from the original "Ruth" avatar in yoga clothing, using the ready-made avatar sets available at the avatar changing station, she did not customize her avatar to resemble her own physical features. This lack of

resemblance to her physical self, allowed her to feel less judged for her appearance by team members. Table 18 shows PK's avatar.

During the post interview with PK, she explained how using an avatar increased her comfort level. Table 19 shows an excerpt of that part of the post interview. In this excerpt, PK indicated that the use of an avatar improved her comfort level when meeting with others. She explained that, for her, an avatar helped to reduce her depression and social anxiety (K1-K3) and make interacting with others on a team more comfortable (K6) and easy (K4-K5). For PK, her avatar functioned as a mechanism to reduce social tension that she felt happened during regular meetings. This reduction of anxiety allowed her to interact more easily with her team members.

Avatar Orientation

Closely associated with the presentation of the self inside a virtual space is the location and placement of avatars. Because avatars appear inside TeacherSim they can be oriented in many ways in relation to other avatars. This concept of avatar orientation is related to the ideas of physical and social presence. Because avatars move around a digital space and can interact with other avatars, individuals can have the desire to position their avatar near the other avatars. One example came from ST's first Goal Writing Meeting and a similar interaction also occurred with PK's group. For her initial meeting, ST arrived late and her avatar rendered on the Orientation Pathway rather than in the group meeting area. Upon noticing her avatar was not near her group, ST asks where her team members are located.

Table 20 shows this interaction. As ST looked around inside TeacherSim she

asked, (L1) “where are you guys?” ST felt like she needed to get “inside” the appropriate space (the group meeting area) in TeacherSim to meet with her team members. Like ST, PK had a similar experience at the beginning of one of her team meetings. Because her avatar had rendered in a different location than her group, PK suggested that she should come and join her team members and felt like her group was having a meeting in a different place.

How TeacherSim Hindered Special Educator Engagement

While ST, PK, and their group members worked together to discuss the Utah Core Standards and develop a standards-based IEP goal, there were a few elements of TeacherSim that presented challenges to the participants. These challenges may have hindered engagement for special educators. The elements of TeacherSim that were challenging for participants were the synchronous nature of the activities, the steps needed to use certain tools, and programming issues with some objects in the virtual space. Each of these issues will be described next using different excerpts from ST and PK’s group meetings.

Table 16

ST's and PK's Scores on the TPI.

Spatial Presence	M	SD	ST	PK
How much did it seem as if the objects and people you saw/heard had come to the place you were? (1 = Not at all 7 = Very much)	5.25	1.28	6	7
How much did it seem as if you could reach out and touch the objects or people you saw/heard? (1 = Not at all 7 = Very much)	4.88	1.25	5	6
How often when an object seemed to be headed toward you did you want to move to get out of its way? (1 = Not at all 7 = Very much)	4.88	1.81	5	7
To what extent did you experience a sense of being there inside the environment you saw/heard? (1 = Not at all 7 = Very much)	5.5	1.07	7	7
To what extent did it seem that sounds came from specific different locations? (1 = Not at all 7 = Very much)	3.75	2.25	6	6
How often did you want to or try to touch something you saw/heard? (1 = Not at all 7 = Very much)	4.63	1.41	7	5
Perceptual Realism	M	SD	ST	PK
Overall, how much did touching the things and people in the environment you saw/heard feel like it would if you had experienced them directly? (1 = Not at all 7 = Very much)	4.6	1.77	6	6
How much did the heat or coolness (temperature) of the environment you saw/heard feel like it would if you had experienced it directly? (1 = Not at all 7 = Very much)	3.4	2.26	5	4
Overall, how much did the things and people in the environment you saw/heard smell like they would had you experienced them directly? (1 = Not at all 7 = Very much)	2.4	1.85	6	4
Overall, how much did the things and people in the environment you saw/heard look like they would if you had experienced them directly? (1 = Not at all 7 = Very much)	3.5	2.33	6	6
Overall, how much did the things and people in the environment you saw/heard sound like they would if you had experienced them directly? (1 = Not at all 7 = Very much)	5.6	1.3	6	6
Social Presence (Parasocial)	M	SD	ST	PK
How often did you have the sensation that people you saw/heard could also see/hear you? (1 = Never 7 = Always)	4.88	1.81	7	7
To what extent did you feel you could interact with the person or people you saw/heard? (1 = None 7 = Very much)	6	1.07	7	7
How much did it seem as if you and the people you saw/heard both left the places where you were and went to a new place? (1 = Not at all 7 = Very much)	5.5	1.2	5	5
How much did it seem as if you and the people you saw/heard were together in the same place? (1= Not at all 7 = Very much)	6	1.07	7	7
How often did it feel as if someone you saw/heard in the environment was talking directly to you? (1 = Never 7 = Always)	5.63	1.19	7	6
How often did you want to or did you make eye-contact with someone you saw/heard? (1 = Never 7 = Always)	4	2.07	6	1
Social Presence (Passive)	M	SD	ST	PK
During the media experience how well were you able to observe the facial expressions of the people you saw/heard? (1 = Not well 7 = Very well)	2.75	1.98	5	2
During the media experience how well were you able to observe the changes in tone of voice of the people you saw/heard? (1 = Not well 7 = Very well)	4.37	2.2	6	6
During the media experience how well were you able to observe the style of dress of the people you saw/heard? (1 = Not well 7 = Very well)	4.75	2.05	7	5
During the media experience how well were you able to observe the body language of the people you saw/heard? (1 = Not well 7 = Very well)	2.62	1.92	6	3
Social Presence (Active)	M	SD	ST	PK
How often did you make a sound out loud (e.g. laugh or speak) in response to someone you saw/heard in the media environment? (1 = Never 7 = Always)	4.5	1.69	6	5
How often did you smile in response to someone you saw/heard in the media environment? (1 = Never 7 = Always)	5.5	0.93	7	6
How often did you want to or did you speak to a person you saw/heard in the media environment? (1 = Never 7 = Always)	6	0.76	7	6

Table 17

ST's Rationale for Changing Her Avatar.

Data Source: Semistructured interview
Descriptive Code: Recognizing Avatars
Stanza. J.
J1. "I'm going to make my avatar look like me."
J2. I thought about making her like a blue-skinned
J3. six-foot tall...And then I thought,
J4. you know what?
J5. I'm going to make her short.
J6. I'm going to give her red hair.
J7. I'm going to make her kind of beefy like I am.
J8. So then people who know me in real life can go,
J9. "Oh, look.
J10. It's ST."

Table 18

Comparison of ST and PK's Avatars.

ST's Avatar	**PK's Avatar**
	

Table 19

PK's Feeling of Comfort.

Data Source: Semistructured Interview
Descriptive Code: Avatar Appearance
Stanza K.
K1. [Laughter] You know it's - it's interesting for me because,
K2. um, I have, um, dealt with some depression and
K3. some kind of social anxiety kinds of things...
K4. so this is a very easy for me –
K5. an easy way for me to be able to interact with people.
K6. It's very comfortable for me.

Table 20

ST Moving Her Avatar to be with Her Group.

Data Source: Goal Writing Meeting One
Descriptive Code: Finding Meeting
Stanza L.
L1: ST: So where are you guys?
L2: Are you inside?
L3: PB: Yes. Let me teleport you to us.

Synchronous Nature of Activities

As anyone who has participated in an online synchronous meeting knows, there are various aspects that can be problematic. Because of the real-time nature of the meeting, individuals must be digitally in the same place at the same time. If there are technological issues like bandwidth latency (or lag), individuals may miss important parts of conversations or miss participating in the meeting entirely. While this may seem like a forgone conclusion, the abrupt shift from being able to interact with others to having no contact can quickly hinder engagement. If the participant is unable to rejoin the meeting quickly, they may lose engagement for the activity overall. During ST's Goal Meeting

One, she was detained by conversations she needed to have with parents about her actual students and so was late to the meeting in TeacherSim. In addition to being late, ST accidentally turned off the power to her machine, removing her from the meeting for several moments. Table 21 shows the moment when ST returned to the meeting and offered an explanation of what happened. In this episode, SC (the group facilitator) is talking to ST about not being worried about leaving the meeting accidentally. This instance from the meeting highlights an issue with any synchronous tool and, specifically, TeacherSim. If power is lost (M7-M9) or if there is an issue with connectivity, then the meeting is put on hold. Whenever ST or any other group member left the meeting unexpectedly, it was disorienting for all other group members still in the meeting. Similarly, if group members arrived late or needed to leave early, other participants could be kept waiting.

Remembering Steps

Individuals new to virtual spaces have a variety of new skills to learn in order to interact in the environment. As a reminder, all of the participants were exposed to TeacherSim during an initial orientation meeting. During this meeting the main skills of movement and interacting with objects were explored using PBL techniques. However, even with this orientation, some participants found it difficult to remember all the steps needed to use a specific tool. During PK's Goal Writing Meeting Two, she forgot the multiple steps needed to share a "note card" (a digital text file) with a team member. In this excerpt, ER (an SLP) asked PK to share the notes from her note card. After several moments of waiting for PK to send the note card to her, ER asks if PK has sent her

materials yet (N1). PK explains that she forgot the steps (N2). Table 22 shows this interaction.

With any new technology, individuals must be able to remember the steps needed to effectively use the tool. While PK was unable to remember the specific steps for sharing a note card, she was able to remember other steps such as moving, sitting, and clicking objects to interact with them. Perhaps the multi-step process of creating and sharing a note card got lost among these other new skills learned for using TeacherSim. ST's group had similar experiences to PK where one member of the team forgot the steps for some of the functions of TeacherSim, but the rest of the team was able to help solve the problem by sharing information.

Table 21

ST Returning to the Meeting.

Data Source: Goal Writing Meeting One
Descriptive Code: ST Dropping Out of the Meeting
Stanza M.
M1: SC: You're back.
M2: ST: I am back.
M3: I feel really dumb right now.
M4: SC: Oh Heavens, don't.
M5: PB: No worries.
M6: ST: Oh, no.
M7: Listen, I have a power strip under my desk
M8: where a bunch of my stuff is plugged in to,
M9: and I kicked it.

Table 22

PK Not Able to Send a Note Card.

Data Source: Goal Writing Meeting Two
Descriptive Code: PK Forgetting Steps
Stanza N.
N1: ER: Did you send me your card?
N2: PK: No, I forgot how to do it.

Object Programming

One element of TeacherSim that could have hindered engagement for special educators was the responsiveness of some objects in the environment. Because TeacherSim is built using open source technology, some aspects of the code can be faulty. One such aspect that is sporadically faulty is the reactions of avatars to the programming needed to sit in chairs. During PK's Goal Writing Meeting One, PS (one of her team members) could not sit in her chair. PS is surprised by her avatar's mysterious behavior and asks her team members what was going on. Table 23 shows this issue.

While PK's team member, PS, did have an issue with sitting (O1-O2), ST's group did not have this same issue, as the glitch is unpredictable. The open source community is familiar with this glitch and is addressing it. However, anytime a technology behaves without a clear reason, participants may be apprehensive about continued use.

Table 23

Programming Issues PS's Chair.

Data Source: Goal Writing Meeting One
Descriptive Code: Programming Issues
Stanza O.
O1: PS: I can't believe I'm sitting on the desk.
O2: Why am I sitting on the desk?
O3: ER: From my perspective, your legs are going through the desk.
O4: PS: That's kind of cool.

Summary

As shown in the episodes and excerpts from meetings and interviews in this case study; the use of TeacherSim as a professional development tool for special education professionals is a possible solution for collaborating on standards-based IEP goals. As the excerpts indicate, special educators could engage in the task of creating standards-based IEP goals using TeacherSim. Both ST's and PK's groups were able to refer to and talk about the Utah Core Standards and negotiate ways to integrate them into the larger task of writing a standards-based IEP goal. While wrestling with unclear benchmarks, the team members determined elements of the standard that applied to the needs of their scenario. This kind of interaction and dialogue is not normally possible without travel for special education professionals in rural districts because of geography.

The use of the virtual space in TeacherSim also enabled new social considerations and impacted participation and engagement in these professional development activities. TeacherSim supports engagement because both ST and PK experienced physical and social presence while using it. In addition to feeling presence, ST was able to modify her

avatar to present herself more accurately as way of relating to her team members. In contrast, PK felt the use of her avatar allowed her to have some psychological distance from her team members, which improved her comfort level in meetings. This psychological distance allowed PK to interact more freely in her meetings as evidenced by her statements in the semistructured interview (see Table 20, lines K5-K6).

The use of TeacherSim as a virtual space also impacted where individuals located their avatars. Because the professional development activities occurred in a virtual school with a specified group meeting area, individuals felt the need to move their avatars to the appropriate location. These movements also likely related to ST's and PK's feelings of physical and social presence.

Because participants in a virtual environment like TeacherSim are able to experience an authentic professional development situation at a distance from one another, this is a viable option for teachers in geographically diverse locations. Instructional designers should also be aware that a technology like TeacherSim can hinder engagement because it can present challenges when it does not work as expected; however, meeting in a virtual world allows participants to experience physical and social presence in spite of physical separation from their colleagues.

CHAPTER 6

CONCLUSIONS

Overview of the Study Purpose and Methods

The purpose of this study was to determine the extent to which special education professionals were able to learn how to write standards-based IEP goals within the TeacherSim environment. The two research questions guiding this study were (a) how did special educators engage with the task of creating standards-based IEP goals using TeacherSim? and (b) how did TeacherSim support or hinder this? This research used a descriptive case study to "describe the intervention" (Yin 2013) specifically the unique elements of using TeacherSim as a tool for professional development.

The focus of the analysis was the selection and description of two participants who demonstrated different intensities of the user experience. This was evident in differing levels of participation and the differing use of avatars by each participant. The two participants were ST, a special education teacher from Group A; and PK, a special education teacher in Group B. The TeacherSim professional development experience is bounded by the activities in these cases and the behaviors of participants in regard to the case propositions.

These case propositions were drawn from the literature and defined the parameters of the case. The specific case propositions were that (a) virtual environments can be an adequate space for professional learning, and (b) virtual environments allow for interactions beyond just information delivery. As described in the Methods and Findings, the primary data source used for qualitative coding was meeting transcripts. Screen

captures of meetings were used to supplement and support conclusions drawn from the transcripts. Results from the TPI also helped to establish that ST and PK experienced social and physical presence.

The primary method of data analysis used in this study was qualitative coding. The first cycle of coding borrowed steps from Gee (2011) then applied descriptive codes as outlined by Saldaña (2013), resulting in a list of topics discussed during the meetings (seventy-one codes: see Appendix F). The second cycle of coding categorized these seventy-one codes into five groups to provide a picture of recurring ideas in the data. These five overall categories were Goal Writing, Physical and Social Presence, Challenges with Technology, Roles in PBL, and Researching the Core. Identifying these categories allowed a characterization of how participants used and experienced the technology. Once coding was completed, I wrote narrative descriptions of ST's and PK's experiences and then shared these with them as a form of member checking. These data sources and techniques helped to provide a picture of the overall experience of special education professionals using TeacherSim.

Summary and Discussion of Results

In describing two participants' professional development experiences, this case study reveals that both individuals were able to engage in the task of creating standards-based IEP goals using TeacherSim. This was shown in the Findings through excerpts illustrating that participants were able to discuss their thinking about the Utah Core Standards within TeacherSim as they would have done in a face-to-face meeting. The activities in TeacherSim were what many teachers would do in a face-to-face meeting:

find a way to use the Utah Core Standards but make necessary adaptations as they formulate standards-based IEP goals.

TeacherSim supported this process by promoting feelings of physical and social presence. Both ST and PK experienced these feelings which likely impacted each group's ability to effectively collaborate. ST and PK also both adjusted the presentation of themselves and the orientation of their avatars to improve their feelings of comfort. TeacherSim hindered this process through the synchronous nature of the activities, the steps needed to use certain tools, and programming issues with some objects in the virtual space.

In considering the experience of the two participants with physical and social presence in TeacherSim, both participants experienced these sensations according to their TPI results. In addition to feeling presence, ST modified her avatar to present herself more accurately so that she could better relate to her team members. In contrast, PK felt the use of her avatar allowed her to have some desired psychological distance from her team members. This psychological distance allowed PK to interact more freely as evidenced by her statements in the semistructured interview. Because PK scored high on the TPI for social presence and described anxiety that she felt in social settings, distancing herself from her team members helped her maintain a comfort zone. This comfort zone enabled her to participate more freely in the professional development activities. This is similar to Walker's (2009) observation that in high-risk situations an avatar could help a participant focus on skill building while alleviating stress inherent to the situation. The movement and colocation of avatars also likely related to ST's and

PK's feelings of physical and social presence. This case study also highlighted some challenges that other designers should be aware of as they plan and create similar settings for professional development. The elements of TeacherSim that were challenging for participants were the synchronous nature of the activities, the steps needed to use certain tools, and programming issues with some objects in the virtual space. The synchronous element that was problematic was the scheduling necessity for participants to be in one place at one time. Having a fixed meeting time can be problematic for professionals with already busy schedules. The second difficult aspect of the experience for participants was the importance of remembering several steps in order to use a tool. One example of a tool that presented problems was the process to create note cards. The final issue that presented challenges to participants was the programming of some of the chairs in TeacherSim. This bug made it so some avatars had a hard time sitting down or standing from the sitting position.

Recommendations for Future Use and Research

As described in the literature review, two similar efforts are being used in special education; specifically, Tyler-Wood, Estes, Christensen, Knezek, and Gibson's (2015) SimSchool and Dieker, Hynes, Hughes, Hardin, and Becht's (2015) TeachLivE. Both of these tools, while helping special educators develop skills, lack the functionality for professionals to collaborate and interact in real time. Further research should be conducted to understand the extent to which collaboration in TeacherSim fosters continued collaboration as well as the continued development of standards-based IEP goals.

As the results of this study suggest, one future use of TeacherSim and similar virtual worlds could be providing additional professional development opportunities for special education professionals. Leko and Brownell's (2009) recommendations for professional development can be fulfilled in a virtual world by making the activities "coherent," "content-focused," "active and situated in classroom settings," and "include student data" (p. 67). A virtual world using PBL methods allows the professional development activities to be content-focused and active while also simulating a classroom setting. Future activities could include widening research on holding simulated IEP meetings in the virtual world (Glomb, Mason, & Blair, 2016). Another possible professional development option using a virtual world could include part or all of the "lesson study process." Lewis, Perry, Foster, Hurd, and Fisher (2011) explain that the lesson study process involves "a small team of teachers [interacting with the] content of the curriculum and plan[ing] a research lesson. One team member teaches the lesson while the others carefully observe students and collect data on their responses to the lesson" (p. 64). After this data collection period, the teachers meet again to determine how to improve the lesson based on students' responses to the lesson. Within a virtual world like TeacherSim, teams of teachers who are geographically dispersed could meet to discuss and plan lessons. the teachers could meet to discuss and plan lessons. Then the teachers could teach the material in the virtual world (as long as the students were also in the space) and then regroup to discuss how the students received the material. Alternatively, if the students were not present in the virtual world, the teachers could use it mainly as coordination and planning venue to prepare and discuss their lessons.

Using a virtual world as a setting was a practical alternative in some ways for holding a professional development meeting compared to the time spent traveling for face-to-face meetings. Designers should further explore the time commitment of using virtual worlds for professional development activities for both teachers and designers. While teachers have the challenge of learning new tools and scheduling synchronous activities, designers must consider the time needed to ensure that all technology is installed and working properly.

Since one of the participants had some difficulty remembering the steps to using note cards, additional testing and research could determine the ideal amount of training time needed for participants to learn how to use all of the tools. Ideally, participants using a virtual world for professional development activities would have the opportunity to use the environment over an extended period of time rather than in three sessions over a three-week period. This would allow them to gain the fluency needed to use all the collaboration tools available to them without the concern of remembering how to use each function. It would also make the time spent setting up the technology and developing the virtual environment more worthwhile.

While PBL use in a virtual world allowed participants to create standards-based IEP goals at a distance in this study, it would be helpful to determine the amount of training necessary for groups to work well as a team and to determine what helps or hinders their performance across multiple problems. As Amador, Miles, and Peters (2006) suggested, scaffolding for learners new to PBL was very important, and many of the participants in this study wanted additional information about the child scenarios they

were assigned. Future studies should help participants understand that the information in PBL situations may be incomplete; and thereby, prepare them for the uncertainties that are part of this instructional method.

Additional studies should further explore improved collaboration and the relationships between participants and their avatars. If more professionals are able to overcome anxieties of face-to-face meetings, a virtual world could be a solution for greater participation and collaboration during professional development activities. Future research should explore the viability of the tool as a venue for special education professionals, parents, general education teachers, and administrators to collaborate together.

Further research should explore whether physical and social presence changes through continued use of TeacherSim. This research should also explore how physical and social presence impacts long-term collaboration. In regards to physical and social presence, additional research should explore the reliability and validity of repeated use of the TPI in a virtual world. Further exploration should be done to determine the conditions that help to foster greater feelings of physical and social presence and to determine why some individuals experience these feelings more or less than others. Also a study exploring whether audio impacts presence and learning would be helpful for researchers and practitioners. An important aspect of this future research should also focus on identifying additional ways avatars impact social presence and whether these feelings persist, increase, or diminish over time.

Limitations of the Study

Because of the nature of case study design, generalization must be made not to populations but to theory (Yin, 1994). Since this was a descriptive case study, results from these participants may be unique to these special education professionals working in a rural district. Because the case study used only two participants of a single case, additional studies using multiple cases or sites may find different results and improve generalizability.

Because one of the preselected PBL facilitators needed to withdraw from the study for family reasons, I assumed the role of facilitator in one of the PBL groups. While I was careful to follow the guidelines offered by Hmelo-Silver and Barrows (2006), because of the need to assume a dual role in the study, some relevant data may have been missed. However, through the use of screen recording software I attempted to address this limitation.

Another limitation to the study may be the process of selecting the participants for analysis. Because selection of PK and ST for closer study came as a result of applying the case propositions to the study after data had been collected, some slightly different perspectives could have been found using other participants for analysis. Similarly, because qualitative coding is an interpretative process, other possible interpretations could also be valid. I tried to address this interpretive issue through the use of triangulation and member checking.

Another limitation of the study is the possibility that some of the participants knew each other from the district even though they were in different schools during the

study. This preexisting familiarity could have impacted their feelings of physical and social presence. Specifically, in Group A, ST was an acquaintance of RC, however PK did not have any previous experience with ER and PS.

Finally, the hardware and software requirements for using this technology may be viewed as a limitation. As stated in the Methods chapter, it was important for me to personally prepare each computer so that participants could be part of the study without the frustration that could come if they had to set up the hardware and software without help. Researchers and instructional designers hoping to use this technology for training would need to keep in mind the fact that some participants may not have the technological background to prepare their computers on their own.

Summary

In summary, this case study indicates that TeacherSim was a viable platform for professional development activities. The virtual world and embedded instructional activities enabled the special education professionals to reflect on and use the Utah Core Standards for the creation of standards-based IEP goals. The use of a virtual world, while new to this group of professionals, was a tool for creating feelings of physical and social presence for some of the professionals participating remotely. It also impacted their engagement in the professional development meetings and allowed them to find ways to create standards-based IEP goals using the Utah Core Standards. While there were challenges for participants, all of them could use most of the technology features to accomplish the meeting activities. Individuals wishing to a use virtual world coupled with

an embedded instructional method should consider both the strengths and weaknesses revealed in this case study in their own implementation of similar tools.

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APPENDICES

APPENDIX A

STANDARDS-BASED IEP STEPS REFERENCED IN THE STUDY

Holbrook's Seven Steps	**Samuel's Steps**	**Scenario Step Directions**
Step 1: Consider the grade-level content standards for the grade in which the student is enrolled or would be enrolled based on age.	Step 2: Choose the standard. Step 3: Unpack the standard. Step 4: Analyze the sub skills.	Step 1: Start with the grade level and work backwards to identify one common core target relevant to her skills, including: a) Strand b) Anchor standard c) Grade level (s)
Step 2: Examine classroom and student data to determine where the student is functioning in relation to the grade level standards.		
Step 3: Develop the present level of academic achievement and functional performance.	Step 1: Use present level of performance.	Step 2: Write the present level of academic achievement and functional performance.
Step 4: Develop measurable annual goals aligned with grade-level academic content standards.	Step 5: Develop the goal. Step 6: Write the short-term objectives and benchmarks.	Step 3: Write up to 3 measurable annual goals based on the Utah Core Standards.
Step 5: Assess and report the student's progress throughout the year.	Step 7: Monitor the goal.	
Step 6: Identify specially designed instruction including accommodations and/or modifications needed to access and progress in the general education curriculum.		
Step 7: Determine the most appropriate assessment option.		

APPENDIX B

SELECTION SURVEY

Please answer the following questions to participate in this study.

1. How many years have you been teaching in the district?

2. What is your gender?

3. Please select your technology background.
   - Basic (I use email and surf the web)
   - Intermediate (I use email, surf the web, and use social media sites like Facebook)
   - Advanced (I use email, surf the web, use social media, and web conferencing like Skype)
   - Expert (I use email, surf the web, use social media, web conferencing, and video games)

4. Please select the statement that defines your feelings about technology
   - Technology gets in the way of teaching.
   - Technology is wonderful when it works.
   - I can figure most technology out even if it does not work perfectly.

5. Please select how you feel about video games.
   - Games are a waste of time.
   - Games have limited use for education.
   - Games can be a reward for good behavior
   - Games can be used for a variety of educational purposes

6. Please specify the school in the district where you teach.

APPENDIX C

TEMPLE PRESENCE INVENTORY SCORES FOR PARTICIPANTS

Spatial Presence	**CP**	**ER**	**RC**	**PS**	**ML**	**ST**	**PK**
How much did it seem as if the objects and people you saw/heard had come to the place you were? (1 = Not at all 7 = Very much)	3	6	6	5	4	6	7
How much did it seem as if you could reach out and touch the objects or people you saw/heard? (1 = Not at all 7 = Very much)	3	6	6	6	3	5	6
How often when an object seemed to be headed toward you did you want to move to get out of its way? (1 = Not at all 7 = Very much)	5	4	6	6	1	5	7
To what extent did you experience a sense of being there inside the environment you saw/heard? (1 = Not at all 7 = Very much)	5	5	6	5	4	7	7
To what extent did it seem that sounds came from specific different locations? (1 = Not at all 7 = Very much)	2	6	3	5	1	6	6
How often did you want to or try to touch something you saw/heard? (1 = Not at all 7 = Very much)	4	5	6	5	3	7	5
Perceptual Realism	**CP**	**ER**	**RC**	**PS**	**ML**	**ST**	**PK**
Overall, how much did touching the things and people in the environment you saw/heard feel like it would if you had experienced them directly? (1 = Not at all 7 = Very much)	3	5	5	6	1	6	6
How much did the heat or coolness (temperature) of the environment you saw/heard feel like it would if you had experienced it directly? (1 = Not at all 7 = Very much)	3	5	1	1	7	5	4
Overall, how much did the things and people in the environment you saw/heard smell like they would had you experienced them directly? (1 = Not at all 7 = Very much)	2	3	1	1	1	6	4
Overall, how much did the things and people in the environment you saw/heard look like they would if you had experienced them directly? (1 = Not at all 7 = Very much)	3	6	1	4	1	6	6
Overall, how much did the things and people in the environment you saw/heard sound like they would if you had experienced them directly? (1 = Not at all 7 = Very much)	3	5	6	7	7	6	6
Social Presence (Parasocial)	**CP**	**ER**	**RC**	**PS**	**ML**	**ST**	**PK**
How often did you have the sensation that people you saw/heard could also see/hear you? (1 = Never 7 = Always)	5	6	5	4	3	7	7
To what extent did you feel you could interact with the person or people you saw/heard? (1 = None 7 = Very much)	4	6	6	6	7	7	7
How much did it seem as if you and the people you saw/heard both left the places where you were and went to a new place? (1 = Not at all 7 = Very much)	3	6	7	6	6	5	5
How much did it seem as if you and the people you saw/heard were together in the same place? (1= Not at all 7 = Very much)	4	5	7	6	6	7	7
How often did it feel as if someone you saw/heard in the environment was talking directly to you? (1 = Never 7 = Always)	5	4	6	7	4	7	6
How often did you want to or did you make eye-contact with someone you saw/heard? (1 = Never 7 = Always)	5	3	6	5	1	6	1
Social Presence (Passive)	**CP**	**ER**	**RC**	**PS**	**ML**	**ST**	**PK**
During the media experience how well were you able to observe the facial expressions of the people you saw/heard? (1 = Not well 7 = Very well)	1	2	1	4	1	5	2
During the media experience how well were you able to observe the changes in tone of voice of the people you saw/heard? (1 = Not well 7 = Very well)	4	5	1	6	6	6	6
During the media experience how well were you able to observe the style of dress of the people you saw/heard? (1 = Not well 7 = Very well)	3	5	4	6	1	7	5
During the media experience how well were you able to observe the body language of the people you saw/heard? (1 = Not well 7 = Very well)	2	2	1	5	1	6	3
Social Presence (Active)	**CP**	**ER**	**RC**	**PC**	**ML**	**ST**	**PK**

How often did you make a sound out loud (e.g. laugh or speak) in response to someone you saw/heard in the media environment? (1 = Never 7 = Always)	5	5	5	6	3	6	5
How often did you smile in response to someone you saw/heard in the media environment? (1 = Never 7 = Always)	5	6	5	5	4	7	6
How often did you want to or did you speak to a person you saw/heard in the media environment? (1 = Never 7 = Always)	5	6	5	7	6	7	6

APPENDIX D

PROBLEM SCENARIOS

Holly: Student Background

Holly is a 10th grader who has received special education services for reading, writing, math, and language since the 2nd grade. She has a classification of specific learning disability. According to current general education teacher reports, Holly has a hard time following multi-step oral and written directions, understanding informational text. Holly is very motivated and turns in almost every assignment but requires significant help to complete them. With substantial support, her overall grades are average, however, she consistently receives poor scores on quizzes and tests. The resource teacher has been working with Holly on reading multisyllabic words fluently and comprehension skills. She reports that Holly can write a three paragraph persuasive essay with topic sentences, supporting details and conclusion. But all of the sentences were simple sentences lacking adjectives, adverbs, and use of conjunctions. The SLP has been working with Holly on increasing sentence complexity to include: adjectives, adverbs, and coordinating conjunctions.

Goal Writing Meeting One

Based on the information that you just read, begin with Holly's grade level and work backwards to identify one common core target relevant to her skills, including the following:

- Strand (Reading Literature, Reading Foundational Skills, etc.)
- Anchor Standard (e.g. Phonics and Word Recognition, Fluency, Key Ideas and Details, Craft and Structure, etc.) that you would assess.
- Grade(s)

PBL Process to answer in this meeting

Consider what you know about the problem. As a team you will want to list what you know about the child based the information provided. What are the problems and how do they relate to the Utah Core Standards? Consider what you do not know about the problem: Where can you access the Utah Core Standards? What anchor standards seem to apply? What do you know about writing standards-based IEP goals?

Gather information to help you answer your questions:

- What grade likely applies?
- What have others described as the process for writing standards-based goals?
- Two options are available here: http://mmdc.sper.usu.edu/teachersim-activities/
- Make group assignments for who will fulfill what assignment

Please record these decisions in new note card at your group workspace. Then end the meeting to find answers to your questions. Your next meeting will be in the next few days.

Goal Writing Meeting Two: Narrowing Focus/CBA Information
Your team has now met an additional time and shortened the list of common core standards on which to further assess the student. Please note, in actual practice, you should work within a full range of standards to identify annual IEP goals, but for this research study some of the work has been narrowed for you. Your team has determined to focus on the following common core:

- Strand: Writing
- Anchor Standard: Text Types and Purposes

To determine Holly's writing skills, she was asked to write a letter to their principal to install video cameras in the classroom for safety reasons. Within the selected standards, you assessed her using a teacher-designed rubric with a scale from 0-3 to evaluate an argumentative essay.

The essay results

- Stated a claim: 2
- Acknowledge opposing claims: 1
- Supports the claim with evidence: 1
- Appropriate style: 2
- Concluding statement: 2
- Conventions: 1

SLP Results: Using the same essay containing 20 sentences, the SLP noted the use of 5 adjectives, 0 adverbs, and the use of "and" on 3 occasions. The sentences were complete, simple sentences.

Write a Present Level of Performance and Goal for this child.
Using the Common Core Anchor Standards: Text Types and Purposes and the results of the CBA, write a single PLAAFP and up to three Measurable Annual Goals (MAG) for this student.

Jimmy: Student Background
Jimmy is a 3rd grader who has received special education services for reading and language since the 2nd grade. He has a classification of speech language impairment. According to current general education teacher reports, Jimmy has a hard time following multistep directions, understanding grade level vocabulary, and understanding grade level narrative text. Jimmy completes and turns in 80% of his work; however, most of the work is not very accurate. The resource teacher has been working with Jimmy on basic and advanced decoding skills and oral reading fluency. She reports that Jimmy currently reads 1st grade level narrative text at 26 wpm with 88% accuracy. The SLP has also been working on grade level high-frequency vocabulary as well as articulation of /r, s, l/.

Goal Writing Meeting One

Based on the information that you just read, begin with Jimmy's grade level and work backwards to identify one Utah Core Standards target relevant to her skills, including the following:

- Strand (Reading Literature, Reading Foundational Skills, etc.)
- Anchor Standard (e.g. Phonics and Word Recognition, Fluency, Key Ideas and Details, Craft and Structure, etc.) that you would assess.
- Grade(s)

PBL Process to answer in this meeting

Consider what you know about the problem. As a team you will want to list what you know about the child based the information provided. What are the problems and how do they relate to the Utah Core Standards? Consider what you do not know about the problem: Where can you access the Utah Core Standards? What anchor standards seem to apply? What do you know about writing standards-based IEP goals?

Gather information to help you answer your questions:

- What grade likely applies?
- What have others described as the process for writing standards-based goals?
- Two options are available here: http://mmdc.sper.usu.edu/teachersim-activities/
- Make group assignments for who will fulfill what assignment

Please record these decisions in new note card at your group workspace. Then end the meeting to find answers to your questions. Your next meeting will be in the next few days.

Goal Writing Meeting Two: Narrowing Focus/CBA Information

Your team has now met an additional time and shortened the list of Utah Core Standards on which to further assess the student. Please note, in actual practice, you should work within a full range of standards to identify annual IEP goals, but for this research study some of the work has been narrowed for you. Your team has determined to focus on the following Utah Core Standard Anchor Standards:

- Reading Foundational Skills; Anchors: Phonics and Word Recognition, Fluency, Range of Reading and Level of Text Complexity
- Language; Anchor: Vocabulary Acquisition and Use

To determine Jimmy's skills within the selected standards, you assessed him using the Core Phonics Survey and DIBELS. Based on the data obtained in those assessments you had him read a K-1 passage, "Frog and Toad". The results included the following:

Core Phonics

- Short Vowel sounds: 70%
- Long Vowel sounds: 100%
- R-controlled sounds: 70%

- Multisyllabic words: 37%

DIBELS Grade 3

- Oral reading fluency:
- Reading Rate: 30 cwpm
- Accuracy: 61%

"Frog and Toad" K-1 Passage

- Reading Rate: 41 cwpm
- Accuracy: 99%

Qualitative Reading Inventory

- Reading Level: 3rd, Accuracy: 60%, Rate: 29 cwpm, Independence: Frustration
- Reading Level: 2nd, Accuracy: 91%, Rate: 37 cwpm, Independence: Instructional
- Reading Level: 1st, Accuracy: 98%, Rate: 42 cwpm, Independence: Independent

Write a Present Level of Performance and Goal for this child.
Using the Utah Core Standards Anchor Standard Key Ideas and Details and the results of the CBA(s), write a single PLAAFP and up to three Measurable Annual Goals (MAGs) for this student. Please individually write this information in a note card and put the note card in your workspace drop box.

APPENDIX E

FACILITATOR TRAINING

The following are the topics covered in the Power Point slides during the facilitator training.

Slide 1: Logistics

- Fill out the Selection Survey and Initial Goal Writing Process
- Fill out the Doodle Calendar on Scheduling for you and your Group or the Word document.
- Review of Teamspeak
- Review of Imprudence

Slide 2: TeacherSim Refresher

- Moving Around: Walking and Flying
- Walking
- Flying
- Camera Controls
- Chatting and Saving a Log File
- Changing your Avatar

Slide 3: Your Groups

These are subject to change based on scheduling

- Group 1 PB: ER (SLP), RC (Teacher), PK (Teacher)
- Group 2 CS: CR (Teacher), ML (SLP), ST (Resource), PS (SLP)

Slide 4: PBL Facilitator want the Teachers/Learners to:

- Explain how they will write standards-based IEP goals based on what they have read.
- Use effective reasoning.
- Identify knowledge limitations.
- Direct teachers to look for knowledge in self-directed learning or social knowledge construction.
- Evaluate the learning process.

Slide 5: PBL Facilitator Goals for Role

- Keep all students active in the learning process
- Keep the learning process on track
- Make teachers thoughts and depth of understanding apparent (through creating note cards/whiteboards)
- Encourage students to become self-reliant for direction and information.

- You are a resource to help them in the discovery process. It would be great if you read the articles they will read.

Slide 6: PBL Facilitator Strategies

- Use open-ended questioning and the PBL document
- Ask teachers to explain what they mean
- Revoice/restate what the teachers say for clarity
- Ask quieter learners to summarize what the decisions and direction are so far.
- Then follow-up with other group members to see if they agree.
- Encourage teachers to develop hypotheses to become aware of what they don't know. What should they be focusing on?
- Help teachers create notecards to write down their process.

Slide 7: PBL Process

- Consider what you know about the problem: As a team you will want to list what you know about the child based on the information provided.
    - What are the problems and how do they relate to the Utah Core Standards?
- Consider what you do not know about the problem:
    - Where can you access the Utah Core Standards?
    - What anchor standards seem to apply?
    - What do you know about writing standards-based IEP goals?
    - Who will fulfill what assignment?
- As you gather information to help you answer your questions:
    - What grade likely applies?
    - What have others described as the process for writing standards-based goals?
    - Two options are available here: http://mmdc.sper.usu.edu/teachersim-activities/
    - Please record these decisions in a note card at your group workspace. Then end the meeting to find answers to your questions. Your next meeting will be in the next few days.

Slide 8: Meetings Overview

Meeting next week

1) Use the PBL process to learn more about how to write goals in TeacherSim.
    - Learn how to work together.
2) Meeting the following week watch a video about Peter's group using the PBL process to create some standards-based IEP goals.
    - Start using the PBL process to determine how they will go about creating a standards-based IEP goal.
3) Meeting to continue the PBL process to individually write and then compare standards-based IEP goals.

Slide 9: What is One Way of Writing Standards-based IEP Goal?
Goal Writing Meeting One: Standards Alignment
Based on the information that you just read, begin with Camille's grade level and work backwards to identify one Common Core target relevant to her skills, including the following:

- Strand (Reading Literature, Reading Foundational Skills, etc.)
- Anchor standard (e.g. Phonics and Word Recognition, Fluency, Key Ideas and Details, Craft and Structure, etc.) that you would assess.

Slide 10: What is One Way of Writing Standards-based IEP? Continued.
Goal Writing Meeting Two: Narrowing Focus and Goal Creation
Your team has now met an additional time and shortened the list of Utah Core Standards on which to further assess the student. Your team has determined to focus on the following Utah Core Standards

- Anchor Standards:
    - Key Ideas and Details
    - Range of Reading and Level of Text Complexity
- CBA information
    - She could answer 7 of 10 explicit questions from the text
    - She could determine the main idea from the text but couldn't identify supporting details

Slide 11: What is One Way of Writing Standards-based IEP? Continued.
Write a Present Level of Academic and Functional Performance (PLAAFP) and 3 Measurable Annual Goals for this child. Using the Utah Core Standards Anchor Standard Key Ideas and Details and the results of the CBA(s), write a single PLAAFP and up to three Measurable Annual Goals (MAGs) for this student. Please write this information in a note card and put the note card in your workspace drop box.

Slide 12: Another Possible Goal Writing Process

- Consider the grade-level content standards based on age
- Examine classroom and student data to determine functioning
- Develop present levels of academic achievement and functional performance
- Develop measurable annual goals aligned with grade-level content standards
- Assess and report on student progress
- Identify specially designed instruction/accommodation to access progress in general curriculum
- Determine most appropriate assessment option

APPENDIX F

SEMISTRUCTURED INTERVIEW QUESTIONS

1) What did you see as the strengths of these kinds of activities?
2) What did you see as the weaknesses of these kinds of activities?
3) Describe for me your group process in the activities
4) What did your group pay attention to in the scenario?
5) What resources did you use in TeacherSim?
6) Did you change your avatar's appearance? Why or Why not? Did you feel you related to your avatar?
7) Now that you've explored some of the ways of creating a standards-based IEP goal could you describe that process for me?
8) Do you feel you have a better understanding of how to create standards-based IEP goals?

APPENDIX G

STANZAS, DESCRIPTIVE CODES, AND CATEGORIES

Table G1

Stanzas, Descriptive Codes, and Categories Used in Study Excerpts.

Stanza	**Descriptive Code**	**Category**
Stanza A.	Uncertainty About Benchmarks	Researching the Core
Stanza B.	ST's Summary of CP	Roles in PBL
Stanza C.	ST Summarizing Scenario Details	Roles in PBL
Stanza D	ST Summarizing CP Offering a Solution	Goal Writing
Stanza E.	Interpreting the Core	Goal Writing
Stanza F.	Strategy for Using the Core	Goal Writing
Stanza G.	Addressing differences between student and the Core	Goal Writing
Stanza H.	Experience of Writing a Standard-based IEP Goal	Goal Writing
Stanza I.	What Can I Apply From the Core	Goal Writing
Stanza J.	Recognizing Avatars	Physical and Social Presence
Stanza K.	Avatar Appearance	Physical and Social Presence
Stanza L.	Finding Meeting	Challenges with Technology
Stanza M.	ST Dropping Out of the Meeting	Challenges with Technology
Stanza N.	PK Forgetting Steps	Challenges with Technology
Stanza 0.	Programming Issues	Challenges with Technology

Table G2

Descriptive Codes for Writing a Goal.

Stanza	**Descriptive Code**	**Category**
Stanza P.	Writing a PLAAFP	Writing a Goal
Stanza Q.	Where to start	Writing a Goal
Stanza R.	Process for Writing a standards-based IEP	Writing a Goal
Stanza S.	Wording to avoid in PLAAFP	Writing a Goal
Stanza T.	Tying Goal to Utah Core Standards	Writing a Goal
Stanza U.	Articulation	Writing a Goal
Stanza V.	How to write a standards-based IEP	Writing a Goal
Stanza X.	What to do in the future	Writing a Goal

Table G3

Stanzas and Descriptive Codes for Researching in the Utah Core Standards.

Stanza	**Descriptive Code**	**Category**
Stanza Y.	Unfamiliarity with the Utah Core Standards	Researching in the Utah Core Standards
Stanza Z.	Where to look in the Utah Core Standards.	Researching in the Utah Core Standards
Stanza AA.	Understanding terms in Utah Core Standards	Researching in the Utah Core Standards
Stanza AB.	Finding the right standard	Researching in the Utah Core Standards
Stanza AC.	What strand and anchor standard	Researching in the Utah Core Standards
Stanza AD.	Selecting Anchor Strands	Researching in the Utah Core Standards
Stanza AE.	Clarifying place in the Utah Core Standards	Researching in the Utah Core Standards
Stanza AF.	Where and what I looked in the Utah Core Standards	Researching in the Utah Core Standards

Table G4

Stanzas and Descriptive Codes for Challenges in Technology.

Stanza	**Descriptive Codes**	**Category**
Stanza AG.	Using the whiteboard	Challenges in Technology
Stanza AH.	Making excuses for technology not being perfect	Challenges in Technology
Stanza AI.	Resolution on PowerPoint slides	Challenges in Technology
Stanza AJ.	Graphic Organizer	Challenges in Technology
Stanza AK.	Accessing Note card information	Challenges in Technology
Stanza AL.	How to use the note card information	Challenges in Technology
Stanza AM.	Understanding camera controls	Challenges in Technology
Stanza AN.	Saving and sharing a note card.	Challenges in Technology
Stanza AO.	Questions about Teamspeak	Challenges in Technology
Stanza AP.	Sending note card	Challenges in Technology
Stanza AQ.	Question about whiteboard	Challenges in Technology
Stanza AR.	Using URLs in TeacherSim	Challenges in Technology
Stanza AS.	Changing daytime settings	Challenges in Technology
Stanza AT.	Avatar Name Placement	Challenges in Technology
Stanza AU.	Understanding the graphic organizer	Challenges in Technology

Table G5

Stanzas and Descriptive Codes for Feeling Social and Physical Presence.

Stanza	**Descriptive Codes**	**Category**
Stanza AV.	Virtual location of items and people	Feeling Social and Physical Presence
Stanza AW.	Avatar movement	Feeling Social and Physical Presence
Stanza AX.	Recognizing avatars	Feeling Social and Physical Presence
Stanza AY.	Avatar appearance	Feeling Social and Physical Presence
Stanza AZ.	Too busy to clean	Feeling Social and Physical Presence
Stanza BA.	Professional development	Feeling Social and Physical Presence
Stanza BB.	Games and aggression	Feeling Social and Physical Presence
Stanza BC.	Meeting outside of study	Feeling Social and Physical Presence
Stanza BD.	Temple Presence Inventory	Feeling Social and Physical Presence
Stanza BE.	Family Issues	Feeling Social and Physical Presence
Stanza BF.	Feelings about group	Feeling Social and Physical Presence
Stanza BG.	My avatar behaving badly	Feeling Social and Physical Presence

Table G6

Stanzas and Descriptive Codes for Defining a Role in the PBL Process.

Stanza	**Descriptive Codes**	**Category**
Stanza BH.	Collaborating on student information	Defining a role in the PBL process
Stanza BI.	Meeting actions	Defining a role in the PBL process
Stanza BJ.	Gathering information	Defining a role in the PBL process
Stanza BK.	Choosing is hard	Defining a role in the PBL process
Stanza BL.	Locating resources	Defining a role in the PBL process
Stanza BM.	Comparing notes	Defining a role in the PBL process
Stanza BN.	Understanding instructions	Defining a role in the PBL process
Stanza BO.	Assigning roles to each other in the meeting	Defining a role in the PBL process
Stanza BP.	Sharing group summary of information	Defining a role in the PBL process
Stanza BQ.	Assigning Website readings	Defining a role in the PBL process
Stanza BR.	Checking assignments before meeting	Defining a role in the PBL process
Stanza BS.	Reporting on individual research paths	Defining a role in the PBL process
Stanza BT.	Using the whiteboard to share information in real time	Defining a role in the PBL process

VITA

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Education

- **Ph.D.**, Instructional Technology & Learning Sciences, Utah State University, 2017
- **M.S.**, Instructional Technology, Utah State University, 2004
- **B.A.**, English: Technical and Professional Communication, Utah State University, 2002

Professional Memberships

- American Educational Research Association, Sig IT, Sig PBL, Sig ARVEL
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Employment

- 13-Current: Curriculum Design Leader, Online Learning, Brigham Young University-Idaho
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Teaching

- Spring 2010: Teaching Assistant: ITLS 6540 Learning Theory
- Fall 2009: Teaching Assistant: ITLS 6570 Performance Systems
- Summer 2003: Instructor: ITLS 5215/6215 Digital Video Editing
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Service

- Proposal Reviewer, American Educational Research Association, SIG-IT 2011
- Proposal Reviewer, American Educational Research Association, SIG-IT 2010

Awards

- Outstanding Paper Award: How Virtual Learning Environments Function to Simulate IEP Team Meetings in a Distance Teacher Education Program, Society

for Information Technology and Teacher Education, 2012, presented to Lee Mason, Nancy Glomb, and Peter Blair
- Emerging Virtual Scholar from Applied Research in Virtual Environments for Learning Special Interest Group American Educational Research Association 2010 presented to Lee Mason, Tae Jeon, Peter Blair and Nancy Glomb
- Nominated for the College of Education Research Assistant of the Year 2012 by Dr. Nancy Glomb.
- Nominated for the College of Education Research Assistant of the Year 2011 by Dr. Nancy Glomb.

Scholarly Presentations

Blair, P., Glomb, N., Christensen, R., & Reeder, M. (2012) Standards-Based Individual Education Plan Goal Development via Problem-based learning sessions in a Multi-User Virtual Environment, Society for Information Technology and Education: Austin, Texas.

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Life, Association for Behavior Analysis International Annual Conference. Phoenix, AZ.

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Blair, P., Mason, L.L., & Glomb, N. (In Press) Virtual World Simulations for Learning Activities. Live and In Real Time: Monographs of the American Council on Rural Special Education, 1, 1.

Mason, L.L., Jeon, T.K., Blair, P., & Glomb, N. (2011). Virtual tutor training: Learning to teach in a multi-user virtual environment. International Journal of Gaming and Computer-Mediated Simulation, 3(1), 51-67. (Also available here: http://www.igi-global.com/bookstore/article.aspx?titleid=53153)