A Window Into the Classroom: Examining the Use of Virtual Classrooms in Teacher Education

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This exploratory study examined the perceived usefulness of virtual classroom visits in literacy education coursework and teacher preparation programs from the perspectives of elementary teacher candidates (TCs) and teacher educators. Virtual tour technology was used to capture 360-degree views of classrooms. Participants (N = 10) had access to these virtual classrooms via a professional development website. After viewing four of the preK-6 virtual classrooms, participants were invited to a focus group or an interview where they described the potential use of virtual classroom visits in literacy education coursework. An inductive approach to analysis led to preliminary insights into the benefits and challenges of using virtual classrooms in teacher education programs and coursework. Findings suggest that virtual classroom visits have the potential to bridge the gap between what TCs learn in their coursework and their field experiences. Virtual classroom visits can offer TCs an additional window into exemplary classrooms and access to models of highly experienced teachers.

Teaching Reading Well: A Synthesis of the International Reading Association's Research on Teacher Preparation for Reading Instruction reported the need for "systematically arrayed field experiences that are closely coordinated with [teacher candidates'] coursework and expose [teacher candidates] to excellent models and mentors" (International Reading Association, 2007, p. 1). The rationale is that teacher candidates (TCs) are better able to make the connections between theory and practice if they are exposed to classrooms where they can have firsthand experience with the content covered in their courses (National Institute of Child Health and Human Development [NICHD], 2000).

Field placements should provide TCs with opportunities to integrate theoretical and practical knowledge (Darling-Hammond, Hammerness, Grossman, Rust, & Shulman, 2005). Unfortunately, there is often a mismatch between course content and practices observed in the field. This mismatch has been reported by TCs, who often feel a disconnect between what they are learning in their courses and what they observe during their field placements (Beck & Kosnik, 2002; Grossman et al., 2000; Haas-Barota, 2011; Heredia, 2010; Melnick & Meister, 2008; Risko et al., 2008).

Teacher candidates have reported limited opportunities to observe research-based practices discussed in their courses, as they may not be highly utilized in some classrooms (Flessner, 2012; Gilbert & Graham, 2010; Scott, Jamieson-Noel, & Asselin, 2003). Teacher candidates have also reported exposure to a limited number of grade levels and a desire for more and varied opportunities to visit classrooms prior to entering the profession (Beck & Kosnik, 2002; Haas-Barota, 2011). These reports point to a need for teacher education programs (TEPs) to consider ways in which they can provide their TCs with greater access to evidence-based classroom practices.

Additional field placements across numerous grades and with exceptional teachers who are in communication with university instructors is an ideal approach to closing the gap between coursework and field placements. However, the relative brevity of TEPs and the reality that mentor teachers often have varying backgrounds suggest that alternative approaches need to be considered. One approach to the challenge of connecting course content to practices observed in the field is to provide TCs with opportunities to visit virtually classrooms of highly experienced teachers at all of the elementary grades. The inclusion of virtual classroom visits in the curriculum of TEPs can allow every TC to engage in guided observations of a range of classrooms. Additionally, TCs can learn from virtual classroom teachers who deeply understand evidence-based strategies for teaching reading and writing and who know how to implement effective practices within the realities of the classroom context.

This paper shares findings of a qualitative study examining how virtual classroom tours can offer TCs with an additional window into exemplary classrooms and access to highly experienced teachers. The prekindergarten-to-sixth grade virtual classroom tours used in the current study allowed users to maneuver around a classroom virtually, zoom in to view classroom materials, and click on embedded video hot spots to hear from the classroom teacher about various aspects of his or her program.

Literature Review

Literacy Education and Teacher Knowledge

Considerable advances have been made in recent years regarding the knowledge base that should be included in elementary teacher preparation coursework. Several landmark reports have been published delineating the key components of effective literacy education, such as *Preventing Reading Difficulties in Young Children* (Snow, Burns, & Griffin, 1998), *Report of the National Reading Panel: Teaching Children to Read* (NICHD, 2000), *Developing Literacy in Second-Language Learners: Report of the National Literacy Panel on Language-Minority Children and Youth* (August & Shanahan, 2006), and *A Meta-Analysis of Writing Instruction for Students in the Elementary Grades* (Graham, McKeown, Kiuhare, & Harris, 2012). These reports present a fairly consistent picture of the literacy content that should be included in teacher education coursework.

Five essential components of an effective reading program are phonemic awareness, phonics, fluency, vocabulary, and comprehension. These components must be well-understood by elementary teachers so that they have the knowledge-base to deliver high-quality literacy programs.

Research continually shows a positive relationship between teachers' knowledge of these key components of effective literacy education and student outcomes in reading (Cunningham, Zibulsky, Stanovich, & Stanovich, 2009; Moats & Foorman, 2003; Piasta, Justice, McGinty, & Kaderavek, 2012). Several researchers have found that teachers who receive research-based information about reading instruction based on these key components have students who perform significantly better on reading-related tasks than do teachers who did not receive the same type of information (Foorman & Moats, 2004; McCutchen et al., 2002; Piasta, McDonald Connor, Fishman, & Morrison, 2009; Spear-Swerling & Brucker, 2004).

For instance, Spear-Swerling and Brucker (2004) found a positive relationship between students' word reading scores and their teachers' knowledge of the essential components of reading. Students who received instruction by teachers with a higher knowledge of reading components achieved higher word reading scores than did students tutored by teachers with lower scores. Similarly, in a study that examined whether teacher knowledge predicts students' word identification gains, Piasta et al. (2009) found that the instruction provided by teachers with higher levels of language and literacy knowledge was significantly more effective in improving students' word-reading skills, compared to the same amount of instruction provided by teachers with lower levels of knowledge.

Based on the implications of studies such as these, TCs who receive a strong knowledge-base of effective literacy instruction in their coursework should be equipped with the foundational skills necessary to foster student growth in reading and writing. However, TCs also require opportunities to observe the research-based practices they are learning about in their coursework to help them bridge their conceptual understandings to the realities of the classroom. They need to have the knowledge of what to teach, how to teach in developmentally appropriate ways, and how they might apply their learning of core literacy concepts to practice (Hammond, 2015; Neuman & Cunningham, 2009).

Through field placements TCs can see the skills they are learning in their coursework firsthand, such as assessing student needs, planning for instruction, and implementing lessons. Field placements should provide TCs with the opportunity to integrate theory and

practice and gain exposure to effective teaching models and environments (Darling-Hammond et al., 2005). However, these opportunities are not always feasible or available.

Digital Technology in Teacher Education

The inclusion of digital technology and multimedia in teacher preparation coursework has been increasingly employed by teacher educators (TEs) to help TCs bridge conceptual and theoretical understandings to classroom practice (Hughes, Liu & Lim, 2016; Kennedy, Hart, & Kellems, 2011; Wang & Hartley, 2003; Zottmann et al., 2013). Multimedia learning allows information to be presented in more than one mode, such as visually and auditorily (Mayer, 1997). Research has shown the utility of using media to enhance TCs' knowledge of course content in the domain of special education (Kennedy et al., 2011; Kennedy & Thomas, 2012). Additionally, studies examining the outcomes of multimedia learning show how the combination of delivery media, presentation modes, and sensory modalities (how information is processed) can greatly enhance learning (Kennedy et al., 2011; Mayer 1997; Moreno & Mayer, 2007).

For instance, video viewing helps TCs reflect upon key instructional contexts and actually observe real teachers engaging in research-based practices in authentic classroom situations (Santagata, Gallimore, & Stigler, 2005). The videos can act as catalysts for in-depth discussions around practice and can be watched more than once to help TCs gain a more in-depth understanding of the topic. Moreover, videos permit the TE and TCs to develop a "shared understanding and common language about teaching" (Darling-Hammond & Baratz-Snowden, 2007, p. 127). Videos can provide scaffolding to TCs; for example, the instructor can offer insight into the dynamic and complex nature of fostering reading and writing success in classrooms of diverse learners (Darling-Hammond et al., 2005).

Recent studies have shown that video viewing can have positive effects on TCs' content and pedagogical knowledge (Gaudin & Chalies, 2015; Seidel, Blomberg, & Renkl, 2013; Sherin & Russ, 2014). For instance, Seidel et al. (2013) investigated effective approaches for integrating video examples into teacher education coursework. The authors found a positive impact of video instruction on TCs' general pedagogical knowledge when the videos addressed instructional objectives and goals.

Similarly, in their review of 255 studies, Gaudin and Chalies (2015) examined how video viewing is used in teacher education. Most studies in their review indicated that video viewing provides opportunities for TEs to expose TCs to a wide variety of professional practices. As a shared activity, video viewing is perceived as a starting point for reflections and discussions about teaching and learning. Videos of teachers explaining or demonstrating a literacy practice can be "viewed repeatedly and with different lenses in mind, promoting new ways for teachers to 'see' what is taking place" (Sherin & Russ, 2014, p. 3).

Along with video viewing, virtual environments have become an increasingly popular venue for learning. The term *virtual classroom* has been used to describe various types of online learning environments, such as web-conferencing systems, communication platforms, and interactive learning modules, to name a few (Falloon, 2011; McBrien, Cheng, & Jones, 2009; Skylar, 2009). While these types of virtual classrooms provide interactive and multimedia learning opportunities, the term virtual classroom in the current study incorporates virtual tour technology as a way to capture 360-degree views of existing classroom environments.

Similar to the street view in Google Maps, visitors of these virtual environments can move freely throughout the classroom and zoom in and out to examine specific elements. An additional feature of these virtual tours is the embedded video hot spots. Viewers can click on videos within the virtual environment to hear from the classroom teacher explaining the nature of a particular activity and how it supports the teaching program and children's literacy development.

For the purposes of the current study, a virtual tour can be defined as an online environment of an existing area, allowing website users to explore the environment interactively, view video clips of defining features, and see photos of selected materials of interest at their own control and convenience. The virtual classroom tours used in this study include over 30 hotspots distributed around the room.

While virtual tour technology has become a common approach to showcase existing environments in the real estate and hospitality industries, the application of virtual tour technology in TEPs, and in particular literacy education coursework, is relatively nonexistent. Yet, incorporating this technology into TEPs can offer a solution to the relative brevity of many programs and the research-to-practice gap. Virtual classroom visits in teacher education coursework could allow every TC to engage in guided observations of a range of classrooms and to learn about research-based strategies for teaching reading and writing within the realities of the classroom context. As a result, TEPs can provide TCs with a comprehensive knowledge-base of literacy education prior to entering the profession (e.g., Cunningham et al. 2009; Ness, 2011).

The purpose of this exploratory study was to examine the feasibility and utility of applying virtual tour technology in TEPs and literacy education coursework. Two research questions were used to guide this exploratory study:

1. What are the benefits and challenges of virtual classroom visits from the perspectives of teacher candidates and teacher educators?
2. How can virtual classrooms be used in literacy education courses?

Methods

This study employed an exploratory case study research design (Creswell, 2007). Based on qualitative methods, which generate insights into the social practices and experiences of a particular phenomenon, the focus of case study research is to develop an understanding of an event or activity from individual perspectives (Creswell, 2007). Given the exploratory nature of this study and the lack of prior research examining the use of virtual tour technology in TEPs and literacy education coursework, an exploratory case study design was deemed appropriate.

In this study, the open-ended research questions provided a foundation for the focus groups with the TCs and TEs. The intent of using these guiding questions was to initiate a discussion with participants about their general thoughts of the virtual classrooms and their views on how the virtual classrooms could be integrated into literacy education coursework. The aim of this exploratory case study was not to provide conclusive answers to the research questions, but rather to explore the topic and offer insights for future studies.

Context of the Study

The context of the current study occurred within a professional development literacy website for prekindergarten-to-sixth-grade elementary teachers and literacy teacher educators called The Balanced Literacy Diet: Putting Research Into Practice in the Classroom (http://www.oise.utoronto.ca/balancedliteracydiet/Home/index.html). This free multimedia website provides access to a variety of web-based learning tools, including hundreds of videos of teachers explaining and demonstrating literacy lessons, photographs of teacher material and student work, lesson plans, and key concepts about literacy development and literacy education.

In addition, The Balanced Literacy Diet website features virtual classroom tours ranging from prekindergarten to sixth grade. Virtual tour technology was used to capture 360-degree panoramic views of over 20 existing elementary classrooms. Each virtual classroom was then created through the process of stitching together a sequence of six classroom images all captured from a single vantage point. Between 20 and 30 video recordings or hot spots of the classroom teacher discussing or demonstrating aspects of their literacy program were embedded within each virtual learning environment.

Virtual classroom visitors have access to these 360-degree panoramic views in which they can maneuver around the classroom, zoom in to view classroom materials, and click on embedded video hot spots to hear directly from the classroom teacher about a particular aspect of his or her literacy program. The video hot spots are represented by red dots hovering around the space of the virtual classroom. In addition to the video hot spots, each virtual tour is accompanied by a "meet the teacher" video, where the classroom teacher shares his or her philosophy of teaching. The teachers on The Balanced Literacy Diet website were selected for the site based on their exemplary practice and high reviews from an administrator. Interviews prior to capture also provided insight into the teacher's program and literacy practice.

To provide the participants with a range of classroom environments, teaching approaches, and teaching backgrounds four virtual classrooms were selected for this study: prekindergarten/kindergarten (PreK-K), first and second grade, second and third grade, and fourth and fifth grade. These virtual classrooms were selected through recommendations and discussions by the research team prior to the focus group sessions. The decision to use these four virtual classrooms for this study was also based on the following criteria: The virtual classroom includes a range of literacy components; classroom activities are aligned with the report of the National Reading Panel (NICHD, 2000); the classroom offers at least 20 video hot spots; and the environment highlights the teacher's literacy expertise.

Figure 1 shows a snapshot of one of the virtual classroom tours used in this study. The accompanying hyperlink leads to this virtual classroom tour.

Figure 1. *Sample virtual classroom tour*
(http://www.oise.utoronto.ca/balancedliteracydiet/12NR.html).[/caption]

- PreK-K: http://www.oise.utoronto.ca/balancedliteracydiet/JKLC.html
- First and second grade:
  http://www.oise.utoronto.ca/balancedliteracydiet/12CS.html
- Second and third grade:
  http://www.oise.utoronto.ca/balancedliteracydiet/12NR.html
- Fourth and fifth grade:
  http://www.oise.utoronto.ca/balancedliteracydiet/56JL.html

Data Collection Procedure

Email invitations were sent out to 60 TCs currently enrolled in a 2-year initial teacher education program. Six TEs who had previously taught or were currently teaching a language arts course at the same institution were also sent an email invitation to participate in the study. The email invitation included the description of the research and an overview of participant involvement. Those who decided to participate were provided with a university research ethics approved information letter outlining the study's purpose, procedures, and participant involvement.

Both the TCs and TEs were then asked to sample four PreK to fifth grade virtual classroom tours independently prior to attending a focus group. The TCs and TEs attended separate focus groups. The purpose of keeping these two groups separate was to eliminate any sense of power dynamics and provide both groups of participants with a comfortable environment in which to share their insights.

In total, three focus groups with TCs and one focus group with TEs participated. Due to the difficulty of scheduling a time for all interested participants to meet for the focus group, interviews were conducted for one TC and one TE who were unable to attend the focus group sessions. Focus groups lasted approximately 60 minutes, and interviews lasted approximately 30 minutes. A total of approximately 300 minutes of audio recording resulted from the focus groups and interviews. Focus groups and interviews were facilitated and transcribed by a member of the research team who was also one of the authors of this article. This approach contributed to the quality of transcription, where errors of omission and substitution were reduced as much as possible. Transcription also began the initial stages of analysis.

Participants

Teacher Candidates. Seven TCs volunteered to participate in this study, and all participants completed informed consent forms. All of the TCs were currently enrolled in a two-year PreK-to-sixth-grade teacher education program from the same postsecondary institution as the TEs. Teacher candidates met with one of the researchers in the spring of their first year of their program. During their first year, they had gained classroom experience through either two or three PreK-to-sixth-grade field placements. Additionally, all of the TCs had been enrolled in one language arts course prior to participating in this study. All of the TCs indicated that prior to the study they had not used a virtual classroom tour.

Teacher Educators. Three teacher educators (TEs) from a large metropolitan area volunteered to participate in this study. Prior to their participation, the TEs completed an ethics approved informed consent form. Since the virtual classroom tours used in this study focus on PreK-to-sixth-grade literacy education, the TEs recruited for this study had taught or were currently teaching a language arts course in an initial teacher education program. Years of postsecondary teaching experience ranged from 5-20 years, and all of the TEs had previously been in a range of PreK-to-sixth-grade classrooms prior to the study.

All of the TEs had research interests or ongoing projects related to language and literacy education. During the meetings all of the TEs discussed how they integrated technology into their courses. This integration involved demonstration videos and access to online resources for lesson planning. The TEs also discussed their professional interest of incorporating more technology into their coursework. They also indicated that prior to the study they had not used virtual classroom tours.

Data Sources

Focus Groups. Focus groups were used to collect data about how the participants, who all had experience using the virtual classroom prior to meeting, perceived how the virtual classrooms could be used in TEPs. The focus groups were facilitated by one of two researchers who followed a protocol and had familiarity with the virtual tour technology and the study's research questions. The focus group protocol was developed by the members of the research team, who based the design of the protocol on Yin's (2015) conception of focus groups as a method of collecting qualitative data.

The focus group protocol included three main sections: Phase 1 included a welcome statement, a restatement of the research study, introductions, a chance for participants to ask questions, and signing of consent forms; Phase 2 included five guiding questions; and Phase 3 included a statement thanking the participants for their involvement in the focus

group. The protocol was sent out to each member of the research team for validation. Discrepancies and suggestions were discussed until a final protocol was established. For instance, the question, "What potential improvements can you envision to make virtual classrooms more useful in TEPs?" was included after a discussion about prompting participants to follow up on any challenges they described.

Given the exploratory nature of this study, the research team also decided to use the experience of conducting these focus groups as a way to contribute to the validity of the protocol for future research. The facilitators used guiding questions to prompt participants' thoughts related to the virtual classrooms. Guiding questions included the following: "What benefits can you envision of the use of virtual classrooms in TEPs?" "What challenges?" "What potential improvements can you envision to make virtual classrooms more useful in TEPs?" "How can virtual classrooms be used in literacy education courses?" and "Is there anything else you would like to share about the use of virtual classrooms in TEPs and literacy education courses?"

Interviews. The purpose of conducting semistructured interviews was to meet with two interested participants who were unable to attend one of the focus groups. Similar to the focus group questions, interview questions focused on participants' general thoughts related to the virtual classroom tours as well as to the benefits and challenges of incorporating virtual classrooms into TEPs and literacy education coursework.

Data Analysis

A general inductive approach to analysis was employed leading to in-depth descriptions and understandings related to the research questions (Lincoln & Guba, 1985; Thomas, 2006). First, the process of close readings, coding, comparisons, and categorizations of transcripts occurred for the TC data. This was followed by an analysis of the TE data.

Each analysis began with a reflective reading of the transcripts. This initial reading was necessary to gain a general sense of participants' thought processes. Phrases were identified during a second reading of the transcripts. These phrases contained meaningful utterances related to the research questions. For example, the following phrase was identified during the second reading of the transcripts: "I really liked how on the bottom of where you're taking the virtual tour, you can look closer at some of the different aspects of the classroom, like the morning message."

This second reading of the transcripts employed an open-coding technique, where phrases within the transcripts were given labels. The above phrase was labeled: "Beneficial Feature." Labeling began the initial phase of categorization, in which initial codes were generated based on the raw data (Charmaz, 2014). During this phase, coding was conducted as objectively as possible by staying close to the data and continuously reflecting on the study's research questions.

For each data set labels were organized into categories. Categorization of the transcripts led to a list of 24 initial themes. This initial list is outlined in Table 1 according to each research question.

Table 1
Initial Themes

Research Question 1: What are the benefits and challenges of virtual classroom visits from the perspectives of teacher candidates and teacher educators?	
Benefits	A window into a classroom
	Closing the gap between practicum and theory
	Extension of field placement
	Authenticity
	Concrete examples
	Usefulness for beginning teachers
	Accessing digital information
	Multiple forms of media
	Increases in self-efficacy
	Expanding the scope of knowledge through reflective observation
	Accessibility
	Feeling inspired
	Future use of the virtual classroom tours
Challenge	Connecting to the teacher

Research Question 2: How can virtual classrooms be used in literacy education courses?
Activities to link to the field
Connecting practicum to theory
Self-guided assignments
Choice and autonomy
In lieu of weekly readings
Highlighting course content
Video demonstrations
Bridging the gap between field placements and coursework
Guided discussions and group activities
Engagement

A review of these categories was necessary to reduce redundancy and the total number of themes in relation to the research questions. This review helped to establish connections between categories. For instance, the initial themes, a window into a classroom, extension to field placement, and authenticity, were combined to the single theme, a window into a classroom. This decision was a result of identifying connections between phrases.

The phrases, "It felt almost like a field experience," and, "It could add a lot to our real life experiences," were initially coded as the theme, extension of a field placement. Additionally, the phrase, "It's like a real classroom, it felt very real," was initial coded as the theme, authenticity. To create cohesion among the categories these phrases were grouped together with phrases coded as the theme, a window into a classroom.

As a result of reviewing the categories, we identified 11 themes. These themes were reviewed by members of the research team to determine the relevance of the themes with respect to the research questions. Table 2 presents a summary of the findings according to the research questions. The findings and discussion are organized according to each research question and highlight the unique views and insights of each group of participants

(the TCs and TEs). The findings and discussion section describes each theme in detail and includes direct participant quotations to support each theme.

Table 2
Summary of Findings

Research Question 1: What are the benefits and challenges of virtual classroom visits from the perspectives of teacher candidates and teacher educators?	
Benefits	A window into a classroom Usefulness for beginning teachers Accessing digital information Increases in self-efficacy Expanding the scope of knowledge through reflective observations Feeling inspired
Challenge	Connecting to the teacher

Research Question 2: How can virtual classrooms be used in literacy education courses?
Activities to link to the field—Approaches to integrate coursework and classroom practice
Self-guided assignments—A way to independently engage with course material and the virtual classrooms
Highlighting course content—The use of virtual classroom tours to point out literacy elements
Guided discussions and group activities—Making connections between theory and practice by unpacking the key points presented in the virtual tours

Findings and Discussion

Research Question 1: Benefits

A Window Into a Classroom. All of the TCs described the virtual tours as an accessible "window into a classroom that you wouldn't otherwise have." They reported that "it was helpful to be in the classroom with the teacher, even if there isn't that direct contact." The virtual classrooms "have teachers talking about their practice, there is a synthesis of literature, and all of those things, I think, are really useful." For most of the TCs, the virtual classrooms "almost felt like a practicum experience...instead of going to visit a classroom in person, I can look at this classroom and be able to learn."

The learning experience that resulted from accessing virtual classrooms was particularly relevant given the relative brevity of TEPs and the limited number of field placements. Throughout the course of their program TCs' field experiences, in general, are often restricted to only a few different grade levels, and the mentor teachers of those grades are sometimes perceived by the TCs as having poor teaching practice (Beck & Kosnik, 2002; Wimmer, 2008). Extended field placements are an essential component of high quality TEPs (Cook-Sather, 2002; Darling-Hammond et al., 2005; Volante, 2006). Providing TCs with prolonged and comprehensive field placements has an enormous impact on the TCs' overall perception of their TEP and on their growth as a classroom teacher.

Access to virtual classroom tours provides an additional venue for learning; an additional door into a grade level that TCs might not otherwise have access to. One TC stated,

> [Virtual classroom visits are] definitely beneficial…. In my second year I am only going to be in a kindergarten classroom, so being able to visit a primary and junior classroom, even virtually, I think is a great thing.

Similarly, another TC described how "being able to visit virtually as a preservice teacher" is highly beneficial, especially when "we don't get to be in all the grades."

Usefulness for Beginning Teachers. All of the TCs agreed that virtual classroom visits would be especially useful as a beginning teacher. TCs were thinking ahead to their first few years of teaching where they anticipated challenges. For instance, one said,

> Coming into this empty classroom and thinking, "Okay, how should I set up the room?" … I think I could definitely go back to [the virtual classrooms], and it would be a visual reminder of some of the ways that I could set up my classroom…. Viewing different aspects of the space would be really useful at the beginning if I was starting off in my first year.

Another TC also described the usefulness of the virtual classroom tours as a beginning teacher:

> Setting up a classroom, like the space at the start of the year would be this big task…. I feel like it would be useful to have that visual to give me some tips or refreshers that I might have forgotten.

It is well known that beginning teachers often feel overwhelmed by the complexities they face in their first year of teaching with respect to classroom setup and program planning (Bastug, 2016; Beck & Kosnik, 2002; Melnick & Meister, 2008; Nahal, 2010). Novice elementary teachers struggle to develop a coherent literacy program while they balance the demands of classroom management, curriculum integration, and daily planning. These demands have led school districts to provide induction and mentoring programs for new teachers (Kutsyuruba, 2012; Stanulis, Little, & Wibbens, 2012). Such supports are perceived by new teachers as extremely valuable (Desimone et al., 2014; Gilles, Carillio, Wang, Stegall, & Burngarner, 2013). An additional support for beginning teachers and a component of mentoring programs could be virtual classroom visits.

Accessing Digital Information. The TCs perceived the value of accessing digital information related to their teaching practice and coursework. One TC thought "it was great as a visual learner…. I had gotten pretty much the core idea from the pictures." Teacher candidates generally described that "pictures are helpful because you can actually see…. It's all about images, it's all about visuals." In addition, the web-based technologies embedded within the virtual classrooms provided access to materials and the classroom context. One TC noted how zooming in to view classroom materials provided a "closer look at some of the different aspects of the classroom, like the morning message." Another TC reflected on how the videos could "give you context of what's going on."

Teacher candidates also described how the ease of maneuvering around the virtual space contributed to their engagement. For instance, one participant noted that "you could turn left, right, up, down, and that made it a lot easier to be engaged, to be interested." Similarly, another participant described the virtual classroom tours as "really user friendly. I was able to zoom out, even to turn, like I could turn with my mouse or just use the keyboard."

Interactive digital technologies provide TCs with "a lens through which teachers can study real-life teaching situations, evaluate their ideas of effective teaching, reflect on their conceptions of teaching" (Barnett, 2006, p. 717). The use of interactive technologies in coursework can have positive effects on TCs' engagement and motivation for learning, ultimately leading to enhanced pedagogical and content knowledge (Gaudin & Chalies, 2015; Mayer, 1997; Seidel et al., 2013).

Increases in Self-Efficacy. The TCs who participated in this study made references to their self-efficacy and comfort level with teaching. Self-efficacy refers to teachers' self-perceptions of their competence with the activities of teaching (Tschannen-Moran & Johnson, 2011). Viewing the model teachers in the hot spot videos seemed to contribute to increases in self-efficacy — likely because the model teachers provided a source of vicarious learning where the observer thinks: if they can do it, so can I (Protheroe, 2008).

Specifically, as TCs viewed the virtual classrooms and watched the video clips of the model teachers describing or demonstrating a literacy activity, they noted an increase in their confidence. For example, after one TC viewed the organization of a virtual classroom she explained, "That is so comforting, so relaxing to see because the classroom can be such a hectic place, especially if you're new to the profession."

Similarly, another TC noted that navigating through a virtual classroom "would be really comforting for a preservice teacher who's trying to get comfortable in the classroom." Touring a virtual classroom would be a powerful resource for new teachers "because it would really help them feel more comfortable.... There's a lot of anxiety when you just push someone into a classroom."

Expanding the Scope of Knowledge Through Reflective Observations. The virtual classrooms were seen as an additional space for TCs to expand the scope of their knowledge about classroom practices in literacy. Teacher educators suggested how virtual classrooms can provide an additional opportunity for TCs to "stand back as reflective observers." Reflection in teacher education is widely viewed as an essential component to teaching and learning (Sherin & Russ, 2015). Opportunities to reflect upon and make connections between course material and classroom environments can help to bridge the gap between theory and practice.

The embedded video hot spots throughout the virtual classrooms were also noted as being valuable. For example, one TE described the inclusion of videos in her coursework as "one of the best ways to show that [TCs] can do this; this is what it can look like." The "little snippets and being able to hear someone communicate their philosophy and then use the virtual tour to give examples" was something that the TEs thought was a way to help TCs expand the scope of their literacy knowledge.

Feeling Inspired. Teacher educators discussed their future use of the virtual classrooms with respect to their own professional growth. One TE said she had "been reconsidering how I will reshape my class in subsequent years." Incorporating virtual classroom visits into coursework is a way in which this TE noted that she could use technology to enhance the students' learning experiences. Another TE also referred to her professional learning: "I'm appreciative that such resources are available, and the timing couldn't be better for my professional learning."

The TEs also described the significance of the accessibility of the virtual tours. As one TE noted, "The resources are accessible when our students leave the program. They can get

into the habit of going to those professional sites for their own professional learning in their own time."

Research Question 1: Challenge

Connecting to the Teacher. The TEs thought connections between the virtual classroom teachers and the TCs were possible via the videos, particularly the "meet the teacher video." Hearing from the classroom teacher about his or her philosophy and overall approach to literacy education could allow TCs to select a virtual classroom that closely matched his or her own teaching philosophy and personal interests. However, the TEs also expressed concern for how the "online contexts do not provide opportunities for developing relationships" with mentor teachers and students, a "critical" feature of field placements.

A collaborative relationship between TCs and their mentor teachers has been noted as an important component of a good field placement (Beck & Kosnik, 2002). While connecting to the virtual classroom teacher was not possible in the current study, one TE stated, "There's no reason why a university instructor couldn't take the role of one of those teachers." By taking on this role, TEs could provide TCs with possible links between various aspects of the teacher's program and relate these aspects to a relevant course topic.

Research Question 2

Activities to Link to the Field. All of the TCs saw the potential value of integrating the virtual classroom visits in a literacy course. Participants suggested that virtual classroom visits could be connected to future field placements in which TCs might have limited experience. Teacher candidates described that the virtual classrooms "could add a lot to our real-life experiences." One TC thought, "If I was going into a placement, it would have been nice to check out what a kindergarten classroom looks like." In a literacy course, the virtual classrooms could also be used as a compare and contrast activity: TCs could connect the virtual classroom visits "with what's going on in our practicums and field experiences" through discussions about "which was more motivating...more personal." Similarly, a TC suggested,

> After we have seen some classrooms virtually we can then go to our schools and the next day we might notice some things that we didn't … and I feel that could definitely be something that we could do in class.

These findings are consistent with Volante's study (2006) on TCs' perspectives of the essential elements of a TEP. Participants in their study assigned greater importance to coursework that directly linked to their practicum experiences. In the context of a literacy course, viewing classrooms virtually would allow for greater integration between coursework and classroom practice.

Self-Guided Assignments. Teacher candidates also suggested self-guided assignments as a way to engage with course material and the virtual classrooms because they could "choose [their] own navigation through the website" and "reflect and connect with what's going on in [their] practicums to the coursework." As a self-guided study, TCs could "watch the videos and listen to the teacher speak" and that by "doing your own research" TCs could connect their navigation to "how it plays out in the classroom." While self-guided assignments are important to include in any initial teacher education course, a self-guided approach to learning is especially important in preparing preservice teachers to know not only what teach but also how to effectively teach literacy (Neuman & Cunningham, 2009).

Literacy skills are fundamental to all formal education (Moats & Foorman, 2003); reading, writing, and language skills are integrated into all subject areas. Preparing TCs at the elementary level requires literacy TEs to address many topics in great depth. For instance, elementary literacy teachers must provide their students with explicit and systematic instruction to decode text, multiple opportunities to practice reading fluency and expression and modelled, shared, and guided instruction on the use of reading comprehension strategies, all while accommodating students' various needs and interests and providing ongoing assessment to tailor lessons to individuals.

Self-guided assignments can provide TCs with an opportunity to review specific literacy areas (e.g., phonemic awareness) in which they require further support. For instance, after observing a first-grade lesson on making letter-sound associations or learning about letter-sound associations during a lecture, a TC could decide to use the self-guided assignment as a way to learn more about the components of letter sounds and how to teach beginning readers to use their knowledge of letter-sound associations during reading and writing activities. The individual components of literacy, including those outlined by the National Reading Panel (NICHD, 2000), can be reviewed by the TCs within a holistic program during the TCs field experiences or coursework.

Additionally, TCs have the opportunity to connect with a literacy teacher with whom they share a teaching philosophy. Providing TCs with time to explore the virtual classrooms during their coursework and as a component of their field placements would contribute to engagement and motivation; TCs "could choose [their] own navigation through the website." Choice and autonomy are two major characteristics of adult learning and motivation research (Candy, 1988; Knowles, 1975). Self-guided virtual tour assignments lend themselves to these two characteristics and can ultimately have a positive effect on TCs' engagement and motivation for literacy learning (Cervetti, Kulikowich, Drummond, & Billman, 2012).

Highlighting Course Content. Incorporating virtual classrooms into a literacy course could be a way for the course instructors to highlight specific course content. For example, a course instructor could use virtual classroom tours to point out "literacy elements…. There's vocabulary, areas that build phonological awareness." Prior research has shown that TCs who perceive coursework as having a practical focus are more likely to connect course content to the realities of the classroom in a meaningful way (Volante, 2006).

The TEs also suggested that "it would also be really helpful if you were doing the virtual tours, to have 'look fors,' or say, 'This is what I want you to talk about when you come back to class.'" One TE described the importance of narrowing the focus:

> [Providing TCs with] the "look fors" for a comprehensive literacy program – Where do you see these components? What do these components look like? – [would also be showing them how] all of these pieces are coming together in this classroom…. It would help them look more holistically at a program.

As described by another TE, "There's a little more control about the classrooms you're peeking into." Teacher educators also described the importance of the realistic nature of the virtual classrooms, an essential component for any virtual environment (Miller, 2016). One TE stated that the virtual classroom she viewed "felt like children can be in this space…. It didn't look artificial." In addition, a TE described the value of authenticity when integrating videos into her coursework: "I'm a big fan of being able to show [TCs] real clips of real instances in real classrooms." Another TE described the importance for TCs to connect theory to practice by "having something that is very concrete…. This is really, really important."

Guided Discussions and Group Activities. It was suggested that the virtual classrooms could be integrated into guided discussions, where the TE could make explicit connections between theory and practice by "unpacking some of the key points presented in the virtual tours." Course instructors could bridge theory and practice by watching the embedded video hot spots as a shared experience. Through guided discussions TEs could "translate pieces" to clarify how a classroom teacher might apply theory in the context of his or her classroom. An additional in-class activity could involve "different stations of the different classrooms, and maybe a group of [TCs] would be there watching the videos from each station and doing something based on that."

While the potential value of incorporating virtual classrooms into coursework was mentioned by all participants, cautions about choosing virtual classrooms also arose. For example, one TE noted that she would "be really careful which classroom I picked, and I'd have to go through the activity and do it myself first to make sure, that's just responsible teaching."

Implications for Literacy Teacher Preparation

A main challenge of TEPs is to provide all TCs with opportunities to observe research-based practices they are learning about in their coursework and to help them bridge their conceptual understandings to the realities of the classroom. This challenge is particularly pertinent to the field of literacy, given the integration and use of literacy skills across all subject areas. Although exploratory in nature, this study has three main implications for preparing TCs to be literacy teachers through the use of virtual tour technology.

Making Clear Connections Between Theory and Practice. Clear connections between theory and practice allow TCs to create deeper levels of understanding and construct new knowledge about teaching literacy (Volante, 2006). Teacher educators who decide to incorporate virtual classrooms into their coursework should make explicit connections between literacy concepts and the realities of the classroom. By pausing the embedded videos at particular time points or zooming in to view classroom material related to a class topic, TEs can highlight how key elements of literacy theories translate into classroom practice.

For instance, a discussion about schema theory and the importance of activating students' prior knowledge to increase text comprehension could be discussed while viewing a virtual classroom. The TE could zoom in to view an anchor chart showing sentence prompts for activating prior knowledge, select an accompanying video of the classroom teacher demonstrating a lesson with their students, and maneuver around the virtual classroom to demonstrate how this lesson is part of a larger literacy program. Modeling the use of the virtual classrooms would also allow TCs to understand the various features and use of the technology.

Relevance to Current Experiences. Based on the study's findings, it is evident that both participating groups valued assignments, discussions, and in-class activities that provided opportunities for TCs to use and reflect upon their current literacy teaching experiences. Providing TCs with opportunities to view and analyze a virtual classroom that is the same grade in which they are currently completing a field placement can allow TCs to see how the key literacy components, as outlined by the National Reading Panel (NICHD, 2000), are taught in different contexts. Key literacy components (e.g., phonemic awareness) must be well-understood by elementary teachers so that they have the knowledge-base to deliver high-quality literacy programs. In addition to developing a

strong understanding of literacy concepts and theories, elementary teachers must also know how to put the knowledge to practice (Hammond, 2015).

Analyses of literacy programs across virtual classrooms and field experiences can be prompted by TEs with questions, such as the following:

- How does the teacher foster growth in reading and writing? Or more specifically, vocabulary growth?
- How does the physical space of the classroom encourage reading?
- How does the space foster oral language development?
- How do the physical spaces connect to the key literacy components important at the particular grade level?
- How does the teacher enact the principles of practice?

Prompts such as these can encourage TCs to make meaningful observations across classroom contexts and develop knowledge of core literacy concepts as well as practical how-to knowledge of teaching literacy. TCs can then share their responses as a collective group, comparing their ideas and considering how they might modify lessons or aspects of the environment to develop high-quality literacy programs.

Beyond the Virtual Environment: Creating Relationships. A final implication for preparing TCs to be literacy teachers through the use of virtual tour technology is for TEs to consider creating opportunities for TCs to develop relationships with the literacy teacher. While online contexts do not provide opportunities for developing the same kind of relationships between mentor teachers and TCs as field experiences do, TEs are encouraged to find ways to move beyond the virtual environment. Incorporating question/answer periods into class discussions or connecting with the virtual classroom teachers through blogs or other social media sites could promote collaborative relationships between the TCs and the virtual classroom teachers.

Study Limitations and Future Directions

There are two main limitations to this study that need to be considered when interpreting the findings. Although strategies for establishing trustworthiness were taken, the ability to generalize qualitative findings is limited. Rather than attempting to explain, predict, or generalize to other contexts, this research seeks to provide thorough details about the perceived usefulness of virtual tour technology in TEPs. This qualitative approach provides greater insights into how individuals experienced and perceived a particular phenomenon (Lincoln & Guba, 1985). The results should provide guidelines as opposed to definitive conclusions. Presenting the perspectives of the TEs and TCs provides valuable insights into how these individuals perceived the feasibility and usefulness of virtual tour technology in TEPs. The findings of this study can offer educational stakeholders and TEs across institutions guidelines for incorporating virtual classroom visits into TEPs.

The second limitation of this study is the small sample size of each group of participants (TEs and TCs). While each group of participants provided in-depth qualitative findings, this limitation must be considered when interpreting the results. Future research that considers a larger sample size of both TEs and TCs and uses survey data will contribute to the credibility of the findings.

Additionally, future research could examine the findings related to the second research question. In particular, if a course instructor implemented the suggestions outlined by the participants, a follow-up survey and interview could identify the perceived value of the

approaches. Measures of engagement and literacy knowledge could also be included to determine whether these approaches actually contribute to learning.

Conclusion

The inclusion of virtual classroom tours in literacy education coursework addresses the International Reading Association's (2007) call for field experiences to be closely coordinated with TCs' coursework and has the potential to overcome the challenges faced by TEPs. The study's findings suggest that virtual classroom tours can offer an innovative solution to the brevity of TEPs and field placements and address the disconnect that often exists between research-based strategies that TCs learn about in their coursework and the strategies they observe in their field placements.

In addition, the integration of multimedia in TEPs allows students to be engaged in meaningful learning experiences and ultimately can lead to increases in knowledge about how to best teach reading and writing in the classroom. As previous research indicates, the combination of delivery media, presentation modes, and sensory modalities can greatly enhance learning (Kennedy et al., 2011; Mayer 1997; Moreno & Mayer, 2007). As a multimedia environment, virtual classroom visits in literacy education coursework can provide students with a combination of modalities to access relevant information. An additional advantage of using these multimedia learning environments is that TCs can watch and review aspects of the virtual classrooms and literacy programs multiple times. TCs can also have autonomy over choosing which areas of the environment and hot spots they find interesting and useful as a learning experience.

Virtual classroom visits in TEPs can allow every TC to access a range of grades and classroom environments and enhance their exposure to exemplary educators in conjunction with their literacy courses. TCs who deeply understand research-based strategies for teaching reading and writing and who know how to implement effective practices within the realities of the classroom context will be more likely to feel confident and capable of implementing an effective and enriching literacy program upon entering the teaching profession.

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