Contribution of Research

Digital Literacy Practices and Technology Applications of Former Teacher Candidates: Were They Prepared

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Abstract

This study explored the intersection and disjuncture between digital literacy practices in a teacher preparation program coursework, personal digital literacy use, and applications once in a classroom setting. This research was based on interviews with six in-service teachers about their digital literacies in their first year as a classroom teacher, as a reflection on their teacher preparation program. The findings of this study indicated that teacher preparation programs should provide as much background knowledge of digital literacies and technology applications in teacher candidates' coursework as needed for that program, although some districts adopt their own software and technology. While teacher preparation is important, the findings signified that there was no means to be prepared for it all.

Keywords: Digital literacies, Teacher candidates, Digital tools, K-12 practices, higher education teacher programs

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There is an increasing body of research investigating teacher preparation programs and their introduction of digital literacies within coursework, to provide them ways to enhance their future lessons for their future students. The findings to an approach to literacy and technology in Jacobs' (2006) study indicated a shift in looking at the specifics of technology, to how the activities in using technology are culturally meaningful. Teacher candidates in Herro, Visser, and Quian's (2021) survey associated technology-related theories presented in their coursework, but the practices of technology application in this coursework being deficient. They found the course outlines were not aligned to the advised course policies of faculty's methods and practices (Herro et al., 2021). A technology-framework for teacher candidates needs to be present at the teacher program level, for candidates support in pedagogy and learning (Clausen, 2020).

There is limited degree of research from scholars studying teacher candidates as first or second year inservice teachers on what and how their teacher preparation program prepared them to teach with technology in their future classrooms. In the 2012, Duncan-Howell study, researchers strived to assist college professors (i.e., teacher educators) in preparing their students for digital literacies and fluency and planning in the learning environment. Duncan-Howell (2012) discovered that "expectations have been either largely ignored or have failed to be understood by universities, resulting in a mismatch between student expectations and their experiences" (p. 827). Burnett (2011) argued the need of digital literacies opportunities across all areas of teachers' personal and professional lives, for advancement into investigating and developing pedagogies that make the most of digital literacies and technology advancement in the classroom. Research indicated the necessity of university's teacher preparation program to prepare teacher candidates how to embed digital literacies in their pedagogy and instruction (Archer et. al., 2012, Banister & Vannatta, 2006; Boulton & Hramiak, 2014; Hughes, 2013)

Students of the Net-Generation who were born between 1980 -1996, were the first to grow up with digital media surrounding their every being (Tapscott, 2009) and are subject to defining moments in history that guide their life's view (Nowell, 2012). The Net-Geners, born 1980 – 1996 are also known as Millennials (Pew Research Center, 2018). Moments like the Columbine shootings, September 11th, and the War in Iraq inspired Tapscott (2009) to give them another name, The Echo Boomers (i.e., Net-Gen). These Echo Boomers are "bathed in bits" (p.17), as this researcher described this generation because of the significant change in computers, the Internet, and digital technologies; they literally have the world at their fingertips, the push of a button or screen (2009). Participants (i.e., now in-service teachers) of this study fell into that category of the Net Generation, Millennials, or

Echo Boomers, although the students they taught were Generation Next or "Generation Z" (Tapscott, 2009), making up 40.1 million children who were born in or after 1998 in the United States. The problem existed in the Generation Next digital literacy practices versus the Net-Geners or Millennials. Those students of Generation Next assimilate with technology as another "part of their environment" (p. 18), while learning a new way of communication and information access for adults (i.e., Net Generation) requires new ways of thinking and accommodating modern technology (2009). Teaching courses in higher education and knowing required digital literacies and technology standards, as well as teaching to Generation Next learners, the researcher developed activities where teacher candidates created lesson plans, took notes, and completed coursework activities in digital literacy platforms. They modeled classroom activities using electronic devices in teaching, communication, and classroom presentations. However, even with support from faculty in providing the skills necessary to create lessons with applied digital literacies and technology in the program, did not necessarily provide a connection for these candidates to apply in their first-year classroom.

Purpose of the Study

Archer, Childs, Covaciu, and DeYoung's (2012) mixed methods research discussed how educators teaching today's youth have minimal experience and knowledge of applying necessary technological tools in the workplace and their daily lives. According to Archer et al., (2012) educators regarded this technology invasion as little or no time for preparation in the field of education. They posited that veteran teachers and adults have not grown up in the digital world of the adolescents they teach, therefore leaving a gap in effective implementation of technology in the classroom (Archer et al., 2012).

The purpose of this study was to explore intersection and disjuncture between digital literacies practices of teacher candidates in a teacher preparation program coursework and if those digital practices transferred into their first year as a classroom teacher. The researcher looked at how they connected coursework digital literacies to better understand their strengths of using these literacies in a school setting, applying them to coursework and assignments. Studying the coursework and first-year use of digital literacies of the participants allows educators of higher learning to better understand what digital literacies students were using in and out-of-school, how to incorporate them into coursework, and how they could connect to students in the classroom. Various methods for teacher educators are provided in coursework to apply technology, but programs are limited to one or two stand-alone courses focusing on technology integration (Gronseth, Brush, Ottenbreit-Leftwich, Strycker, Abaci, Easterling, Roman, Shin, & Leusen, 2010). More recent teacher candidates who graduated indicate a lack of implementing technology and practices within their program feel unpaired for the change (Clausen, Borthwick, Rutledge, and Walker, 2023).

The researcher used this collective case study to better comprehend teacher candidates' uptake of digital literacies in their teacher preparation program and to see if and/or how those digital literacies transferred into their first year in a classroom. This data was used to alter and modify any application of digital literacies in coursework in a teacher preparation program. For this study, teacher candidates refer to the participants enrolled in the teacher preparation program and inservice teachers are classroom teachers of record. The question remains: are the teacher candidates in teacher preparation program being prepared for integrating digital literacies and technology applications in their future classrooms and if not, how can those programs prepare for it?

Philosophical Perspective

A philosophical perspective was used to understand how a researcher views the world and allows a researcher to determine the appropriate research paradigm and related methodologies (Creswell & Poth, 2018). The philosophical perspective and research paradigm that guided this study were closely aligned with the social constructivist theories characterized by Berger and Luckmann (1967), comparing social order to that of human interaction. As long as people are persistent in activity and communication, social order will survive (Berger & Luckmann, 1967). This paradigm supported the concept of social activities, based on participants' understanding and uptake of digital literacy application. The researcher selected informants (i.e., criterion cases), endorsing the social constructivists' conception on how interview interpretations are arranged and socially created by interviewers and interviewees (Roulston, 2010), producing interaction. Focus was placed on participants' perceptions of their understanding and uptake of digital literacies (i.e., personal and professional) during and after their teacher preparation program, to better understand their insights of digital literacies in the classroom.

With a social constructivist paradigm, the study focused on the social processes and interactions of former teacher candidates and their digital literacies within their coursework. The researcher sought to understand if the social processes and interactions of digital literacies transferred in the classroom with their lessons and activities. They prepared lessons for their coursework that they could apply to their future classroom instruction. While they were enrolled in their teacher preparation program, they administered these lessons and activities

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embedded with digital literacies to their students in their internship (i.e., field) experiences in surrounding schools. This study was to help connect teacher candidates' lessons applying digital literacies they prepared in their teacher preparation program to their future classroom instruction and activities, meeting the needs of all their students. Along with the professional use of digital literacies, this study was to learn personal use of digital literacies and how they assisted teachers in connecting with their students in the classroom (Burnett, 2011; Cetin , Çalışkan, & Menzi 2012; Joosten, Pasquini, & Harness, 2013; Misirli & Akbulut, 2013).

Practical Framework

Lester (2005) defined a research framework as a structure of ideas on the investigative topic of research. Theoretical, conceptual, and practical frameworks differ in several ways. A theoretical framework guides research in theory that has been observed in relationships, whereas a conceptual framework is an "argument with the concepts chosen for investigation, and any anticipated relationships among them, will be appropriate and useful given the research problem under investigation" (p. 460). Both theoretical and conceptual frameworks are based on research already conducted (Lester, 2005). A practical framework is described as an "accumulated practice knowledge of practitioners" (p. 459) whereby the framework guides the researcher directly involved in the experience, during the experience, towards what is effective (Lester, 2005). This study rests upon the practical framework of the International Society of Technology in Education (ISTE) standards for teacher educators.

Guiding Questions

To complete an analysis of teacher candidates' viewpoint of the preparedness of digital literacy integration in a teacher preparation program and how they integrated these digital literacies in a classroom for their first and/or second year of teaching, the following research questions guided this study:

How do inservice teachers apply digital literacies in their classrooms and teaching after their teacher preparation program?

How do inservice teachers apply digital literacies in their personal lives after their teacher preparation program?

What intersections and disjunctures occur between how inservice teachers personally and professionally apply digital literacies?

Methodology

This study followed Leech and Onwuegbuzie's (2010) 13-step methodological framework for qualitative research. Step 1: Objective for research; Step 2: Develop research study objective; Step 3: Justification for research; Step 4: Ultimate objective of research study; and Step 5: Developing research questions. Descriptions of Steps 6-11 include Step 6: classification of sampling; Step 7: type of qualitative inquiry for the research design; Step 8: data collection process; Step 9: transcript evaluation; Step 10: analysis of data; Step 11: synthesis and analysis of data. Analyzing the course data assisted the researcher in determining criteria for selecting key informants who had been enrolled in the teacher education program where they were employed.

Data Analysis

The criterion to select participants that emerged included (a) former preservice teacher enrolled in one or more of the researcher's courses, (b) former teacher candidates who were using multiple digital literacies in their coursework, and (c) current teachers in their first- or second-year teaching at a Title One school in East Texas. The researcher selected six participants to interview applying questions that regarded their activities using digital literacies and technology in the teacher preparation program, their application of the same practices in their classroom as a first-year teacher, and intersections and disjunctures of personal and professional practices of digital literacies and technology application. The purpose of the study was to understand their perceptions (i.e., self-efficacy) of digital literacy integration in the classrooms. Empowering teachers with the digital literacies and practices necessary for teaching adolescents who have grown up in a digital world guided this collective case study.

Thematic Analysis. Braun and Clarke (2006) described thematic analysis as one qualitative analytic method that is rarely acknowledged, yet often administered in the world of psychology (Boyatzis, 1998; Roulston, 2001). Thematic analysis was also stated as a common qualitative practice in the social sciences (Holstein & Gubrium, 1997). Thematic analysis was characterized by Boyatzis (1998) as an across method's tool, whereas Braun and Clarke (2006) argued thematic analysis "should be considered a method in its own right" (p. 4). Braun and Clarke (2006) set out to provide research of thematic analysis for researchers and teachers of psychology. Thematic analysis is a qualitative method of identifying and reporting patterns (i.e., themes) of selected data (2006). While there are many qualitative analysis techniques that identify themes (i.e., classical content analysis or constant comparison analysis), thematic analysis has a benefit in its flexibility (Braun& Clarke, 2006), with different demonstrations of the method within the large theoretical framework. This flexibility provided me "a rich, detailed, yet complex account of the data (p. 5).

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Social Constructivism. Secondly, essentialism and constructionism are compatible with thematic analysis. Social constructionism was defined as focusing on the creation of understanding between people in a group, within societies, while social constructivism is focused on the individual participants' constructed system of knowing (Papert & Harel, 1991). This research was aligned with the philosophical perspective of social constructivism, focusing on the individuals' perspective of their digital literacies, in which thematic analysis can be applied to the interview for reoccurring themes and concepts embedded in the participants' responses. By applying multiple data analysis techniques and triangulating the outcomes of this qualitative study, the results were more legitimate and trustworthy (Leech & Onwuegbuzie, 2007).

Significance of the Study

The results from this study helped bridge the gap between teacher candidates' perceptions of digital literacies in their personal lives and professional studies in a teacher preparation program, by better understanding their incorporation of digital literacies personally and professionally in their first year as a classroom teacher. Additionally, these findings provided teacher preparation programs the necessary tools for future professional development and digital literacies integration into their course curriculum. The educator section of the ISTE Standards provides a road map to helping students become empowered learners. These standards hope to deepen practice, promote collaboration with peers, challenge traditional approaches and prepare students to drive their own learning. ISTE (2007) posited:

Today's educators must provide a learning environment that takes students beyond the walls of their classrooms and into a world of endless opportunities.…ensuring that digital-age students are empowered to learn, live, and work successfully today and tomorrow (para. 1).

An example of the ISTE Designer standard (i.e., 2.5) indicates that educators should: design authentic, learner-driven activities and environments that recognize and accommodate learner variability. Educators: 2.5a Use technology to create, adapt, and personalize learning experiences that foster independent learning and accommodate learner differences and needs; 2.5b design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning; and 2.5c explore and apply instructional design principles to create innovative digital learning environments that engage and support learning (ISTE, 2007). These standards are implemented throughout the researcher's teacher preparation program in higher education and should be modeled for teacher candidates' future collaboration with lessons, co-teach peers, and future students. One of the participants' practices, in the teacher preparation program, personally, and professionally is provided in the chart below. Following the chart is a discussion of the findings of the case study.

Discussion

Teacher educators have strong beliefs that they can successfully model and support technology integrations and support teacher candidates in their applications of PK12 student learning (Clausen et al., 2023). The participants in the researcher's study reported their teacher preparation programs provided multiple opportunities working with technology and digital practices and felt supported in their efforts to create lessons infused with technology for PK12 classroom settings. These opportunities included accessibility to the devices, practice time with the integration of the devices into lessons, physical practice with devices (i.e., Smart Board and Elmo), and connecting these practices to their personal digital literacies. Candidates indicated more than once the importance of learning as much as they could regarding digital literacies and technology application in their teacher preparation program; however, there was no way to learn everything about technology because of how fast it changes and evolves.

Findings also included what they were utilizing at the district level, as first-year classroom teachers: necessary adaptations, barriers with devices and technology, and what it meant to be 'future' ready. One of the final pieces taken from the study, included the strong impact they felt for including digital literacies and technology application as a mean for students' successful learning and engaging lesson activities, especially since this Generation Z is surrounded with technology. The following patterns emerged from the case studies of the candidates' discussion of their teacher preparation program and the first year in their school districts: accessibility, application, communication, and barriers within the classrooms.

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Table 1
Participant Perceptions of Digital Literacy

Participant 1	**Teacher Preparation Program**	**Personal Application**	**Professional Application**
Technology Tools	• iPhone • Class phone • Cellphone • TI -Nspire • Laptop carts • Computers • Google Drive		• Computer • TI-Nspire • Online Training • Laptop cart • Google Drive • Emails
Online Interactions	• Google Docs • Expectations		• Online sign-up • Testing • Quizzes • Worksheets • TI-Nspire • Videos • Google School • Google Instruct • Communicating • Emails • Report cards
Literacies	• Vocabulary • Defining • Visual • D.L. Implementing	• Communication • Phone calls	• Respond listening • Writing/ implementing • Define • Research
Online Resources	• Google Docs	• Communication	• Google Drive • Online websites • REWIND • Google Classroom
Barriers	• Lack confidence • Grasping digital literacies • Lack of info	• Separating Personal and Professional	• Calculator applications • Student self-paced • Differentiated activities • Technology • Explore time • Student resources at home • Cell phone rules • Teachers' break rules • Student motivation • Computer outage • Students' lack of computer knowledge

Teacher Preparation Program

Accessibility. Instructional contexts of technology being infused throughout a candidate's program of student has been emphasized as essential experiences for success (Buss, Wetzel, Foulger, & Lindsey, 2018; Clausen, 2020; Foulger, Buss, & Su, 2021). The participants reflected on activities, lessons, and practice time in their teacher preparation program, indicating there were opportunities to include digital literacies and technology applications for their future classroom. They discussed the importance of using social media for classroom activities and connections outside the district. Being able to practice these skills in a teacher preparation program, allowed them to apply digital literacies in their own classrooms in multiple ways.

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One of the participants recalled an assignment in their teacher preparation coursework where they completed a vocabulary list individually, a Google Doc assignment for vocabulary instruction then finished simultaneously as a whole group. She reconstructed this same Google Doc assignment to fit her students' lesson on financial literacy. Students researched their financial literacy term, cited definitions from their textbook, and provided a friendly definition, comparable to that in her coursework. The students also provided a visual for their vocabulary term as well. These practices were evident in seeing participants' activities connected to their lessons in their first year as a classroom teacher.

Applications. Sprague, Parsons, and Parker (2020; as cited in Borthwick, Foulger, & Graziano, 2020) posits elements to aid teacher candidates in developing their framework for technology integration in teaching and learning to include scaffolding in coursework. Also, supplementary resources for candidates to experiment and take risks in technology integration with PK12 students in a classroom setting are imperative (Sprague, Parsons, and Parker, 2020). Bell, Maeng, and Binns (2013) studied a preservice teacher program that helped teacher candidates effectively integrate technology into their instruction. The participants in this study alluded to created lessons where technology was modeled with instructional approaches, collaborating with peers, and feedback on their teaching was very important. Brooke would have liked to have experienced teaching with more resources and modeling of different outlets that were available in the teacher preparation program, although she believed herself to be well-prepared for teaching overall. Future research on situated learning theory (i.e., integration of technology into instruction) may provide ways teacher candidates can be prepared for reform-based instruction with integration of technology (Bell et al., 2013).

A participant of the study remembered one of her professors in the teacher preparation courses introducing an online simulation resource she learned as "P.H.E.T" - a non-profit resource for educational, explorable explanations project created at the University of Colorado, Boulder. Jana alluded to some concepts the students cannot see (i.e., the Earth rotating around the Sun); manipulating interesting things were more realistic through the PHET simulations. She recalled her professor modeling and scaffolding these simulations and then compared it to what she needed to know as a first-year teacher. Her district had a lesson plan website to incorporate daily lessons and the structure and inclusion of district happenings, could not really be 'taught' in the teacher preparation program. Jana never learned how to format in spreadsheet programs like Microsoft's Excel, or word processing programs like Microsoft's Word in the TPP. However, she semi-taught herself how to use Google slides, from an assignment in one of her classes.

Communication. Higher education teacher preparation programs should offer teacher candidates early exposure to a real-world classroom experience and a foundation of knowledge about pedagogy and subject matter (Feuer, Floden, Chudowsky, & Ahn, 2013), including things such as social media use. Social media was helpful in increasing the effectiveness of a university's communication to their community (Joosten, Pasquini, & Harness, 2013). Joosten et al., (2013) surveyed administrators, faculty, teachers, students, and staff in a university setting regarding social media utilization. Jana remembered a college class, involving only technology, although she indicated that the course did not seem up to date, because of ever-evolving technology.

This study provided evidence that social media was the greatest communicative platform, over radio, television, etc., to connect the university community in areas of student services and support, business services and operations, and instruction and research and this is an important implication in thinking through how to teach teacher candidates to effective use social media in their own communicative practices. Teachers in this study also deemed social media communication as a better communicative platform in coursework and the classroom. They recalled applying social media accounts such as Twitter and Instagram in their coursework activities and practicing Class Dojo as a communication platform.

Barriers. A study of the perspectives of teacher education identified three factors of faculty technology infusion concerns: faculty beliefs about technology value, confidence in modeling technology applications, and program level support (Clausen, 2021). Establishing instructional contexts of infused technology throughout a whole teacher preparation study was prevalent in Clausen's (2021) study. Faculty in Foulger's (2020) study identified ongoing technical changes, lack of professional development, and disparities between a universities' program and field placement locations as all needed, addressable problems. Foulger (2020; as cited in Borthwick, Foulger, & Graziano, 2020) also determined the importance of immersing technology in a teacher preparation program. These factors were mentioned regarding one participant's lack of knowledge of digital paperwork, after graduation and starting her first year as a teacher. She revealed how districts wanted contracts signed digitally through email, and the lack of knowledge of digital signatures was prevalent. She suggested adding digital paperwork instruction to teacher preparation programs would benefit everyone, especially for any necessary paperwork signatures and trying to find a job.

Erstad (2008) challenged the simplistic understanding of digital literacies to move beyond the skill of technology, moving towards digital literacies as a "set of competencies"

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(p. 198). Digital literacies under the umbrella of Lankshear and Knobel (2008) described launching certain tasks, demonstrations, and performances of skills in a digital environment as being digitally literate. Agility, confidence, and creativity added to this definition, supplements these digital literacies and how students are being digitally literate (Robertson & Lange, 2017). This confidence and program support were lacking with the three of the study's participants' applications of digital literacies in their teacher preparation program. They suggested technology practices were present and they were aware of faculty modeling digital literacy in coursework, but not as much as what they learned on their own for their first-year teaching. All three of these participants were creative and performed tasks in a digital environment (i.e., D2L, discussion boards, journal entries). For example, Amy was unclear exactly how to define digital literacies, therefore did not make any connections that she was using them in the program. However, when describing her activities with the Google Doc financial literacy lesson and how her students were responding, creating, and visualizing in her classroom, she made that connection with her teacher program as creating with digital literacies and applying technology.

Another example of a barrier in the program was the lack of technology courses dedicated to teaching and learning. They mentioned one technology course was sufficient for the basics of learning about pieces of technology information, but technology infusion in all courses would be beneficial for connections in the actual classroom. Perceptions alluded to digital literacies learned in coursework, although they were not clearly developed as digital literacy practical applications. Two participants provided evidence of engaging math lessons with Quizziz, Kahoots, and Pear Deck learned in the program, but felt a disconnect a digital environment in their first year as classroom teachers.

First Year Teaching

Accessibility. The lines between personal and professional connections of digital literacies and technology applications were incomplete when teachers discussed their practices. They all requested more time to do practice within the districts' technology programs, a lack of connection on professional and personal research, and barriers that fell within the district's accessibility or lack of. One of the participants was employed in a district where she had to adapt to the district's technologies and digital literacy methods. Brooke was not using Google Drive or Pear Deck at the time of the interviews. In other words, she was adjusting to her first teaching semester (i.e., lesson plans, students, meetings) and learning the districts' technology practices at the same time. She felt if she studied these programs or applications in teacher preparation program and with personal connections, there would be more time for her to incorporate them within her professional setting – the classroom.

Kristi mentioned her personal use had slowed down since she has started teaching school. Burnett (2011) and Cetin et al., (2012) posited digital literacy practices should be experienced across different areas of teacher candidates' and inservice teachers' lives, both personally and professionally, to make the most of new technology pedagogies of investigation and development. Studying a teacher preparation program and its digital literacy and technology components will help higher education teachers adjust their curriculum to meet the needs of teacher candidates' digital connection with their students in contemporary K-12 classrooms (Burnett, 2011; Cetin et al., 2012). Researchers provided studies that demonstrated the importance of teacher candidates' self-efficacy of computers and preparation to use these and other digital literacy practices in their personal and professional lives (Jacobs, 2006; Joosten et al., 2013, Kim & King, 2011; Lewis & Fabos, 2005; and Marsh, 2006).

Application. Two candidates discussed the use of a district/school Twitter account to promote classroom happenings and activities. However, Brooke's first choice would be to get on Twitter or Facebook for personal reasons versus professional. She did not remember a connection of Twitter, personal and professional, while in coursework or now in present time. They mentioned getting online to shop and research for personal use; however, they stated when they were engaged online, it seemed to be mostly for school, creating engaging lessons and activities for their students. Brooke contrasted her personal and professional digital literacies as separate entities. She corrected herself stating how those do compare to each other, that her personal interactions with digital literacies are connected professionally. She berated herself for wanting to use social media on a more personal level, although she liked how the school displayed their classroom activities and goings on with Twitter. The main goal for all the teachers in this study was to find a balance between professional and personal use, between work and home applications of digital literacies and technology practices.

Participants mentioned how they constantly researched for their classes and student interaction while they were at school (i.e., professionally) and at home (i.e., personally). Sixth graders in Jana's advisory class used the Canvas learning management system for homework. She studied and researched Canvas on many occasions at home. Different grade levels at her school used different means of homework; seventh grade students completed homework online, while sixth grade students still turned in homework on paper. Since many sixth graders did not have personal,

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handheld devices at school, Jana mentioned that paper and pencil were as efficient.

Communication. There are teacher candidates who use technology and digital devices for social media and communication purposes, although not necessarily for classwork in their education courses. Knowing what type of digital literacies are preferred by teacher candidates according to their teaching and learning styles, and then being able to integrate these practices into lesson plans, was communicated in the program so they could effectively use digital literacies to assist them as first year, classroom teachers. These participants recognized the need for a technology break, shutdown, or disconnect intended for their students and their own lives. The inservice teachers stressed the importance of students having a balance of how to 'shut down' or 'decompress.' They questioned if they should be the ones to communicate that 'break' or whether the parents should take on that responsibility. The participants' students responded through face-to-face discussions with Exit Tickets and Google forms and quizzes, some digital, some paper and pen. One participant determined to use as much writing in her class activities as possible, to communicate the need for decompressing from technology.

Other forms of communication included face-to-face platforms for a participant's school district's Parent Teacher Organization (PTO) and Tiger Climate (pseudonym). She described Tiger Climate as parent-led meetings involving community building activities with parents and learners, relating back to what learners were creating in school. Committee meetings and data meetings were also face-to-face, with the candidate's team met regularly with the assistant principal and counselors, discussing weekly data testing scores and learner concerns. While both were face-to-face, they were also videoed and distributed on a district website for parents and teachers who could not attend. Online communication platforms for four teachers in this study included Remind 101, emails, Canvas, and Schoology, all programs they practiced in their teacher preparation program. District websites, TEAM parent portals, text/cell phone calls also provided necessary communication between inservice teachers, learners, and parents at the district level.

Another participant attempted to use a communication tool discussed in her teacher preparation program called Edmodo – in order to connect teachers, students, and parents. She linked many digital literacies and technology tools from her teacher program, like Edmodo and Google Docs; however, she too said there were many different district platforms already in place that she had to use. Kelly reflected teacher instruction, student research, and student presentations as her students' digital literacies practices, although her instruction was the highest application from her teacher preparation.

Barriers. District barriers were talked about by all participants, regarding how to apply the learned digital literacies from their teacher preparation program into their own classroom practices. These barriers included lack of devices per student, lack of training for teachers, and accessibility to the available devices within the district. Kelly and Brooke had online quizzes and discussion boards ready for students for specific class times; however, these students did not have personal iPads or iPad carts in their classrooms, therefore the lessons had to be transferred to paper and pencil. Kelly's district relied heavily on data and assessment. Without having that quick assessment collection in an online manner, it was not as quick a turnaround for Kelly to provide her students' assessment data.

Participants in Miller's (2012) study used mobile tablets to enhance their teaching and learning in the teaching areas of music, communication studies, English, and physical education. The focus was on teacher candidates' perceptions of the learning experience rather than the faculty use and incorporation of technology in the classroom. The research inferred the teacher candidates expressed a clear acceptance of the iPad as learning tools and the perceptions of their own learning experiences as overall positive (Miller, 2012). Although, these participants also had negative comments about digital literacy integration and lack of classroom focus in leu of technology. Future studies should include how to keep the tablets from being a distraction, what to do if they did not work properly, and how to keep focused when using technology (Miller, 2012).

One participant also stressed the importance of decompressing from technology and screens. She was adamant about creating healthy online interactions and connections of technology between school and home. At one point during a student assessment in her class, ten iPads crashed. She felt lucky to have resources and technology support at her school, since she did not feel she had the means to repair devices. She reiterated several times about how lucky she felt with her district's support of technology and providing support staff to assist their needs. Also, the participants who had students with digital devices at their fingertips,reported a lack of concern about how the students treated their devices, which led to maintenance problems. Kristi's school provided every student with a Chromebook. They would check the Chromebooks out at the beginning of each day and return them before going home. This check-out process itself was a distraction for students and teachers, especially if students 'left' their device in previous classes. She also mentioned the disregard and disconnect students had for these

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Chromebooks. They had no accountability factor in the moment, during that day, and would often throw their backpack on the ground or accidentally break the keyboards. There was a damage or loss fee students were responsible for, although that was at the end of the school year. She reiterated a Chromebook cart might be more suitable for each teacher, in their own classroom, so students would not have access to the devices all day at school.

Teachers in Larson's (2012) study were not prepared to teach with devices or given instruction on how to use the device with literacy instruction in their teacher training. These first-year teachers were enrolled in a methods course that used e-books as a driving tool of learning. As these teachers were not trained. This hindered meeting the technological needs of their students in contemporary elementary and secondary classrooms (Larson, 2012; Swan & Hofer, 2011). Teachers in this study felt prepared to use technology devices in their classrooms; however, the time restraint on being able to practice with the tools and apply them to their lessons, demonstrated a barrier across the board.

One participant of the study encouraged student technology engagement, as well as downtime. She recalled Google Classroom that some teachers used on her campus. Kelly mentioned online assignments and activities were something she was proficient in at the onset of the teacher preparation program. However, learning how to use and operate the websites that were introduced posed a challenge in her own classroom application. Her preference would be to incorporate technology more, although the lack of tools in her school, hindered that. She mentioned teacher preparation programs with more instruction essentially applying technology could be beneficial to all educators. During the interviews with former teacher candidates (i.e., now inservice teachers), there were many discussions about technology tools and how limited access can preclude the best laid plans due to the lack of technology, if iPads or Chromebooks were not available. The results from this study warranted that higher education teachers provide multiple lessons in coursework that stress the use of integrating technological practices and adaptations into instruction, regardless of the technology tool available.

Future Preparations

Being Ready

One objective in common with all the teachers was to be future ready. They realized there was no way to prepare for all activities and technology tools for their future classrooms; however, they found a balance on how to be ready for the future with digital literacies and technologies in the classroom, as well as time to be away from technology. They felt it necessary to be ready for what the district provides, set expectations for their students early, provide time for class time practice, and enlist downtime within the technology realm. The primary suggestion was to set expectations with technology and prepare as much as you can before school starts (i.e., summer, spring break, holidays). The participants were adamant about bringing specialists in to help with technology issues and assistance. Training was a necessity to keep up with the changing technology and district requirements, in addition to engaging with district issued tools and apps that are free.

Applications. In the cases of these participants, three adopted strong applications of digital literacies in their classroom as the teacher, as well as incorporating student inclusion of digital literacies with online resources, interactions, and technology tools. Their use of technology platforms (i.e., hand-held devices), the software that ran it (i.e., district adaptions), and the interface (i.e., application that one sees) were addressed by these participants as teacher candidates in their teacher preparation programs and inservice teachers in their classrooms (Eshet-Alkali& Amichai-Hamburger, 2004). These inservice teachers used information and communication technologies to create outstanding lessons where students evaluated and communicated information to the teacher and their peers. When one teacher described her activities and online interactions, she had a grasp on what digital literacies were, even though she perceived them more as using technology tools, or lack of them, when creating her math lessons. Her students answered quizzes and discussions online, which by definition, are digital literacies.

Devices. Study participants stated by seventh and eighth grade, most of the students had a personal device at school, thus, online homework for 'turn-it-in' worked. (www.TurnItIn.com is an American internet-based plagiarism detection service). Kelly mentioned she used social media as a personal practice to wind down when she got home, although admitted she tried to pull back some and disengage technologically. She scrolled through Facebook and when researching at home, if popups occurred, she used Google to look it up. Kelly researched things for her classroom on Teachers Pay Teachers (https://www.teacherspayteachers.com/) for math activities, stating how hard it was to keep students interested in math. She read teacher blogs to see what new behavior management trick was working in other teachers' classrooms and searched social media sites (i.e., Instagram) to establish what functional classroom activities might also work in her classroom. She noted, "Research is constant for me; I cannot turn it off"; adamant that she was unable to stop planning for her classes. Even looking at it personally, it turned into professional research for her.

Google Classroom was where Kristi's students turned in everything and where all district information was stored -

lesson plans, homeroom information, PowerPoints from the counselors, and AVID (Advanced Via Individual Determination) activities. This was like her online platform in the teacher preparation program; however, she did not recall PowerPoints shared by all of her professors. "That would have been an easy way for me to study and prepare, if all teachers provided their copy of PowerPoints," Kristi mentioned. She rephrased that statement, mentioning if notes were that easy to get, she might not have studied as hard, which she said was probably true of her own students as well. A disjuncture she recalled was classroom management preparedness. Kristi did not recollect much classroom management training throughout her teacher preparation program, and she struggled in this area.

Implications for Practice

Teacher Educators

After the case study, the researcher determined implications to apply in the teacher preparation program. These included alternatives to pedagogy and instruction in coursework. Setting early, clear expectations of the days, weeks, and course assignments to be implemented. A final application for practice in a teacher preparation program was the significance of 'opting out' of technology use, giving a choice of utilizing technology or finding other ways to deliver the lessons' activities.

Alternative Assignments. One assignment was to add a section in already created lesson plans on implementing intake of technology. Participants suggested providing small changes and options with technology, instead of presenting technology apps and tools all at once, in one segment. They also reminded the researchers that technology changes very quickly, so their lessons should be adapted to the technology available. If there was an opportunity to learn where these teacher candidates might be teaching (i.e., district, school, etc.), the researcher could research their districts' technology applications and tools for their future. This would provide them time to look up their districts' technology and use, regarding lesson planning, adopted apps, and device initiatives.

The researcher introduced a new assignment for coursework for teacher candidates to research their 'future' district, as a result from this study. Although teacher candidates might not know exactly what district they want to teach in, they might have an idea about the area they want to live. The 'District App Assignment' required them to research districts' adapted software, technology apps, instructional coaches, and online communication platforms, where they could be potentially housed as first year teachers. Once they did their research, the assignment continued for teacher candidates to view a lesson plan already created, highlighting any digital literacies (i.e., intersection of technology and literacy; (Heitin, 2013) practices with the strategies and activities already in place. If digital literacies were not present in the lesson plan as is, candidates added three to five areas where they could place those intersections of technology and literacy.

Opting out. Lastly, providing teacher candidates and inservice teachers ways to consider options excluding technology, was found as important in future teacher preparation coursework following this study. Some teacher candidates felt "bogged" down in their teacher preparation coursework, trying to match right digital resource to their lesson plans. Betsy used an example of making at 30-second video on math integers and concepts. She already knew she was going to introduce integers and math concepts (i.e., organization and delivery), she added a 30-second video on IPads involving math integers and concepts (i.e., digital literacy and technology application) for students to view upon entry into her classroom. This is how the researcher adjusted teaching, referring to examples like hers. Teacher candidates and inservice teachers need to create a structure for their lessons, starting with organization and delivery, then figure out what technology and digital literacies to apply to make their activities become lessons where different generations can connect.

Conclusion

This collective case study was organized case by case, with sections combining all the cases for cross-case analysis (Johnson & Christensen, 2014). The researcher reconstructed the teacher candidates' portrayal of digital literacies within their teacher preparation programs and their classrooms as first-year teachers. Many factors influenced if teachers' lessons and activities for their classrooms were successful. Surviving because of support groups, sharing with fellow teachers, and lessening distractions of technology in and out of the classroom, were some of these factors. State and district technology policies and procedures limit teacher's technology applications and requirements in the K-12 schools. Many participants felt overwhelmed at the district rules and responsibilities, (excluding technology) and therefore relied on veteran teachers for learning about technology in the classroom. Accessibility, convenience, and connections regarding digital literacies and technology should be applied by teacher candidates and inservice teachers in their classrooms. The researcher provided discussions, and implications of future research derived from the data in this study. Research implications and ideas for future research are also addressed.

After completing this study, the researcher decided that different research questions could make this study stronger, therefore altered the research questions two and three to strengthen future studies of digital literacies of teacher candidates and inservice teachers. When conducting

Infusing technology in an already intensified curriculum still provides challenges for teacher preparation programs (Clausen et al., 2022). The question remains, how can teacher preparation programs provide more support to their teacher candidates in the areas of applying digital literacies and technology to their classwork and connecting it to their future classrooms? Generation Z's have technology surrounding their whole world, a generation with significant change in computers, the Internet, and digital technologies; they literally have the world at their fingertips with the push of a button or screen (Tapscott, 2009). This challenge is to assist teacher candidates to be prepared for all things technology - is there a way to assist teacher candidates to be prepared for it all?

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